

WARTA GEOLOGI



GEOLOGICAL SOCIETY OF MALAYSIA
PERSATUAN GEOLOGI MALAYSIA

Jilid 48
No. 2

August
2022

Volume 48
No. 2

ISSN 0126 - 5539; e-ISSN 2682 - 7549

PP2509/07/2013(032786) RM 80.00



PERSATUAN GEOLOGI MALAYSIA
Geological Society of Malaysia

Council 2022/2023

President :	Ahmad Nizam Hasan
Vice President :	Mohd Hariri Arifin
Secretary :	Farah Fazulah Abdullah
Assistant Secretary :	Norazianti Asmari
Treasurer :	Lim Choun Sian
Editor :	Wan Hasiah Abdullah
Immediate Past President :	Abd Rasid Jaapar
Councillors :	Abdul Halim Abdul Latiff Abdull Halim bin Abdul Ahmad Zulqurnain bin Ghazali Amie Norsyazan Amir Joy Jacqueline Pereira Nor Shahidah bt. Mohd. Nazer Nur Iskandar Taib Tan Boon Kong

The Geological Society of Malaysia (GSM) was founded in 1967 with the aim of promoting the advancement of geoscience, particularly in Malaysia and Southeast Asia. The Society has a membership of about 700 geoscientists based in Malaysia as well as abroad.

Warta Geologi is published three times yearly (April, August, December) by the Society. Warta Geologi publishes peer-reviewed short geological communications and original research on Earth Science. The scope includes local and regional geology, conservation geology, economic geology, engineering geology, environmental geology, geochemistry, geomorphology, geophysics, hydrogeology, palaeontology, petroleum geology, sedimentology, stratigraphy, structural geology and tectonics. Warta Geologi also reports on activities and news about GSM and the geoscience community in Malaysia.

Warta Geologi is distributed free-of-charge to members of the Society and is available free online through the Society's website: www.gsm.org.my.

GSM is committed to upholding standards of ethical behaviour at all stages of the publication process and we recommend the Committee on Publication Ethics (COPE) Best Practice Guidelines (<http://publicationethics.org/resources/guidelines>).

All articles published by Warta Geologi are licensed under the Creative Commons Attribution 4.0 International License. No fee is imposed on authors for publishing in the journal.

Further information can be obtained from:

The Editor,
Geological Society of Malaysia,
c/o Department of Geology, University of Malaya,
50603 Kuala Lumpur, Malaysia
Tel: 603-79577036 Fax: 603-79563900
Email: geologicalsociety@gmail.com

Warta Geologi

Editor

Wan Hasiah Abdullah

Geological Society of Malaysia, Malaysia

Assistant Editors

Baba Musta

Universiti Malaysia Sabah, Malaysia

Meor Hakif Amir Hassan

University of Malaya, Malaysia

Mohammed Hail Hakimi

Taiz University, Yemen

Editorial Board

Alfredo Lagmay

University of the Philippines, the Philippines

Azman A. Ghani

University of Malaya, Malaysia

Felix Tongkul

Universiti Malaysia Sabah, Malaysia

Harry Doust

Vrije Universiteit Amsterdam, The Netherlands

Ian Metcalfe

University of New England, Australia

Ibrahim Komoo

Universiti Kebangsaan Malaysia, Malaysia

Joy J. Pereira

Universiti Kebangsaan Malaysia, Malaysia

Ng Tham Fatt

University of Malaya, Malaysia

Peter R. Parham

Universiti Teknologi Malaysia, Malaysia

Rajib Shaw

Keio University, Japan

Robert Hall

University of London, UK

Editorial Management Committee

Lim Choun Sian, Mazlan Madon, Muhammad Hatta Roselee,
Elvaene James, Anna Lee, Wan Aida Wan Zahari

Copyright:

Copyright 2022 by the Authors.

Licensee Geological Society of Malaysia.

The articles in the journal are open access articles distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) License 4.0.

Characterizing a weathering profile over serpentinite in the Senaling area, Negeri Sembilan Darul Khusus

JOHN KUNA RAJ

No. 83, Jalan Burhanuddin Helmi 2, Taman Tun Dr. Ismail, 60000 Kuala Lumpur, Malaysia
Email address: jkr.ttdi.tmc@gmail.com

Abstract: Three broad morphological zones can be differentiated; the top, 2.5 m thick, pedological soil comprising IA and IB sub-zones of brown, soft clays, and IC1 and IC2 sub-zones of reddish brown, stiff silty clays with lateritic concretions and lateritized core stones. The intermediate, 1.5 m thick, saprock zone consists of brown, stiff, silty clays with indistinct relict fault planes and core-stones, whilst the bottom bedrock zone consists of serpentinite with effects of weathering along discontinuity planes. Constant volume samples show the earth materials to be rather loose with dry unit weights of 10.32 to 16.28 kN/m³ and porosities of 39 to 60%. Particle size distributions are variable with depth; silt contents decreasing from 38 to 58% in saprock to 28 to 44% in the pedological soil zone. Increasing fine clay (<2 µm) contents up the profile from 34 to 43% in saprock to 40 to 51% in sub-zones IA and IB indicate that pedological processes result in continued disintegration of weathered serpentinite. Plastic and liquid limits have limited variation ranging from 24 to 33%, and from 36 to 50%, respectively. Weathered rims around core-stones show alteration of serpentinite to start with the opening-up of grain boundaries and formation of micro-cracks (Stage 1) followed by staining along chrysotile veinlets (Stage 2). More extensive staining then occurs with decomposition (to clay minerals) of most antigorite and chrysotile grains (Stage 3) and ending with formation of a brown, stiff silty clay (Stage 4). Increasing stages of weathering are marked by decreasing dry unit weights and uniaxial compressive strengths, but increasing apparent porosities. It is concluded that in situ alteration of serpentinite through lowering of an unconfined groundwater table has led to development of the weathering profile.

Keywords: Serpentinite, weathering profile, pedological soil, saprock, groundwater lowering

INTRODUCTION

Deep weathering profiles are found in Peninsular Malaysia as a result of favorable tectonic and environmental settings that have facilitated prolonged and pervasive chemical weathering throughout most of the Cenozoic Era (Raj, 2009). The earth materials of these profiles are known as 'residual soils' in geotechnical literature and said to have characteristics that are quite different from those of 'transported or sedimentary soils' (Wesley, 2009). It has also been said that many present-day concepts in soil mechanics may or may not be relevant to 'residual soils' as the concepts were developed through the study of remoulded sedimentary soils with an emphasis on stress history and separation into normally consolidated, and over-consolidated, soils (Wesley, 2009).

There is very limited published data on the geotechnical properties of earth materials in weathering profiles over basic and ultrabasic igneous bedrock in Malaysia. A study of three deep weathering profiles over basalt, granite and schist (with depths to bedrock of 16, 27 and 10 m, respectively) furthermore, has shown that they

have rather similar physico-chemical properties despite differences in parent material (Hamdan & Burnham, 1996). It was thus concluded that the rain forests of Peninsular Malaysia over old, deeply weathered soils, had 'closed' nutrient cycling systems where the cationic nutrients are in equilibrium with the main input from the atmosphere; there being negligible contribution of nutrients from weathering of bedrock material. That older soils on a wide range of parent materials tend to be very similar chemically, explains why similar forest growth is found over different geological substrata in Malaysia (Hamdan & Burnham, 1997).

Physico-chemical analyses of 12 soil samples over serpentinite in the Kuala Pilah area showed them to have large clay (21 to 72%), but variable silt (7 to 69%), and low sand and gravel (<10%), contents (Tan & Eng, 2004). The specific gravity of soil particles was relatively large (2.77 to 3.65) due to the presence of iron oxides, whilst liquid limits exceeded 50% and the plasticity index between 6% and 48%. The soils had large natural moisture contents (26 to 69%) due to the large clay contents that allowed high

adsorption or retention of soil moisture. Chemical analyses of pore fluids showed them to be slightly acidic (pH 5.2 to 5.8) with low conductivities (-0.02 to 0.20 millisiemens/cm) that reflected low dissolved cations due to continuous leaching by percolating water (Tan & Eng, 2004).

In view of the scarce study of “serpentinite formations”, Mahsa Tashakor *et al.* (2014) investigated the geochemistry of serpentinite soils from four outcrops in Peninsular Malaysia at Bukit Rokan and Petasih in Negeri Sembilan, and at Cheroh and Bukit Malim in Pahang. Geochemical analyses of 15 superficial weathered samples indicated that they were depleted in silica and essential plant nutrients (as calcium, potassium and phosphorus), but remarkably rich in chromium, nickel and cobalt. It was thus concluded that serpentinite derived soils were non-conductive environments for fauna and flora (Mahsa Tashakor *et al.*, 2014).

At a weathering profile over the Kuantan Basalt, three broad morphological zones were differentiated, i.e. an upper, 3.60 m thick pedological soil, an intermediate, 1.12 m thick, saprock and a lower bedrock of vesicular olivine basalt (Raj, 2021). Clay and silt contents increased up the profile with a corresponding decrease in sand and gravel contents; colloid contents in particular increasing from 10 to 15% in saprock through 30 to 40% in saprolite and exceeding 57% in solum. Thin-sections of weathered rims showed alteration of the basalt to start with the formation of micro-cracks (Stage 1) followed by their staining and decomposition of olivine crystals (Stage 2) and then the decomposition of augite (Stage 3), and plagioclase feldspar (Stage 4), crystals. An increase in apparent porosity, but decrease in unit weights and specific gravity, reflected these stages of weathering; the boundary between ‘rock’ and ‘soil’ material occurring when all olivine and augite crystals had decomposed (Stage 4). The study concluded that the weathering profile resulted from in situ alteration of basalt due to lowering of an unconfined groundwater table; pedological processes giving rise to further alteration (Raj, 2021).

In the course of a study on the characterization of weathering profiles in Peninsular Malaysia was investigated a profile developed over serpentinite in the Senaling area of Negeri Sembilan Darul Khusus (Raj, 1983). In this article is discussed the characterization of the profile based on the field differentiation of weathering zones and sub-zones and laboratory determination of their physical and soil index properties. Weathering of the bedrock is also discussed and is based on the study of thin-sections and slices of weathered rims around core stones. Effects of weathering are here discussed in terms of changes in physical and soil index properties of the weathered materials rather than chemical parameters in view of the continuous leaching that has occurred at weathering profiles in the Peninsula (Hamdan & Burnham, 1996; Tan & Eng, 2004).

GEOLOGICAL SETTING OF WEATHERING PROFILE

Several small bodies of ultrabasic igneous rock are found in Peninsular Malaysia and largely outcrop as elongated, elliptical shaped bodies on the eastern flanks of the north-south trending Main Range. These mainly serpentinite bodies have an average width of 1 km and are everywhere characterized by shallow, clayey surface soils that are mapped as the Sungai Mas Soil Series by the Malaysian Soil Survey Department (Law, 1967).

The investigated weathering profile was exposed during excavation works for widening of the road shoulder along the Kuala Pilah - Tampin trunk road, some 4 km to the south of Senaling village in Negeri Sembilan Darul Khusus (Figure 1). The exposed bedrock (Figure 2) is a strongly jointed and sheared serpentinite which occurs as an elliptical shaped intrusive body within pre-Lower Permian quartz-mica schists (Khoo, 1974). A number of

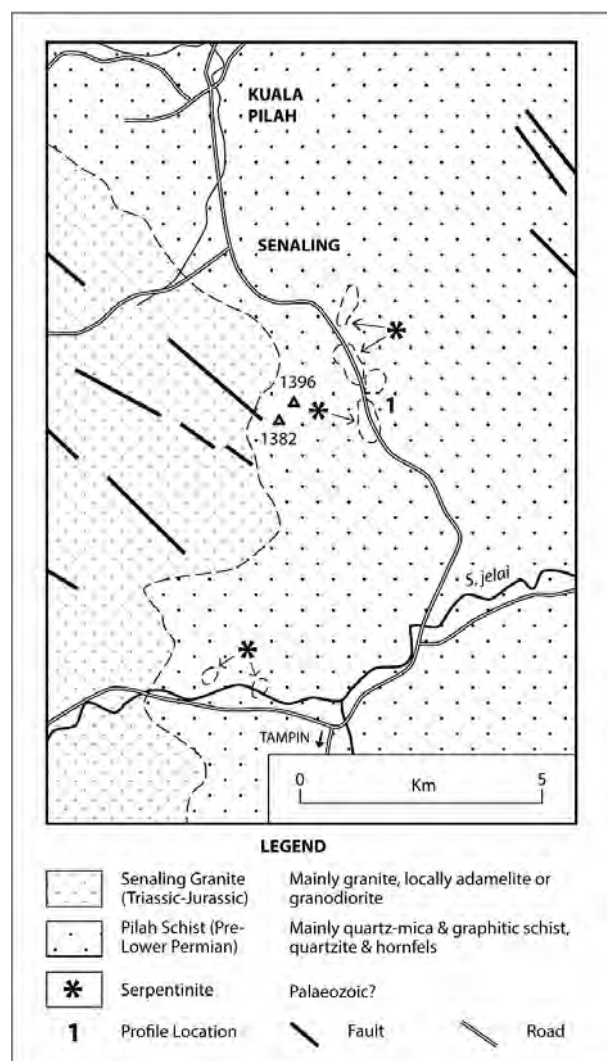


Figure 1: Geology map of the Senaling area, Negeri Sembilan Darul Khusus (Khoo, 1974).



Figure 2: View of exposed weathering profile.

other smaller and similar shaped, serpentinite bodies are exposed at nearby sites and all show shallow, weathering profiles. The origin of the serpentinites is uncertain though they are usually believed to result from the alteration of basic or ultra-basic flows that were probably inter-bedded with the pre-metamorphosed sediments of the schists (Wilbourn, 1933).

In hand specimens, the serpentinite shows various colours ranging from pale green through greenish grey to black and is cut by numerous criss-crossing veinlets of yellowish green chrysotile. In thin-sections, the rock is seen to be mainly made up of anhedral antigorite crystals with lesser chrysotile crystals occurring as criss-crossing veinlets. Dark opaque iron oxide and chromite grains are also seen in accessory amounts with some zeolite, calcite and phlogopite crystals. Obscure relicts of olivine and pyroxene occurring as ooid areas of completely serpentinized minerals have also been reported (Mutalib, 1973).

METHODOLOGY

The exposed earth materials were first described in the field in terms of the Soil Survey Manual for Malayan Conditions (Leamy & Panton, 1966); the pedological features described including colour, consistence, soil structure and texture as well as the content of concretions and organic matter. Geological features were also described, in particular, the textures and structures of the original serpentinite bedrock now indistinctly to distinctly preserved in the weathering profile. Lateral similarity in the pedological and geological features was then used to differentiate weathering zones and sub-zones.

In order to better describe the earth materials present, constant volume samples were then collected at various depths (Figure 3) to determine their physical and soil index properties (samples S1 to S15). Brass tubes of 4 cm length and 7.6 cm internal diameter were used for sample collection; the tubes having a constant wall thickness of 0.3 cm except at one end where the lower half tapered to 0.15 cm thick to provide a cutting edge. Prior to sampling,

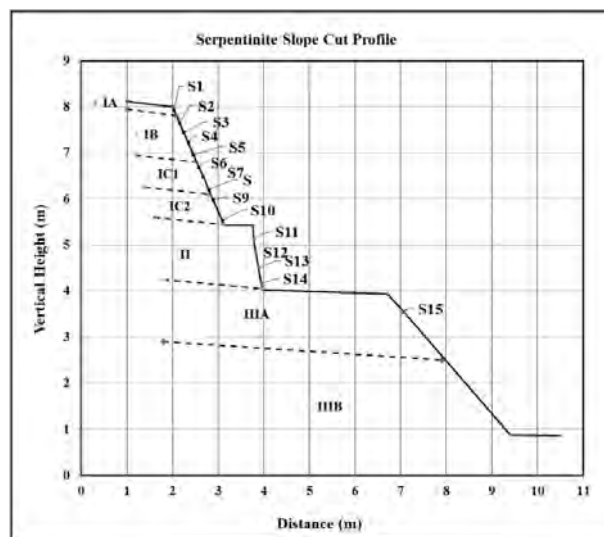


Figure 3: Slope profile and sample locations.

the tubes were externally greased to facilitate entry into the soil while the surface materials were cleared to a depth of 0.3 m to minimize surface influences.

The sampling tubes were sealed and taken to the laboratory where their moisture contents, unit weights and densities were determined before the specific gravity of constituent mineral grains was measured using a pycnometer (ASTM, 1970). Porosities, void ratios and degrees of saturation of the samples were then calculated before the plastic and liquid limits of the fine fractions (<0.42 mm size) were determined (ASTM, 1970). Particle size distributions of the samples were next determined using the sieving, and sedimentation, methods for the coarse (>0.0625 mm diameter), and fine (<0.0625 mm diameter), grained fractions, respectively (ASTM, 1970). The main minerals present in the gravel, sand and silt sized fractions were identified with the aid of a binocular microscope, whilst X-ray diffractograms of the clay fractions were prepared under normal, glycolated, and 500°C heated, conditions to determine the minerals present (Raj, 1983).

Several core-stones were also collected and diamond-sawn into slabs of variable thickness. The weathered rims of the slabs were then studied with a hand lens to identify differences in visible features as staining, colour, texture and the appearance of mineral grains. Thin-sections of the weathered rims were also studied with a petrological microscope to identify changes in texture and mineralogy. Variations in the visible features as well as textural and mineralogical changes were then used to define generalized stages of weathering of the serpentinite bedrock.

Small tetrahedral blocks of the different stages of weathering were then sawn-out from the slabs (samples A1 to A25) and their unit weights, densities and apparent porosities determined by the saturation and buoyancy

method (ISRM, 1979). The specific gravity of the constituent mineral grains of the different blocks was also determined with the use of a pycnometer (ASTM, 1970). Several tetrahedral blocks (samples B1 to B24) were also loaded to failure in a compression load frame following standard procedure in order to determine uniaxial compressive strengths (ISRM, 1981).

RESULTS

Weathering zones and sub-zones

Differences in pedological and geological features allow differentiation of three broad weathering zones, i.e. an upper pedological soil (zone I), an intermediate saprock (zone II), and the lower bedrock (zone III) (Table 1).

The pedological soil is 2.5 m thick and can be separated into IA and IB sub-zones (solum) as well as the IC sub-zone (saprolite) (Table 1). The solum consists of brown to yellowish brown, soft clays with many plant roots, whilst the saprolite consists of reddish brown, stiff silty clays with lateritic concretions and lateritized core-stones. Variable amounts of lateritic concretions allow distinction of upper IC1, and lower IC2, sub-zones (Table 1).

The saprock is 1.5 m thick and consists of brown, stiff silty clays that in their lower part contain serpentinite core-stones and indistinct to distinct, relict fault planes. The bedrock zone is a continuous outcrop of serpentinite and can be separated into an upper sub-zone (IIIA) with effects of weathering along and between joint planes, and a lower sub-zone (IIIB) with effects of weathering only along joint planes (Figure 4).

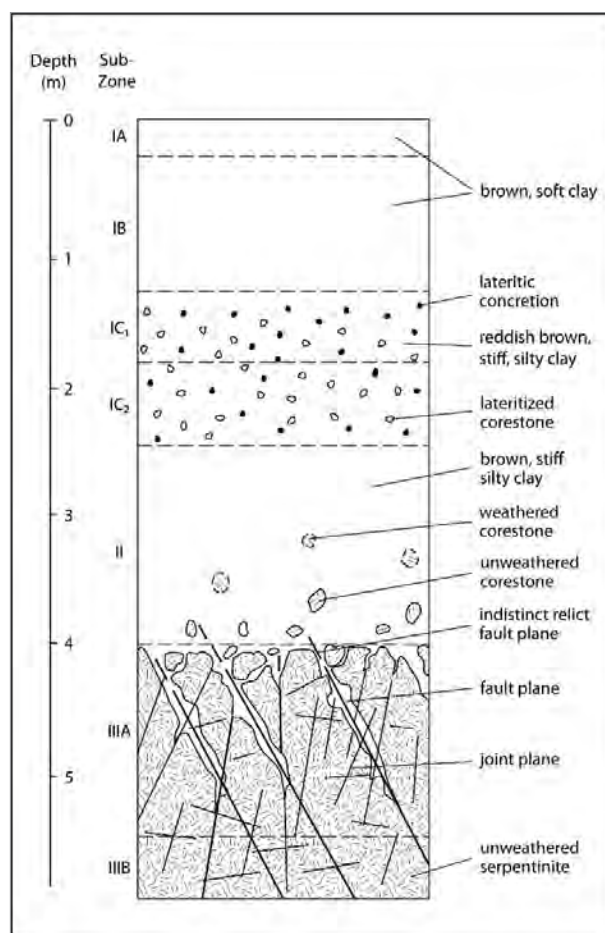


Figure 4: Schematic sketch of morphological features in the weathering profile.

Table 1: Field descriptions of weathering zones and sub-zones.

Zone & Sub-zone	Vertical Depth (m)	Field Description
IA	0.0 - 0.2	Brown (10YR4/3), soft clay; sub-angular blocky moist; friable dry; many roots; boundary wavy, clear.
IB	0.2 - 1.2	Dark yellowish brown (10YR4/4), soft clay; sub-angular blocky moist; friable dry; porous; many roots; boundary irregular, gradual.
IC1	1.2 - 1.9	Reddish brown (5YR4/3), stiff, silty clay; sub-angular blocky moist; friable dry; few roots; many angular lateritized core-stones & lateritic concretions; boundary irregular, gradual.
IC2	1.9 - 2.5	Reddish brown (5YR4/4), stiff, silty clay; sub-angular blocky moist; friable dry; abundant lateritized core-stones & lesser, lateritic concretions; boundary irregular, gradual.
II (Saprock)	2.5 - 4.0	Brown (7.5YR4/4), stiff, silty clay; friable dry; some partly altered core-stones; fresh core-boulders & indistinct to distinct relict fracture planes in lower part of zone; boundary irregular, diffuse
IIIA (Bedrock)	4.0 - 5.5	Continuous outcrop of serpentinite with weathering effects (staining & alteration to silty clay) along & between joint & fault planes; boundary irregular, diffuse.
IIIB (Bedrock)	>5.5	Continuous outcrop of serpentinite with weathering effects (staining & alteration to silty clay) along joint & fault planes.

Physical properties of earth materials in the weathering profile

Constant volume samples show the earth materials to be rather loose; sub-zones IA and IB with dry unit weights of 10.32 to 11.95 kN/m³, sub-zones IC1 and IC2 with values of 11.17 to 14.12 kN/m³, and saprock (zone II) with values of 13.66 to 16.28, kN/m³ (Table 2). Values of dry density mirror those of dry unit weight; sub-zones IA and IB with values of 1,052 to 1,218 kg/m³, sub-zones IC1 and IC2 with values of 1,139 to 1,439 kg/m³, and saprock with values of 1,392 to 1,660 kg/m³ (Table 2). Minimum values of dry unit weight and density in sub-zone IA, but maximum values in saprock indicate a general decrease in compactness of the earth materials up the weathering profile.

The specific gravity of soil particles is quite variable; sub-zones IA and IB with values of 2.58 to 2.65, and sub-zones IC1 and IC2 and upper saprock with values of 2.65 to 2.75 due to the many lateritic concretions present (Table 2). The specific gravity of soil particles from lower saprock and sub-zone IIIA is also relatively large from 2.75 to 2.85 due to the iron oxide and chromite grains present.

Porosities are relatively large; sub-zones IA and IB with values exceeding 50%, whilst sub-zones IC1 and IC2 and upper saprock have values of 39 to 50% (Table 2). Porosities of lower saprock and sub-zone IIIA are also relatively large and exceed 45%. Void ratios reflect the large porosities with sub-zones IA and IB as well as IIIA having ratios exceeding 1.13, whilst sub-zones IC1 and IC2 and zone II have void ratios of 0.63 to 1.01 (Table 2).

Field moisture contents are variable but increase with depth; the pedological soil zone with contents of 25.3 to 28.7%, whilst the saprock and sub-zone IIIA have contents of 20.5 to 43.7% (Table 2). Degrees of saturation distinctly increase with depth; the pedological soil zone with 51 to 81%, upper saprock with 88 to 90%, and lower saprock and sub-zone IIIA with values exceeding 99% (Table 2). Increasing degrees of saturation with depth thus indicate the presence of an unconfined groundwater table in the bedrock zone.

Soil index properties of earth materials in the weathering profile

Particle size distributions are variable with depth, though gravel contents are extremely low (<1%) except for one sub-zone IC1 sample with 3.5% due to the presence of many lateritic concretions. Sand contents are more variable; the solum and saprock with 5 to 24%, and the saprolite with 9 to 30%. Silt contents are of limited variability from 28 to 44% in the pedological soil, and from 38 to 58% in saprock and sub-zone IIIA (Table 3).

Total clay contents are distinctly variable; the solum with contents exceeding 45%, whilst the saprolite has contents of 26 to 49%, and the saprock and sub-zone IIIA with contents of 32 to 50%. Fine clay (<2 µm size) contents generally increase up the profile, with 34 to 43% in saprock and sub-zone IIIA, but 16 to 45% in saprolite, and 40 to 51% in solum. Colloid (<1 µm size) contents also generally increase up the profile with 30 to 39% in saprock and sub-zone IIIA, but 12 to 40% in saprolite, and 36 to 50% in solum (Table 3). Increasing

Table 2: Physical properties of earth materials in the weathering profile.

Sample No.	Sub-zone	Depth (m)	Dry Unit Weight (kN/m ³)	Dry Density (kg/m ³)	Specific Gravity Particle	Porosity (%)	Void Ratio	Water Content (%)	Degree Saturate (%)
S1	IA	0.08	10.32	1,052	2.60	60	1.47	28.7	51
S2	IB	0.36	11.28	1,150	2.61	56	1.27	27.9	57
S3	IB	0.56	11.79	1,202	2.58	53	1.15	27.8	63
S4	IB	0.78	11.62	1,185	2.65	55	1.24	27.6	59
S5	IB	1.04	11.95	1,218	2.65	54	1.18	25.3	57
S6	IC1	1.31	11.17	1,139	2.65	57	1.33	25.9	52
S7	IC1	1.53	14.07	1,434	2.70	47	0.88	25.4	78
S8	IC1	1.80	14.12	1,439	2.72	47	0.89	26.5	81
S9	IC2	2.02	13.33	1,359	2.70	50	0.99	25.4	70
S10	IC2	2.47	13.16	1,341	2.70	50	1.01	26.4	70
S11	II	2.87	16.09	1,640	2.75	40	0.68	22.2	90
S12	II	3.15	16.28	1,660	2.70	39	0.63	20.5	88
S13	II	3.49	15.20	1,549	2.82	45	0.82	28.7	99
S14	II	3.83	13.66	1,392	2.75	49	0.98	35.0	99
S15	IIIA	4.45	12.48	1,272	2.85	55	1.24	43.7	100

Table 3: Index properties of earth materials in the weathering profile.

Sample No.	Sub-zone	Gravel (%)	Sand (%)	Silt (%)	Total Clay (%)	Plastic Limit (%)	Liquid Limit (%)	Fine Clay (<2 µm) (%)	Colloids (<1µm) (%)
S1	IA	0.0	19	28	53	24	36	51	50
S2	IB	0.1	5	48	47	26	36	43	39
S3	IB	0.0	21	32	47	27	43	43	38
S4	IB	0.4	9	43	48	28	43	43	38
S5	IB	0.0	21	34	45	27	47	40	36
S6	IC1	3.5	12	40	44	30	47	39	34
S7	IC1	0.0	19	33	48	29	50	43	40
S8	IC1	0.1	9	42	49	28	47	45	39
S9	IC2	0.0	30	44	26	30	47	24	21
S10	IC2	0.0	20	34	46	31	Ind	16	12
S11	II	0.8	10	39	50	33	Ind	38	33
S12	II	0.0	24	38	38	27	43	43	39
S13	II	0.1	9	50	41	27	43	34	30
S14	II	0.0	10	58	32	31	47	39	34
S15	IIIA	0.0	8	49	43	33	52	40	32

Note: Ind means indeterminate

fine clay and colloid contents up the profile, especially within the pedological soil (zone I), clearly point to the role of pedological processes in continued disintegration of completely weathered bedrock.

Plastic limits are of limited variation within the profile; the pedological soils with values of 24 to 31%, and saprock and sub-zone IIIA with values of 27 to 33% (Table 3). Liquid limits show some variation; the solum with values between 36 and 47%, whilst the solum and saprock have values between 43 and 50% (Table 3). In view of these results, the earth materials at the weathering profile can be classified as inorganic silts and clays of low plasticity in terms of the Unified Soil Classification System (Wagner, 1957).

X-ray diffractograms

X-ray diffractograms show broad and low reflection peaks as a result of high background values that reflect the large content of colloids present (Figure 5). Kaolinite-smectite mixed layer clay minerals are interpreted to be present in view of the narrow, symmetrical peaks at $12.30^\circ 2\theta$ (7.20 Å) and $24.80^\circ 2\theta$ (3.59 Å) and the broad reflection band from about 11 Å to 14 Å on the untreated diffractograms (Thorez, 1975). The narrow, symmetrical peaks do not shift in the glycolated diffractograms, though the broad reflection band shifts towards 13 Å to 17 Å. In the 500°C heated diffractograms, the reflection at 7.20 Å disappears, whilst the reflection at 3.59 Å is reduced

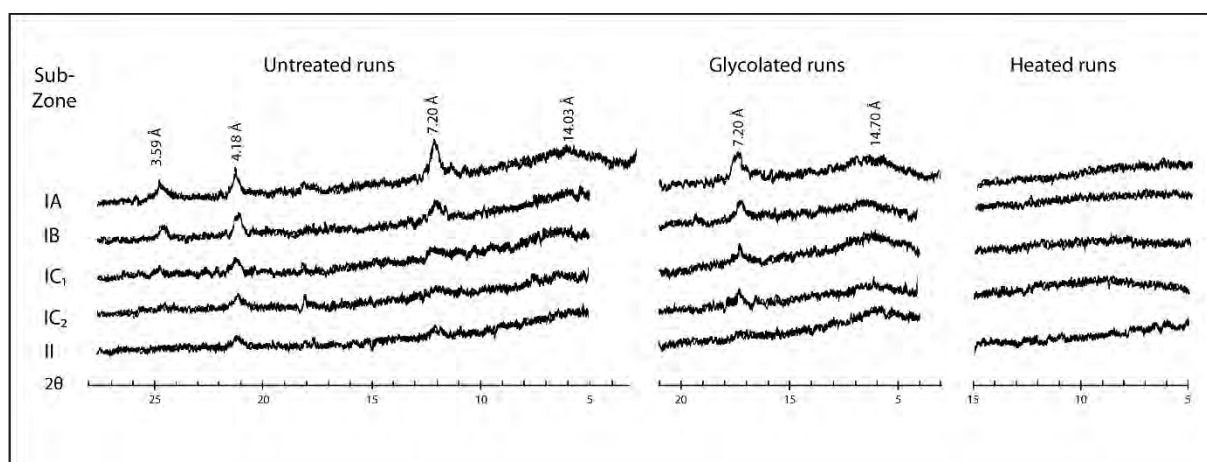


Figure 5: X-ray diffractograms of clay sized fractions in the weathering profile.

in intensity and the broad reflection band is replaced by a single reflection peak of about 10 Å. Goethite is also present in the clay sized fraction and identified by the broad reflection at $21.75^\circ 2\theta$ (4.18 Å) in the untreated scans.

Weathering of serpentinite rock material

Hand specimens, and thin-sections, of the narrow (1–3 cm thick) weathered rims around core-stones show alteration of the serpentinite to follow a limited number of generalized stages (Table 4). Alteration starts with the opening-up of grain boundaries and formation of micro-cracks (Stage 1) followed by staining along chrysotile veinlets (Stage 2). More extensive staining then occurs with decomposition (to clay minerals) of most antigorite and chrysotile crystals (Stage 3). Continued decomposition of antigorite and chrysotile crystals then results in a brown, stiff silty clay (Stage 4) which readily disaggregates when dry samples are agitated in water; a criterion that allows it to be classified as “soil” material (Terzaghi & Peck, 1948). Stage 3 weathered serpentinite thus represents the transition between “rock” and “soil” material.

Differences in physical properties reflect weathering of the serpentinite; increasing stages of weathering marked by a decrease in dry unit weight and density, but an increase in apparent porosity (Table 5). Fresh serpentinite has a dry unit weight between 24.72 and 26.14 kN/m³, and dry density between 2,520 and 2,666 kg/m³, whilst stages 1 and 2 weathered serpentinite have corresponding values between 21.06 and 24.72 kN/m³, and between 2,148 and 2,520, kg/m³, respectively. Stage 3 weathered serpentinite which is transitional between “rock” and

“soil”, however, has dry unit weights between 17.05 and 20.21 kN/m³ and dry densities between 1,738 and 2,017 kg/m³ (Table 5). Fresh serpentinite furthermore, has an apparent porosity of less than 2.7%, whilst stages 1 and 2 weathered serpentinite have values between 3.7 and 17.3%, and stage 3 an apparent porosity between 21.6 and 30.7% (Table 5).

Differences in uniaxial compressive strength also reflect the different stages of weathering, though there is much scatter in the results due to the inherent chrysotile veinlets that impart an anisotropy to tested specimens (Table 6). Fresh (unaltered) serpentinite has a uniaxial compressive strength ranging from 118.2 to 182.0 MPa, whilst stage 1 weathered serpentinite has values between 28.3 and 98.6 MPa, and Stage 2 weathered serpentinite values between 10.3 and 21.6 MPa (Table 6). Stage 3 weathered serpentinite that represents the transition between weathered “rock” and “soil” has a uniaxial compressive strength of between 5.1 and 7.9 MPa (Table 6).

DISCUSSION

Comparison with published literature

Grain size distributions of samples from the pedological soil profile in the present study are comparable with those reported in the earlier study involving soil samples over serpentinite in the Kuala Pilah area (Tan & Eng, 2004). Similar large clay contents (>21%) as well as variable silt contents (7 to 69%), and low sand and gravel contents (<10%) are seen in both sets of samples. Weathered earth materials over serpentinite in the Oe-yama

Table 4: Generalized stages of weathering of serpentinite.

Stage	Hand specimen Features	Thin-section Features
0	Dark green to black, rock material with criss-crossing, yellow green to white veinlets. Mineral grains appear fresh & unaltered. (Unweathered serpentinite).	Unaltered, fine grained antigorite crystals with veinlets of fresh chrysotile crystals. Grain boundaries tight. Many opaque, iron oxide & chromite grains.
1	As Stage 0 (unweathered rock material) but some open grain boundaries & micro-cracks. (Slightly weathered serpentinite).	As Stage 0 (unweathered rock material) but some open grain boundaries & micro-cracks.
2	As Stage 0 (unweathered rock material) but brown stains along veinlets. Many open grain boundaries & micro-cracks. Mineral grains appear unaltered. (Moderately weathered serpentinite)	Brown stains along chrysotile veinlets. Antigorite & chrysotile crystals appear unaltered. Many open grain boundaries & micro-cracks. Many iron oxide & chromite grains seen.
3	Light to dark brown “rock material” with distinct relict texture. Does not disaggregate when agitated in water. Mineral grains all appear altered. (Highly weathered serpentinite).	Brown stains pervade relict antigorite & chrysotile grains (altered to clay minerals). Grain boundaries & micro-cracks are open. Many opaque, iron oxide & chromite grains seen.
4	Brown, stiff silty clay soil. Disaggregates when agitated in water. Coarse fraction of iron oxide & chromite grains. (Completely weathered serpentinite)	X-ray diffractions show clay fraction to consist of mixed layer kaolinite & smectite.

Table 5: Physical properties of generalized stages of weathering of serpentinite.

Sample Number	Stage of Weathering	Dry Unit Weight (kN/m ³)	Porosity (%)	Dry Density (kg/m ³)	Specific Gravity Particles
A1	0	25.79	0.44	2,629	2.641
A2	0	26.14	1.30	2,666	2.701
A3	0	25.69	1.48	2,620	2.659
A4	0	25.13	2.72	2,562	2.634
A5	1	24.72	3.70	2,520	2.617
A6	1	24.20	5.03	2,467	2.598
A7	1	24.19	7.08	2,466	2.654
A8	1	23.18	8.13	2,364	2.573
A9	2	23.43	10.68	2,389	2.675
A10	2	23.36	10.76	2,382	2.669
A11	2	22.61	11.65	2,306	2.610
A12	2	22.61	12.38	2,305	2.631
A13	2	21.97	13.24	2,240	2.582
A14	2	21.67	15.43	2,210	2.613
A15	2	21.84	15.58	2,227	2.638
A16	2	21.06	17.30	2,148	2.597
A17	3	20.21	21.58	2,061	2.628
A18	3	19.69	22.97	2,008	2.607
A19	3	19.78	24.38	2,017	2.667
A20	3	17.05	30.74	1,738	2.510
A21	4	15.27	38.53	1,557	2.533
A22	4	15.45	39.40	1,576	2.600
A23	4	15.66	42.04	1,597	2.755
A24	4	13.91	44.06	1,419	2.536
A25	4	12.54	51.86	1,279	2.656

and Seki-no-miya districts of central Japan, however, show more variable grain size distributions with sand contents of 37.5 to 72.0%, silt contents of 15.5 to 29%, and clay contents of 7 to 43.5% (Matsukura *et al.*, 2000).

The specific gravity (2.58 to 2.85) of soil particles in the present study is quite similar to those (2.43 to 2.92) reported for weathered earth materials over serpentinite in the Oe-yama and Seki-no-miya districts of central Japan (Matsukura *et al.*, 2000). The present values are, however, not as high as those (2.77 to 3.65) reported in the earlier study of Tan & Eng (2004); the difference likely due to variations in iron contents.

Moisture contents in the present study (25.7 to 43.7%) are comparable with those (26 to 69%) reported in the earlier study (Tan & Eng, 2004); the large moisture contents reflecting the large clay contents present. These moisture contents are also comparable with those (36.3 to 85.3%) reported for weathered earth materials over serpentinite in the Oe-yama and Seki-no-miya districts of central Japan (Matsukura *et al.*, 2000). Plasticity indices

(8 to 21%) of samples in the present study are similar to those (6 to 48%) reported in the earlier study (Tan & Eng, 2004), though liquid limits (36 to 52%) are more variable in comparison with the results (>50%) of the earlier study.

Evolution of weathering profile

The differentiation of three broad zones within the weathering profile is based on the pedo-weathering profile concept (Tandarich *et al.*, 2002) and is closely similar to the three alteration zones differentiated in a 140 cm thick weathering profile over serpentinite near La Roche in central France (Caillaud *et al.*, 2004). The three alteration zones, from bottom to top, are (a) unweathered rock, (b) saprock where coherent rock structure was still preserved and primary minerals still interconnected, and (c) saprolite where the texture of the original rock had been destroyed and replaced by a mixture of clay associated with oxyhydroxides and relics of primary minerals. The saprolite was separated into a lower saprolite with prismatic structure

Table 6: Uniaxial compressive strengths of generalized stages of weathering of serpentinite.

Sample Number	Stage of Weathering	Uniaxial Compressive Strength (MPa)	Uniaxial Compressive Strength (psi)	Bulk Unit Weight (kN/m ³)	Orientation Sample
B1	0	182.02	26,398	25.55	Layering perpendicular or gently dipping to direction of loading
B2		155.78	22,593	25.23	
B3		130.01	18,856	25.47	
B4		124.82	18,102	24.97	
B5		118.20	17,143	25.87	
B6	0 & 1	98.63	14,304	25.44	Layering parallel or steeply dipping to direction of loading
B7		97.01	14,070	24.96	
B8		79.62	11,548	25.66	
B9		76.31	11,068	25.47	
B10		66.34	9,622	24.95	
B11		45.10	6,541	25.16	
B12		43.18	6,262	25.62	
B13		38.04	5,517	23.96	
B14		33.34	4,835	24.60	
B15		28.30	4,105	24.84	
B16	2	21.58	3,128	24.80	Layering with stains at variable orientations to direction of loading
B17		15.69	2,275	20.09	
B18		11.80	1,712	19.82	
B19		10.49	1,522	21.00	
B20		10.30	1,493	21.14	
B21	3	7.85	1,138	19.58	
B22		6.86	995	21.00	
B23		5.88	853	20.05	
B24		5.10	739	19.30	

generated by wetting and drying cycles in the deeply argillized rock, and an upper saprolite with polyhedral structure. Overlying the saprolite was as allochthonous deposit that contained feldspars and quartz resulting from weathering of the Masif Central (Caillaud *et al.*, 2004).

Differentiation of the three broad weathering zones clearly substantiates the view of Carroll (1970) that chemical weathering at the outer part of the lithosphere takes place in two stages; the first stage being the production of rotten rocks, on which the second stage, soil formation, takes place. The first stage is geochemical weathering, and is mostly the inorganic alteration of solid rocks, but in the second stage, the effects of vegetation, both living and dead, together with the effects of metabolism of micro-organisms living in the geochemically altered rock materials, are added by the continued inorganic processes (Carroll, 1970).

The pedological soil (zone I) of the present study is thus considered to result from alteration of bedrock by both geochemical and pedological processes, whilst the saprock

(zone II) results from alteration of bedrock by geochemical processes. Increasing fine clay and colloid contents upwards within the pedological soil clearly point to the role of pedological processes in continued disintegration of completely weathered bedrock (saprolite).

The present location of the unconfined groundwater table in the bedrock zone furthermore, indicates that lowering of the water table with time has given rise to leaching and alteration of the bedrock. Such continuous leaching by percolating water has in fact been considered to give rise to the low dissolved cations in weathered soils over serpentinite in the Kuala Pilah area (Tan & Eng, 2004).

CONCLUSIONS

It is concluded that the weathering profile can be differentiated into three broad zones; an upper pedological soil (zone I), an intermediate saprock (zone II) and the underlying bedrock (zone III). The 2.5 m thick, pedological soil consists of brown, soft to stiff,

silty clays and can be separated into IA, IB, IC1 and IC2 soil horizons (sub-zones). The 1.5 m thick saprock consists of brown, stiff, silty clays with indistinct relict fault planes and core-stones, whilst the bedrock consists of serpentinite with effects of weathering along, discontinuity planes.

Constant volume samples show the earth materials to have dry unit weights ranging from 10.32 to 16.28 kN/m³, and porosities of 39 to 60%. Particle size distributions are variable with silt contents decreasing upwards from 38 to 58% in saprock to 28 to 44% in the pedological soil. Increasing fine clay (<2 µm) contents upwards from 34 to 43% in saprock to 40 to 51% in sub-zones IA and IB indicate that pedological processes have led to continued disintegration of weathered serpentinite.

Weathered rims around core-stones show alteration of serpentinite to start with the opening-up of grain boundaries and formation of micro-cracks (Stage 1) followed by staining along chrysotile veinlets (Stage 2). More extensive staining then occurs with decomposition (to clay minerals) of most antigorite and chrysotile grains (Stage 3) and finally formation of a brown, stiff silty clay (Stage 4). Increasing stages of weathering are marked by decreasing dry unit weights, dry densities and uniaxial compressive strengths, but increasing apparent porosities.

It is concluded that in situ alteration of serpentinite through lowering of an unconfined groundwater table has led to development of the weathering profile.

ACKNOWLEDGEMENTS

Grateful thanks are extended to the University of Malaya for an F-Vote Research Grant that supported this study. Grateful thanks are also extended to the two anonymous reviewers for their valuable comments on the initial submission.

CONFLICTS OF INTEREST

The author has no conflicts of interest to declare that are relevant to the content of this article.

REFERENCES

- ASTM, American Society for Testing and Materials, 1970. Special procedures for testing soil and rock for engineering purposes. Special Publication 479, American Society for Testing and Materials, Philadelphia. 630 p.
- Caillaud, J., Prousti, D., Right, D. & Martin, F., 2004. Fe rich clays in a weathering profile developed from Serpentinite. *Clays & Clay Minerals*, 52(6), 779-791.
- Carroll, D., 1970. *Rock weathering*. Plenum Press, New York. 203 p.
- Hamdan, J. & Burnham, C.P., 1996. The contribution of nutrients from parent materials in three deeply weathered soils of Peninsular Malaysia. *Geoderma*, 74, 219-233.
- Hamdan, J. & Burnham, C.P., 1997. Physico-chemical characteristics of three saprolites in Peninsular Malaysia. *Communications Soil Science & Plant Analysis*, 28, 1871-1834.
- ISRM, International Society for Rock Mechanics, 1979. Suggested methods for determining water content, porosity, density, absorption and related properties and swelling and slake durability index properties. Abstracts International Society for Rock Mechanics, Mineral Science & Geomechanics, 16, 141-156.
- ISRM, International Society for Rock Mechanics, 1981. Suggested methods for rock characterization testing and monitoring. Brown, E.T. (ed.), Pergamon Press, Oxford. 211 p.
- Khoo, K.K., 1974. *Geology of the central part of Sheet 104, Kuala Pilah, Negeri Sembilan*. Annual Report for 1973, Geological Survey of Malaysia, Government Printing Office, Kuching, 133-143.
- Law, W.M., 1967. Reconnaissance soil survey of the Raub – Temerloh - Jerantut region, northwest Pahang. *Malaysian Soil Survey Report No. 2, Malaysia*. 79 p.
- Leamy, M.L. & Panton, W.P., 1966. *Soil survey manual for Malayan conditions*. Soil Science Division, Department of Agriculture Malaysia, Malaysia. 226 p.
- Mahsa Tashakor, Wan Zuhairi Wan Yaacob, Hamzah Mohamad & Azman A. Ghani, 2014. Geochemical characteristics of serpentinite soils from Malaysia. *Malaysian Journal of Soil Science*, 18, 35-49.
- Matsukura, Y., Asanao, Y. & Komatsu, Y., 20002. Some geotechnical properties of clayey soils of weathered serpentinite. Annual Report, Institute of Geosciences, University of Tsukuba, 26, 21-23.
- Mutalib, B.M.Y., 1973. *Geology of the Kuala Pilah area, Negeri Sembilan, West Malaysia*. (Unpublished) B.Sc. (Hons)

- Thesis, Department of Geology, University of Malaya. 100 p.
- Raj, J.K., 1983. A study of residual soils and their slope cut stability in selected areas of Peninsular Malaysia. Doctor of Philosophy Thesis (Unpublished), University of Malaya. 462 p.
- Raj, J.K., 2009. Geomorphology. In: Hutchison, C.S. & Tan, D.N.K. (Eds.), *Geology of Peninsular Malaysia*. University of Malaya & Geological Society of Malaysia, Kuala Lumpur, 5-29.
- Raj, J.K., 2021. Characterizing the weathering profile over the Kuantan Basalts. *Bulletin of the Geological Society of Malaysia*, 72, 15-23.
- Tan, B.K. & Eng, B.K., 2004. Physico-chemical properties of serpentinite soils in the Kuala Pilah area, Negeri Sembilan. *Bulletin of the Geological Society of Malaysia*, 48, 37-40.
- Tandarich, J.P., Darmody, R.G., Follmer, L.R. & Johnson, D.L., 2002. Historical development of soil and weathering profile concepts from Europe to the United States of America. *Journal Soil Science of America*, 66, 335-346.
- Terzaghi, K. & Peck, R.B., 1948. *Soil mechanics in engineering practice*. John Wiley and Son Inc., USA. 566 p.
- Thorez, J., 1975. *Phyllosilicates and clay minerals – A laboratory handbook for their X-Ray diffraction analysis*. G. Lelotte, Belgium. 579 p.
- Wagner, A.A., 1957. The use of the Unified Soil Classification System by the Bureau of Reclamation. *Proceedings 4th International Conference on Soil Mechanics & Foundation Engineering*, London, 2, 125-134.
- Wentworth, C.K., 1922. A scale for grade and class terms for clastic sediments. *Journal of Geology*, 30, 377-392.
- Wesley, L., 2009. Behaviour and geotechnical properties of residual soils and allophone clays. *Obras y Proyectos*, 6, 5-10.
- Wilbourn, E.S., 1933. *Report of the Geological Survey Department for 1932, Federated Malay States*. 18 p.

*Manuscript received 18 May 2022;
Received in revised form 23 August 2022;
Accepted 24 August 2022
Available online 30 August 2022*

Geology, resource potential and organic petrography of the Neogene coals in the Miri area of Northwest Sarawak, Malaysia

WAN HASIAH ABDULLAH^{1,*}, SIA SAY GEE²

¹Geological Society of Malaysia, c/o Department of Geology, University of Malaya, 50603 Kuala Lumpur, Malaysia

²Jabatan Mineral dan Geosains Malaysia, Negeri Johor, Tingkat 9, Menara TH, Jalan Ayer Molek, 80000 Johor Bahru, Johor Darul Ta'zim, Malaysia

*Corresponding author email address: wanhasia@gmail.com

Abstract: There are three coal-bearing geological formations in the Miri area, viz. the Belait Formation, the Lambir Formation, and the Liang Formation. Of the three coal-bearing geological formations, only the sub-bituminous B Tutoh coals from the Belait Formation, with an estimated resource of 203 million tonnes, are believed to be of economic potential. The Tutoh coals are dominated by vitrinite group, especially desmocollinite. The sub-bituminous B from the Lambir Formation and the lignite from Liang Formation are of low economic potential due to the limited area of the hosting formations.

Keywords: Coal resource potential, organic petrography, Belait Formation, Lambir Formation, Liang Formation

INTRODUCTION

Despite global efforts to reduce the use of coal as a primary energy source, current and future geopolitics may dictate that countries may require to revert to the use of coal to maintain energy security. This aspect of “return to coal” was recently highlighted by Stanway (2022). Presently Malaysia remains partially dependant on coals within its current energy mix. Nevertheless, Malaysia has reached 23% installation of renewable energy, and there is a plan to hit 40% by 2035 (Bernama, 2022).

Coals in Malaysia are present in the Tertiary basins in all three geographical provinces, viz. Sarawak, Sabah and Peninsular Malaysia, with most of them located in the states of Sabah and Sarawak. As at the end of 2011, 1,468 Mt or 80.7 % of the coal resources, ranging from sub-bituminous to anthracite, were located in Sarawak (Sia & Abdullah, 2012).

Coals are present in three different geological formations at three different localities in Miri, viz. the Belait Formation at Tutoh, the Lambir Formation at Kuala Tutoh, and the Liang Formation at Long Patan (Figure 1). The aim of this study is to assess the resource potential of these coals based on the exploration carried out by Sia & Johari (2004) and Aro *et al.* (2005). Organic petrographic analysis was performed on the Belait Formation coals to complement these published data.

METHODOLOGY

Traversing was conducted along rivers, creeks, valleys, timber tracks and footpaths to scout for coal and rock exposures. All coal outcrops found were either manually trenched or pit to expose the fresh and clean coal, as well as full section of the seam for detailed lithotype description of seam and sampling as described by Sia & Johari (2004).

Samples for petrographic study were progressively polished using finer grades of silicon carbide papers (320, 800 and 1200 grit) and followed by alumina (initially 1 µm, then 0.3 µm and finally 0.05 µm grades). Details of sample preparation prior to polishing were as described by Wan Hasiah (1999). Water was used as lubricant for all the polishing stages. Microscopical examination was performed under oil immersion (with a reflective index of 1.518 at 23 °C) in plane-polarised reflected light using a Leica DM 6000M microscope equipped with fluorescence photometry system.

GEOLOGY, RESOURCE POTENTIAL AND ORGANIC PETROGRAPHY

Belait Formation

At Tutoh, the coal deposit is hosted by the Middle Miocene and possibly also in the Early Pliocene Belait Formation (Wilford, 1961), covering an area of 230 km²

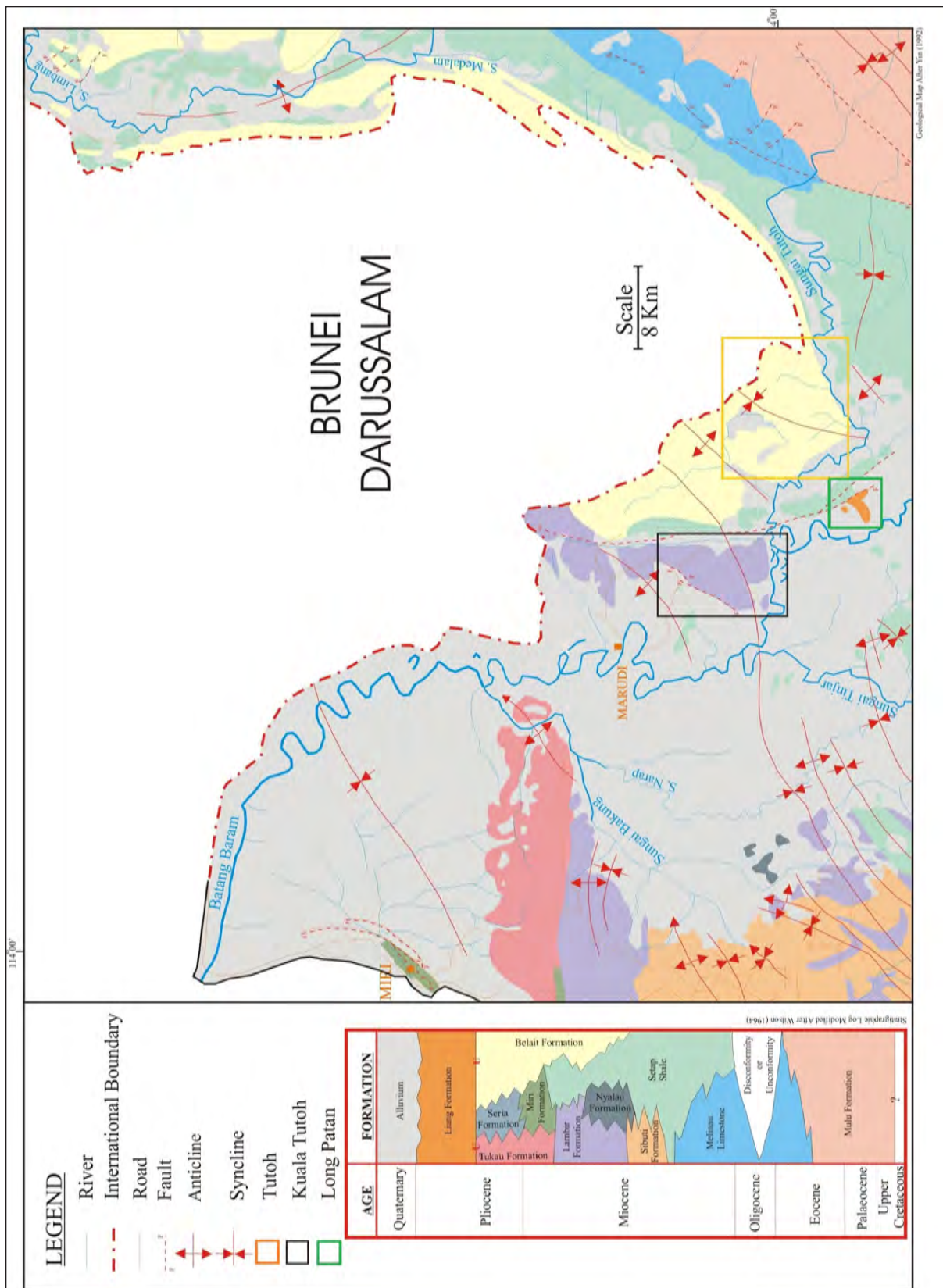


Figure 1: Geological map of the Miri area (modified after Yin, 1992).

(Figure 1). Sediments at the eastern part dip at 35° – 50° towards NW while sediments at the western part dip 10° – 30° towards NE, forming a northeast plunging syncline. The coal deposits extend beyond the international boundary into Brunei Darussalam. On the Malaysian side, six main coal seams, ranging in thickness from 0.65 m to 3.20 m, have been identified (Aro *et al.*, 2005; Figure 2). Total moisture of Tutoh coals varies from 8.5% to 23.2%, ash yield from 1.1% to 35.7% but generally below 10%, and total sulphur varies from 0.43% to 7.00%. The volatile matter content (dry) varies between 30.7% and 54.5% with an average of 45.5%. The heat value for coal with ash yields less than 10% ranges from 24.67 MJ/kg to 30.05 MJ/kg, indicating a sub-bituminous B coal rank (Aro *et al.*, 2005) and generally of good quality. Aro *et al.* (2005) reported the Tutoh coal field hosted an estimated reserve of 203 million tonnes and recommended drilling and geophysical logging to better correlate with the mapped sections.

The analysed sub-bituminous coals from Belait Formation were studied petrographically using a reflected light microscope under oil immersion as described in the Methodology section above. An example of the observed maceral association is shown in Figure 3. The Tutoh coal is dominated by vitrinite maceral group (Figure 3A and

3C); the most dominant maceral being desmocollinite (also known as collodetrinite after ICCP, 1998). Liptinite (also referred to as exinite) macerals occur in significant amount, the most common being cutinite, resinite and suberinite. Under UV (ultra violet) light excitation, these liptinites show greenish yellow to dull yellow fluorescence (Figure 3B and 3D). Inertinite is fairly common with presence of sclerotinite (also known as funginite after ICCP, 2001) being most distinct. Mineral matter such as pyrite and clay minerals were often observed although their abundance is generally low to fairly common.

The mineral matter content is often associated with ash yield determined by proximate analysis and is a parameter used in determining coal quality. The composition of the ash depends on the composition of the mineral precursors (Diessel, 1998). He described that in combustion process, after injection into the furnace, mineral matter particles may decompose, whereby the majority of flyash particles are the thermal transformation products of the minerals contained in the feed coal. Coals rich in reactive macerals such as vitrinite and exinite from low rank coals of Batu Arang, Selangor have been reported to have a high coal conversion and oil+gas yields and thus can be considered as a potential alternative energy resource for liquid fuel (Abdullah *et*

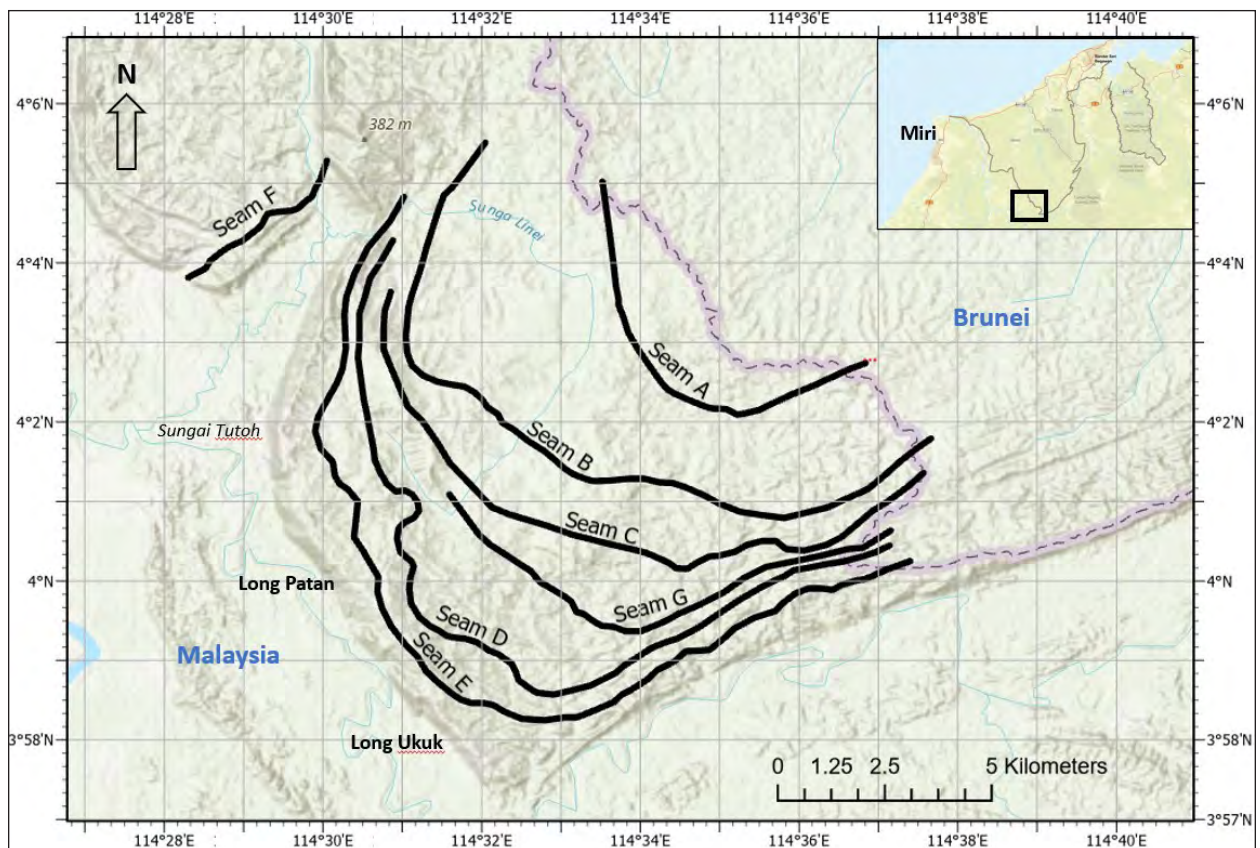


Figure 2: Coal seams occurrences at Tutoh (modified after Aro *et al.*, 2005).

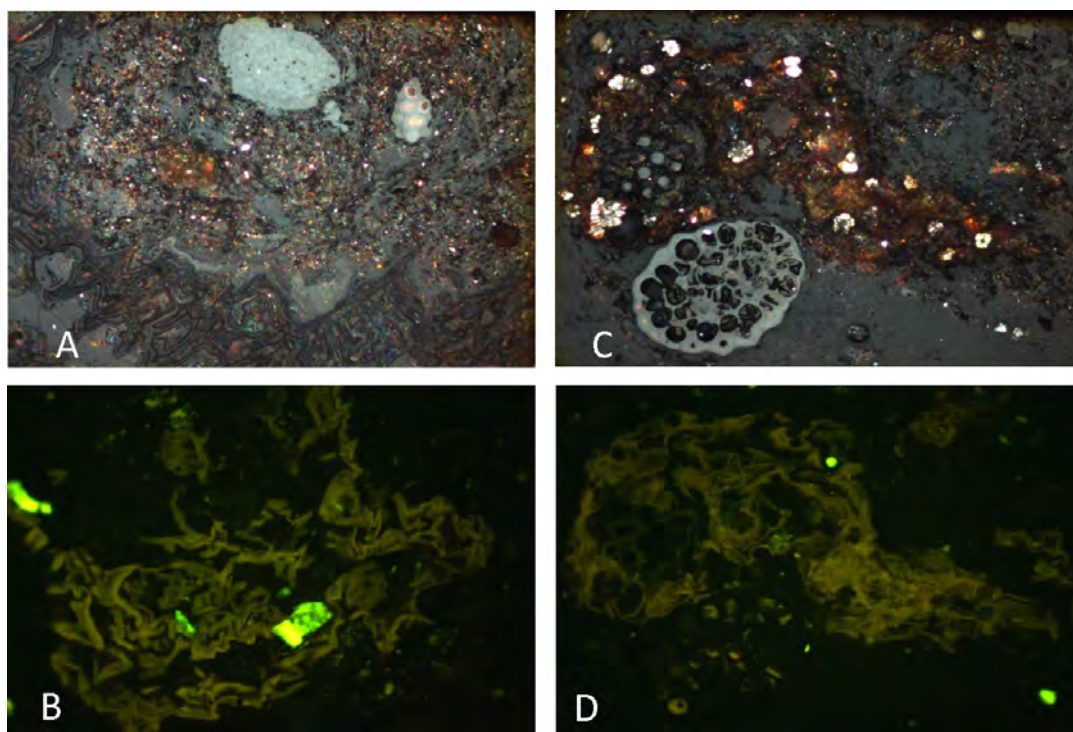


Figure 3: A: High reflecting sclerotinite (top and to the right) embedded in low reflecting desmocollinite matrix and fine-grained clay minerals with the occurrence of colourful oil smear associated with suberinite (band at bottom of photomicrograph) under normal reflected white light. B: Fairly well preserved yellow fluorescing cutinite with minor occurrence of intense greenish yellow resinite as observed under UV light excitation. C: Association of vitrinitic coal constituents with common occurrence of sclerotinite (lower southwest corner of photomicrograph) and some very highly reflecting framboidal pyrite under normal reflected white light. D: Same view as C observed under UV light excitation showing poorly preserved cutinite macerals fluorescing dull yellow and some fluorescing resinite in the cell lumen of the sclerotinite. All photomicrographs were taken on polished surfaces under oil immersion and field width is 0.25 mm

al., 2014) instead of using raw coal feedstock as it would be more environmentally friendly. The analysed Tutoh sub-bituminous coals, similar to the Batu Arang coals, in that they also contain a high abundance of structureless vitrinite, namely desmocollinite, therefore could also possess similar energy resource potential. However, the presented petrographic data here is insufficient to provide conclusive findings as other relevant experimental data is not available in this study. Nevertheless, the encouraging results of similar liquefaction experiments that were performed on a coal dominated by vitrinite with significant liptinite content (from Mukah Balingian, Sarawak) also indicated high coal conversion and high oil yield (Ishak *et al.*, 2005). Details on the application of coals and other organic-derived materials for industrial purposes are presented by Speight (2017).

Lambir Formation

Lambir Formation is present in many areas in Miri, but only at Kuala Tutoh it is coal-bearing (Figure 1). The Kuala Tutoh area is a tilted horst block, bounded to the east by the NNW-SSE trending Kalijau Fault and to the west by the NE-SW trending Muam Fault (Sia

& Johari, 2004), covering an area of 73 km². The horst is underlain mainly by the coal-bearing Middle to Late Miocene Lambir Formation, with patches of Oligocene to Late Miocene Setap Shale and the Pleistocene Old Alluvium Deposits covering the low undulating hills in the west, as well as the recent alluvium deposits covering the floodplains in the east. Coal exposures are seen only at the southern part of Kuala Tutoh, viz. Tebabo Lake and S. Belasoi areas (Figure 4). The coal exposures are believed to be of the same seam, with thickness up to 0.65 m (Sia & Johari, 2004). The coals are of sub-bituminous B in rank, with high ash yield and total sulphur. Since there is only one coal seam, and this seam has a high ash yield and total sulphur and is restricted to an area of not more than 30 km², it is believed that coal in the Kuala Tutoh vicinity is of low economic potential.

Liang Formation

Accumulation of coal at Long Patan (Figure 5) took place in the Pliocene and is part of the Liang Formation. The area is transacted by the south-eastward extension of the NW-SE trending Kelijau Fault, which serves as the



Figure 4: A sixty-five centimeter coal bed at the S. Belasoi area which is transected by a fault.

contact for the Liang Formation with Setap Shale (Figure 1). The coal is dark brown, dull with matt lustre (Figure 6), disintegrates easily when exposed, and its woody structure is still recognizable in hand specimens. Two coal seams have been identified, viz. the 0.29 m Upper Patan seam and the 1.67 m Lower Patan seam; they are of Lignite A and Lignite B rank. The coal is high in total moisture, carbon and volatile matter, but is low in ash yield and total sulphur. Even though two coal seams have been identified with the Lower Patan reaching 1.67 m, it is believed that coal in Long Patan is of low economical potential owing to its low coal rank and the limited area of not more than 4.5 km² covered by the Liang Formation.

CONCLUDING REMARKS

In summary, among the three coal-bearing formations in the studied Miri area, only the sub-bituminous B Tutoh coals from the Belait Formation with an estimated resource of 203 million tonnes, seems to possess resource potential, but further detailed exploration would be required to evaluate the commercial value.

The Belait Formation Tutoh coals are dominated by structureless vitrinite with common liptinite macerals. In addition, the coals that are generally low in mineral matter content may indicate good quality coals suitable for industrial purposes including for application in the energy sector, if ever required.

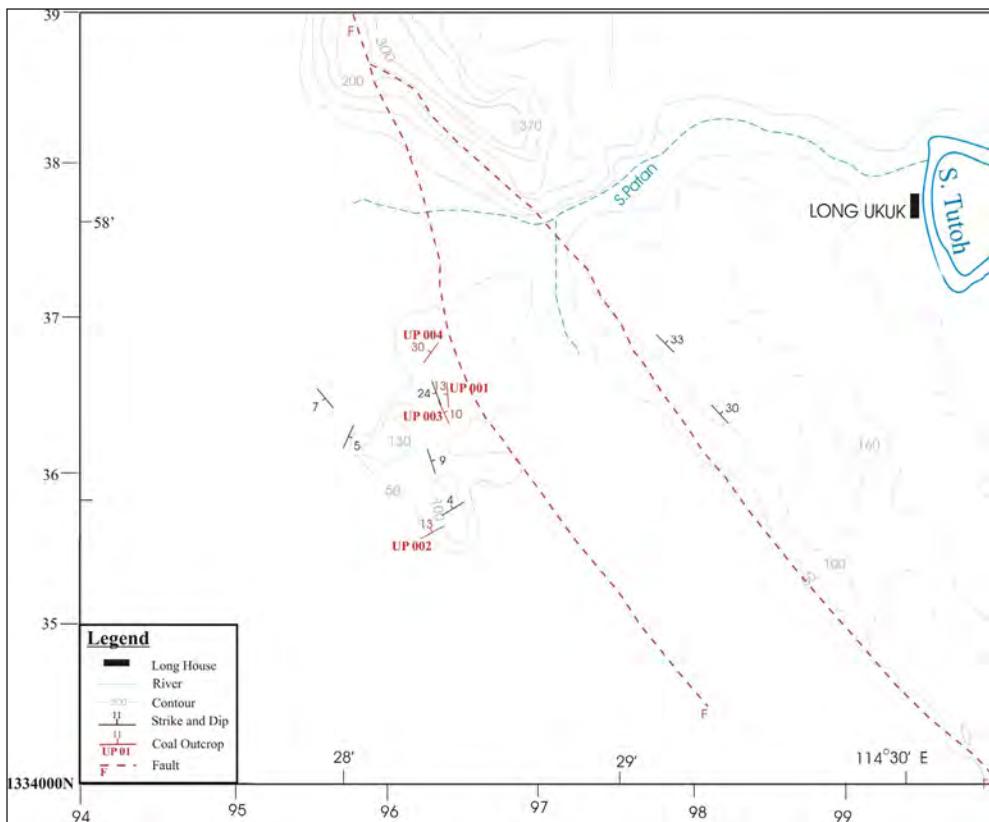


Figure 5: Coal occurrences at Long Patan (after Sia & Johari, 2004).



Figure 6: The dark brown, dull with matt lustre coal at Long Patan.

ACKNOWLEDGEMENTS

The authors wish to thank Tuan Haji Kamaruddin Bin Abdullah, Director of the Department of Mineral and Geoscience Malaysia (Johor), for the guidance and support rendered to the second author. Thanks also go to Mr. Jaithish John (Deputy Director) and Mr. John Joseph Jinap (Senior Geologist) of the Department of Mineral and Geoscience Malaysia (Sarawak) for various forms of assistance provided. The Department of Geology University of Malaya is acknowledged for providing the reflected light microscope used in this study. Two anonymous reviewers are acknowledged for their comments that improved this geological note.

AUTHOR CONTRIBUTIONS

The authors confirm their contribution to the paper as follows:

- Study conception and design: WHA and SSG.
- Data collection and interpretation: SSG and WHA.
- Petrographic analysis and description: WHA.
- Draft manuscript preparation: SSG and WHA.
- Both authors reviewed the results and approved the final version of the manuscript.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest in this paper.

REFERENCES

Abdullah, W.H., Kiselev, V., Makeen, Y.M., Olayinka, T.S. & Mustapha, K.A., 2014. Direct liquefaction on low rank

Batu Arang coals of Malaysia: Influence of petrographic composition. *Bulletin of the Geological Society of Malaysia*, 60, 95-99.

Aro, J.J., Johari, D., Yusoff, A.R.M. & Ambun, A.U., 2005 (unpublished). Evaluation of the coal resources of the Tutoh Coal Field, Sarawak, Malaysia. Department of Mineral and Geoscience Malaysia, Sarawak. JMG.SWK(SAB) 1/2005. 56 p.

Bernama, 2022. Malaysia at 23% renewable energy installation to date, aims to hit 40% by 2035 – Deputy minister: <https://www.theedgemarkets.com/article/malaysia-23-renewable-energy-installation-date-aims-hit-40-2035-%E2%80%944-deputy-minister>. Accessed 16 August 2022.

Diessel, C.F.K., 1998. Technological applications. In: Taylor, G.H., Teichmuller, M., Davis, A., Diessel, C.F.K., Littke, R. & Robert, P. (Eds.), *Organic Petrology – A new handbook incorporating some revised parts of Stach's Textbook of Coal Petrology*. Gebrüder Borntraeger. Berlin. Stuttgart. 519-614.

ICCP: International Committee for Coal and Organic Petrography, 1998. The new vitrinite classification (ICCP System 1994). *Fuel*, 77, 349–358.

ICCP: International Committee for Coal and Organic Petrology, 2001. New inertinite classification (ICCP system 1994). *Fuel*, 80, 459–471.

Ishak, M.A.M., Ismail, K., Abdullah, M.F., Kadir, M.O.A., Mohamed, A.R. & Abdullah, W.H., 2005. Liquefaction studies of low-rank Malaysian coal using high-pressure high-temperature batch-wise reactor. *Coal Preparation – A Multinational Journal*, 25(4), 221-237.

Sia, S.G. & Abdullah, W.H., 2012. Geochemical and petrographical characteristics of low-rank Balingian Coal from Sarawak, Malaysia: Its implications on depositional conditions and thermal maturity. *Int. J. Coal Geol.*, 96-97, 22-38.

Sia, S.G. & Johari, D., 2004 (unpublished). Evaluation of the coal resources of the Kuala Tutoh and Long Patan Areas, Sarawak, Malaysia. Department of Mineral and Geoscience Malaysia, Sarawak. GSKL 002/10/148. 19 p.

Speight, J.G., 2017. Industrial organic chemistry. In: James G. Speight (Ed.), *Environmental organic chemistry for engineers*. Butterworth-Heinemann, Oxford, UK. 87-151.

Stanway, D., 2022. Analysis: China no closer to peak coal despite record renewable capacity additions. <https://www.reuters.com/world/china/china-no-closer-peak-coal-despite-record-renewable-capacity-additions-2022-08-22/>. Accessed 22 August 2022.

Wan Hasiah, A., 1999. Oil-generating potential of Tertiary coals and other organic-rich sediments of the Nyalau Formation, onshore Sarawak. *Jour. Asian Earth Sciences*, 17, 255-267.

Wilford, G.E., 1961. The geology and mineral resources of Brunei and adjacent parts of Sarawak with description of Seria and Miri Oilfield. Geological Survey Department, British Territories in Borneo, Memoir 10. 319 p.

Yin, E.H., 1992. Geological Map of Sarawak. Second edition, Geological Survey of Malaysia.

*Manuscript received 8 August 2022;
Received in revised form 26 August 2022;
Accepted 29 August 2022
Available online 30 August 2022*

56th ANNUAL GENERAL MEETING & ANNUAL REPORT 2021

**PERSATUAN GEOLOGI MALAYSIA
GEOLOGICAL SOCIETY OF MALAYSIA**

**56th ANNUAL GENERAL MEETING
& ANNUAL REPORT 2021**

22nd April 2022

- i) Sheraton Hotel, Petaling Jaya
- ii) ZOOM Online Meeting Platform



Agenda

The Agenda for the Annual General Meeting is as follows:

1. Welcoming Address by the President for Session 2021/2022
2. Confirmation of Minutes of the 55th AGM
3. Matters Arising
4. Annual Report for Session 2021/2022
 - a. President's Report
 - b. Secretary's Report (including Assistant Secretary's Report)
 - c. Editor's Report
 - d. Treasurer's Report
 - e. Honorary Auditor's Report
 - f. GSM Endowment Fund Report
5. Election of Honorary Auditor
6. Other Matters
7. Announcement of New Council for 2022/2023
8. Presidential Address For 2022/2023

Confirmation of Minutes of the 55th AGM

PERSATUAN GEOLOGI MALAYSIA GEOLOGICAL SOCIETY OF MALAYSIA (GSM)

MINUTES OF THE 55th ANNUAL GENERAL MEETING

Date: 30th April 2021
Time: 4.30 p.m.
Venue/Platform: Aloft Hotel KL / ZOOM Online Meeting

Online

1. A. Halim A. Latiff
2. Abd Hanan Ahmad Nadzeri
3. Abd. Rasid Jaapar
4. Abdul Ghani Md Rafek
5. Ahmad Nizam Hasan
6. Ahmad Tariq Ahmad Ziyad
7. Awg Mohd Faizal Awg Mohamad Hamssin
8. Choo Mun Keong
9. Farah Fazulah Abdullah
10. Fateh Chand, Datuk
11. Felix Tongkul
12. Joy Pereira
13. Lee Chai Peng
14. Lim Choun Sian
15. Ling Nan Ley
16. Loganathan Ponnambalam

17. Maryam Syazana Dzulkefli
18. Mazlan Madon
19. Norazianti Asmari
20. Nur Iskandar Taib
21. Tan Boon Kong
22. Wan Hasiah Abdullah
23. Yunus Abd Razak, Dato'

Aloft Hotel

24. Abd. Rasid Jaapar
25. Ahmad Nizam Hasan
26. Ahmad Tariq Ziyad
27. Faizal Hamssin
28. Lim Choun Sian
29. Maryam Dzulkefli
30. Norazianti Asmari
31. Tan Chun Hock

Note: 31 out of 41 pre-registered members for AGM, attended.

GSM Council Members and members of the Board of Trustees for the Endowment Fund were also sent an invitation link without requiring to pre-register.

Adoption of Agenda

The Chairperson tabled the following agenda to the AGM for acceptance:

1. Welcoming Address by the President for Session 2020/2021
2. Confirmation of Minutes of the 54th AGM
3. Matters Arising
4. Annual Report for Session 2020/2021
 - a. President's Report
 - b. Secretary's Report
 - c. Editor's Report
 - d. Treasurer's Report
 - e. Honorary Auditor's Report
 - f. GSM Endowment Fund Report
5. Election of Honorary Auditor & Board of Trustees
6. Other Matters

The agenda was adopted by Prof. Joy and seconded by Datuk Fateh.

1. Welcoming Address by the President for Session 2020/2021

Mr. Abd Rasid Jaapar, the President of Geological Society of Malaysia acted as the Chairperson of the AGM and called the meeting to order at 4.30 pm.

2. Confirmation of Minutes of the 54th AGM

The Minutes of the 54th AGM was tabled for confirmation.

The Secretary proposed that the minutes be confirmed, seconded by Prof. Joy Pereira. The minutes were unanimously confirmed without any amendment.

3. Matters Arising (54th AGM Minutes)

No comment from members of AGM.

Information

4. Annual Report for Session 2020/2021

a. President's Report

Abd Rasid Jaapar tabled the President's Report, and thanked council members for the support.

The AGM discussed the following matters:

- Dato' Yunus Abdul Razak thanked Mr. Abd Rasid and hoping he will make a comeback.
- Mr. Choo Bon Keong commented on the suggestion by the President, in his personal capacity, on the possibility of merging GSM and IGM. He pointed out that proposal has been considered before, but did not receive enough support from members. Mr. Choo suggested that GSM should stick to its "original objective".
- Mr. Tan asked if face-to-face meeting would be possible next year (2022).

Action: Incoming Council

Abdul Hanan B. Ahmad Nadzeri proposed that the President's Report to be accepted, seconded by Dato' Yunus Abdul Razak.

b. Secretary's Report

Farah Fazulah Abdullah tabled the Secretary's Report and Assistant Secretary's Report.

The AGM discussed the following matters:

- Dr. Mazlan suggest a correction to the name of award receiver 'Teng Yu He'.

Action: Incoming Council

Datuk Fateh Chand proposed that the Secretary's and the Assistant Secretary's Report to be accepted, seconded by Dr. Wan Hasiah Abdullah.

c. Editor's Report

Wan Hasiah Abdullah tabled the Editor's Report.

The AGM discussed the following matters:

- No comments were made.

Action: Incoming Council

Abd Hanan B Ahmad Nadzeri proposed that the Editor's Report to be accepted, seconded by Mr. Loganathan.

d. Treasurer's Report

Dr. Lim Choun Sian reported the Treasurer's Report.

The AGM discussed the following matters:

- Mr. Loganathan seeks further clarification on 'long term sustainability of the publication unit via infrastructure....' possibly with example or proposed course of action.
- The AGM suggested to transfer more money from Bank Balances into short-term or long-term deposit, to earn higher interest.

e. Honorary Auditor's Report

The secretary goes through the Auditor's Report.

Action: Incoming Council

Mr. Loganathan proposed Treasurer's and Honorary Auditor's reports to be accepted, seconded by Mr. Abd Hanan B Ahmad Nadzeri.

f. GSM Endowment Fund Report

Datuk Fateh Chand, Chairman in Board of Trustees (BOT) of the GSM Endowment Fund, highlighted that under LHDN regulations the Society has always been recognized as an organization that is allowed to collect donations. Following that, Datuk Fateh presented the recommendations of the BOT to the AGM.

The AGM discussed the following matters:

- A discrepancy in the balance of accounts reported in the GSM Auditor's Report 2020 compared to that calculated from the bank statements, which amounted a difference of about RM100,000. It was proposed that this discrepancy be looked into by the incoming Council and resolved by the next report by the Auditor's.

Mr. Loganathan proposed that report and recommendations from the Board of Trustees to be accepted by AGM, seconded by Dr. Felix Tongkul and Miss Wendy.

Action: Incoming Council

5. Election of Honorary Auditor & Board Of Trustees

Honorary Auditor ; The AGM unanimously agreed to the re-appoint of existing Honorary Auditor S.F Lee & Co. Board of Trustee ; The AGM nominate:

Chair : Dato' Yunus Razak

Member:

- Dr. Lee Chai Peng
- Prof. Joy Pereira
- Dr. Mazlan Madon

Action: Incoming Council

6. Other Matters

No Other Matters were raised.

7. Announcement of New Council for 2021/2022

The announcement of new council was presented based on the election results certified by the Election Committee chaired by Dr. Mazlan Madon, and two scrutineers, Prof. Azman Abd Ghani and Dr. Muhammad Hatta Roselee, who were also appointed by the Council.

The Council for 2021/2022:

President :	Mr. Ahmad Nizam Hasan (GeoSolution Resources)
Vice-President :	Dr. Mohd Hariri Arifin (UKM)
Immediate Past President :	Mr. Abd Rasid Jaapar
Secretary :	Ms. Farah Fazulah Abdullah
Assistant Secretary :	Ms. Norazianti Asmari (GDS Sdn Bhd)
Treasurer :	Dr. Lim Choun Sian (UKM)
Editor :	Dr. Wan Hasiah Abdullah

Councillors 2020/2022:

- Mr. Ahmad Tariq Ahmad Ziyad
- Mr. Awg Mohd Faizal Awg Mohamad Hamssin
- Maryam Syazana Dzulkefli
- Tan Chun Hock

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

Councillors 2021/2023:

Abdul Halim Abdul Latiff
Amie Norsyazan Amir
Joy Jacqueline Pereira
Nur Iskandar Taib

Information

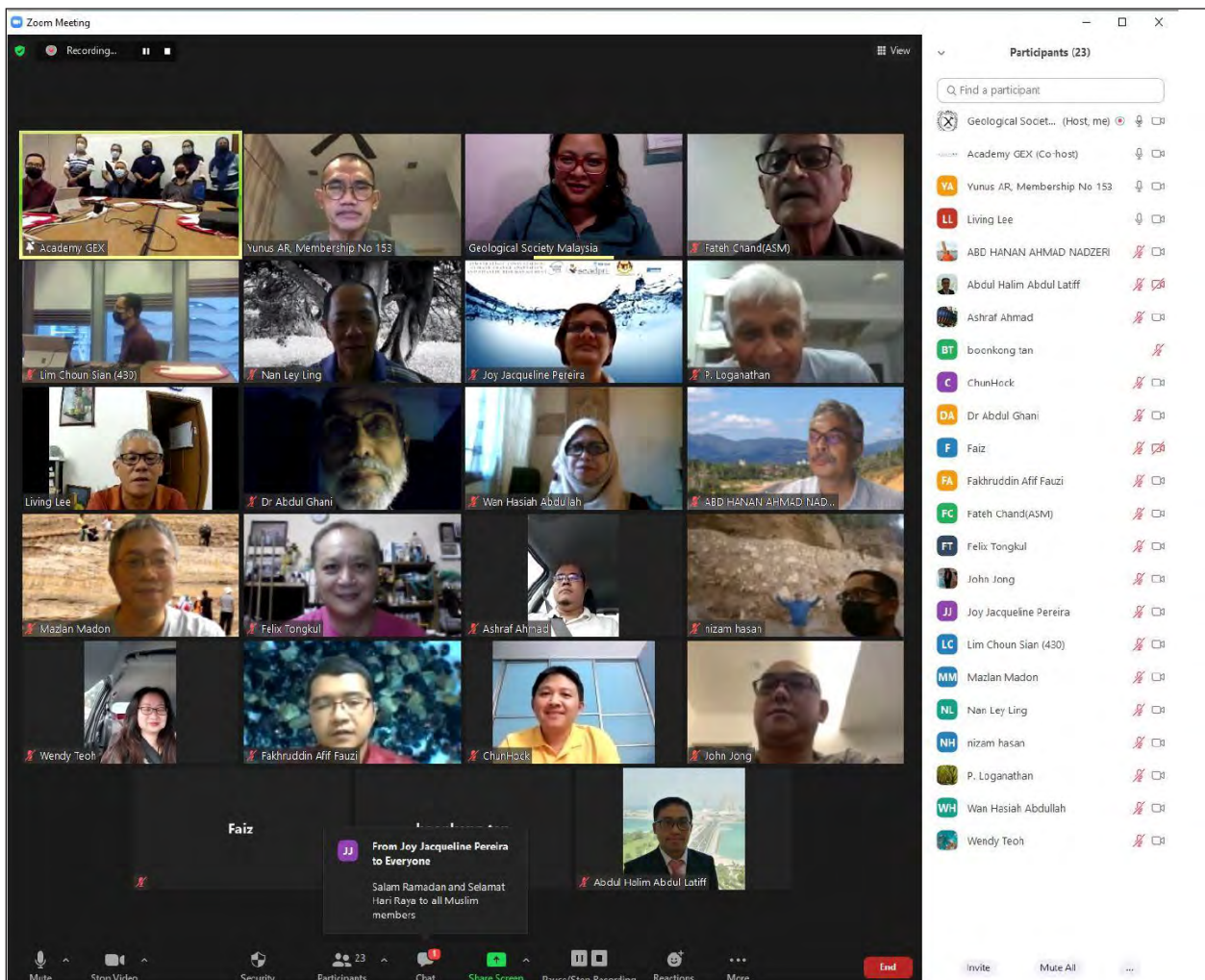
8. Presidential Address for 2021/2022

The President, En. Ahmad Nizam expressed that it is a great honour for him to be elected after a decade of participation in GSM council, in particular as Treasurer of the Society's funds have grown over the years, placing the society in a comfortable financial position and hopefully this would benefit more members through quality activities in the future.

He pledged that he and the new Council would try their best to serve for the good of the Society.

The AGM adjourned at 7:00 pm.

FARAH FAZULAH ABDULLAH
Secretary 2020/2021
30th April 2021



Annual Report for Session 2021/2022

a) President's Report

Introduction

The Geological Society of Malaysia (GSM) has sustained its objective of actively promoting the advancement of the geological sciences in the country and the region. GSM continued with activities that were designed to strengthen the capacity of geoscientists and had embarked on initiatives to formalise collaborations and alliances with key institutions within the geoscience fraternity. Nevertheless, within the spirit of 'GSM Cares GSM Prihatin', GSM also called to participate in various Corporate Social Responsibility (CSR) programme not only focusing on financial needs of geology students in various universities that are facing a difficult time during the PKP due to pandemic Covid 19 situation but also to the community that faced the geohazard catastrophic.

Promotion and Collaborations

In the term of 2021/22, GSM was actively promoting on student outreach programs in other than mainstream or specific majoring courses that are strongly embedded with geology subject. GSM proudly launched the GSM-USM Student Chapter in December 2021 at USM Penang main campus attended by Dr. Nordiana Mohd Muztaza (Geophysics Programme Chairman), Dr. Andy A. Bery (Advisor GSM-USM Student Chapter) and Dr. Teoh Ying Jia (Co advisor GSM-USM Student Chapter). While in January 2022, GSM has signed a Memorandum of Understanding (MOU) with University Malaysia Terengganu in an overwhelming signing ceremony held in UMT Main Campus officiated by Prof. Dr. Marinah Mohd Ariffin, Deputy Vice Cancellor (Research and Innovation) and attended by Prof. Madya Dr. Maisara Abdul Kadir, Deputy Dean (Akademik dan HEP- Fakulti Sains dan Sekitaran Marin), Dr. Nor Bakhiah Baharim (Head of Marine Geoscience Programme) and Tn. Haji Zukiferee Ibrahim (Registrar UMT). Through this MOU, GSM officially launched the GSM-UMT Students Chapter.

In the meantime, throughout the years, GSM as well as GSM University Students Chapter have actively organised various form of webinars and virtual technical talk programmes such as GSM Working group Promotion of "Sembang Petang dengan...", GIW 2021 by University Malaya, Wednesday Series of technical talks by University Kebangsaan Malaysia, Technical Talk on Site Investigation, and Career Fair by University Malaysia Kelantan. We believe that these continuous promotion and collaboration programmes would be an excellent effort in tapping student members and future leaders at a very early stage before they enter the real-world challenges and would continuously support the GSM programmes in the future.

Nevertheless, GSM under the flagship of Working Group is consistently organising various technical webinar programme generally for public and industry such as a monthly technical talk from Working Group Engineering Geology (WGEG) lead by Mr. Tan Boon Kong that features a range of professional geotechnical engineers sharing their experience and view on the importance of Engineering Geological subject matter in solving the geotechnical engineering design. The Working Group Marine and Quaternary Geology (WGMQG), led by En. Abdullah Sulaiman, actively organised a diverse and cross-sectoral webinar event on Marine and Quaternary geological subjects in other professional quarters in relation to the marine environment and archaeology. The webinar series of Sundaland organised by WGMQG attracted not only local but also international participations. The Working Group Hydrogeology led by En. Ismail Tawnie together with IGM, actively organised a series of hydrogeology webinar covering all aspect of fundamental groundwater exploration, technology and environment.

The Working Group of Geophysics under Dr. Abdul Halim Abdul Latiff and Dr. Mohd Hariri Arifin has continuously carried out events with IGM on various subject of Geoheritage and Geopark with participation from local and international participants and speakers from multi sectors. This term, GSM has introduced a new Working Group of Karst and Caves led by Dr. Ros Fatimah that jointly organise the webinar on Karst-based Geotourism in Malaysia together with other related subject matter experts such as speleologist, palaeontologist and archaeologist. GSM is committed to expanding and uplifting the subject to the mainstream under the working group flagship in the future. The Working Group of Mining Geology led by Dr. K.K. Cheang successfully jointly organised with IGM an annual webinar - GSM-IGM Virtual Advanced Seminar on Mining Geology & Mineral Resources in Supporting the Growth & Development of Malaysia & The Region, on 12th April 2022. The overwhelming webinar attracted more than 180 participants and speakers from local and international, covering various subjects related to mining resources, exploration, engineering and hydrogeology. The GSM president was given the honour to officiate and also presented a paper on Engineering Geology In Mining.

The Flagship on Geoscience to Action for Disaster Risk Reduction (G2A4DRR) was established in 2015 as a joint initiative of GSM and IGM, with technical support from SEADPRI-UKM and the Geology Department of UM. The G2A4DRR serves as a catalyst to incubate and create market potential geoscience technology, tools and services relevant to address the risks of hazards, as well as conduct capacity building and professional development.

The G2A4DRR is a financially sustainable initiative, with funding from the IDRC Canada via an agreement signed with UKM. In 2021, the G2A4DRR conducted a training course on DRR and Climate Change, targeting final year geology undergraduates in local universities. Other ongoing initiatives are the development of a Geohazards Knowledge Hub and formulation of Technical Guidance on Terrain Mapping and Area Business Continuity Plans.

The IGM-GSM Joint Committee (JC) met 2 times over the year. The JC will continue to oversee the collaboration between the two institutions, especially on capacity building, outreach & promotion, geoscience policy and quality geoscience education in Malaysia. This term, JC was invited by JMGM to collaborate in 2 main community outreach programs which are a scientific site visit to the areas that were affected by debris flow in Gunung Jerai (Kedah) and Hulu Langat (Selangor), and landslides in Kg. Palimbayan, Sg. Penchala, Kuala Lumpur. The program is to give a collaborative perspective in view of potential cause, extend and safety of the affected community to JMG as a geohazard agency. The President and/or the Working Group on Promotion also continue the collaboration jointly visit to geological departments at local universities and communities throughout the year with recently, to Kuching, Sarawak by invitation from Dr. Richard Mani Banda, Chairman of IGM Sarawak Chapter in March 2022 which was attended by committee members who are mainly geologists in public agencies and industries in Sarawak. The main objective was to oversee and manage the activities or program towards the development, professional direction and recognition of geoscience in Sarawak. The collaboration of GSM and IGM is planned to organise the main event which will be implemented in Sarawak this year.

In memory of arwah Assoc. Prof. Dr. Tajul Anuar (UKM), GSM has collaborated with the Society for Engineering Geology & Rock Mechanics Malaysia (SEGRM) and IGM on a special commemoration webinar 'Dr. Tajul Anuar Jamaluddin Memorial Seminar – Case Histories In Engineering Geology and Rock Engineering' on 11th September 2021. This collaborative event was important as to remember the everlasting effort, initiative and contribution of arwah throughout his life dedicating his utmost knowledge on engineering geology not only to the local geology fraternity or internationally but also to the public community.

A virtual technical talk to introduce the new application of geophysics as a tool in research and industry. Working Group of Geoheritage lead by Dr. Tanot Unjah actively organise a jointly webinar.

Further initiative in enhancing the application of geology knowledge in multi cross-sectoral, GSM was invited and paid a courtesy visit to the Director of Geotechnic Division of JKR on 10th May 2021 to enhance further the collaboration and was invited as panel in reviewing the application of geological aspect in reviewing existing 'JKR Standard For Road Works Section 17: Site Investigation (JKR/SPJ/2013-S17)' documents, represented by the President and Vice President.

And on 19th March 2022, the President was invited as panel and presenter together with the Deputy Director General of PLAN Malaysia in a webinar forum organised by the Malaysian Institute of Planners (MIP) on 'Kepentingan Lapuran Penilaian Geologi Kejuruteraan Bagi Proses dan Pelaksanaan Jawatankuasa Sensitif Alam Sekitar (KSAS) Negeri Selangor' attended by more than 200 participants comprising professional planners, developers and stakeholders from both government agency and GLCs.

National Geoscience Conference (NGC)

Due to the MCO and Covid 19 situation, the 33rd National Geoscience Conference 2020 (NGC 2020) scheduled to be held in Bangi, Selangor was postponed and was held virtually in 2021 as NGC 2020/21. Congratulations on the successful event that was co-organised by UNITEN, UKM, JMG and IGM. The collaborative synergy proved to be successful at the conference where diverse geological aspects were covered including applications, professionalism, etc that outreached a wider range of practitioner geologists either in academia or industry. This collaboration shows another success milestone of NGC as an established national prominent geoscience event of the year. Nevertheless for the year 2022, NGC will be a featuring conference in the GEOSEA 2022 congress in a mega collaboration with all the local universities that have the related geoscience program.

GEOSEA

GSM again consensus agreed by members of GEOSEA to continue as the secretariat for GEOSEA till 2022. The 16th Regional Congress on Geology, Mineral and Energy Resources of Southeast Asia (GEOSEA XVI) was organised successfully by the Geological Society of the Philippines (GSP) from 6th to 8th December 2021 in Manila in virtual,

with the theme of ‘5(+1) Years After ASEAN Integration: Milestones, Challenges and Perspectives for Geoscientists’. During the GEOSEA members meeting, an official MOU signing ceremony on the formation of ASEAN Federation of Geoscience Organisation (AFGEO) by leaders from the Philippines, Thailand, Indonesia and Vietnam was successfully held. All signing leaders hope that all other members will be following the step and concluded the participation from the rest of the ASEAN countries under a formal flagship of AFGEO as a structured ASEAN geoscience organisation. The collaboration will be a roadmap to all members to officially further cross the border in the enhancement of the sharing of knowledge and professionalism within ASEAN registered Professional Geologists countries.

Further in the meeting, GSM was officially announced as the next host organiser of the 17th Regional Congress on Geology of Southeast Asia (GEOSEA XVII) which will be held in Langkawi from 17th to 21st October 2022 with the theme ‘ADVANCE GEOSCIENCE ADVANCE ASEAN’. The President made a short welcoming presentation on what GEOSEA LANGKAWI 2022 will be offering to members at the end of the AGM. An overwhelming response from all members, looking forward to the long-awaited physical event after Hanoi, Vietnam in 2018.

In preparing for the event in Langkawi, the President together with IGM and JMG teams managed to get the full support and commitment from Langkawi Development Authority (LADA) in officially recognising GEOSEA LANGKAWI 2022 as one of their events of the year. The main organising committee is formed with the President as the organising chairman while En. Abdul Rasid Jaapar; President of IGM, En. Abdullah Sulaiman; representing JMG and En. Azmil Munif Mohd Bukhari from LADA together appointed as the Co-Chairman. While the GSM Vice President, Dr. Mohd Hariri Ariffin as the secretary and the treasurer is Dr. Lim Choun Sian. As the event is also in conjunction with NGC 2022, more than 10 geological themes are being highlighted and with involvement representative from all universities offering geological subject being assigned as convenors. In highlighting Langkawi as a UNESCO Geopark, the event is customised into 3 days, where the afternoon of the second day is a compulsory field excursion for all participants to enjoy selected prominent geosites. The arrangement will be supported by Langkawi Research Centre (PPL), UKM. Further to that, the event will also be more field work-oriented as various packages of field excursions will be available during pre or post-conference, from the main island to other surroundings of Langkawi Island. In the spirit of geoscience, there are 2 other geoscience events that prominently have their own branding which is SERIES 2022 organised by UMP, and RCL 2022 that is an established annual event organised by LADA, that will be humbly joining in the celebration of GEOSEA XVII fiesta as an Olympic congress of Geoscience. GSM would like to encourage our members to support, participate and together we celebrate the GEOSEA XVII in Langkawi 2022.

Publications

The GSM magazine, *Warta Geologi* has a new look. As a further improvement, the Editorial team is in the process of applying the Scopus-index for *Warta Geologi*. The GSM technical publication, the *Bulletin of the Geological Society of Malaysia*, has consistently published twice a year since 2017. In early 2022, the Editorial team applied for the indexing of the *Bulletin* in the Web of Science. The index will ensure our *Bulletin* to become one of the sought-after publications in this region by researchers and readers. A detailed report shall be presented in the Editor’s Report.

I would like to thank the Editorial Team led by Dr. Wan Hasiah, Associate Professor Dr. Ng Tham Fatt, the Managing Editor for the *Bulletin*, Puan Aida, the editorial executive for their tireless efforts. We are now publishing on time two volumes of the *Bulletin* and three issues of *Warta Geologi* a year. This year GSM goes full pledge of paperless publications after getting a positive response from the members. GSM is also planning to publish 2 books which are ‘*Topi Bulat Geologi*’ by Dr. Hariri and Dr Lim, and ‘*Book of Fossil in Malaysia*’ by Dr. Meor Hakif and Dr. Mazlan Madon that are currently in the middle of writing and data gathering. Hopefully the books can be ready by next year. GSM appreciates and encourages members to contribute in form of ideas, time and financial sponsorship to ensure the books complete on schedule.

Field Excursions

As said by Read (1940): ‘The best geologist is (the one) who has seen the most geology’. This term, as our country is still in the mid of the pandemic Covid 19, GSM only manage to support the field excursion of GeoXpdc@Bentong Raub Suture – Into The Subduction Zone from 18th to 20th March 2022, organised by Geodream Academy and Adventure Sdn. Bhd., and conducted by En. Askury Abd Kadir. GSM will pursue further on similar activities in the next term as our country embarks on the endemic phase of Covid 19.

GSM Website

This year the GSM website will go through a total revamp and overhaul of our existing website. The initiative is important in preparing the website to be more interactive, dynamic and vibrant, catering the all aspects of publications,

archives, manuscript submission, conference management, membership updating, payment system and promotions as part of GSM digitalisation program in making our geoscience resources online.

Way Forward

The President strongly urges the members of GSM to support by giving comments and recommendations that can improve the management of GSM. As the need to manage GSM professionally like an enterprise entity, the President will suggest to have more full-time support staffs in various critical key administration such as finance, promotion, marketing and multimedia. This will be crucial as GSM is in the middle of re-vamp or re-branding its current website to be more interactive with members and incorporate an on-line payment system, on-line technical paper submission, etc that needs for routine management to handle and updating. The amount of investment can be further discussed and deliberated among the new council members in a special brainstorming session with the participation of experts among members and regional representatives on how to move forward. In support of Continuous Professional Development (CPD) agenda, GSM has been given an exclusivity from Board of Geology (BOG) together with IGM to conduct program that provide CPD points to professional geologist (P.Geol) members. Therefore, an initiative to organise more CPD points oriented programs either with fee charges or free will be organised as part of GSM main agenda and responsibility to members.

Closing Remarks

As a final remark and closing term of 2021/22 curtains, GSM now have a total of 1057 memberships in various categories and hope to have more in years to come with a well-structured promotion and outreach program. GSM would like to encourage and put in all effort together with IGM and BOG (Board of Geologists) in achieving a solid national geoscience agenda and awareness to outreach the public on the importance of geoscience for nation building. As the president, I would like to thank all the council members for giving all their heart, volunteering on the successful years together and not to forget warmest appreciation to the outgoing council members for their contributions as well as to all members for their ideas and support. Thanks to all organising chairs of all events, working group chairs and regional representatives. Last but not least, a big thank you and salute to the one and only secretariat member, Ms Anna Lee for another excellent year of contribution managing GSM in another restricted year of PKP situation.

AHMAD NIZAM HASAN, P.Geol, F.I.G.M
President 2021/2022
Geological Society Of Malaysia

b) Secretary's Report (including Assistant Secretary's Report)

On behalf of the members of the Council of the Geological Society of Malaysia (GSM), it is my pleasure to present the Secretary's Report for the session 2021/2022.

Society Structure

The Society's stakeholders are the members of the Society led by an elected Council. The Council's main functions are to set directions to promote the advancement of geosciences, endorse activities and provide guidance for the execution of the activities of the Society. The Council is supported by 15 Working Groups and an Editorial Committee (formerly known as Editorial Group). There is no regional representative for the past two (2) terms. The Working Groups were increased from 10 to 115 in the year 2021, details to be table out in subsequent section.

The Council

The Council for the Geological Society of Malaysia for 2021/2022 session resumed their office after the 55th AGM on the 30 April 2021.

At the end of the nomination period on 30 September 2020, nominations were received for all posts. Only a single nomination was received for all posts except for the four 2-year councillor posts, for which 5 nominations were received. (see Report of Nominations Committee, dated 18 October 2020).

The Council decided to conduct email balloting for the four (4) council members for the 2- year posts that will be vacated at the end of the term in April 2021.

On 10th November, ballot forms were sent out to members with the profile of all 5 candidates for selection by email ballots.

At the closing of balloting on 15 December 2020, the following votes were counted and verified by the Elections Officer Dr Mazlan Madon and two Scrutineers, Prof. Azman A. Ghani and Dr. Muhammad Hatta Roselee, who were appointed by the Council.

The ballot count is as follows:

1. **Joy Jacqueline Pereira (66 votes)**
2. **Amie Norsyazan Amir (61 votes)**
3. **Nur Iskandar Taib (60 votes)**
4. **Abdul Halim Abdul Latiff (57 votes)**
5. *Tan Boon Kong (36 votes)

Candidates with the 4 highest votes (above names in bold) were elected to the Council for the two-year term (2021/2022 – 2022/2023). Ahmad Tariq expresses his decision to depart from the council role and was then seamlessly replaced by Mr. Tan Boon Kong.

With this the council position was all filled with no further changes throughout the term.

The council for 2021/2022 are:

President	–	Ahmad Nizam Hasan
Immediate Past President	–	Abd Rasid Jaapar
Vice-President	–	Mohd Hariri Arifin
Treasurer	–	Lim Choun Sian
Editor	–	Wan Hasiah Abdullah
Secretary	–	Farah Fazulah Abdullah
Assist. Secretary	–	Nor Azianti Asmari

Councillors (for remaining 1-year of their term) [2021/2022]

- *Ahmad Tariq Ahmad Ziyad / Tan Boon Kong
- Awg Mohd Faizal Awg Mohamad Hamssin
- Maryam Syazana Dzulkifli
- Tan Chun Hock

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

Councillors (for 2-year term) [2021/2022-2022/2023]

- Abdul Halim Abdul Latiff
- Amie Norsyazan Amir
- Joy Jacqueline Pereira
- Nur Iskandar Taib

Council Meetings

During the 2021/2022 session, given the pandemic of COVID-19 circumstances, virtual meeting was preferred and held at all times. The Council met virtually 6 times with the dates below :

- i. 27 May 2021
- ii. 23 July 2021
- iii. 24 Sept 2021
- iv. 26 Nov 2021
- v. 28 Jan 2022
- vi. 25 Mar 2022

The attendance of the council members to the meetings is presented in the next table.

All six (6) meetings were conducted via online Zoom Meeting and unlike previous term, where an attempt of face to face meet was done at Department of Geology, University of Malaya, Kuala Lumpur, with online option at the other end.

However, the network issue remain as constant obstacle that the council decided on reverting to virtual option, in the current term.

Attendance of Council Members at Council Meetings:

	Name	1	2	3	4	5	6	Total
1	Mr. Ahmad Nizam Hasan	/	/	/	/	/	/	6 / 6
2	Mr. Abd Rasid Jaapar	/	/	/	/	0	/	5 / 6
3	Dr. Mohd Hariri Arifin	/	/	/	/	0	/	5 / 6
4	Dr. Lim Choun Sian	/	/	/	/	0	/	5 / 6
5	Dr. Wan Hasiah Abdullah	/	/	/	/	/	/	6 / 6
6	Ms. Farah Fazulah Abdullah	/	/	/	/	0	/	5 / 6
7	Ms. Norazianti Asmari	/	/	/	/	/	/	6 / 6
8	Mr. Tan Boon Kong	/	/	/	/	/	/	6 / 6
9	Awg Faizal Awg Hamssin	/	0	0	0	0	0	1 / 6
10	Maryam Syazana Dzulkifli	/	0	0	/	0	0	2 / 6
11	Tan Chun Hock	/	0	/	/	0	/	4 / 6
12	Prof. Joy Jacqueline Pereira	/	0	/	/	/	/	5 / 6
13	Dr. Nur Iskandar Taib	/	/	/	/	/	/	6 / 6
14	Dr. Abdul Halim Abdul Latif	/	/	/	/	/	/	6 / 6
15	Amir Norsyazan Amir	/	0	/	/	/	0	4 / 6

Working Groups

The Working Groups and the Chairs for the session were appointed during the first Council Meeting, comprising all council members and three (3) guest members as follows;

WORKING GROUP	CHAIR PERSON & SUPPORTING PERSONNEL
Engineering Geology	Mr. Tan Boon Kong; committee members Azianti, Nizam, Rasid & Dr. Lim
Hydrogeology	En. Ismail Tawnie
Promotion of Geoscience, Social Media & Digital Content	Norazianti

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

Economic Geology & Mineral Resources	Dr. K.K. Cheang
Regional Geology	Dr. Nur Iskandar
Geophysics	Chair: Dr. Hariri Ariffin, Co-chair: Dr. Halim Latiff
Petroleum Geoscience	Amie Amir, Hock, Maryam
Young Geologist & Student Outreach	Maryam Dzulkifli
GSM-IGM Joint Committee	Dr. Hariri Ariffin & Nizam Hasan
IT & Website	Dr. Lim Choun Sian & Dr. Iskandar
GSM-IGM Flagship on Geoscience to Action for Disaster Risk Reduction (G2A4DRR)	Prof. Joy Pereira
CPD Liason	Norazianti & Farah
Membership Database	Norazianti, Dr. Halim, Dr. Hariri, Anna, Dr. Iskandar
Quaternary & Marine Geology	En. Abdullah Sulaiman
Karst & Caves	Dr. Ros Fatimah (UM)

Membership

As of 31st December 2021, the total number of members in the Society stands at 1057, a slight decrease from previous year by 42. The decrease is mainly from Student category. The table below presents the breakdown in membership categories and their geographical breakdown.

Breakdowns of Membership:

COUNTRY	Hon.	Life	Full	Assoc.	Student	Inst.	Total 2021	Total 2020	Total 2019	Total 2018
Malaysia	12	414	119	6	417	-	968	1013	672	561
Australia	1	20	-	-	-	-	20	18	22	20
Bangladesh	-	2	-	-	-	-	2	1	2	2
Brunei	-	2	-	-	-	-	2	2	2	1
Canada	-	3	-	-	-	-	3	3	2	1
China	-	1	-	-	-	-	1	1	1	3
Europe	-	15	-	-	-	1	16	17	15	13
Hong Kong	-	1	-	-	-	-	1	1	1	2
India	-	2	-	-	-	-	2	1	1	1
Indonesia	-	8	-	-	-	-	8	8	10	3
Japan	-	3	-	-	-	-	3	3	3	2
Libya	-	3	-	-	-	-	3	3	3	2
New Zealand	-	2	-	-	-	-	2	2	2	-
Philliphines	-	2	-	-	-	-	2	2	1	2
Qatar	-	1	-	-	-	-	1	1	0	-
Singapore	-	9	-	-	-	-	9	9	9	8
Thailand	-	2	-	-	-	-	2	2	3	3
USA	-	11	-	-	-	-	11	12	12	7
Total 2021	13	501	119	6	417	1	1057			
Total 2020	13	481	127	2	473	1		1099		
Total 2019	13	465	122	10	149	3			762	
Total 2018	12	435	92	9	138	3				689

Note : i) Country listed are based on mailing address, not Nationality-based.

Project, Agreement, Secretariat and Working Groups Activity

Research Project:

GSM is one of the partners in the research project on Disaster Resilient Cities: Forecasting Local Level Climate Extremes and Physical Hazards for Kuala Lumpur, led by SEADPRI-UKM that received funding from the Newton-Ungku Omar Fund.

GSM's role is to benchmark the process and guide knowledge transfer in the research. The project supported the GSM-IGM Flagship on Geoscience to Action for Disaster Risk Reduction (G2A4DRR).

Agreements:

Two (2) MoU's were inked within this Council Year, which was done virtually.

- GSM x GEOSEA
- GSM X University Malaysia Terengganu (UMT)

Joint Secretariat:

This Council year, the GSM-IGM Joint Committee met on

- 30 July 2021
- 18 March 2022

The Joint Committee, an initiative under an agreement signed between GSM and IGM on 5 April 2013 and was tasked to set up various subcommittees with the objectives, among others, to promote education, research, and graduate membership, and to oversee and review geoscience curricula in Malaysian universities. The meetings discussed on future joint organisation of NGC, technical talks, geoscience curricula and continuous professional development program.

Activities:

Throughout the term, 64 events were held, with virtual presence of members and the public.

Bil.	TARIKH	AKTIVITI	PENCERAMAH	MODERATOR
1	8/6/21	Sepetang bersama Presiden Persatuan Geologi Malaysia	En. Ahmad Nizam Hasan	
2	15/6/21	Technical Talk: Reservoir modeling & characterization	Jairo Antonio Plata Torres (Principal Reservoir Geoscientist, PETRONAS)	Dr. Abdul Halim Abdul Latiff
3	17/6/21	Sepetang bersama Timbalan Presiden Persatuan Geologi Malaysia	Dr. Mohd Hariri Arifin	Norazianti Asmari
4	30/6/21	Postgraduate opportunity for geoscientist in Malaysia	1. Dr. Abdul Halim Abdul Latiff (UTP): Postgraduate Opportunity in UTP Petroleum Geoscience: Creating a Pipeline of Petroleum Geoscience Specialist. 2. Dr. Nor Shahidah Mohd Nazer (UKM): Peluang melanjutkan kejarjanaan di UKM: Peneraju ahli geologi kejuruteraan dan geofizik terbilang di Malaysia 3. Dr. Nursufiah Sulaiman (UMK): Postgraduate Opportunity in Geoscience Department, Universiti Malaysia Kelantan. 4. Dr. Nordiana Mohd Muztaza (USM): Postgraduate Opportunity in Geophysics, USM. 5. Dr. Muhd Nur Ismail Abdul Rahman (UMT): Postgraduate degree in Marine Geoscience at UMT. 6. Dr. Hijaz Kamal Hasnan (UM): Postgraduate Opportunity in Petroleum Geology, Department of Geology, Universiti Malaya. 7. Dr. Zulherry Isnain (UMS): Postgraduate study in Geology at UMS.	Dr. Mohd Hariri Arifin
5	14/7/21	Slope stability: Input from geoscientist	P.Geol. Gs. Hairil Azwan Razak from Geotechnica Sdn. Bhd.	Dr. Mohd Hariri Arifin

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

6	15/7/21	Technical Talk: Electromagnetic method for investigating	Gs. Dr. Muhammad Hafeez Jeofry	Dr. Abdul Halim Abdul Latiff
7	15/7/21	Antarctic ice-sheet stability	Universiti Malaysia Terengganu	
8	4/8/21	Otai Masih Berbisa	1. Dr. Abdul Ghani Rafek 2. Dato Amran Mohamad	Dr. Mohd Hariri Arifin
9	11/8/21	Geohazard Risk Assessment on the acid tank and pipeline gas leakage using 2D SSPT Geomodelling and Partial Discharge (PD) testing method	P.Geol. Dr. Abdull Halim Bin Abdul M.I.G.M CEO Groundwave SSPT Sdn. Bhd.	Dr. Nor Shahidah Mohd Nazer
10	16/8/21	Technical Talk: Driving exploration with Air-FTG Technology	Roy Kittrell (Lead Regional Geologist for SE Asia, Bell Geospace)	Dr. Abdul Halim Abdul Latiff
11	18/8/21	Otai Masih Berbisa	Dr. Suhaili Ismail	Dr. Mohd Hariri Arifin
12	25/8/21	Geoenergy Talks's Series: Geothermal Energy	1) Dr. Zuhar Zahir Tuan Harith 2) Dr. Wen J. Whan 3) Asst. Prof. Dr. Helmut Josef Durrast 4) Mr. Noor Akhmar Kamarudin	Dr. Mohd Hariri Arifin
13	15/9/21	Bicara santai bertemakan Geosaintis dan Kepimpinan	1) Prof. Dr. Ismail Yusoff, 2) Prof. Baba Musta 3) Dr. Mohd Rozi Umor 4) Prof. Emeritus Dato' Dr. Ibrahim Komoo	Dr. Mohd Hariri Arifin
14	13/10/21	Bicara bersama ahli geologi dan geofizik muda	Dr. Muhammad Taquiuddin bin Zakaria En. Mohammad Noor Akmal bin Anuar En. Muhamad Afiq bin Saharudin	Dr. Nor Shahidah Mohd Nazer
15	20/10/21	Sharing Session: Geologist and Slope Work	Siti Hajar Juraimi & Ir. Saifuddin Bin Sheafi	Norazianti Asmari
16	22/10/21	Technical Talk: Scalable Cloud Solution for Exploration Geology	Mohd Azizul Yahya	Dr. Abdul Halim Abdul Latiff
		Geophysics workflow	Team Lead, Halliburton Landmark G&G Services Delivery	
17	27/10/21	USM di hati GSM	Dr. Nur Azwin Binti Ismail & Dr. Teoh Ying Jia	Dr. Mohd Hariri Arifin
18	13/11/21	Promosi GSM di Geologi UKM	En. Ahmad Nizam Hasan & Dr. Mohd Hariri Arifin	Kelab Geologi UKM
19	23/11/21	Dino-Lite Digital Microscope Malaysia	Mr. Johnson	Dr. Mohd Hariri Arifin
20	3/6/21	Water Sector Transformation 2040 (WST2040) Webinar on Alternative Water Financing	Alternative Water Financing (AWF) Task Force and Academy of Sciences Malaysia	Forum
21	3/6/21	Juzaili Azmi	Fugro	Webinar
22	5/6/21		G2A4DRR	Forum
23	8/6/21	Sepetang bersama Presiden GSM		Ahmad Nizam Hasan

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

24	15/6/21	Reservoir modelling & characterization: Theory & practice	Principal Reservoir Geoscientist, PETRONAS	Jairo Antonio Plata Torres
25	24/6/21	The search for new deposits of tin, gold, rare earth elements, iron ore and other economic minerals in Malaysia	UKM Fakulti Sains dan Teknologi	Dato' Sia Hok Kiang
26	30/6/21	Sambung belajar geologi di universiti tempatan (Malaysia)	UM, UKM, USM, UTP, UMT, UMS dan UMK	Dr. Halim, Dr. Nordiana, Dr. Nor Sufiah, Dr. Nor Shahidah, Dr. Zulheri, Dr. Ismail & Dr. Hijaz
27	2/7/21	Resume in the eyes of employer	Geosolution/GSM	En. Ahmad Nizam Hassan
28	3/7/21	IGM GeoSembang Maya bersama Pak Chu Bummy: GeoSains, pendidikan and professionalisme: Kenapa dan bagaimana?	GeoDream	Abd. Rasid Jaapar, Prof. Dato' Dr. Husaini Omar, Askury Abd Kadir
30	9/7/21	Sepetang Bersama	GSM	En. Abd Rasid Jaapar
31	14/7/21	1. Geo-Trio: Integration of geology, geotechnical and geospatial in geohazard and risk assessment; 2. Impacts of hill top development to hill bottom household : Field observation at Taman Bukit Koman, Raub, Pahang. 3. The junction between geophysics and geology for geohazard assessment	Geotechnica Sdn. Bhd., Geologi UKM, Geoventure Solution Sdn. Bhd.	PGeol. Gs. Hairil Azwan Razak, PGeol. Ir. Ts. Dr. Goh Thian Lai, PGeol. Ahmad Zulqurnain Ghazalli
32	15/7/21	Electromagnetic method for investigating Antarctic ice-sheet stability	UMT	Gs. Dr. Muhammad Hafeez bin Jeofry
33	21/7/21	Technical Talk: Mining sector		
34	23/7/21	GSM-IGM Flagship in Disaster Risk Reduction (DRR) Talk Application of Technology for DRR in Malaysia	SEADPRI UKM	Dr. Rabieahtul Abu Bakar
35	4/8/21	Otai Masih Berbisa- siri 1 (UKM)	Pesara; Geostrength	Dr. Ghani Rafek & Dato Amran
36	11/8/21	Underground investigation using 2D SSPT method	Groundwave SSPT Sd. Bhd.	Dr. Abdull Halim Bin Abdul
37	13/8/21	Lautan dan Al Quran	JMG KPPP	Abdullah Sulaiman
38	16/8/21	Full-tensor gravity gradiometry: Subsurface identification of Malaysian Basin	Bell Geospace	Roy Kittrell
39	21/8/21	Sepetang Bersama Editorial Team	Dr. Wan Hasiyah Abdullah, Dr. Mazlan Madon, Dr. Lim Choun Sian	Dr. Mohd. Hariri Arifin
40	23/08/21	The Quarternary and climate change	JMG (PERSARA)	Dr. Kamaludin
41	25/8/21	Geothermal : Malaysia and Taiwan experiences	3JTech Taiwan, JMG	Dr. Wen, En. Akmal, Dr. Zuha & Dr. Helmut
42	27/08/21	Hala tuju Geoarkeologi negara	USM	Prof. Dato' Dr. Mokhtar Saidin

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

43	30/08/2021	3 rd National Workshop on Coastal & Marine Geology	UTP	
44	15/9/21	Geosaintis dan Kepimpinan	UKM, UM, UMS, LESTARI	Dr. Rozi, Prof. Ismail, Prof. Baba & Prof. Dato' Ibrahim Komoo
45	17/9/2021	Arkeologi Marin	Jabatan Warisan Malaysia	En. Ruzairy Bin Arbi
46	22/9/2021	Investigating and mitigating measures to peat fire, sinkholes in limestone formation and boulder fall	GNP	Ir. Liew Shaw Shong (G&P)
47	23/9/21	T.B.A	UMT	A.P. Dr. Edlic Sathiamurthy
48	13/10/21	Geofizik 2	USM, UKM dan ABEM MALA	Dr. Taqi, Akmal & Afiq
49	20/10/21	Rockfall protection system by Maccaferri Malaysia Sdn. Bhd.	Ir. Saiffuddin bin Sheafi & Siti Hajar	Maccaferri
50	22/10/2021	Scalable cloud solution for exploration geology & geophysics workflow	Halliburton	Mohd Azizul Yahya
51	27/10/21		USM	Dr. Nur Azwin Ismail, Dr. Teoh Ying Jia
52	24/11/21	Portable Geology Microscope	DPRO Group	Johnson Ng
53	15/12/21	Gold exploration	Gerak Darma	Sheikh Kamarul
54	22/12/21	Geology - Agile & versatile career	Independent	Cindy Simba
55	15/1/22	Industri perlombongan - Menemui permata tersembunyi	UMG-GSM	Edwin James
56	23/2/22	Sudut geseran dalam mekanik batuan	UKM-GSM	P.Geol. Dr. Abd Ghani Rafek
57	9/3/22	Deep seabed mining: perspective from developing nation	IGM-GSM	
58	22/3/22	Rock slope stability analysis: The selection & modelling issue	WG Eng Geo	Ir Dr Rini Asnida
59	28/3/22	Becoming a professional geologist, challenges ahead	UMS-GSM	P.Geol. Abd Rasid Jaapar
60	12/4/22	GSM-IGM virtual advanced seminar on mining geology and mineral resources in supporting the growth and development of Malaysia and the region.	WG Mining Geology	
61	13/4/22	How & Why Landslide	WG Eng Geo	Ir Darryl
62	14/4/22	Pengenalan kepada kejuruteraan gempa bumi & seismik	UMS-GSM	Ts Dr Noor Sheena
63	22/4/22	Geology & archeology marvels of Baling Karst	GSM	Dr. Ros Fatihah
64	28/4/22	Program taklimat peluang melanjutkan pengajian peringkat siswazah di UKM	UKM & GSM	Ts. Dr. Mohd Hariri

GSM Awards

Here are the awards given by the Society for the year 2021/2022:

- GSM Best Student Award 2022 : Yuvan A/L Manohkaran (UKM)
- Hadiah Buku Langkawi : Qursyiah Binti Mahamud (UM)
- Hadiah Persatuan Geologi Malaysia : Nadhrah Binti Azmi Shah (UM)

Linkages and Collaborations

GSM maintained linkages with national and international institutions such as:

- Institute of Geology Malaysia
- Confederation of Scientific and Technological Association of Malaysia (COSTAM)
- Formation Evaluation Society Malaysia (FESM)
- American Association of Petroleum Geology (AAPG)
- Newton Ungku Omar Fund and IGM-GSM Flagship since July 2015
- GEOSEA
- MoU with NrgEdge, University of Malaya, Universiti Malaysia Kelantan
- Asian Network on Climate Science and Technology, and Newton-Ungku Omar project partners
- Society of Exploration Geophysicists (SEG)
- For the Student's Geological Club Collaboration; AAPG Student Chapter of University of MoU

The continued co-operation and support extended by JMG, PETRONAS, UKM, UMS, UTP, IGM, ANCST and Newton-Ungku Omar project partners is recorded with gratitude. The unwavering support of Ms. Anna Lee and Ms Wan Aida in the administration of GSM is also very much appreciated.

I would like to applaud council members and their uptake in overcoming digital and technology gap in enabling virtual meetings, and organizing of events is made possible. Throughout this term, we do leverage a lot on social media, and multiple ways of communicating in pursue of decision and consensus.

Last but not least, the Council also wishes to record its appreciation to all GSM members for their advice, and special mention to Miss Azianti (currently assistant secretary) on your support, and understanding given the geographical distance barrier that's set between us.

Till next time.

FARAH FAZULAH ABDULLAH
Secretary 2021/2022
Geological Society of Malaysia

Assistant Secretary's Report

The sales of the Society publications and the list of organizations and institutions that were exchanging publications with GSM are presented in the following tables.

Sales and stock of publications for 2021 (Bulletin only)

Publications	Sales 2021	Stock remaining by end of 2021	Remarks
Bulletin 1		Out of Stock	
Bulletin 2	2	162	
Bulletin 3	2	124	
Bulletin 4	2	38	
Bulletin 5		Out of Stock	
Bulletin 6	2	359	
Bulletin 7	2	218	
Bulletin 8		Out of Stock	
Bulletin 9		Out of Stock	
Bulletin 10		Out of Stock	
Bulletin 11		Out of Stock	
Bulletin 12		Out of Stock	
Bulletin 13		Out of Stock	
Bulletin 14		Out of Stock	
Bulletin 15		Out of Stock	
Bulletin 16		Out of Stock	
Bulletin 17		Out of Stock	
Bulletin 18		Out of Stock	
Bulletin 19	2	339	
Bulletin 20	2	292	
Bulletin 21	2	91	
Bulletin 22	2	168	
Bulletin 23	2	181	
Bulletin 24	2	340	
Bulletin 25	2	48	
Bulletin 26	2	148	
Bulletin 27	2	22	
Bulletin 28	2	57	
Bulletin 29	2	72	
Bulletin 30	2	98	
Bulletin 31	2	74	
Bulletin 32	2	48	
Bulletin 33	2	206	
Bulletin 34	2	27	
Bulletin 35		Out of Stock	
Bulletin 36	2	60	
Bulletin 37	2	112	
Bulletin 38	2	178	
Bulletin 39		Out of Stock	
Bulletin 40	2	62	

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

Bulletin 41	Out of Stock		
Bulletin 42	0	Out of Stock	
Bulletin 43	2	94	
Bulletin 44	2	12	
Bulletin 45	Out of Stock		
Bulletin 46	Out of Stock		
Bulletin 47	Out of Stock		
Bulletin 48	2	4	
Bulletin 49	2	266	
Bulletin 50	2	303	
Bulletin 51	2	176	

Sales and stock of publications for 2021 (All other GSM publications)

Other Publications	Sales 2021	Stock remaining by end of 2021
Proceeding AGC 2000	Out of Stock	
Proceeding AGC 2001	2	100
Malaysian Stratigraphic guide	Out of Stock	
Lexicon of stratigraphy	Out of Stock	
Stratigraphic correlation	Out of Stock	
Rocks poster	Out of Stock	
Geology of Borneo (CD)	Out of Stock	
Geology of Borneo (Map)	5	677
Geol. Evolution of SEA	8	404
Geology of P. Malaysia	104	294

There was a consensus decision made to digitize the Bulletin as of 2019, E-Bulletin 67 onwards, only 50 hard printed copies with limited distribution to standing orders subscribers.

List of organizations and institutions that are exchanging publications with GSM

Item	Organization	Country
1	New South Wales Dept of Mineral Resources	Australia
2	Geologica Belgica a.s.b.I	Belgium
3	University of Geosciences	China
4	Nanking Institute of Geology	China
5	National Geological Library	China
6	Peking College of Geology	China
7	Suomalaineu Tiedeakatemia	Finland
8	Freie Universitat Berlin	Germany
9	National Museum of Natural History	Holland
10	Geological Society of Japan	Japan

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

11	Dept Mineral & Planetary Science, Hiroshima	Japan
12	Museum of Nature & Human Activities	Japan
13	National Science Museum	Japan
14	Natural History Museum and Institute	Japan
15	Institute of Geosciences	Japan
16	Geological Society of Korea	Korea
17	Dewan Bahasa dan Pustaka	Malaysia
18	Minerals and Geoscience Department Malaysia, Headquarters	Malaysia
19	Minerals and Geoscience Department Malaysia, Ipoh	Malaysia
20	Minerals and Geoscience Department Malaysia, Kuching	Malaysia
21	Minerals and Geoscience Department Malaysia, Kota Kinabalu	Malaysia
22	Kementerian Dalam Negeri	Malaysia
23	Perpustakaan Negara Malaysia	Malaysia
24	Library PETRONAS Berhad	Malaysia
25	Pusat Sumber Maklumat Negeri Sarawak	Malaysia
26	Perpustakaan Tun Sri Lanang, UKM	Malaysia
27	Program Geologi, UKM	Malaysia
28	Library, UM	Malaysia
29	Library, USM	Malaysia
30	Malaysian Institute of Nuclear Technology	Malaysia
31	Library of Congress, USA Embassy	Malaysia
32	Institute of Ecological & Nuclear Science	New Zealand
33	National Library	Singapore
34	Central Geological Survey	Taiwan
35	American Museum of Natural History, New York	USA
36	CIGESE Library	USA
37	Oklahoma Geological Survey	USA
38	US Geological Survey	USA
39	University of Kansas	USA
40	AAPG Foundation Library	USA
41	Senckenberg Research Institute and Natural History Museum Frankfurt	Germany

NORAZIANTI BINTI ASMARI
Assistant Secretary 2021/2022
Geological Society of Malaysia

c) Editor's Report

In 2021, three issues of *Warta Geologi* volume 47 were published (issue no. 1 in April, no. 2 in August and no. 3 in December), while two volumes of the *GSM Bulletin* (Volume 71 and 72) were published in May and November, respectively. The status of publication is currently up to date.

The Society is grateful to authors for their contributions, the reviewers for their time and effort to improve the quality of the Society's publications, and members of the Editorial Board for their support. The reviewers for the 2021 *Bulletin* and *Warta* articles are as listed in *Warta Geologi* volume 48(1).

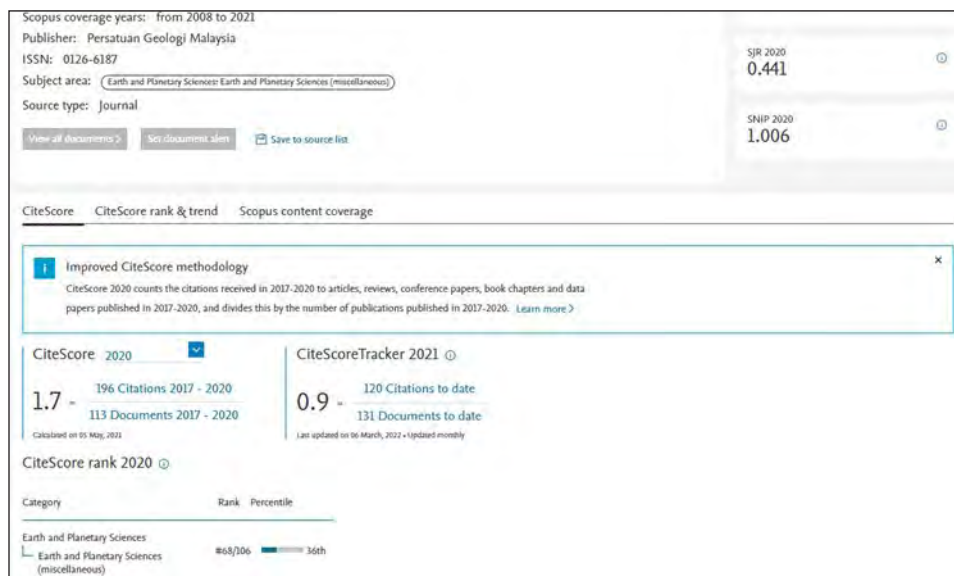
The GSM online publication website is now in its 9th year. In 2021, the website was visited approximately 63,500 times, with an average of 5,294 visits/month. The visitors were from about 100 countries, with the highest number from Malaysia, followed by the United States, Indonesia, Singapore, The Netherlands, China, France, Russia, Germany and some unknown localities. In total, 1,741 articles that are available on the website were downloaded.

Indexing

Warta Geologi is now indexed in the Malaysian Citation Index / MyCite, while preparation is being made to apply Scopus indexing for *Warta Geologi* soon. The application for indexing of the *Bulletin* in the Web of Science was made in January 2022 by submitting the volume 72 *Bulletin* of November 2021. The application is presently under evaluation.

Impact factor of the Bulletin

Total CiteScore and recent citation (2017-2020; updated by Scopus on 6/03/2022) is as shown below:



May I take this opportunity to thank all the editorial committee members for their assistance during the editorial process.

WAN HASIAH ABDULLAH
 Editor 2021/2022
 Geological Society of Malaysia

d) Treasurer's Report

For the Financial Year 2021, the society posted a net surplus of RM 42,806 compared to RM 5,134 in year 2020 in its General Fund. The year 2021 posted higher because there was a withdrawal of RM 50,000 from the Endowment Fund while there was no withdrawal from the Endowment Fund in year 2020.

Total income for year 2020 was RM 171,680 in 2021 as compared to RM 141,805 in 2020. Total operating expenditure increased from RM 72,009 (year 2020) to RM 84,002 (year 2021). However, further decline in interest rates in fixed deposits, reduced the income from bank interest, from RM 77,516 (year 2020) to RM 51,639 (year 2021). Both operating revenue and expenditure showed a slight increase due to more activities being carried out as some relaxation and adaptation to COVID-19 pandemic restriction.

Membership subscription increased from RM 16,211 (year 2020) to RM 19,584 (year 2021).

Sales of publication in the form of royalty, shows a consistent increase since last few years. Sales of publications was RM 48,651 (year 2021) compared to RM 41,060 (year 2020) and RM 34,781 (year 2019). Note, the classification of "Sales of Bulletin and Warta Geologi" in the year 2020 was previously subsumed under the "Sales of Publication" in the year 2019 and 2020.

Printing cost of Warta Geologi and Bulletin show a slight increase. GSM spent RM 8,450 and RM 10,000 respectively as compared to RM 6,200 and RM 7,175 in year 2021; and RM 19,625 and RM 25,650 in year 2020. There is also an increase in postage to RM 433 from RM 316 (year 2020). In helping geoscience students in universities who could not afford to own a laptop that is necessary for online classes during the COVID-19 lockdown, GSM donated laptops at a sum of RM 10,200 to the candidates vetted by heads of respective geology department. More than half of the sum was contributed by donors of GSM members.

The Treasurer would like to express a great appreciation to the donors, sponsors and all parties for their contributions and supports throughout the year. Credits to GSM Endowment Fund and shared resources from projects jointly carried out with SEADPRI-UKM for the funding of allowances for human resource and electronic journal publishing including its websites for publication and submission. Last but not least to Ms Anna Lee for her contribution in managing the accounts and many miscellaneous tasks throughout the year.

LIM CHOUN SIAN
Treasurer 2021/2022
Geological Society of Malaysia

e) Honorary Auditor's Report

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society no: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)**

**FINANCIAL STATEMENTS
31 DECEMBER 2021**

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society No: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)**

THE CORPORATE INFORMATION FOR 2021 / 2022

President	:	Ahmad Nizam Hasan (Geosolution Resources)
Vice President	:	Mohd Hariri Arifin (UKM)
Immediate Past President	:	Abd Rasid Jaapar (Geomapping Technology)
Secretary	:	Farah Fazullah Abdullah (Consultant)
Assistant Secretary	:	Norazianti Asmari (Geoxpert Sdn Bhd)
Treasurer	:	Lim Choun Sian (UKM)
Editor	:	Wan Hasiah Abdullah (Consultant)
Councillors	:	Tan Boon Kong (Consultant) Nur Iskandar Taib (UM) Joy Jacqueline Pereira (LESTARI-UKM) Awg Mohd Faizal Awg Mohamad Hamssin (Vale Malaysia Minerals) Maryam Syazana Dzulkefli (Petronas Carigali) Tan Chun Hock (Shell) Abdul Halim Abdul Latiff (Universiti Teknologi Petronas) Amie Norsyazan Amir (IHS)
Auditors	:	S.F. Lee & Co. (AF : 0670) No.5-3, Udarama Complex, Jalan 1/64A, Off Jalan Ipoh, 50350 Kuala Lumpur. Tel: 03-40410540 Fax: 03-40410586
Register Of Corporate Office	:	c/o Department of Geology, University of Malaya, 50603 Kuala Lumpur.
Bankers	:	United Overseas Bank (Malaysia) Berhad Standard Chartered Bank

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society No: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)**

**FINANCIAL STATEMENTS
31 DECEMBER 2021**

CONTENTS

	Page
Statement by Council	1
Statutory Declaration	1
Independent Auditors' Report	2 – 4
Statement of Financial Position	5
Statement of Income and Expenditure	6
Statement of Cash Flows	7
Notes to the Financial Statements	8 – 15

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)**
(Society No: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)

STATEMENT BY THE COUNCIL

We, Ahmad Nizam Hasan and Lim Choun Sian, being president and treasurer of the Council Members of Persatuan Geologi Malaysia (Geological Society Of Malaysia), do hereby state that, in our opinion, the accompanying financial statements set out pages 9 to 15 are drawn up in accordance with Malaysian Private Entities Reporting Standard and the requirements of the Societies Act, 1966 in Malaysia so as to give a true and fair view of the financial position of the Persatuan Geologi Malaysia (Geological Society Of Malaysia), as at 31 December 2021, and of the financial performance and cash flows of the Society for the year then ended.

Signed on behalf of the Council:


Ahmad Nizam Hasan
President

14 MAR 2022

Kuala Lumpur


Lim Choun Sian
Treasurer

STATUTORY DECLARATION

I, Lim Choun Sian, being the treasurer primarily responsible for the financial management of Persatuan Geologi Malaysia (Geological Society Of Malaysia), do solemnly and sincerely declare that the accompanying financial statements set out on pages 9 to 15 are in my opinion correct, and I make this solemn declaration conscientiously believing the same to be by virtue of the provisions of the Statutory Declarations Act, 1960.

Subscribed and solemnly declared by abovenamed
Lim Choun Sian at Kuala Lumpur in Wilayah
Persekutuan on 14 MAR 2022

Before me:
Kuala Lumpur



No. 86, Jalan Putra
50350 Kuala Lumpur


Lim Choun Sian



No. 5-3, Jalan 1/64A,
Kompleks Udarama, Off Jalan Ipoh,
50350 Kuala Lumpur.
Tel : 03 - 4041 0540 / 546
Fax : 03 - 4041 0586
Email : sfleeco@yahoo.com.my

**INDEPENDENT AUDITORS' REPORT
TO THE MEMBERS OF PERSATUAN GEOLOGI MALAYSIA (GEOLOGICAL
SOCIETY OF MALAYSIA)**

Report on the Financial Statements

Opinion

We have audited the financial statements of **Persatuan Geologi Malaysia (Geological Society Of Malaysia)**, which comprise the statement of financial position of the Society as at 31 December 2021, the statement of income and expenditure and statement of cash flows of the Society for the year then ended, and a summary of significant accounting policies and other explanatory notes, as set out on pages 9 to 15.

In our opinion, the accompanying financial statements give a true and fair view of the financial position of the Society as at 31 December 2021, and of its financial performance and its cash flows for the year then ended in accordance with Malaysian Private Entities Reporting Standard and the requirements of the Societies Act, 1966 in Malaysia.

Basis for opinion

We conducted our audit in accordance with approved standards on auditing in Malaysia and International Standards on Auditing. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Independence and Other Ethical Responsibilities

We are independent of the Society in accordance with the By-Laws (on Professional Ethics, Conduct and Practice) of the Malaysian Institute of Accountants ("By-Laws") and the International Ethics Standards Board for Accountants' *International Code of Ethics for Professional Accountants (including International Independence Standards)* ("IESBA Code"), and we have fulfilled our other ethical responsibilities in accordance with the By-Laws and the IESBA Code.

Information Other than the Financial Statements and Auditors' Report Thereon

The council members of the Society are responsible for the other information. The other information comprises the statement by the council and all information in the annual report but does not include the financial statements of the Society and our auditors' report thereon.

Our opinion on the financial statements of the Society does not cover and we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements of the Society, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements of the Society or our knowledge obtained in the audit or otherwise appears to be materially misstated.

If, based on the work we have performed, we conclude that there is a material misstatement of the other information, we are required to report that fact. We have nothing to report in this regard.



S.F. LEE & CO (AF: 0670)

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)**
(Society No: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)

Responsibilities of the Council for the Financial Statements

The council of the Society are responsible for the preparation of financial statements of the Society that give a true and fair view in accordance with Malaysian Private Entities Reporting Standard and the requirement of the Societies Act, 1966 in Malaysia. The council are also responsible for such internal control as council determine is necessary to enable the preparation of financial statements of the Society that are free from material misstatements, whether due to fraud or error.

In preparing the financial statements of the Society, the council are responsible for assessing the Society's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the council either intend to liquidate the Society or to cease operations, or have no realistic alternative but to do so.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements of the Society as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditors' report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with approved standards on auditing in Malaysia and International Standards on Auditing will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with approved standards on auditing in Malaysia and International Standards on Auditing, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements of the Society, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Society's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the council.



S.F. LEE & CO (AF: 0670)

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society No: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)**

- Conclude on the appropriateness of the council's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Society's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditors' report to the related disclosures in the financial statements of the Society or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditors' report. However, future events or conditions may cause the Society to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements of the Society, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with the council regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Report on Other Legal and Regulatory Requirements

In accordance with the requirements of the Societies Act, 1966 in Malaysia, we also report that in our opinion the accounting and other records and the registers required by the Act to be kept by the Society have been properly kept in accordance with the provisions of the Act.

Other Matter

This report is made solely to the members of the Society, as a body, in accordance with the Societies Act, 1966 in Malaysia, and for no other purpose. We do not assume responsibility to any other person for the content of this report.

S.F. LEE & CO.
AF 0670
CHARTERED ACCOUNTANTS

LEE SIEW FATT
01179/09/2022 (J)
CHARTERED ACCOUNTANT

Kuala Lumpur
Dated: 14 MAR 2022

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society No: PPM PPM-001-14-10011967)
(Registered under the Societies Act, 1966)**

**STATEMENT OF FINANCIAL POSITION
As at 31 December 2021**

	Note	2021 RM	2020 RM
FUND ACCOUNTS			
GENERAL FUND	4	859,465	816,659
ENDOWMENT FUND	5	1,944,987	1,902,094
STUDENT LOAN FUND		1,755	1,755
YOUNG GEOSCIENTIST AWARD FUND		3,143	3,143
		<u>2,809,350</u>	<u>2,723,651</u>
Represented by:			
NON-CURRENT ASSETS			
PROPERTY, PLANT AND EQUIPMENT	6	6,822	3,961
CURRENT ASSETS			
Deposits		600	600
Fixed deposits with licensed bank	7	2,379,701	2,229,701
Cash and bank balances		767,981	894,114
		<u>3,148,282</u>	<u>3,124,415</u>
CURRENT LIABILITIES			
Other payables	8	343,725	404,594
Current tax liabilities		2,029	131
		<u>345,754</u>	<u>404,725</u>
NET CURRENT ASSETS		2,802,528	2,719,690
		<u>2,809,350</u>	<u>2,723,651</u>

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society No: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)**

**STATEMENT OF INCOME AND EXPENDITURE
For the year ended 31 December 2021**

INCOME	Note	2021 RM	2020 RM
Advanced Seminar On Economic Geology		50	3,754
Entrance fee		1,400	800
Fixed deposits interest income		51,639	77,516
Membership fee		19,584	16,211
Sales of publications		437	30
Geology of Peninsular Malaysia		8,410	-
National Geoscience Conference		41,109	2,451
Sales of Bulletin and Warta Geologi		-	41,030
AAPG royalties		48,651	-
Geological Evolution of Southeast Asia		400	13
		<u>171,680</u>	<u>141,805</u>
EXPENDITURE			
Annual dinner		3,230	-
Audit fee		2,000	1,590
Audit fee underprovided in prior year		1,500	-
Bank charges		189	55
Best Student's award (UKM and UM)		4,000	1,000
Depreciation on property, plant and equipment		1,214	715
Depreciation overprovided in prior year		(1,085)	-
Department of Geology		-	12,000
Donation of laptop to B40 students		10,200	-
Geology of Peninsular Malaysia (GPM)		-	955
GSM-SEGRM		-	151
Honorarium		24,000	24,100
Information Technology		-	2,574
Miscellaneous expenses		3,346	418
Postages		433	316
Photo competition		4,150	-
Photocopy		-	315
Printing and Stationery			
- Warta Geologi		8,450	6,200
- Bulletin		10,000	7,175
- Stationery		2,863	2,075
Professional fee		850	800
Property, plant and equipment written-off		-	8,051
Refreshment		797	905
Souvenirs		1,110	325
Speakers' account		-	424
Sponsorship for student's activities		-	1,000
Subscription fee		2,923	-
Telephone and fax		1,332	955
Website development		2,500	-
		<u>84,002</u>	<u>72,099</u>
Surplus before tax		87,678	69,706
Income tax expense	9	(1,979)	(131)
Net surplus for the year		<u>85,699</u>	<u>69,575</u>
Represented by:			
General fund		42,806	5,134
Endowment fund		42,893	64,441
		<u>85,699</u>	<u>69,575</u>

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society No: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)**

**STATEMENT OF CASH FLOWS
For the year ended 31 December 2021**

	2021	2020
	RM	RM
Cash flows from operating activities		
Surplus of income over expenditure for the year	87,678	69,706
Adjustments for:-		
Depreciation on property, plant & equipment	1,214	715
Depreciation on property, plant and equipment overprovided in prior year	(1,085)	-
Property, plant and equipment written off	-	8,051
Interest income	(51,639)	(77,516)
Surplus before working capital changes	<u>36,168</u>	<u>956</u>
(Decrease) / increase in other payables	<u>(60,869)</u>	<u>334,462</u>
Cash (used in) / generated from operations	<u>(24,701)</u>	<u>335,418</u>
Tax paid	(81)	(132)
Interest income	<u>51,639</u>	<u>77,516</u>
Net cash generated from operating activities	<u>26,857</u>	<u>412,802</u>
Cash flows from investing activities		
Purchase of property, plant and equipment	<u>(2,990)</u>	<u>-</u>
Net cash used in investing activities	<u>(2,990)</u>	<u>-</u>
Net increase in cash and cash equivalents	23,867	412,802
Cash and cash equivalents at beginning of the year	3,123,815	2,711,013
Cash and cash equivalents at end of the year	<u>3,147,682</u>	<u>3,123,815</u>
	2021	2020
	RM	RM
<u>Cash and cash equivalents comprised of:</u>		
Deposits held with licensed banks	2,379,701	2,229,701
Cash at bank	767,954	893,108
Cash in hand	27	1,006
	<u>3,147,682</u>	<u>3,123,815</u>

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society No: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)**

NOTES TO THE FINANCIAL STATEMENTS –31 DECEMBER 2021

1. GENERAL INFORMATION

The principal activity of the Society is to promote the advancement of the geological sciences in Malaysia. The Persatuan Geologi Malaysia (Geological Society Of Malaysia) is a registered society under Societies Act, 1966.

The registered of corporate office of the Society is located at c/o Department of Geologi, University of Malaya, 50603 Kuala Lumpur.

The financial statements were authorised for issue in accordance with a resolution by the Council on 14 MAR 2022

2. SIGNIFICANT ACCOUNTING PILICIES

(a) Statement of compliance

The financial statements of the Society have been prepared in accordance with Malaysian Private Entities Reporting Standard (“MPERS”) and the requirements of Societies Act, 1966 in Malaysia.

(b) Basis of measurement

The financial statements have been prepared on the historical cost basis except as otherwise stated in the financial statements.

(c) Functional and presentation currency

These financial statements are presented in Ringgit Malaysia (“RM”), which is the Society’s functional currency.

(d) Significant accounting estimates and judgements

The preparation of the financial statements in conformity with MPERS requires the use of certain accounting estimates and exercise of judgements. Estimates and judgements are continuously evaluated and are based on past experience, reasonable expectations of future events and other factors.

The Council are the opinion that there are no key assumptions concerning the future and other key sources of estimation uncertainty at the reporting date, that have a significant risk of causing material adjustment to the carrying amounts of assets and liabilities within next financial year.

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society No: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)**

3. SUMMARY OF ACCOUNTING POLICIES

(a) Property, plant and equipment and depreciation

All items of property, plant and equipment are initially recorded at cost. The cost of an item of property, plant and equipment is recognised an asset if, and only if, it is probable that future economic benefits associated with the item will flow to the Society and the cost of the item can be measured reliably.

Subsequent to recognition, property, plant and equipment are measured at cost less accumulated depreciation and accumulated impairment losses. Repair and maintenance costs are recognised in statement of income and expenditure as incurred.

Depreciation on property, plant and equipment is computed on a reducing balance basis to write-off the cost to its residual value over the estimated useful lives of the assets at following annual rate:-

Information of technology equipments	20%
Office equipment	10%

The carrying values of property, plant and equipment are reviewed for impairment when events or changes in circumstances indicate that the carrying value may not be recoverable.

The residual value, useful life and depreciation method are reviewed at each year-end, and adjusted prospectively, if appropriate.

An item of property, plant and equipment is derecognised upon disposal or when no future economic benefits are expected from its use or disposal. Any gain or loss on derecognition of the asset is included in the statement of income and expenditure in the year the asset is derecognised.

(b) Impairment of non-financial assets

The carrying amounts of non-financial assets are reviewed at the end of each reporting period to determine whether there is any indication of impairment. If any such indication exists, then the asset's recoverable amount is estimated.

For the purpose of impairment testing, assets are grouped together into the smallest group of assets that generated cash inflows from continuing use that are largely independent of the cash inflows from other assets or cash-generating units.

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society No: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)**

The recoverable amount of an asset or cash-generating unit is the higher of its fair value less costs to sell and its value in use. In assessing value in use, the estimated future cash flows are discounted to their present value using a pre-tax discount rate that reflects current market assessments of the time value of money and the risks specific to the asset or cash-generating unit

An impairment loss is recognised if the carrying amount of an asset or its related cash-generating unit exceeds its estimated recoverable amount.

Impairment losses are recognised in income and expenditure statement. Impairment losses recognised in respect of cash-generating units are allocated first to reduce the carrying amount of any goodwill allocated to the cash-generating unit (group of cash-generating units) and then to reduce the carrying amounts of the other assets in the cash-generating unit (group of cash-generating units) on a pro rata basis.

Impairment losses recognised in prior periods are assessed at the end of each reporting period for any indications that the loss has decreased or no longer exists. An impairment loss is reversed if there has been a change in the estimates used to determine the recoverable amount since the last impairment loss was recognised. An impairment loss is reversed only to the extent that the assets's carrying amount does not exceed the carrying amount that would have been determined, net of depreciation or amortisation, if no impairment loss had been recognised. Reversals of impairment losses are credited to statement of income and expenditure in the financial year in which the reversals are recognised.

(c) Financial instruments

(i) Initial recognition and measurement

A financial asset or financial liability is recognised in the statement of financial position when, and only when, the Society becomes a party to the contractual provisions of the instrument.

A financial instrument is recognised initially at the transaction price unless the arrangement constitutes, in effect, a financing transaction. If then arrangement constitutes a financing transaction, the financial asset or financial liability is measured at the present value of the future payments discounted at a market rate of interest for a similar debt instrument.

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society No: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)**

(ii) Subsequent measurement

Debt instruments that meet the following conditions are measured at amortised cost using the effective interest method:

- (a) returns to the holder are determinable, e.g. a fixed amount and/or variable rate of return benchmark against a quoted or observable interest rate;
- (b) there is no contractual provision that could result in the holder losing the principal amount or any interest attributable to the current or prior periods;
- (c) prepayment option, if any, is not contingent on future events.

Debt instruments that are classified as current assets or current liabilities are measured at the undiscounted amount of the cash or other consideration expected to be paid or received unless the arrangement constitutes, in effect, a financing transaction.

Financial assets or financial liabilities not measured at amortised at cost or cost less impairment are measured at fair value changes recognised in statement of income and expenditure.

All financial assets are assessed at each reporting date whether there is any objective evidence of impairment. An impairment loss is measured as follows:

- (i) For an instrument measured at amortised cost, the impairment loss is the difference between the asset's carrying amount and the present value of estimated cash flows discounted at the asset's original effective interest rate.
- (ii) For an instrument measured at cost less impairment, the impairment loss is the difference between the asset's carrying amount and the best estimate of the amount that would be received for the asset if it were to be sold at the reporting date.

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society No: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)**

(iii) Derecognition

A financial asset or part of it is derecognised when, and only when, the contractual rights to the cash flows from the financial asset expired or are settled, or control of the asset is not retained or substantially all of the risks and rewards of ownership of the financial asset are transferred to another party. On derecognition of a financial asset, the difference between the carrying amount of the financial asset derecognised and the consideration received, including any newly created rights and obligations, is recognised in statement of income and expenditure.

A financial liability or part of it is derecognised when, and only when, the obligation specified in the contract is discharged, cancelled or expires. On derecognition of a financial liability, the difference between carrying amount of the financial liability extinguished or transferred to another party and the consideration paid, including any non-cash assets transferred or liabilities assumed, is recognised in statement of income and expenditure.

(d) Revenue Recognition

- (i) Membership subscription is recognised on an accrual basis.
- (ii) Interest earned from fixed deposit placements are recognized on time proportionate basis.
- (iii) Sales is recognised upon delivery of goods sold.
- (iv) Seminar income is recognized upon the conduct of the respective seminar.

(e) Taxation

Current tax expense is determined according to the Malaysia tax laws substantially enacted by the reporting date and includes all taxes based upon the taxable profits.

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society No: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)**

4. GENERAL FUND

	2021 RM	2020 RM
At 1 January	816,659	811,525
Surplus for the year	42,806	5,134
At 31 December	<u>859,465</u>	<u>816,659</u>

The General Fund can be utilised at the discretion of the Council Members.

5. ENDOWMENT FUND

	2021 RM	2020 RM
At 1 January	1,902,094	1,837,653
Surplus for the year	42,893	64,441
At 31 December	<u>1,944,987</u>	<u>1,902,094</u>

The Endowment Fund can only be utilised with the approval of the members at the Annual General Meeting.

6. PROPERTY, PLANT AND EQUIPMENT

	Information technology equipment RM	Office equipment RM	Total RM
<i>Cost</i>			
At 1 January 2021	5,235	18,826	24,061
Additions	2,990	-	2,990
Disposal and deletion	-	-	-
At 31 December 2021	<u>8,225</u>	<u>18,826</u>	<u>27,051</u>
<i>Accumulated depreciation and impairment losses</i>			
At 1 January 2021	4,118	15,982	20,100
Charge for the year	823	391	1,214
Disposal and deletion	-	(1,085)	(1,085)
At 31 December 2021	<u>4,941</u>	<u>15,288</u>	<u>20,229</u>
Carrying amounts at 1 January 2021	<u>1,117</u>	<u>2,844</u>	<u>3,961</u>
Carrying amounts at 1 December 2021	<u>3,284</u>	<u>3,538</u>	<u>6,822</u>

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society No: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)**

7. FIXED DEPOSITS WITH LICENSED BANKS

	2021	2020
	RM	RM
General fund	537,701	537,701
Endowment fund	1,842,000	1,692,000
	<u>2,379,701</u>	<u>2,229,701</u>

The fixed deposits with licensed banks have an average maturity of between 3 to 15 months (2020 : 3 to 15 months). Interest rates for the deposits ranged from 1.60% to 2.00% (2020 : 1.55% to 2.50%) per annum.

8. OTHER PAYABLES AND ACCRUED EXPENSES

	2021	2020
	RM	RM
Other payables	341,725	404,594
Accrued expenses	2,000	-
	<u>343,725</u>	<u>404,594</u>

9. TAX EXPENSE

Income tax is provided for investment income and on surplus arising from transactions with non-members. The current tax expense consists of:-

	2021	2020
	RM	RM
Current tax:		
On result for the year	2,029	131
Overprovision in prior year	(50)	-
	<u>1,979</u>	<u>131</u>

**PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society No: PPM-001-14-10011967)
(Registered under the Societies Act, 1966)**

10. FINANCIAL INSTRUMENTS

The financial instruments of the Society are categorised into the following classes:

	<u>2021</u> RM	<u>2020</u> RM
Financial assets measured at amortised cost less impairment		
Deposits	600	600
Fixed deposits with licensed bank	2,379,701	2,229,701
Cash and bank balances	767,981	894,114
	<u>3,148,282</u>	<u>3,124,415</u>
Financial liabilities carried at amortised cost		
Other payables	<u>343,725</u>	<u>404,594</u>

11. RECLASSIFICATION OF ACCOUNTS

Certain accounts in 2020 have been reclassified to conform with current year's presentation.

	<u>As previously reported</u> RM	<u>As restated</u> RM
General fund	916,659	816,659
Endowment fund	<u>1,802,094</u>	<u>1,902,094</u>

f) GSM Endowment Fund Report

GSM ENDOWMENT FUND: BOARD OF TRUSTEES REPORT FOR THE 56th ANNUAL GENERAL MEETING OF THE GEOLOGICAL SOCIETY OF MALAYSIA 22 April 2022

Background

1. The 47th AGM in 2013 confirmed the establishment of the GSM Endowment Fund and endorsed the Terms of Reference prepared by Advocates and Solicitors, Messrs Yeap, Yong and Amy.
2. The 48th AGM in 2014 approved an amendment to the Terms of Reference to provide for the establishment of the "Board of Trustees of the GSM Endowment Fund", whose members shall comprise the GSM President, Immediate Past President, Secretary, Treasurer, Editor and at least three independent Full Members "in good standing", to be appointed at the AGM in 2017, 2020, 2023, 2026, 2029, 2032 etc.
3. The 53rd AGM in 2019 was informed that the GSM Council undertook a search on the website of "Lembaga Hasil Dalam Negeri" (LHDN) and found that GSM is listed as an organisation that is approved to collect donations under Subsection 44(6) since the year 1967. The GSM has "tax deductible" status that allows individuals and organizations to obtain tax exemption for their donations.
4. The 55th AGM in 2021 was informed that the GSM Council has developed a procedure for issuance of receipts for tax exemption and to inform LHDN for donations of RM 5,000 and above.
5. The 55th AGM in 2021 also appointed YBhg. Dato' Yunus Abd Razak as Chair of the Board of Trustees of the GSM Endowment Fund, with Dr. Lee Chai Peng, Prof Joy Pereira and Dr. Mazlan Madon as independent Full Members to serve until the AGM in 2023.
6. Items pending from the 55th AGM held online on 30 April 2021 relate to the following:
 - (i) The In-Coming GSM Council is requested to make every effort to transfer some of the fixed deposits in the GSM operating account to the Endowment Fund to increase the principal amount, so that more funds will be available from the interest portion accrued, to be used to meet expenses incurred in the implementation of programmes run by the Society.
 - (ii) The In-Coming GSM Council is requested to look into the difference in the balance reported in the GSM Auditors Report for 2020 amounting to RM 1,802,094 compared to the UOBM statement (Appendix A of the Board of Trustees Report for the 55th AGM of the GSM), which totals up to RM 1,902,093.55.
 - (iii) The In-Coming GSM Council is requested to explore the possibility of earning interest on the RM 210,093.56 in the UOBM current account.
 - (iv) The In-Coming GSM Council is requested to set up a research grant for economic geology from the accumulated interest earned from the contribution of RM 50,000.00 by YBhg. Dato' Sia Hok Kiang to the GSM Endowment Fund in 2014.
 - (v) The AGM is recommended to approve the sum of RM 50,000.00 that was requested by the GSM Council for publications for the year 2021.

Report of the Board of Trustees

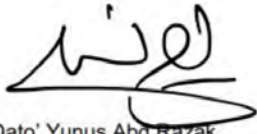
1. This report covers the period from 1 January 2021 to 31 December 2021. The Board of Trustees met virtually via Zoom on 6 April 2022 (Wednesday) to scrutinise the administration of the GSM Endowment Fund. The meeting was moderated by the Chair, YBhg. Dato' Yunus Abd Razak. Members in attendance were the President, Mr. Ahmad Nizam Hasan; Immediate Past President, Mr. Abd Rasid Jaapar; Secretary, Ms. Farah Fazulah Abdullah; Treasurer, Dr. Lim Choun Sian; Editor, Dr. Wan Hasiah Abdullah; and GSM Members Dr. Lee Chai Peng and Prof Joy Pereira. Dr. Mazlan Madon conveyed his apologies for not being able to attend the meeting as he was abroad.
2. The principal amount, in the form of fixed deposits with the United Overseas Bank Malaysia (UOBM) as reflected in the bank statement is currently RM 1,841,999.99. This amount is after the addition of RM 150,000.00 by the GSM Council in Dec 2021.
3. A special operating account is also maintained with UOBM to receive the interest accrued from the principal amount. The interest is kept in this GSM current account at UOBM (which is separate from the operational account of GSM at the Standard Chartered Bank Bhd.). The annual interest accrued from the fixed deposits in 2021 is RM 42,924.83. The balance in the current account of the Endowment Fund as of 31 December 2021 is RM 102,987.39. The balance in the current account of the Endowment Fund in the previous year (as of 31 December 2020) was RM 210,093.56.
4. Following the request of the 55th AGM in 2021, the GSM Council has transferred RM 100,000.00 from the UOBM current account to the UOBM fixed deposit account in December 2021 to earn interest on the balance of RM 210,093.56 (in 2020). A total of RM 50,000.00 was transferred from the GSM Operational Account at Standard Chartered Bhd. to the UOBM fixed deposit account.
5. The total balance reported in the GSM Auditor's Report for 2020 amounting to RM 1,802,094 differs from the balance calculated from the UOBM statement, which totals up to RM 1,902,093.55. This has been restated and reflected in the Auditor's Report for 2021 (Item 11 – Reclassification of Accounts). The issue is now resolved.
6. Following the request of the 55th AGM in 2021, the GSM Council has looked into the need to establish a research grant for economic geology from the accumulated interest earned from the contribution of RM 50,000.00 by YBhg. Dato' Sia Hok Kiang to the GSM Endowment Fund in 2014. The accumulated interest as of 31 December 2021 is RM 12,646.30.

Recommendations to the 56th AGM of the GSM

- (i) The GSM Council is commended for increasing the principal amount of the Endowment Fund. The In-Coming Council is strongly encouraged to make every effort to transfer an additional amount from the fixed deposits in the GSM operating account to the Endowment Fund to increase the principal amount, so that more funds will be available from the interest portion accrued, to be used to meet expenses incurred in the implementation of programmes run by the Society.
- (ii) The In-Coming GSM Council is requested to establish a modality for disbursing the funds amounting to RM 12,646.30 (interest accrued from the contribution of RM 50,000.00 by YBhg. Dato' Sia Hok Kiang to the GSM Endowment Fund in 2014) for either undergraduate or graduate research on economic geology.

- (iii) The AGM is recommended to approve the sum of RM 40,000.00 that was requested by the GSM Council for publications for the year 2022.

On behalf of the Board of Trustees, I declare that I am satisfied that the GSM Endowment Fund is being administered in a satisfactory manner and that the terms of reference are adhered to. I hereby approve the report prepared for the 56th AGM of the GSM.



Dato' Yunus Abd Razak
Chairman
Board of Trustees of the GSM Endowment Fund
Geological Society of Malaysia
6 April 2022



Other Matters

N/A

Announcement of New Council for 2022/2023

GSM COUNCIL ELECTIONS FOR 2022/23 – Report by the Nominations Committee

In accordance with the Constitution of the GSM, the 2021/22 Council sent out the call for nominations for the upcoming Council on August 26, 2021 by email. The chairman of the Nominations Committee, Nur Iskandar Taib, was appointed at the Council Meeting on November 26th 2021.

The following nominations were received by the Council by September 30th, 2021:

Ahmad Nizam bin Hasan	– President
Mohd. Hariri Arifin	– Vice President
Farah Fazullah Abdullah	– Secretary
Norazianti binti Asmari	– Assistant Secretary
Lim Choun Sian	– Treasurer
Wan Hasiah Abdullah	– Editor

There were, in addition, four nominations for Councillor, who will serve two years (2022-2024):

Abdull Halim bin Abdul
Ahmad Zulqurnain bin Ghazali
Nor Shahidah bt. Mohd. Nazer
Tan Boon Kong

In addition, there are four Councillors who will be serving the second year of their two year terms:

Abdul Halim Abdul Latiff
Amie Norsyazan Amir
Joy Jacqueline Pereira
Nur Iskandar Taib

Since there was one nomination for each vacant post, an election was not necessary for the year 2021.

Sincerely,

Dr. Nur Iskandar Taib
Chair, Nomination Committee
Attached: Nomination forms received.

Presidential Address for 2022/2023



Bismillahirrahmanirrahim.

Thank you, Madam Secretary, thank you also Dr. Iskandar Taib, GSM election chairman 2022/23.

Honourable Immediate Past President and IGM President, Mr. Abd Rasid, my fellow council members, congratulations on your new, or your renewed, appointment. Please, let us work together to bring GSM to the next level.

Dato-dato, ladies and gentlemen.

Assalamualaikum warahmatullahi wabarakatuh and Salam Sejahtera.

Alhamdulillah, after a year as GSM President in this new normal of Covid 19 pandemic, we have managed, reasonably comfortably, to not only overcome day to day hurdles, but to also further strengthen our team spirit as council members serving our members with regular virtual programmes. I always remind myself that as council members our task is to work with full responsibility and sincerity to focus on working as a team and, in doing so, will be the fundamental key of our success. Ultimately, we can gain satisfaction by reaching out as wide as possible to the geoscience community and increase the knowledge of our members.

The Prophet Muhammad SAW said in Sunah Ibn Majah, Vol. 1, Book 1, Hadith 240: “Whoever teaches some knowledge will have the reward of the one who acts upon it, without that detracting from his reward in the slightest.”

Alhamdulillah, on 1st April 2022, our government declared the transition phase for Covid 19 from pandemic to endemic. Although welcomed, this provided a challenge to the Council with regard to whether to plan and organise our programmes as virtual, physical or hybrid. We realise that, as geologists, ‘Site Is King’. The reality of not conducting field excursion for the past 2 to 3 years, created a vacuum for some in their geological careers, especially to our undergraduate geologists. Therefore, this year GSM is planning to organise field excursion events especially in supporting the young geologists in university and industry.

This effort, and other initiatives to be organised, will hopefully result in more high impact research papers being produced by local geological researchers and organisations, that will subsequently produce more papers for our Bulletin or Warta Geologi. In support of this, the GSM editorial team is committed on giving our full support, especially in terms of funding as well as developing an infrastructure for online submission, or OJS, via our website platform that is now in its final stage of redevelopment.

As the 2021/22 term demonstrated, the successful synergy of GSM & IGM under the coordination of the GSM-IGM joint committee, resulted in organising a very well-structured webinar/talk virtually and hybrid program. Importantly, this allowed members to acquire CPD hours for professional geologists to renew their professional practicing license by the Board of Geologist (BOG) which is a requirement and responsibility for professional geologists from all over our country. The systematic and structured execution of such programs should be further strengthened in the coming year. This coordination will prove that we can manage challenging situations, avoid any sort of redundancies, give emphasis on quality, as well as quantity in order to accommodate the needs of our professional geologist members.

Dato-dato, ladies and gentlemen,

With the introduction of the tagline “GSM Care, GSM Prihatin” and in the spirit of giving back to the geological community, this year GSM will be strategically activating GSM-University Student Chapters and revisiting all our MOUs that have been signed together with various university geology departments to ensure relevance of our agenda. This initiative will demand long-term strategic planning and commitment from both GSM and Geology Departments from the respective universities. To start off, GSM-IGM has already formed the GSM-IGM GEO-EDUCATION GROUP which will be consistently active in discussing all matters regarding the needs of respective universities in term of coordinating programs, activities or even geological syllabus/module. In addition, the Young Geoscience Working Group and the Promotion Unit will continue their successful efforts in outreach to address the needs of young or undergraduate geoscientists.

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

This year, GSM is given a mandate to become the host of GEOSEA 2022 which will be held in Langkawi from 17th till 21st October 2022, with the theme “ADVANCE GEOSCIENCE ADVANCE ASEAN”. The organising committee, that comprises members of IGM, JMG and Langkawi Development Authority (LADA), is actively planning the latest 2nd circular on Call For Papers. This has already been blasted to members. GSM is expecting an ‘Olympics Geology Congress’ under GEOSEA 2022 by collaborating with two main prominent events, the SERiES 2022 International Conference of Sustainable Earth Resources Engineering by UMP and the Regional Geopark Course 2022 by LADA. GSM urges the need of full support from our members and the geology community in making the event successful.

Dato-dato, ladies and gentlemen,

Finally, as the President, and with the support of my fellow council members, I take all of this as an obligation and responsibility, that we, with the culmination of all our experiences and knowledge, can provide a brighter future for the many generations of geoscientists to come....INSYAALLAH.

DATO-DATO, LADIES & GENTLEMEN,

On that note, I hereby present and officiate the SOFT LAUNCHING NEW LOOK, REBRANDING OF GSM WEBSITE and FOLLOWED BY THE PROMO VIDEO WELCOMING ALL MEMBERS TO PARTICIPATE IN GEOSEA LANGKAWI OCTOBER 2022.

WASSALAMUALAIKUM WARAHMATULLAHI WABARAKATUH....SALAM RAMADAN and SELAMAT HARI RAYA, MAAF ZAHIR BATIN.

THANK YOU.

P.Geol Ahmad Nizam Hasan F.I.G.M
President

CERAMAH TEKNIK TECHNICAL TALK

Hillside development management and case study

Vincent Wong Khien Ngie

Date: 18 May 2022

Platform: Zoom / Facebook Live GSM

The above talk was delivered by Ir. Vincent Wong Khien Ngie (Consultant) on 18th May, 2022, via Zoom/ Facebook Live. Some 22 members participated. An abstract of the talk is given below:

Abstract: As land development in Malaysia grows rapidly, the suitable low lying areas for development have become more and more unavailable and the development of hilly terrain has been increased. However, such development required a proper and careful design as the hillside development may encounter flood, soil erosion, landslide, failure of slope, etc. The Project Manager for the hillside development must have a good understanding of the subsurface profile and properties in order to propose a most economical and suitable design with minimum risk to the property environment and economy but maintain the bottom figure of business profit. The design such as slope buffer zone, slope stability, and surface runoff requirement should achieve the safety engineering requirements as part of the compliance to the local authority. The various technical and authorities requirements will always cause the development no longer feasible with low Gross Development Value (GDV) or high Gross Construction Cost (GCC). In this talk, the essential consideration of hillside development, planning, feasibility study and management, technical consideration, authorities requirements, to be discussed together with few case studies of hillside development to enhance the knowledge of the audience.

We thank Ir. Vincent Wong for his support and contribution to the Society's activities.

Tan Boon Kong

Chairman, Working Group on Engineering Geology

19th May 2022



CERAMAH TEKNIK TECHNICAL TALK

Aplikasi data geospasial dan penderiaan jauh dalam kajian kejadian bencana geologi tanah runtuh dan aliran puing Gunung Jerai, Kedah

Wan Salmi Bin Wan Harun

Date: 22 June 2022

Platform: Zoom / Facebook Live GSM

The above talk was delivered by P.Geol. Wan Salmi Bin Wan Harun (JMG) on 22nd June, 2022, via Zoom/ Facebook Live. Some 50 members participated. An abstract of the talk is given below:

Abstrak: Kejadian bencana geologi tanah runtuh di Gunung Jerai, Kedah telah berlaku pada sekitar jam 3.00 petang 18 Ogos 2021 selepas hujan lebat berterusan yang luar biasa di kawasan Gunung Jerai dan sekitarnya sejak pukul 1.00 tengah hari. Data-data yang sedia ada digunakan seperti data Interferometric Synthetic Aperture Radar (IFSAR) dan tafsiran imej UAV yang ditentusahkan di lapangan bagi mengenalpasti lokasi, jenis tanah runtuh dan sungai-sungai yang berisiko mengalami kejadian aliran puing pada masa akan datang. Sejumlah 128 tanah runtuh dan 6 aliran puing dalam pelbagai saiz telah dikenalpasti. Zon Bahaya, Zon Kawalan dan Zon Impak Tanah Runtuh juga dihasilkan yang telah dijadikan asas bagi pengurusan bencana oleh pihak berkuasa tempatan dan negeri untuk komuniti sekitar kawasan ini. Curahan hujan lebat dan berterusan di luar kebiasaan berlaku di bahagian puncak Gunung Jerai dan ia bertindak sebagai faktor pencetus dalam kejadian tanah runtuh dan aliran puing. Kadar purata curahan hujan ini yang dikategorikan sebagai lebat adalah 281 mm dalam masa 6 jam di Stesen Gunung Jerai dan 175 mm dalam masa 5 jam di Stesen Singkir Genting. Faktor geologi dan geomorfologi pula telah memainkan peranan penting dalam menyumbang kepada kejadian tanah runtuh dan aliran puing. Morfologi cerun yang cekung serta sempit, kecuraman cerun melebihi 25° dan ketebalan tanah baki yang cetek kurang daripada 2 m menyebabkan berlakunya tanah runtuh jenis aliran. .

We thank Sdr Wan Salmi for his support and contribution to the Society's activities.

Tan Boon Kong

Chairman, Working Group on Engineering Geology

23rd June 2022



CERAMAH TEKNIK TECHNICAL TALK

Why failures occur at soil cuts and natural ground slopes in the granitic bedrock areas of Malaysia

John Kuna Raj

Date: 20 July 2022

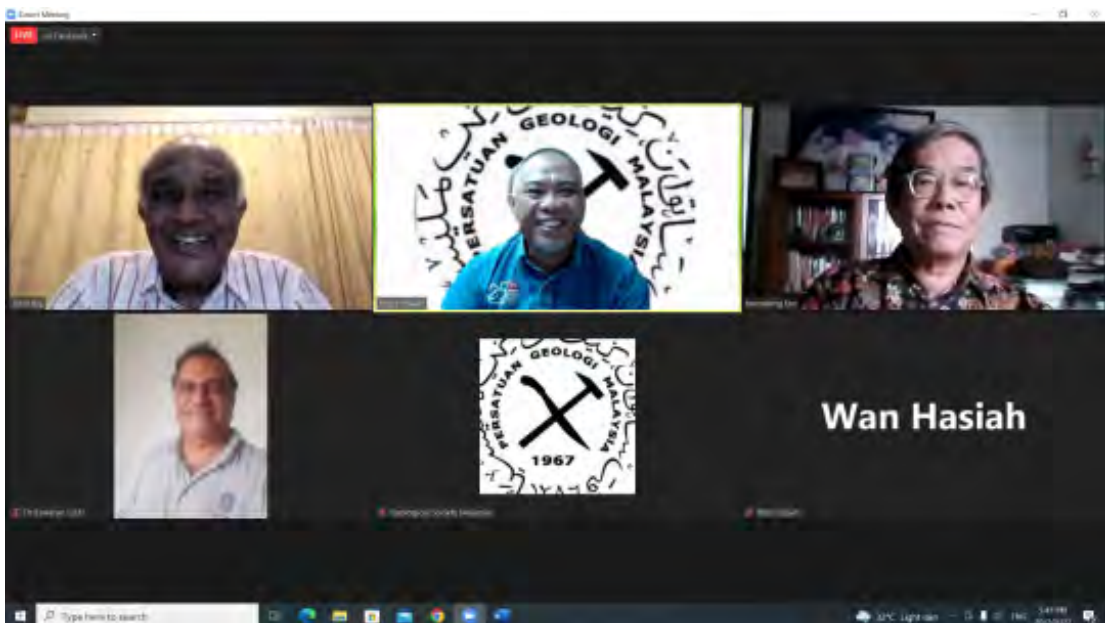
Platform: Zoom / Facebook

The above talk was delivered by P.Geol. Dr John Kuna Raj (Consultant) on 20th July, 2022, via Zoom/Facebook Live. Some 40 members participated. An abstract of the talk is given below:

Abstract: Deep weathering profiles are found in granitic bedrock areas in Peninsular Malaysia, though shallower profiles and outcrops are seen in Sabah and Sarawak. The weathering profiles are characterized by three broad zones, i.e. the upper pedological soil, the intermediate saprock, and the underlying bedrock. Several sub-zones can also be differentiated and assigned Rock Mass Weathering Grades. Pedological soil represents completely weathered granite and mainly comprises sandy clays, whilst saprock represents moderately to highly weathered granite and consists of sandy silts and silty sands with distinct relict granite textures and structures and contains core boulders. In geotechnical literature, the term residual soil is used to describe the pedological soil and saprock.

Earth materials at slope cuts are dependent upon their heights; low cuts (<10 m high) exposing pedological soil, whilst high cuts (>10 m high) expose both saprock and pedological soil. Groundwater tables are close to the ground surface in low-lying terrain where failures can occur under undrained conditions. In hilly to mountainous terrain, groundwater tables are located at depth; the overlying residual soils classified as unsaturated soils and failures occurring under drained conditions.

Stability analyses are important in the design of slope cuts, though there is limited published data on the shear strength parameters of residual soils. Published data mainly involves remoulded samples which do not take into consideration inherent relict granitic textures. Back stability analyses of slope failures allow for determination of



PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

average strength parameters as well as recognition of the triggering factors. Back analyses of some soil cut failures are presented to illustrate the usefulness of back stability analyses.

Relatively small failures (<100 m³ volume) have occurred at steep (>60°) benches and include soil (or earth) falls in pedological soil, and shallow slips in saprock; the failures preceded by development of tension and desiccation cracks. Wedge failures, block and slab slides of small volumes have also occurred at steep (>60°) benches in saprock where there were present steeply dipping and day-lighting, relict discontinuity planes.

Large failures (>1,000 m³ volume) have also occurred and involve earth materials from pedological soil and saprock. Slumps occurred at cuts where the groundwater table is located close to the ground surface, whilst slump flows involving saturated slope materials moved downslope (in part) along the saprock/bedrock boundary. Debris slides are similar to slump flows but contain a large number of core boulders. Large block slides have also sometimes occurred; the sliding plane being a distinct, day-lighting, relict fault plane.

Failures have also occurred at natural ground slopes in granitic bedrock areas; the most prominent event involving rock falls, slumps and debris slides during the 6.0 Mw earthquake on 5 June 2015 at Mount Kinabalu (Tongkul, 2020). Landslide debris created several temporary dams whose breaching gave rise to devastating debris flows.

We thank Sdr Dr. JK Raj for his support and contribution to the Society's activities.

Tan Boon Kong
Chairman, Working Group on Engineering Geology
21st July, 2022

LAPORAN REPORT

Persatuan Geologi Malaysia menandatangani dua Dokumen Perjanjian Persefahaman dengan Universiti Sains Malaysia dan Universiti Malaysia Terengganu

1) UNIVERSITI SAINS MALAYSIA

Pada 3 Disember 2021 telah berlangsung satu majlis pertukaran perjanjian persefahaman (MOU) antara pihak Persatuan Geologi Malaysia dengan Universiti Sains Malaysia (USM). Presiden (En. Ahmad Nizam Hasan) dan ketua unit promosi (Cik Norazianti Asmari) telah menghadiri majlis yang dijalankan secara fizikal di Program Geofizik, USM. Manakala sebahagian besar tetamu telah hadir secara dalam talian.

Majlis dimulakan dengan ucapan penasihat kelab diikuti ucapan pengerusi program iaitu Prof. Madya Dr. Nordiana Mohd Muztaza dan ucapan presiden Persatuan Geologi Malaysia dalam merasmikan penubuhan kelab geologi di USM. Majlis yang berlangsung dari 2.30 petang berakhir sekitar jam 4.30 petang dengan penyampaian cenderamata daripada kedua-dua pihak. Bersama laporan ini disediakan beberapa foto untuk tatapan pembaca. Rakaman lanjut berkenaan majlis ini boleh dilayari di Facebook GSM (<https://fb.watch/ar8GBwwOQu/>).



Foto 1: Pelajar dan kakitangan akademik Geofizik USM bersedia menunggu majlis bermula secara fizikal dan maya.



Foto 2: En. Ahmad Nizam Hasan menyampaikan cenderamata daripada pihak persatuan kepada penasihat Kelab Geologi USM (Dr. Andy Anderson Bery).



Foto 3: Pihak Geofizik, USM diwakili oleh Ketua Program (Prof. Madya Dr. Nordiana Mohd Muztaza) menyampaikan cenderamata kepada wakil persatuan (Cik Norazianti Asmari).



Foto 4: Sesi bergambar kenangan bersama delegasi Persatuan Geologi Malaysia dan jawatankuasa Kelab Geologi, USM.

2) UNIVERSITI MALAYSIA TERENGGANU

Manakala pada 3 Januari 2022 pula berlangsung majlis pertukaran Dokumen Perjanjian Persefahaman (MOU) Persatuan Geologi Malaysia dengan Universiti Malaysia Terengganu (UMT) di Auditorium Institut Oseanografi dan Sekitaran (INOS). Majlis dihadiri oleh pihak pengurusan UMT termasuk Dekan Fakulti Sains dan Sekitaran Marin; Prof. Dr. Marinah Mohd Ariffin. Pihak Persatuan Geologi Malaysia pula dihadiri oleh presiden (En. Ahmad Nizam Hasan) dan timbalan presiden (Dr. Mohd Hariri Arifin).

Kunjungan ini juga menjadi sejarah kepada penubuhan kelab geologi di UMT dan aktiviti pertama yang diadakan adalah ceramah pengenalan fungsi Persatuan Geologi Malaysia dan ceramah teknik (Geophysics & Industry) yang telah disampaikan oleh kedua-dua wakil persatuan.

Rakaman majlis ini boleh dilihat pada pautan laman rasmi Facebook Geosains UMT (<https://fb.watch/apO6L8fhqM/>) manakala rakaman pengenalan persatuan dan ceramah teknik dipautan <https://fb.watch/apNi2M2gtY/>.

Antara foto-foto semasa majlis tersebut adalah seperti berikut:



Majlis penyerahan dokumen MOU antara UMT dan Persatuan Geologi Malaysia.



Gimik perasmian penubuhan Kelab Geologi UMT.



Antara tetamu yang hadir pada majlis berlangsung; dari kiri Dr. Khaira Ismail (UMT), En. Abdullah Sulaiman (Ketua Kumpulan Kerja Geologi Marin GSM / Profesor adjung UMT), Dr. Mohd Hariri Arifin (UKM/ Timbalan Presiden GSM), En. Ahmad Nizam Hasan (Presiden GSM), Prof. Dr. Marinah Mohd Ariffin (Dekan Fakulti Sains dan Sekitaran Marin), Dr. Nor Bakhiah bt Baharim (Ketua Program Geosains Marin) dan wakil pengurusan tertinggi UMT serta staf dan pelajar Program Geosains Marin UMT.



En. Ahmad Nizam Hasan (Presiden GSM).



Prof. Dr. Marinah Mohd Ariffin (Dekan Fakulti Sains dan Sekitaran Marin).

GSM COUNCIL MEMBERS

PRESIDENT



P. Geol Ahmad Nizam Bin Hasan F.I.G.M is the founder and Chief Executive Officer of Geo Solution Resources group of companies, a well-known geological, environmental, mining and geotechnical consultancy based in Selangor, Malaysia with various branches in Southeast Asia. He graduated with Honours from the University of Malaya (UM) in 1990. He has more than 28 years of experience and his expertise is in engineering geology and mining geology. Currently, he is the President of the Geological Society of Malaysia (GSM), as well as Treasurer and Fellow of Institute Geology Malaysia. He is also an Industrial Council Member of Action Group of Entrepreneur (AGE) of University Malaysia Kelantan (UMK), a lecturer at IKRAM Skill and Development Center, a Council member of International Association of Engineering Geology (IAEG) and a member of European Geoscientist Union (EGU). His mission in GSM is to strive for sky-high success, sustainability and transforming to everlast and relevance society for geoscience community and beyond.

VICE-PRESIDENT



Dr. Mohd Hariri Arifin is a senior lecturer at Universiti Kebangsaan Malaysia (UKM) with over 10 years of experience in teaching, research and consultation works. He obtained his bachelor's degree in geology from UKM, then proceeded with his master's studies in engineering geology in the same university and completed his PhD in geophysics exploration at Universiti Sains Malaysia in 2017. He is a registered professional geologist with Board of Geologist Malaysia (PG29) since 2016 and a member of Institute of Geology Malaysia. He established Geo Technology Resources in 2011 before handing it over to his partners, a company with a focus on geophysical and geological services. He has conducted numerous researches, mainly in the field of geothermal exploration, groundwater potential, slope stability, settlement problems and tunnel stability. His passion and dedication in research has resulted in him publishing over 33 articles and getting more than 88 citations in the span of 10 years. His target is to ensure the young generation obtain the best geological education and awareness to enable them to connect to the industry world.

SECRETARY



Ms. Farah Fazulah Abdullah is a Geologist in energy industry and is currently based in Australia but still an active member of GSM. She is a member of the Society since 2017 and has served as Assistant Secretary and Secretary to GSM for the past 3 terms. She obtained her BSc degree in Geology in 2005, and MSc degree in Petroleum Engineering in 2016. She is passionate about knowledge sharing, and has represented GSM since 2005 in promoting geology in schools. Apart from that, she was also responsible for initiating the GSM expedition to Sungai Lembing to visit the remnants of the mining industry. Her mission as a GSM member and for the Geology Communities are:

- To continue promoting geology to younger generations
- Bringing fresh ideas of activity to working groups
- Hoping to co-organize more expedition post Covid restrictions.

ASSISTANT SECRETARY



Ms. Norazianti Binti Asmari earned a B. Sc (Hons) in Geology in 2008 from the University of Malaya in Kuala Lumpur. Since 2012, she has served as the Managing Director and founder of Geoxpert (GEX) Sdn. Bhd. She has nearly 13 years of experience in the engineering geology sector, primarily consulting on geological aspects of highland development, such as geological terrain mapping, slope assessment mapping, and site investigation (S.I.). Her vision and mission are to give back to the geological community in any way possible, and she began contributing officially by serving the Society. In fact, she had already started to give back actively even before becoming a GSM member, by sharing her knowledge across a variety of platforms, particularly on social media. Her sharing is not only beneficial to the geological community, but is also beneficial to the general public in terms of disaster risk reduction education.

TREASURER



Dr. Lim Choun Sian, P.Geol, M.I.G.M, Gs, is a Senior Researcher and Head of Geohazards Program in Southeast Asia Disaster Prevention Research Initiative (SEADPRI) from Universiti Kebangsaan Malaysia and the Editorial Manager for Bulletin of the Geological Society of Malaysia. Prior to the current post as Treasurer in the GSM Council, he served as the Secretary. He is a professional geologist registered with the Board of Geologists Malaysia. His main fields of expertise are landslide, flood, earthquake and natural/human-induced geohazards. His research is focused on Mountain and Urban Geohazards, Engineering Geology, Geomorphology, Disaster Science; Policy and GIS in Earth Sciences. In Malaysia and Indonesia, he is involved in post-disaster investigation studies, i.e. landslides in Bukit Antarabangsa and Ampang Jaya, tsunami in Malaysia (2004), Padang-Indonesia earthquake (2009), Sabah earthquake (2015); Disaster Risk Reduction DRR education and training i.e. as a trainer to ASEAN Youth Volunteer Program (AYVP); and DRR policy for land use planning. He also served as a member in the Technical Committee for Earthquake to Department of Standards Malaysia in drafting for Malaysia National Annex to MS EN 1998-1: 2015, Eurocode 8: Design of structures for earthquake resistance - Part 1: General rules, seismic actions and rules for buildings.

EDITOR

Dr. Wan Hasiah Abdullah, a retired professor since 2020, began her academic career in 1984 upon undertaking a postgraduate programme at the University of Newcastle Upon Tyne, UK. For her M.Sc. project, she worked on the Brent Formation of the North Sea and for her Ph.D. she studied the hydrocarbon generating potential of a succession of sedimentary rocks from Spitsbergen, Svalbard. She started teaching at the Department of Geology, University of Malaya in 1990. Her research interest is in assessing oil-generating potential of coals and other organic-rich sediments, as well as determining their depositional environments. Throughout the years she has presented her research work in Europe, the Middle East, Southeast Asia and Australia. She has published about 100 papers in ISI/SCOPUS indexed journals, supervised 20 M.Sc./Ph.D. students and conducted consulting projects for several major oil companies. Dr. Wan Hasiah served as Head of Geology Department (2004-2007), as coordinator of M.Sc. Petroleum Geology (2005-2015), Deputy Director of the University of Malaya's Consultancy Unit (2013-2020) and member of the Board of Geologists Malaysia (2018-2020). Presently she is a professional geologist registered with the Board of Geologists, Malaysia, a fellow of the Institute of Geology Malaysia and Editor of the Geological Society of Malaysia. The website Research.com recently reported Dr. Wan Hasiah as Malaysia's highest-ranked Earth scientist based on publications and citation values collected from 2014 to December 2021.

IMMEDIATE PAST-PRESIDENT

Mr. Abd Rasid Jaapar is the Chief Executive Officer of GMT Group, a multidisciplinary geoprofessional firm providing consultancy and services in geoscience, geomechanics, geomatics and geospatial. He is a registered professional geologist with Board of Geologists Malaysia (BOG) and a registered environmental specialist with Department of Environments Malaysia (DOE). He is also a professional member of the Institution of Geospatial and Remote Sensing Malaysia (IGRSM) and an associate member of the Institution of Engineers Malaysia (IEM). He has almost 30 years of experience working in construction industry as well as in oil and gas industry. While in the oil and gas industry, he used to manage multimillion ringgit projects covering Malaysia, Southeast Asia, Australia, Papua New Guinea, West Asia, Central Asia and Western Europe. He is the President of the Institute of Geology Malaysia (IGM); Immediate Past President of Geological Society of Malaysia (GSM); Vice President of Society for Engineering Geology and Rock Mechanics, Malaysia (SEGRM) which is affiliated to International Association of Engineering Geology and the Environments (IAEG) and International Society for Rock Mechanics and Rock Engineering (ISRM); and Secretary of Malaysian Geoscience Consultants and Services Association Malaysia (MyGeo). He was the youngest and among the first group of Board Member that served the Board of Geologists Malaysia from 2015 to 2017, and now re-appointed for 2020-2023. He is appointed as Adjunct Professor at the Faculty of Earth Science, University of Malaysia Kelantan (UMK) and Adjunct Lecturer at the Department of Management & Humanities, University of Technology Petronas (UTP) where he teaches Professional Practice and Practical Management for Geoscientists. He is a member of Curriculum Committee, Department of Geology, University of Malaya (UM) and an academic board member of New Academic Programme, Faculty of Science and Natural Resources, University of Malaysia Sabah (UMS). Internationally, he is a member of IAEG Commission 35 on Engineering Geological Model and IAEG Commission 38 on Rock Mass Characterisation with Emphasis on Rock Fall. He obtained his Master degree in Applied Geoscience (Engineering Geology theme) from the University of Hong Kong (HKU) in 2006 where he won Halcrow Prize as a mark of distinction and overall best student and, Bachelor with Honors degree in Geology from the National University of Malaysia (UKM) in 1992. In 2015, he received Tokoh Alumni Swasta Award from the Geological Club of UKM. He is also the President of Sekolah Dato Abdul Razak Alumni (SDARA), one of the public premier boarding schools in Malaysia.

COUNCILLOR



Dr. Abdul Halim Abdul Latiff is currently leading the Centre for Subsurface Imaging (CSI), an oil and gas industry-oriented research centre in Universiti Teknologi PETRONAS (UTP). He obtained his MEng, MSc and Doctorate from Imperial College London, UTP and Universiti Sains Malaysia (USM) respectively with special interest in seismic technology and deep-earth seismology. His main area of expertise is in seismic processing and imaging, both for active and passive seismic (including earthquake seismology). With several years as an industry practitioner with CGG Malaysia as well as researcher and academician with UTP, Halim is on a mission to spread the knowledge in geosciences and nurturing more earth scientist for a sustainable and better future. Halim currently serves GSM as a councillor for 2020-2022.



P.Geol. Dr. Abdull Halim Bin Abdul M.I.G.M graduated with Honours from University of Malaya (UM) in Bachelor of Science in Applied Geology in 1990. He obtained his Master of Environmental Technology from University Malaya in 1999. He also graduated with Ph.D. in Engineering for Soil-Mechanics from University Tenaga Nasional. He is the Chief Executive Officer of Ground Wave SSPT Sdn. Bhd. He has almost 31 years of experience in industries. His expertise is in ground engineering in onshore, offshore, and on-land works. He is a board member of the Malaysian Board of Geologists (BOG) and a life member of the Geological Society of Malaysia.



P.Geol. Ahmad Zulqurnain Ghazalli M.I.G.M graduated with Honours from University Kebangsaan Malaysia (UKM) in Bachelor of Science in Geology in 2010. He is a Director at Geoventure Solution Sdn. Bhd. He has 12 years of experience and his expertise is in engineering geology. He is a committee for engineering Working Group in GSM. His passion is in human development and he believe that the best person is the one who is beneficial for others.



Ms. Amie Amir graduated with a bachelor's degree in Geology from Universiti Kebangsaan Malaysia, in 2007. She is now working as the upstream asset valuation consultant with IHS Markit based in Kuala Lumpur. A versatile petroleum geologist with 15 years of industry experience, specialising in upstream business portfolio, asset valuation and field development planning. She holds a strong passion in the subject of energy and sustainability. She currently serves as a council member of the Geological Society of Malaysia. Her long-term vision for the earth sciences community in Malaysia is women's empowerment, and to promote environmental awareness in the younger generation through early exposure and education.

COUNCILLOR



Professor Dr. Joy Jacqueline Pereira is a Principal Research Fellow at Universiti Kebangsaan Malaysia's Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM) and Fellow of the Academy of Sciences Malaysia.

Professor Pereira is Vice-Chair of the Intergovernmental Panel on Climate Change (IPCC) Working Group 2 on Impacts, Adaptation and Vulnerability. She was Coordinating Lead Author for the Asia Chapter of the IPCC Fifth Assessment Report released in March 2014; Review Editor for the 2012 IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (IPCC-SREX); and Lead Author for the IPCC-AR5 Synthesis Report. Prof. Pereira is also a Member of the United Nations Office for Disaster Risk Reduction (UNDRR) Asia Pacific Science, Technology and Academic Group (APSTAAG), which supports governments in science-based decision making to implement the Sendai Framework for Disaster Risk Reduction. She is a Director of the Asian Network on Climate Science and Technology (ANCST), working closely with University of Cambridge.

Professor Pereira chairs the Malaysia Research Network on Climate, Environment and Development (MyCLIMATE) and serves as a Resource Person to the Malaysian Government in negotiating international agreements. She is a professional geologist registered with the Board of Geologists Malaysia, Past President of the Geological Society of Malaysia and Fellow of the Institute of Geology Malaysia. She was active in the Commission on Geoscience for Environmental Management of the International Union of Geological Sciences (IUGS-GEM) for about a decade and retired after serving as Chair from 2004 to 2008.

Professor Pereira obtained a Ph.D. from University of Malaya in 1996, Master of Science from University of Leicester in 1991 and Bachelor of Science with Honours from Universiti Kebangsaan Malaysia in 1989, specialising in the field of geoscience. She has graduated about 40 doctoral and masters candidates through research supervision and published over two hundred peer reviewed articles.



P.Geol. Dr. Nor Shahidah Mohd Nazer graduated with Doctor of Philosophy in Civil & Environmental Engineering from the University of Strathclyde, Glasgow, United Kingdom in year 2016. She is currently a Senior Lecturer at the Geology Programme, UKM and also appointed as a Programme Coordinator for the Master by Coursework in Engineering Geology. As an expert in soil mechanics and engineering geology, her research interest focusses into understanding the mechanical behaviour of problematic soils in tropical region and its interaction with rainfall-induced geohazard events. She concentrates on laboratory simulation as a way of understanding soil interaction with changing water content from desiccated into slurry condition. She also conducts soil morphometric analysis at macro and micro scale using Image Processing Technique and Scanning Electron Microscopy.

COUNCILLOR



Dr. Nur Iskandar Taib holds a BSc in Geology, MSc in Geology and PhD in Geology from the Indiana University, Bloomington, in the USA. He was a Senior Lecturer at University of Malaya from 2002 to 2021 and is currently retired as of September 2021. His research interests and expertise are igneous and metamorphic petrology and geochemistry. Currently he is working on the geochemistry of volcanic ash deposits in Perak and Kedah.



Mr. Tan Boon Kong was formerly Associate Professor of Engineering Geology at Universiti Kebangsaan Malaysia (UKM), Bangi, where he had served for 33 years. He retired from the university in October 2006. He obtained B.Sc. Hons in Applied Geology (UM) in 1973, M.S. in Geological Engineering (U. Missouri) in 1975, and M.S. in GeoEngineering (U. Minnesota) in 1977.

While at UKM, in addition to teaching and research, Mr. Tan was also engaged occasionally on an ad-hoc or project basis in consultancy practices in Engineering Geology with the private sectors, mostly with the Geotechnical and Civil Engineering consulting companies or contractors. He then continued his practice as an independent freelance Consultant Engineering Geologist. He has published widely on Engineering Geology and Rock Mechanics in local and international conferences and technical journals.

Mr. Tan has also been actively involved in professional bodies such as the Geological Society of Malaysia (GSM), the Institute of Geology Malaysia (IGM) and the Institution of Engineers Malaysia (IEM) as a member of the Council (GSM, IGM) or Technical Divisions (IEM). He is the Chairman of the Working Group on Engineering Geology, GSM.

Awards include: 25-year service award (UKM), 30-year service award (UKM) and Long Service Award (GSM).

NEW MEMBERSHIP

Student Membership

1. Ahmad Rashid Mohamed Yazid
2. Atif Rifqy Mohd Rezal
3. Divhesh Rao Nagaraju
4. Hikmat Salam
5. Ira Farhana Adzharudin
6. Lim Min, Waverly
7. Mahendra Abivoga Hidayat
8. Mohd Zahid Zaidi Zaki
9. Nadhratunnaim Harun
10. Nadira A Rahman
11. Nur Adriana Wahid
12. Nur Syasya Khaisah Saidi Ali
13. Nurnashrah Mohd Norzalimi
14. Peng Choon Zhen
15. Phua Wen Xuan, Hannah Christabel
16. Puteri Siti Zuelaika Megat Shamshul Kamal
17. Rabiatul Adawiyah Mohamad Nasir
18. Siti Nurhanis Atiqah Ryzarul Anuar
19. Siti Nurmasturina Shohailly
20. Ummi Umairah Taufik
21. Wan Zara Annati Wan Mohd Rozi

Full Membership

1. Chan Eng Hoe
2. Cheong Khai Wing
3. Ganesan Ayawo
4. Intan Sazrina Saimy
5. Joanes Muda
6. Mohd Syakir Sulaiman
7. Muhammad Irman Khalif
8. Muhammad Yasir Yusoff
9. Ong Swee Keong
10. Prakasini S Davandran
11. Ramany Maniam
12. Robert Charles Davis
13. Siti Athirah Kelana
14. Siti Rubaiah Kamaruzaman
15. Siti Sarah Ab Rahman
16. Siti Zalipah Jumary
17. Siti Zaniza Tohar
18. Suhaileen Shahr
19. Zulherry Isnain

From Student To Full Membership

1. Astriana Emaonang Sipranus
2. Fong Yi Ning
3. Immas Janggok
4. Muhammad Afiq Abdul Kahar
5. Muhammad Amin Mezan
6. Wan Nursyazana Syarah Wan Ismail

From Full To Life Membership

1. Amir Huzairy Yahya
2. Dahlan Muhd Darwis
3. Mohammad Yasir Mohammad Said
4. Mohd Shafar Jefri Mokhtar
5. Norasiah Sulaiman
6. Nurul Syazwani Yahaya
7. Paulius Godwin @ Paulus
8. Teoh Hoon Ping, Wendy

Associate

1. Ding Lean Koon, Julian

GSM-UMS Geology Club programs held in December 2021

KOTA KINABALU - On December 17, 2021, the GSM-UMS Geology Club hosted the Geomesra Programme. The goal of this programme is to strengthen the bonds that exist between UMS Geology students from their first year to their last year. It also attempts to generate a positive relationship between students and UMS Geology lecturers. Although the programme was only conducted online, the feedback has been quite positive, and it is hoped that this will become an annual tradition.

In addition, The Geotalk 8.0 Programme: What is Behind Engineering Geology? was held on December 18, 2021, by the GSM-UMS Geology Club. Students with a background in geology, from any university, are welcome to participate in the programme. Mr. Mohammad Syafiq bin Salim, Mr. Azfar Rafie Abu Bakar, and Mrs. Yon Basirah binti Yop Baharuddin are three of the most experienced panellists in the Engineering Geology sector. With this program, all students are clear and get early exposure and know the challenges that they will go through in this field of Geology.

Last but not least, all of the programmes went off without a hitch, with positive feedback from both the Geology students and the general public, as evidenced by our live viewers on Facebook and Instagram. We truly want to host more beneficial programmes in the future in conjunction with GSM and the GSM-UMS Geology Club.

Thank you very much.

Siti Nurfaizillah binti Abdul Rasid,
Secretary
Tuesday Jan 4, 2022



Poster of Geomesra Programme. Photo by: kelabgeologi_ums on Instagram.



Screenshots during Geomesra Programme on December 17, 2021. Photo by: Lim Yan Ying.



Poster of Geotalk 8.0: What is Behind Engineering Geology? Photo by: kelabgeologi_ums on Instagram.



Screenshot of the event with the panellists on December 18, 2021. Photo by: Shareena Mazlan.

Laporan Pertandingan Menulis Esei Sempena Hari Bumi 2022 Kelab Geologi Universiti Kebangsaan Malaysia (KGUKM)

Tarikh : 9 Mei 2022

Anjuran : Kelab Geologi Universiti Kebangsaan Malaysia (KGUKM)

Kerjasama : Persatuan Geologi Malaysia (GSM) Dan Institut Geologi Malaysia (IGM)

RINGKASAN PERTANDINGAN MENULIS ESEI SEMPENA HARI BUMI 2022

Pertandingan Menulis Esei Sempena Hari Bumi 2022 merupakan sebuah program bertemakan alam sekitar anjuran Kelab Geologi Universiti Kebangsaan Malaysia (KGUKM) dengan kerjasama daripada Persatuan Geologi Malaysia (GSM) dan Institut Geologi Malaysia (IGM). Objektif pertandingan ini dianjurkan bertujuan untuk memupuk sifat tanggungjawab terhadap Bumi kepada pelajar-pelajar Universiti di samping memelihara khazanah bumi untuk kepentingan bersama. Pertandingan ini juga dapat memberikan pengalaman untuk membentuk keyakinan diri sebagai seorang pelajar dengan mencurahkan segala pendapat dan idea di dalam bentuk esei.

Pertandingan tersebut telah diadakan pada 19 April 2022 sehingga 22 April 2022. Pertandingan ini dihebahkan di Whatsapp dan Instagram secara berkala. Sepanjang pertandingan ini berlangsung, seramai 13 peserta daripada Universiti Kebangsaan Malaysia (UKM), Universiti Malaysia Terengganu (UMT), Universiti Malaysia Kelantan (UMK) dan Universiti Malaya (UM) telah mengambil bahagian untuk menulis esei sempena Hari Bumi 2022. Seterusnya pada 27 April 2022, Pengumuman Pemenang Pertandingan Menulis Esei sempena Hari Bumi 2022 diadakan di FB Live dan Google Meet.

Pengumuman ini dihadiri oleh tetamu VVIP iaitu P.Geol. Ahmad Nizam Hassan (Presiden Persatuan Geologi Malaysia), P.Geol. Abd. Rasid Jaapar (Presiden Institut Geologi Malaysia), serta 2 orang pensyarah Geologi UKM iaitu Dr. Mohd Rozi Umor (Penasihat Kelab Geologi Universiti Kebangsaan Malaysia) dan Dr. Mohd Hariri Arifin (Penasihat Pertandingan Menulis Esei Sempena Hari Bumi 2022). Pemenang serta pelajar Geologi UKM juga turut serta hadir bagi memeriahkan suasana.

Pengumuman pemenang dilakukan oleh saudara Muhammad Aidil Hakimi Bin Mohd Noor selepas sesi kata-kata aluan daripada tetamu VVIP dan pensyarah Geologi UKM. Hadiah berbentuk wang juga diberikan untuk memberikan galakan kepada pelajar untuk ikut serta dalam program yang dilakukan oleh KGUKM. Pengumuman pemenang dilakukan bagi memberi semangat kepada para pelajar untuk menulis esei sebagai salah satu penulisan akademik yang boleh membantu untuk menaikkan nama Universiti masing-masing.

SENARAI NAMA PESERTA PERTANDINGAN MENULIS ESEI

	Nama	Tahun	Universiti	Bidang	Peringkat Pengajian
1	Nurul Damia Binti Roswadi	2	UKM	Geofizik Kejuruteraan Dan Persekitaran	Sarjana Muda
2	Nur Salina Binti Rosli	3	UKM	Geologi	Sarjana Muda
3	Ungku Nur Atikah Sabihah Bt Ung. Md. Salleh	3	UKM	Geologi	Sarjana Muda
4	Nur Athirah Binti Aznan	1	UKM	Geologi	Sarjana Muda
5	Veeralachimy A/P Ganaseelan	1	UKM	Geologi	Sarjana Muda
6	Nur Khaleeda Binti Mohd Faizul	3	UKM	Geologi	Sarjana Muda
7	Afiqah Izzati Abdullah	3	UKM	Geologi	Sarjana Muda
8	Joey Lim	2	UMT	Geosains Marin	Sarjana Muda
9	Raja Nur Aisyah Binti Raja Ismail	2	UMK	Geosains	Sarjana Muda
10	Muhammad Khairul Izzat Bin Haridan	4	UKM	Geologi	Sarjana Muda
11	Mohamad Hazim Bin Md Zin	3	UKM	Geologi	Sarjana Muda

SENARAI NAMA PEMENANG BERSERTA TAJUK ESEI

ESEI BAHASA MALAYSIA			
Bil	Nama/Universiti	Tajuk	Ringkasan
1	Mohamad Hazim Bin Md Zin (UKM)	Bumi Ini Rumah Kita	Peranan kita sebagai penduduk Bumi dalam menjaga, melindungi dan melestarikan alam sekitar untuk kemapanan Bumi.
2	Muhammad Khairul Izzat Bin Haridan (UKM)	Melabur Untuk Kelestarian Bumi Masa Hadapan	Mengutamakan sumber ekonomi sirkular seperti galakan penggunaan sumber yang boleh diperbaharui untuk mencapai kelestarian ekonomi dan alam sekitar.
3	Raja Nur Aisyah Binti Raja Ismail (UMK)	Sayangi Bumi	Menggalakkan usaha kerjasama daripada kerajaan, NGO serta masyarakat untuk bersama-sama melindungi alam sekitar.

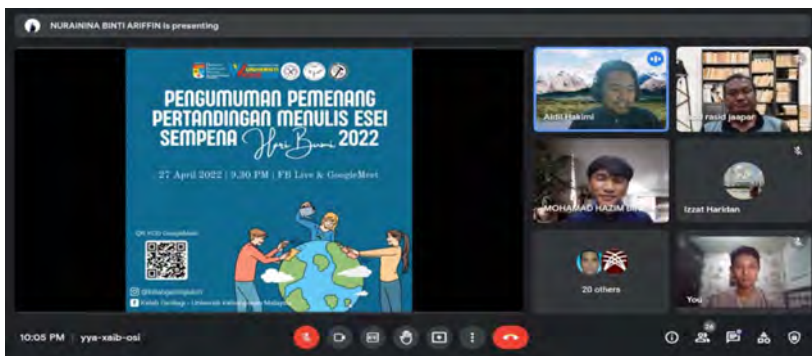
ESEI BAHASA INGGERIS			
Bil	Nama/Universiti	Tajuk	Ringkasan
1	Afiqah Izzati Binti Abdullah (UKM)	A Review On Climate Change	Menyatakan Tentang Isu Pemanasan Global Dan Kesan Terhadap Bumi.
2	Wan Nur Balqish Binti Wan Bazlan (UKM)	Plastic And Geology	Membincangkan Tentang Pencemaran Alam Sekitar Seperti Pembuangan Plastik Dan Kesan Terhadap Ekosistem Laut.
3	Joey Lim (UMT)	Don't Sleep On Earth	Menggalakkan Penggunaan Teknologi Yang Mampan Dalam Melindungi Bumi Daripada Pemanasan Global

GAMBAR-GAMBAR MAJLIS PENYAMPAIAN HADIAH PERTANDINGAN MENULIS ESEI SEMPENA HARI BUMI 2022

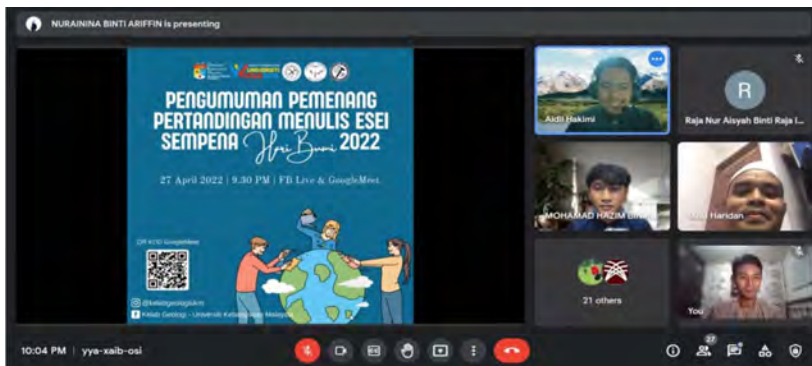


Kata-kata aluan daripada P.Geol Ahmad Nizam Hassan (Presiden Persatuan Geologi Malaysia), P.Geol. Abd. Rasid Jaapar (Presiden Institut Geologi Malaysia) dan Dr. Mohd Rozi Umor (Penasihat Kelab Geologi Universiti Kebangsaan Malaysia).

BERITA-BERITA LAIN (OTHER NEWS)



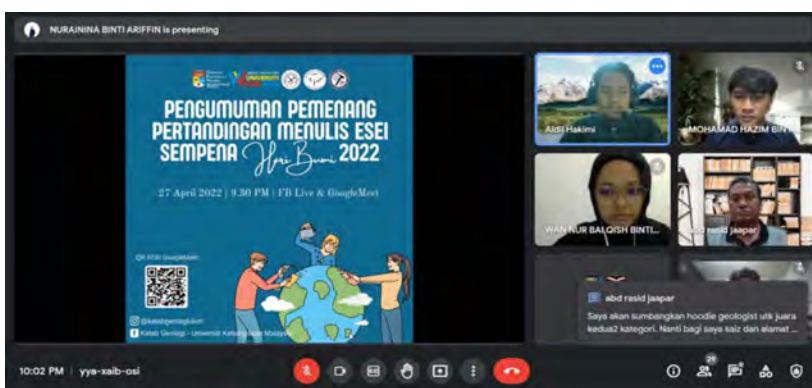
Pemenang Esei Bahasa Melayu tempat pertama - Mohamad Hazim Bin Md Zin (UKM).



Pemenang Esei Bahasa Melayu tempat kedua - Muhammad Khairul Izzat Bin Haridan (UKM).



Pemenang Esei Bahasa Inggeris tempat pertama - Afiqah Izzati Binti Abdullah (UKM).



Pemenang Esei Bahasa Inggeris tempat kedua - Wan Nur Balqish Binti Wan Bazlan (UKM).

Esei Pemenang Pertandingan Menulis Esei Sempena Hari Bumi 2022

1 - BUMI INI RUMAH KITA

Mohamad Hazim Bin Md Zin
Universiti Kebangsaan Malaysia

Siapa sangka bahawa tanah yang dipijak serta langit yang dijunjung ini sudah berusia bukan jutaan tapi berbillion tahun? Satu pertanyaan yang sudah pastinya akan menjadikan pendengarnya terpinga-pinga memikirkan fakta yang sangat menakjubkan ini. Jika diputar kembali lembaran filem masa serta diundurkan bahtera, angkasa raya telah menjadi saksi detik-detik terciptanya satu susuk mega yang dahulunya hanya ibarat sebuah bola gergasi yang membakar, kering seperti gurun tidak berhujan serta gelap gelita seperti malam tidak berbulan.

4.54 billion tahun dahulu atau jika dibesarkan angkanya menjadi 4,540,000,000 tahun merupakan anggaran usia sebuah planet. Benar, seperti apa yang terdetik dalam fikiran para pembaca bahawa bola gergasi yang dinyatakan sebentar tadi merupakan sebuah planet yang diberi nama Bumi. Kedudukan planet ini yang terletak di dalam Zon Goldilocks menjadikannya tidak terlalu terik membakar seperti Zuhrah atau tidak terlalu sejuk mencengkam seperti Marikh. Satu kondisi yang penting bagi menjamin kewujudan air yang memainkan peranan yang amat besar dalam sistem kehidupan sesuatu planet. Bermula dari kehidupan ringkas organisma unisel zaman kuno sehingga menjadi organisma multisel yang lebih kompleks, planet ini akhirnya kini dihiasi dengan kepelbagaian biodiversiti yang amat unik. Siapa dapat menjangkakan bahawa bumi yang dahulunya kering kontang kini dihuni oleh pelbagai susuk kehidupan di setiap ceruk permukaan serta segenap bahagian dasar lautan. Alangkah tersusun dan indahnyanya kejadian kehidupan yang telah ditetapkan oleh Sang Pencipta yang Esa. Justeru, demi menghargai dan mengingati kepentingan bumi kepada setiap kehidupan, tarikh 22 April setiap tahun dipilih bagi meraikan sambutan Hari Bumi pada peringkat global.

Ada diantara kita yang masih lagi tidak mengetahui apakah ertinya sambutan ini diraikan saban tahun. Adakah perlu sambutan Hari Bumi ini dilakukan? Persoalan ini sering bermain-main di minda sesetengah pihak yang beranggapan bahawa sambutan selama satu hari ini cuma hanyalah sekadar satu gimik yang tidak memberi impak yang besar dalam skala global. Demi menjawab persoalan tersebut, berhentilah sejenak pembacaan saudara dan lihatlah keluar jendela. Luaskanlah pandangan sejauh mata memandang dan lapangkanlah hati seluas ufuk Timur. Saksikanlah akan keindahan bumi ini dengan pancaindera pemberian Tuhan. Lihatlah kehijauan dedaun pada pepohon yang meredupkan peneduhannya, akan keputihan awan di kemuncak langit kebiruan yang tidak tergapai dek tangan. Bunyi desiran ombak menghempas butiran pasir bergemerlapan di pesisiran pantai, angin lembut segar yang membelai kedua belah pipi dengan lemah gemalainya. Segala nikmat yang dapat dirasai ini tidak lagi diragui akan menghadirkan ketenangan dan menghilangkan kegusaran yang bermain di jiwa. Segala ketenangan yang dinikmati ini perlulah dijaga bagai menatang minyak yang penuh agar dapat diwariskan kepada generasi seterusnya. Oleh yang demikian, sambutan Hari Bumi ini amatlah penting untuk diraikan sebagai salah satu tanda peringatan kepada kita untuk sentiasa berusaha sehabis baik memelihara dan memulihara alam sekitar. Sempena sambutan Hari Bumi ini, eloklah jika kita menambah ilmu pengetahuan kita mengenai salah satu ancaman besar yang dihadapi oleh Bumi. Permasalahan ini akan dikupas kulit demi kulit dan isi demi isi pada bahagian seterusnya. Diharapkan para pembaca dapat memberikan sepenuh perhatian agar dapat menghadam dan menilai sendiri akan segala bentuk perbincangan dan penyelesaian yang diperolehi demi kemaslahatan bersama.

Planet Bumi terdiri daripada beberapa sistem yang penting iaitu hidrosfera, litosfera, atmosfera dan juga biosfera. Keempat-empat sistem ini adalah saling berkaitan antara satu sama lain. Oleh itu, sebarang kepincangan yang berlaku pada salah satu sistem akan turut memberi kesan yang buruk kepada sistem yang lain lebih-lebih lagi sistem biosfera. Mengulas mengenai sistem atmosfera, atmosfera merupakan lapisan gas dan ampai partikel nipis yang menyelubungi bumi. Unsur-unsur pembentuk atmosfera terdiri daripada 3 gas utama iaitu nitrogen, oksigen dan argon yang merangkumi sekitar 99.96% komposisi atmosfera. Baki peratusan komposisi atmosfera terdiri daripada karbon dioksida, neon, helium, metana, kripton, nitrus oksida, hidrogen dan ozon. Karbon dioksida merupakan gas rumah hijau: iaitu gas yang berperanan menyerap dan memancarkan haba daripada sinaran matahari. Tanpa fenomena kesan rumah hijau, suhu purata Bumi akan jatuh secara mendadak ke satu suhu menghampiri takat beku. Suhu yang rendah ini amatlah tidak sesuai dan akan mengganggu kitaran hidupan di planet Bumi. Walaubagaimanapun, pada ketika ini tanpa kita sedari kandungan karbon dioksida di atmosfera bumi telah lama mencapai paras yang membimbangkan. Pembakaran bahan api fosil, penyahhutan untuk kegiatan pertanian serta aktiviti perindustrian adalah antara

penyumbang utama bagi pelepasan karbon dioksida ke atmosfera. Tambahan lagi, Revolusi Industri yang berlaku pada tahun 1790 sehingga 1870 turut menjadi katalis kepada peningkatan karbon dioksida di atmosfera. Buktinya, kepekatan karbon dioksida dalam tempoh 200 tahun dahulu adalah sekitar 280 ppm berbanding 400 ppm pada masa kini. Peningkatan yang ketara dalam masa yang singkat ini memberi gangguan kepada iklim global kerana apabila kandungan karbon dioksida semakin tinggi, suhu pada permukaan bumi juga akan meningkat. Menjelang tahun 2025, suhu global dunia dijangkakan akan meningkat sekitar 2°C. Peningkatan sebanyak satu angka ini sudah pastinya tidak dilihat sebagai satu ancaman, tetapi kesan yang akan berlaku perlulah dilihat dalam skala global dalam tempoh masa yang panjang. Peningkatan sebanyak 2°C akan menjadikan permukaan bumi menjadi lebih kering, di mana segala jenis sektor ekonomi, pertanian, infrastruktur dan mahupun corak cuaca akan terganggu. Kebimbangan lebih turut dirasakan apabila kenaikan suhu akan merosakkan pelbagai jenis ekosistem di mana spesies yang terlibat seperti batu karang tidak akan mampu menyesuaikan diri dengan perubahan persekitaran yang telah menjadi asing. Lebih memburukkan lagi, kawasan yang terletak pada kedudukan yang rendah atau di bawah paras laut berisiko untuk tenggelam akibat kenaikan paras air laut kesan daripada pencairan ais pada kawasan Greenland dan juga Artik. Oleh yang demikian, langkah pencegahan awal perlulah dilakukan untuk mengurangkan kesan ini daripada berlaku.

Pada hemat saya, antara inisiatif awal yang boleh dilakukan adalah dengan menggalakkan lagi penggunaan kenderaan hibrid dan pengangkutan awam di dalam sektor pengangkutan di negara kita. Mengikut statistik yang dikeluarkan oleh Numbeo, iaitu sebuah badan bebas yang mempunyai pangkalan data kos sara hidup terbesar di dunia, Malaysia berada dalam kedudukan ke-4 bagi tahap kesesakan trafik paling teruk di dalam senarai negara ASEAN iaitu dengan skor indeks trafik sebanyak 197.76 mata. Dengan nilai kesesakan yang tinggi ini, rata-rata pengguna jalan raya di negara kita meluangkan masa sekitar 40.09 minit di dalam kesesakan lalu lintas. Kesannya, kadar pelepasan karbon dioksida yang dibebaskan akan melebihi purata ketika trafik normal. Oleh itu, dengan pengenalan kepada kenderaan hibrid, kadar pelepasan karbon dioksida akan dapat dikurangkan dalam skala yang besar. Ini kerana kenderaan hibrid kurang mencemarkan alam sekitar berbanding kenderaan yang menggunakan bahan api fosil. Demi merealisasikan usaha ini, kerajaan perlulah menguatkuasakan polisi pengecualian cukai dan subsidi kepada pengguna hibrid kerana ini amat membantu dalam menarik minat pengguna untuk bertukar ke kenderaan hibrid yang lebih efisien dan lebih murah dari segi harga dan kos perbelanjaan. Selain itu, penggunaan kenderaan awam seperti bas, van dan tren pula boleh mengurangkan kesesakan trafik. Jika kadar penggunaan kenderaan awam ingin ditingkatkan semaksimum mungkin, kerajaan hendaklah meningkatkan kebolehcapaian kenderaan awam dengan memberikan perkhidmatan bas ulang-alik secara percuma atau meningkatkan kualiti kemudahan awam seperti pondok bas atau stesen menunggu. Dengan perlaksanaan kedua-dua inisiatif ini, sudah pastinya objektif utama dalam mengurangkan kesesakan dan pencemaran akibat pembakaran bahan api fosil dapat dikurangkan sebaik mungkin. Oleh itu, kita sebagai warganegara yang bertanggungjawab di negara ini hendaklah menyokong segala inisiatif yang telah dilakukan dengan sesungguhnya agar inisiatif yang dilakukan ini tidak seperti melepaskan batuk di tangga atau hanya sekadar hangat-hangat taik ayam.

Secara harfiahnya, bumi boleh diibaratkan sebagai sebuah rumah yang berperanan melindungi penghuninya daripada sebarang marabahaya. Sebagai contoh, lapisan atmosfera berperanan menapis sebarang sinaran radiasi yang berbahaya kepada manusia seperti sinaran ultralembayung dan inframerah. Pendedahan yang berterusan daripada kedua-dua radiasi ini boleh menyebabkan keradangan kulit dan mata, juga berpotensi untuk mendatangkan penyakit yang lebih berbahaya seperti kanser kulit yang boleh membawa maut. Sebagai akhir kata penutup bicara, kita sebagai penghuni yang mendiami rumah yang indah ini hendaklah bersama-sama menggembeleng tenaga dan mencurahkan segala kudrat yang dimiliki untuk menjaga Bumi kita yang tercinta tanpa sebarang alasan kerana hendak seribu daya tak hendak seribu dalih. Tanpa sebarang usaha untuk memulakan, mana mungkin kita akan mampu mencapai apa yang diinginkan. Jadi, segalanya bermula dengan diri kita sendiri sebagai seorang individu yang bertanggungjawab memelihara dan memulihara Bumi yang tercinta daripada sebarang bentuk ancaman. Ibarat kata pepatah hidup kayu berbuah, hidup manusia berjasa, walaupun usaha yang dilakukan secara individu tidak memberikan impak yang besar, tetapi ianya akan menjadi salah satu bentuk inspirasi yang akan mencetuskan satu perubahan besar pada masa akan datang. Semboyan sudah berbunyi, gegandang perang sudah dipalu. Harapan saya dalam penulisan ini adalah para pembaca dapat bersama-sama dengan saya untuk berganding bahu dalam melaksanakan inisiatif yang telah dibincangkan diatas demi memastikan segala nikmat yang dirasakan oleh kita dapat dikekalkan dan diberi sebagai satu warisan kepada generasi seterusnya. Sebagai penutup, eloklah jika penulisan ini diakhiri dengan serangkap pantun empat kerat hasil nukilan saya. Selamat Hari Bumi.

*Nasi lemak buah bidara,
Sayang selasih hamba turuti,
Alam ini milik bersama,
Jagalah ia sepenuh hati.*

2 - MELABUR UNTUK KELESTARIAN BUMI MASA HADAPAN

Muhammad Khairul Izzat Bin Haridan
Universiti Kebangsaan Malaysia

Memetik kata-kata aktivis perubahan iklim yang tersohor dari Sweden, Greta Thunberg, beliau berkata: “Bumi ialah sebuah sistem yang sangat rencam (kompleks). Sekiranya anda mengambil satu benda dan meletakkannya di luar keseimbangan maka itu akan memberikan impak kepada sesuatu perkara menjangkau pemahaman kita”. Umum mengetahui bahawa Bumi merupakan suatu sistem bersepadu yang terdiri daripada empat (4) komponen, sub-sistem atau sfera utama iaitu litosfera, atmosfera, hidrosfera dan biosfera. Keempat-empat sfera ini berinteraksi dan mempengaruhi antara satu sama lain dalam sistem Bumi. Merujuk kepada petikan kata-kata Greta Thunberg di atas, dapat dijelaskan bahawa apa-apa perubahan yang berlaku dalam salah satu komponen sistem Bumi mampu membawa kepada ketidakseimbangan seterusnya mencetuskan bencana dasyat kepada bukan sahaja manusia sejagat bahkan kepada sistem Bumi ini keseluruhannya. Kepincangan dalam pengurusan alam sekitar dan sumber Bumi pada hari ini telah mencetuskan krisis alam sekitar dan bencana alam seperti banjir, tanah runtuh, pemanasan global, kepupusan flora dan fauna, pencairan glasier dan sebagainya.

Bertitik tolak daripada peristiwa tumpahan minyak di Santa Barbara, California pada tahun 1969, Hari Bumi mula disambut buat julung kalinya di Amerika Syarikat pada tahun 1970 iaitu hampir 52 tahun yang lepas. Idea untuk menyambut Hari Bumi mula diilhamkan dan dicetuskan oleh seorang bekas Senator Amerika Syarikat yang juga bekas Gabenor Wisconsin bernama Gaylord Nelson. Kini, Hari Bumi yang disambut pada 22 April setiap tahun di seluruh dunia bertujuan untuk meningkatkan kesedaran terhadap pemuliharaan dan pemeliharaan alam sekitar dan isu-isu berkaitan dengan pencemaran. Namun begitu, persoalan utama yang timbul adalah sejauh manakah penghayatan semua pihak yang boleh diambil untuk melestarikan alam sekitar melalui sambutan Hari Bumi? Adakah Hari Bumi yang disambut saban tahun hanya sekadar sambutan semata-mata tanpa objektif dan hala tuju yang jelas?

Tema sambutan Hari Bumi di seluruh dunia bertukar-tukar setiap tahun dengan objektif penyampaian mesej yang berbeza-beza. Berikut merupakan tema Hari Bumi untuk 5 tahun yang lepas: Membaik pulih Bumi Kita (2021); Tindakan Iklim (2020); Lindungi Spesies Kita (2019); Akhiri Pencemaran Plastik (2018); Kecelikan Alam Sekitar dan Iklim (2017). Bertemakan Melabur di dalam Planet Kita (Invest in Our Planet), sambutan Hari Bumi pada tahun ini (2022) menyeru orang awam, pihak kerajaan, badan-badan korporat dan sebagainya untuk menetapkan sebuah matlamat untuk memperlahankan kadar pemanasan global dan mengubah penggunaan sumber sedia ada ke arah kitaran yang lebih lestari. Apa yang dapat difahami daripada tema Hari Bumi tahun ini adalah kita pada masa ini telah pun mempunyai pelbagai cara atau jalan penyelesaian yang tuntas untuk menangani isu perubahan iklim dan alam sekitar. Cumanya, perkara asas yang perlu diteliti adalah seberapa banyakkah peruntukkan yang kita laburkan dalam mewujudkan kehidupan yang lebih lestari padamasa akan datang.

Kebanyakan tenaga yang kita guna sekarang dijana oleh bahan api fosil atau petroleum yang mampu menghasilkan kira-kira 60% pembebasan gas rumah hijau. Pembakaran bahan api fosil ini juga boleh menyebabkan pencemaran udara yang bukan sahaja memberikan kesan buruk kepada manusia bahkan planet Bumi ini. Oleh yang demikian, alternatif atau sumber tenaga yang diperbaharui bagi menggantikan sumber bahan bakar sedia ada dan cara untuk meningkatkan kecekapan tenaga perlu diguna pakai secara meluas bagi meningkatkan kualiti udara seterusnya memelihara planet kita. Berbanding dengan negara maju yang lain, Malaysia sejujurnya agak terkebelakang dalam hal ini memandangkan kebanyakan rakyat negara ini masih bergantung kepada tenaga yang tidak diperbaharui. Tahukah anda bahawa California, sebuah negeri di Amerika Syarikat mempunyai penjaan elektrik yang jauh lebih lestari berbanding Malaysia walaupun kedua-duanya mempunyai rizab minyak yang hampir sama? Hal ini kerana mereka memperuntukkan lebih banyak bajet untuk meneroka dan membuat inovasi dalam mengoptimalkan penggunaan tenaga yang boleh diperbaharui. Tenaga elektrik di sana dijana hampir 33% daripada sumber yang boleh diperbaharui terutamanya daripada tenaga solar, geoterma, tenaga biojisim dan tenaga hidroelektrik. Dalam hal ini, pihak kerajaan, pihak universiti, pihak industri perlu menyalurkan lebih banyak peruntukan kewangan bagi merencanakan bidang penyelidikan dan pembangunan (R&D) agar lebih banyak pakar dalam bidang teknologi tenaga hijau dapat dilahirkan. Peningkatan kepakaran dan pertambahan tenaga kerja profesional penggunaan tenaga hijau yang lebih pesat hasil pelaburan pada hari ini mampu menjadikan negara ini setanding dengan negara-negara maju yang lain bak kata pepatah Melayu, “duduk sama rendah, berdiri sama tinggi”.

Tambahan pula, rantaian bekalan global pada hari ini juga masih dipacu oleh ekonomi linear di mana semua bahan mentah akan diproses, digunakan dan kemudian kebanyakannya akan dilupuskan sebagai sisa buangan. Sekiranya perkara ini berlarutan, bermula pada tahun 2050, permintaan global terhadap sumber sedia ada dijangka akan meningkat hampir tiga kali ganda kepada 130 bilion tan setiap tahun di mana permintaan yang tinggi ini sukar

dipenuhi. Oleh yang demikian, peralihan daripada ekonomi linear kepada ekonomi sirkular perlulah dilaksanakan secara progresif dan menyeluruh dalam mencapai hasrat yang murni untuk mencapai kelestarian ekonomi dan alam sekitar di peringkat global. Dalam pada itu, ekonomi sirkular merupakan satu model penghasilan dan penggunaan yang melibatkan perkongsian, penggunaan semula, membaiki dan mengitar semula bahan dan produk sedia ada selama mana yang mungkin. Pakar menganggarkan bahawa pengamalan ekonomi sirkular mampu mengurangkan pembebasan karbon global sebanyak 40% dengan mengurangkan penghasilan sisa buangan secara drastik. Pengurusan sisa buangan yang efektif mungkin mengambil modal yang agak besar serta memerlukan masa yang panjang namun akan memberi impak positif yang besar terhadap alam sekitar pada akhirnya. Mengorak langkah ke hadapan, Kementerian Perusahaan, Perladangan dan Komoditi melalui menterinya, Datuk Zuraida Kamaruddin berhasrat untuk mengguna pakai ekonomi sirkular dalam mengutamakan kelestarian tanaman dengan mengurangkan pembuangan sisa pertanian di samping meningkatkan penghasilan bahan-bahan komoditi seperti minyak sawit. Kementerian tersebut meletakkan sasaran untuk menjana lebih banyak pendapatan sedia ada dengan menggiatkan usaha kitar semula produk sisa terutamanya biojisim kelapa sawit. Langkah proaktif seperti inilah yang perlu diserap dalam semua lapisan masyarakat agar semua pihak memainkan peranan masing-masing sebagai agen penyelamat Bumi.

Tidak dinafikan bahawa polemik dan krisis alam sekitar yang kita hadapi ketika ini merupakan perkara yang besar dan sukar untuk ditangani. Namun begitu, langkah-langkah yang mungkin dianggap sebagai hal yang enteng atau kecil ini sedikit sebanyak mampu memberikan impak positif dalam menjadikan planet Bumi ini lebih bersih, selesa dan lestari. Usaha yang menyeluruh daripada semua pihak perlu digembleng dalam membaiki pulih Bumi ini seboleh-bolehnya seperti keadaan sedia kala sebelum dicemari dan dinodai oleh kegiatan manusia. Sebagaimana yang termaktub dalam Al-Quran, Surah Ar-Rum ayat 31 mafhumnya, *“Telah timbul berbagai kerosakan dan bala bencana di darat dan di laut dengan sebab apa yang telah dilakukan oleh tangan manusia; (timbulnya yang demikian) kerana Allah hendak merasakan mereka sebahagian dari balasan perbuatan-perbuatan buruk yang mereka telah lakukan supaya mereka kembali (insaf dan bertaubat)”*. Sekiranya bukan kita yang bertindak sebagai agen perubahan, golongan atau pihak manakah yang boleh diharapkan atau dipertanggungjawabkan? Pelaburan untuk melestarikan planet ini merupakan pelaburan jangka panjang bagi kelangsungan generasi kita pada masa akan datang. Dengan tema “Melabur dalam Planet Kita” bagi Hari Bumi tahun ini, usahlah kita berkira-kira atau teragak-agak dalam melakukan perubahan terhadap kelestarian Bumi demi kebaikan bersama. Dalam pada itu, Hari Bumi yang disambut saban tahun tidak seharusnya dijadikan sebagai hari yang berakhir seperti hari-hari kebiasaannya tanpa apa-apa pengertian dan penghayatan sebenar. Namun begitu, bersempena hari khas inilah, semua pihak haruslah menguatkan tekad dan azam serta berganding bahu dalam memelihara, memulihara dan melestarikan Bumi ini bersama-sama.

3 - HARI BUMI

Raja Nur Aisyah Binti Raja Ismail
Universiti Malaysia Kelantan

Dalam meniti era globalisasi ini, projek sosio ekonomi yang dijalankan di negara kita kian pesat dari hari ke hari untuk meningkatkan taraf pembangunan negara. Saranan negara untuk berdiri sama tinggi dan duduk sama rendah dengan negara lain telah mewujudkan sikap kurang prihatin serta tamak dalam diri sesetengah rakyat Malaysia. Isu-isu ini melibatkan pelbagai sudut dan aspek dalam lingkungan alam sekitar termasuklah dari segi pencemaran, pengeksploitan sumber alam sehinggalah kepada sikap masyarakat sendiri. Hal ini termasuklah pengeksploitan manusia secara tamak dan rakus terhadap sumber bahan-bahan mentah bumi. Kesannya, maka wujudlah pelbagai isu yang berkaitan dengan alam sekitar samada di tanah, udara mahupun air. Kesan ini juga akan melahirkan pelbagai masalah seperti bencana alam, kerosakan ekosistem bumi malahan memberi kemudahan kepada kesihatan manusia itu sendiri. Hal ini dikatakan demikian kerana terdapat sesetengah individu yang bersikap materialistik sehingga alpa tentang kepentingan menjaga alam dan keindahan bumi di negara kita. Golongan ini berkemungkinan tidak mengetahui serta memahami akan maksud pencemaran alam ini. Oleh itu, apakah maksud pencemaran alam ini? Pencemaran alam boleh didefinisikan sebagai sesuatu perkara yang mengotorkan alam sekitar sehingga boleh menjejaskan ekosistem di muka bumi ini. Dalam era kemodenan ini, pencemaran alam seolah-olah telah menjadi kebiasaan dan telah “sehati” dalam kehidupan seharian masyarakat setempat. Hal ini demikian kerana, masyarakat telah menjadi alpa bahawa disebalik kemewahan dan keselesaan kemajuan ekonomi telah menyumbang kepada pencemaran alam dinegara kita yang boleh membawa pelbagai kemudahan kepada mereka. Berita berkaitan isu pencemaran alam sering meniti dari bibir ke bibir masyarakat, disiarkan di kaca-kaca televisyen, serta dipaparkan di dada-dada akhbar telah dipandang

“enteng” oleh mereka. Bak kata cendekiawan, “Kita tidak mewarisi alam sekitar daripada nenek moyang kita, sebaliknya kita meminjamnya daripada generasi akan datang. Oleh itu, jagalah alam sekitar supaya anak dan cucu kita dapat menikmatinya. Sudah terang lagi bersuluh bahawa kata-kata Mahatma Gandhi ini membuktikan bahawa pentingnya menjaga kelestarian alam sekitar kerana ia adalah harta bumi yang tidak ternilai. Menyedar hakikat di atas, pelbagai inisiatif perlu diambil oleh penduduk bumi bagi mengekalkan serta memelihara kelestarian alam sekitar.

Oleh hal yang demikian, kerajaan Malaysia telah mengikut jejak langkah negara Amerika Syarikat dengan menubuhkan Hari Bumi yang akan dijalankan pada setiap tahun. Hari Bumi akan diraikan pada 22 April pada setiap tahun yang bertujuan untuk memperingati serta menghargai hasil bumi sekaligus membuka mata masyarakat tentang kepentingan mencintai bumi ini. Hari Bumi sewajarnya disambut oleh seluruh masyarakat Malaysia yang melibatkan pelbagai lapisan masyarakat tanpa mengira peringkat umur atau bangsa. Hari Bumi dicetuskan oleh seorang senator Amerika Syarikat yang bernama Gaylord Nelson. Beliau telah menganjurkan program ini bermula tahun 1970 dan kini Hari Bumi merupakan tanggal yang amat penting dan menjadi tradisi serta acara wajib yang perlu diraikan di seluruh dunia. Bertitik tolak dengan kenyataan di atas, mengapakah ia dinamakan sebagai Hari Bumi? Hari Bumi menjelaskan makna hubungan antara alam, iklim dan pembangunan lestari. Tidak dapat dinafikan bahawa kita sedang berada di ambang kepupusan di mana kerosakan alam sekitar sukar dipulihkan. Maka, dengan wujudnya Hari Bumi, ia sedikit sebanyak dapat memberi impak positif terhadap pemulihan alam sekitar yang terdapat di bumi ini. Tema Hari Bumi pada tahun 2022 ini adalah “Invest In Our Planet” yang membawa maksud kita perlu menyumbang tenaga serta keupayaan demi menjaga kesucian bumi. Namun begitu, apakah sumbangan serta langkah yang dapat diambil untuk mengekalkan kesejahteraan bumi kita?

Oleh yang demikian, terdapat beberapa acara dan aktiviti yang boleh dilakukan sejajar dengan konsep sambutan Hari Bumi ini. Antaranya ialah pihak kerajaan dapat menganjurkan aktiviti “Hari Tanpa Kenderaan” pada hari tersebut. Sebagai contoh, masyarakat boleh berbasikal atau menggunakan pengangkutan awam untuk ke tempat kerja mahupun ke sekolah berhampiran. Sehubungan dengan itu, aktiviti ini bertujuan untuk memupuk dan menggalakkan masyarakat untuk mengurangkan kebergantungan terhadap kenderaan bermotor terutamanya penggunaan motosikal dan kereta. Justeru, dengan mengurangkan penggunaan kenderaan bermotor ini, ia dapat melegakan masalah kesesakan lalu lintas sekaligus mengurangkan pencemaran udara di negara kita. Hal ini dikatakan demikian kerana, kadar pencemaran udara kian meningkat dari hari ke hari dek kerana penggunaan kenderaan bermotor yang berleluasa di atas jalan raya. Pembakaran bahan api fosil seperti minyak petrol dan diesel daripada kenderaan bermotor akan menghasilkan gas karbon monoksida, nitrus oksida, hidrokarbon yang akan menyebabkan berlakunya pencemaran udara di negara ini. Justeru, pencemaran udara akan meninggalkan kesan kepada bumi seperti penipisan lapisan ozon, jerebu, hujan asid, dan pemanasan bumi. Pencemaran udara berkemungkinan boleh memberi kesan terhadap kesihatan, keselamatan dan kesejahteraan manusia mahupun harta benda. Jadi, jelaslah bahawa dengan mengadakan aktiviti Hari Tanpa Kenderaan sewaktu Hari Bumi berlangsung, ia sedikit sebanyak dapat memulihara pencemaran udara di negara sekaligus meningkatkan kelestarian bumi kita. Namun begitu, aktiviti ini haruslah diambil berat oleh seluruh masyarakat dan tidak bersikap lepas tangan dengan mengharap pihak kerajaan semata-mata. Untuk menjayakan program ini, kita perlu berganding bahu seperti peribahasa bagai aur dengan tebing supaya program ini tidak sekadar hangat-hangat tahi ayam sahaja. Pendek kata, kita perlu memastikan program ini berjaya dilaksanakan demi menjaga dan mengekalkan kesejahteraan bumi kita.

Selain itu, pendekatan yang dapat diambil adalah dengan mengadakan aktiviti luar seperti membersihkan sungai, membersihkan kawasan persisiran pantai dan melakukan aktiviti penanaman pokok secara besar-besaran. Walau bagaimanapun, menyedari hakikat kini bahawa kita diancam wabak COVID-19, pastinya pergerakan kita terbatas dan tidak boleh melakukan aktiviti di luar rumah dengan bebas. Namun begitu, masyarakat masih boleh menyumbang kepada bumi dengan mengamalkan konsep 3R dari rumah iaitu Reuse, Reduce dan Recycle. Bahan yang boleh di kitar semula ini termasuklah bahan-bahan seperti kaca, plastik, kertas dan sebagainya. Fakta menjelaskan bahawa sekitar 2 juta helai plastik telah digunakan pada setiap 1 minit. Fakta ini telah membuktikan bahawa rakyat di Malaysia telah menyebabkan bumi ini dibebani dengan sampah berbahan sintetik ini. Seperti semua yang sedia maklum, plastik merupakan bahan yang tidak boleh dibiodegradasi oleh mikroorganism, menyebabkan gas oksigen tidak dapat meresap ke dalam tanah. Oleh itu, dengan mengamalkan konsep 3R ini, ia dapat membantu mengurangkan pembuangan sampah malah membantu menjaga kebersihan serta melindungi alam sekitar. Dewasa ini, konsep 3R ini semakin dilupakan dari semasa ke semasa terutamanya dalam diri generasi muda kini. Dalam pada itu, terdapat juga segelintir generasi muda kini yang tidak cakna akan konsep 3R ini dalam kehidupan harian mereka. Hal ini berkemungkinan kerana mereka tidak didedahkan dengan ilmu serta pengetahuan yang jelas daripada ibu bapa mereka sejak kecil lagi. Ibu bapa seharusnya memainkan peranan yang penting dalam mencorakkan keperibadian diri anak-anak agar mereka lebih menghargai serta mencintai keindahan bumi ini. Mereka perlu didedahkan dengan ilmu-ilmu ini sejak kecil demi kemakmuran kehidupan mereka pada masa akan datang. Persis kata peribahasa melayu, melentur buluh biarlah dari rebungunya. Sebagai tuntasnya, konsep

3R ini merupakan antara usaha yang amat sistematik dalam memulihara keindahan alam serta kesejahteraan bumi kita.

Konklusinya, setiap usaha yang diambil perlu dilakukan dengan semangat jaya yang tinggi agar tidak menjadi seperti mencurahkan air ke daun keladi iaitu usaha yang sia-sia. Jika setiap pihak memainkan peranan yang proaktif persis mutiara kata, ke bukit sama di kaki, ke lurah sama dituruni, nescaya kemelut ini dapat diatasi dengan berkesan. Setiap individu perlu membuka minda serta pemikiran dan membuat interpretasi masing-masing dalam memahami kepentingan memelihara dan memulihara alam sekitar ini demi kelangsungan hidup generasi akan datang. Pada waktu yang sama, setiap masyarakat perlu meraikan Hari Bumi yang dijalankan pada setiap tahun agar objektif untuk melestarikan alam sekitar dapat dijayakan sebelum nasi menjadi bubur. Dengan kata lain, setiap anggota masyarakat perlu mempunyai kesedaran bahawa usaha pemuliharaan patut menjadi teras dalam diri masing-masing kerana ia merupakan perkara asas bagi setiap penduduk bumi. Besarlah harapan untuk melihat bumi ini kekal dengan sumber alamnya yang bersih dan bebas daripada segala jenis pencemaran alam.

1 - EARTH'S DAY

Afiqah Izzati Binti Abdullah
Universiti Kebangsaan Malaysia

Just over a week ago over 1,000 scientists from all over the world took part in protests to call for urgency in climate change. As much as there have been a lot of reviews, stories, and reports on how the health of the world is rapidly declining, not many efforts have been done in a massive scale that actually helped in curbing the warming of the Earth. NASA scientist, Peter Kalmus and other scientists were arrested during their protest in Los Angeles. Kalmus made a tearful comment as reported by Business Insider, "We've been trying to warn you guys for so many decades that we're heading towards a f— catastrophe, and we've been being ignored. The scientists of the world are being ignored, and it's got to stop. We're not joking. We're not lying. We're not exaggerating." Based on the Framework Convention that President Bush submitted to the U.S Senate, climate change means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which in addition to natural climate variability observed over comparable time period (United Nations, 1992).

There are multiple factors that lead to climate change and the change in our ecological system. It is widely known that natural processes such as the change in Sun's energy and volcanic activities does affect the Earth's climate. The warming of the Earth could also be linked to natural causes such as the changes in Earth's orbit and rotation. However, the warming of the Earth observed over the last century shows that human activities (over 95%) might actually be the number one cause for our planet's incoming doom. Essentially, we have contributed to climate change mostly through greenhouse gas emissions (IPCC, 2021).

Concentrations of greenhouse gases has skyrocketed and are now more abundant than it was over the last 800,000 years (National Academy of Sciences, 2020). The fossil fuel industry has contributed to the changes in climate more than any other activities. The world's oil supply could roughly be accessed in either one of two ways – through conventional oil reserves or unconventional ones such as tar sands. Either way it is carried out, the oil industry itself are wildly destructive. The technology and space required for extracting oils destroy the landscape, emits greenhouse gases, produces more pollutants as well as creates a lot of possible contamination.

Effects of climate change have been felt globally, to a point the effects are observable on a massive scale on the environment. Over the century, Earth's temperature has increased at about 2 degrees Fahrenheit (NASA, 2022). 2-degree Fahrenheit might sound small, but for the Earth it brings a significant – mostly disastrous effects. In the past, researchers have been telling us the effects that comes from global climate change. Today, the effects that had been predicted are now occurring all over the world – wildfires are happening more frequently, the duration and intensity of tropical storms are increasing and the glaciers have shrunk dramatically. All these events affect badly on us and our future generation.

Global warming induces natural disaster such as flood. There are several reasons on why this happened. Based on simple physics of liquid, as water warms it expands. Sea level rise predicted over the few years are purely from thermal expansion of liquid. Added water from melting land ice surely worsen this event. It is predicted that sea

level will continue to rise over time as it takes time for large bodies of water to react to the warm conditions of the Earth. The sea level rising combined with increasing storm surges and land subsidence contributes further to the increasing amount of flooding.

Apart from rising sea level, climate change is also changing the precipitation patterns which also brings out higher and longer period of heat waves and an increase in the intensity. These affects agricultural activities as well as the ecosystem. Some areas might be receiving more precipitation while other areas would be dealing with longer droughts. As reported by BBC on 17 April 2022, landslides and floods had killed 167 in Philippines from the Tropical Storm Megi - it was supposed to be dry season in Philippines during this time. This tropical storm had come just after a few months after Super Typhoon Rai. As mentioned, climate change brings out a greater intensity and power in tropical storms. Experts said that the tropical storm had grown more powerful, stronger and faster than predicted. It is important to note that most predictions from scientists and experts have currently exceeded expectations – in a bad way.

Listing the effects and causes of climate change would be easy in explaining the climate change in laymen's terms. However, the solution to this growing concern needs a sense of urgency and collaborative efforts from all over the world. There are indeed several ways in which we can at least reduce the effects of climate change. Individuals could definitely play a part by making better choices as well as spreading awareness and educating other people on the severity of our Earth's health. For individuals, we could start off with reducing plastic usage. Plastic is made from oil and as mentioned oil industry has been one of the most carbon-intense industry to date. The process of plastic disposal, which usually involves burning the plastics as it doesn't break down also contributed to whole lot more of carbon emissions.

On the other hand, we could also reduce consumption in terms of transport, fashion and food. Fast fashion has also been one the industries that produces waste as it releases more products than consumed. There are multiple stores that sells clothing made of recycled materials which help making fashion more sustainable. Another option would be thrifting clothes which helps reducing waste that leads to carbon emission. A motto that would be a good guideline would be "One in, one out" for every product bought. Keeping cosmetics products at a simple routine helps reducing consumption as well as it being cost – savvy. As individuals, the best way again emphasized is by acting collectively. Pressuring the governments and corporations to change policies and business practices to a more sustainable future would greatly help in reducing climate change impact.

Understandably, it is always easy to feel overwhelmed by the issue. For individuals it will undoubtedly feel like a losing battle, but collectively we could make a change. Collective action on pressuring the bigger corporations and governments to take action is powerful for change. It is easy to overlook this battle because some – if not most of us are not directly impacted in the heat of it (ironically). However, some people are impacted directly by both the causes and effects of climate change. Communities such as the Indigenous People and Pacific Islands community are severely affected as sea level rises and deforestation took out their homes and putting their entire existence at risk.

For Earth's Day, as much as there are still greatness and wonders in this world we're living in, it is important to keep fighting the good fight. If we want to keep our Earth's wonders – landscapes, species, and all we must keep making a conscious effort in sustaining the Earth itself. Educating and spreading awareness helps in many ways than not. There is abundance more evidence on climate change – causes and impacts that it would not fit to be told in short without further explanation. In celebrating Earth's Day, I encourage everyone reading to make a conscious effort on change and keep educating ourselves on the issue – as it will only worsen over time. As NASA's chief climate scientist James Hansen once said, "We may as well decide not to make this effort. Such a choice to put off change, however, will merely drive us faster towards it".

References

- IPCC, 2021. Climate Change 2021 : The Physical Science Basis. Working Group I contribution to the fifth assessment report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.
- NASA, 2022, April 18. The Effects of Climate Change. Retrieved from Global Climate Change: Vital Signs of the Planet : <https://climate.nasa.gov/effects/#:~:text=Effects%20that%20scientists%20had%20predicted,lon ger%2C%20more%20intense%20heat%20waves>.
- National Academy of Sciences, 2020. Climate Change: Evidences and Causes: Update 2020. Washington, D.C. : The National Academies Press.
- United Nations, 1992. United Nations Framework Convention on Climate Change. United Nations.

2 - PLASTIC AND GEOLOGY

Wan Nur Balqish Binti Wan Bazlan Farid
Universiti Kebangsaan Malaysia

In the year 2020 alone, 100,000 marine animals have been killed, 500 dead zones have been created in the ocean and the trash vortex in our ocean keeps on increasing, and these are all the doings of a century-old invention we now know as 'plastic'. Nonetheless, these are only a minuscule fraction of what plastic has done to our beloved home. Plastic, being a man-made product invented over a century ago, has made its impact more than anything in this world but the convenience of this lightweight chemical has its consequences. Every day, around 8 million pieces of plastic make its way into our oceans, disrupting the habitats of aquatic organisms. However, plastic does not just affect the marine life, it also affects other geological aspects of the Earth, like our biosphere, lithosphere, and atmosphere. People are aware of the plastic pollution going on today but not the details of it like the existence of the Great Pacific Garbage Patch or the fact that plastics can be fossilised. Individuals, communities, and corporations can all take part to make a difference.

Essentially, when making a change, it all depends on ourselves so as an individual, the easiest way to act against plastic pollution is by reducing single-use plastics. Single-use plastics refer to plastic goods that are meant to be disposed of right after use. Plastic water bottles, bags, containers, wrappers, and straws are examples to name a few. Our usage of single-use plastics has been increasing drastically over the years because of its undeniable convenience. However, reducing our single-use plastic usage could possibly be the easiest and most direct way of combatting plastic pollution. A statistics report showed that the world uses over 500 million plastic bags each year, which roughly equates to 150 plastic bags per person on Earth. Nevertheless, there are plenty of steps that can be taken to reduce this peculiar dependence on single-use plastics in our daily lives.

We can start by refusing the unnecessary plastics that we have been subconsciously accepting over the years. For example, refusing the plastic bags offered to us at the supermarket, straws at the coffee shop or even plastic cutleries when we order takeout food seem like pretty insignificant gestures, but in time, these actions could go a long way. Of course, reducing our usage of plastic items does not necessarily mean eliminating their functions entirely from our lives. We just have to find other alternatives of these items. For instance, we can start by bringing our own reusable grocery bag to the supermarket or invest in a reusable water bottle we can bring with us wherever we go. You might be wondering how does single use plastics correlate with geology at this point. Well, there are actually quite a lot of geological features of the Earth impacted by plastics. One of them being the Earth's layers. Geology, is essentially, the study of the Earth, and in geology, there is branching subject called 'Stratigraphy', which focuses on the Earth's layers. These layers are used to study about the history of the Earth as they contain important information like fossils. Fossils that are cemented in these Earth's layers are considered as stratigraphical markers. They give information such as the period at which a particular layer was formed. For example, fossils such as dinosaur bones and teeth indicate the Mesozoic Era, otherwise known as the "Age of Reptiles" when dinosaurs, crocodiles and pterosaurs ruled the land and air. And what do these fossils have to do with plastics? Well, a recent study showed that plastics can become fossilised, so as to become stratigraphical markers themselves. Plastics have become so widely used that it has become a key geological indicator of our current era or period, the Anthropocene. This is due to its hard and inert nature, making it difficult to break down. Despite being a good geological indicator, it is not something that we can cheer on about now, can we? So, I ask you, is that plastic bag you're paying for really worth your 10 cents?

An action that can be taken as a team or community is organising beach cleanups. As the name implies, a beach cleanup is the act of removing litter and debris deposited on beaches or coastlines, and they are usually done in groups. Basically, anyone can organise a beach cleanup when you are all passionate in making the Earth a cleaner place. Beach cleanups have been proven to be very important over the years. They help raise awareness regarding the trash problem in our coastal and marine environments. According to National Geographic, research in southern California had found that volunteers who participate in beach cleanups tend to become more mindful of how they dispose of their own disposables. It raises an awareness to the threat of debris to the public. There has been some debate about the effectiveness of beach cleanups because some say that cleaning up plastic waste is like mopping the floor while a sink is overflowing. However, every little bit counts, and it is certainly important that beach cleanups are conducted with the aim of educating the public thus creating a chain reaction for a more responsible way of living as a society. There are multiple organisations that have successfully conducted beach cleanups in Malaysia. In 2019, it was reported that a group of 50 volunteers had collected a total of 719.7 kilograms of garbage along Pantai Remis, Selangor. And this was done in just three hours. Collectively, these beach cleanups have a significant impact on one of Earth's problems regarding pollution right now, which is the Great Pacific Garbage Patch. The Great

Pacific Garbage Patch is a vortex of marine debris located in the North Pacific Ocean. It is also known as the vortex due to its collection of plastic waste and debris that have been broken down into small particles in the ocean. It is about 1.6 million square kilometers in size, making it bigger than the size of Texas, which is known as the biggest state in the U.S. This is also because plastics are difficult to wear down, so they just end up being accumulated in the ocean causing a worrying level of marine plastic pollution, thus destroying the hydrosphere of the Earth. 70 per cent of this marine debris sinks to the bottom of the ocean, disrupting the lives of aquatic animals and the geological aspects of the marine environment. Truthfully, when I saw pictures of the Great Pacific Garbage Patch, I was hesitant to believe that it was real and thought that they were all just exaggerated information, but more research led me to the realisation of how serious of a threat this is.

Companies and business corporations can certainly help reduce plastic pollution by finding more sustainable alternatives for their products. In 2015, it was reported that the packaging sector became the dominant plastic producer. Evidently, food packaging is the biggest contributor to the plastic pollution that is occurring today. You've probably noticed how most food packaging these days are made from plastic, and it's all because of its convenience. They are lightweight, durable, and versatile but a definite and permanent pain to the environment, nonetheless. Because of that, these plastic food packagings were never meant to be reused so therefore in 2020 alone, 32 per cent of plastic packaging that are disposed ended up in natural ecosystems, most notably our oceans. Apart from practicing better waste management, companies and businesses alike can help make a difference with this issue by switching to more sustainable alternatives. A few companies have taken initiatives recently. Food and drink conglomerate Nestlé recently pledged to make all its plastic packaging 100 per cent biodegradable by the year 2025. Procter & Gamble, the company behind the Head & Shoulders shampoo, recently produced its first recyclable shampoo bottle. These are only a few initiatives, so it is only a matter of time until other companies start to follow suit. Like beach cleanups, this action could greatly impact the Great Pacific Garbage Patch since food packaging has been found in great abundance there. And as far as beach cleanups go, green initiatives taken by huge companies can create a bigger impact on society. Even the smallest steps such as replacing plastic straws or plastic cups can raise an awareness to the public, thanks to our inevitable peculiar nature as humans to question everything.

In conclusion, individuals, communities, and corporations can all take part to combat plastic pollution. Plastic waste is everywhere today due to our accustomed way of living. I hope people don't put a blind eye to it and I urge us all to play a part in reducing these effects in the future. So, the next time you think a little bit of plastic in our lives wouldn't hurt, I implore you to think of the future generations and how unfair it would be to them if they don't get to experience the beautiful Earth as it once was for us.

3 - DON'T SLEEP ON EARTH

Joey Lim
Universiti Malaysia Terengganu

When I was kid, every 22 of April that passed was just another day. The significance of Earth Day only gets consolidated when one understands the reason and purpose of this celebration. Young children are curious beings; always questioning about how or why things are the way they are, like "Why is the sky blue?" or "Did dinosaurs really exist?". I was that child too. But as I grew older, realization and maturity to comprehend the true meaning of this celebration got integrated into my consciousness. It became more serious. The questions I had as a child were starting to get answered when I pursued my degree in Geosciences. There are still so many things left unexplored, unanswered and unexplained. Things I will never know but to just wonder. I thought to myself "This self sustaining planet called Earth is fascinating, how can we not want to preserve something this precious to us (?)".

This geoid shape looking thing sitting in the planetary system is the only known planet with liquid on the surface and is literally taking one for the team. It's 4.5 billion years old and an average human lives up to 72.6 years, the least we can do is to show some respect. Imagine just sitting down by the beach, and trash just swashes up to shore, you take a deep breath in and all you smell is garbage. You look at the sky and it's gray and ashy because of air pollution. All the animals are sick and dying, crops are destroyed because temperatures are boiling hot, people are getting displaced from their homes; Earth no longer becomes habitable and we have to leave it all behind. Massive destruction - is that what you want to see? Are we anticipating all these disasters because of human intervention? Are we really going to sit here selfishly and let our home go to sleep? Why are we accelerating the impacts of climate change?

The triggering effects of climate change on Earth will cause a package of global issues with it. Ergo, we need solutions and we need them fast. About 416 parts per million of Earth's surface is covered by carbon dioxide and it is recorded as the highest in human history. In 2020, NOAA (National Oceanic and Atmospheric Administration) showed that the average global temperature was warmer by 1.76 degrees compared to the twentieth century average. 800,000 hectares of mangroves are lost every year which translates to a loss of the buffer system. Eleven percent (800 million people) of the world population is currently vulnerable to climate change which includes floods, heat waves, extreme droughts and sea level rise. More than 1 million species are at risk of extinction because of climate change. The world population is at the brink of a water scarcity war. And, the worst is yet to come. How long are we going to ignore the fact that this is the future reality of our lives?

We have to believe that we are able to tackle climate change and win this race together. Goal 13 urges for immediate action to fight climate change and its consequences. It is inextricably tied to all 16 of the 2030 Agenda for Sustainable Development Goals. Countries signed the Paris Agreement in December 2015 to restrict global temperature rise to far below 2 degrees Celsius in order to address climate change. Affordable and sustainable technologies are now available to help nations accelerate their transition to cleaner, more robust economies. Positive changes are rapidly occurring as more people turn to renewable energy and a variety of other steps to minimize emissions and improve adaptation efforts. However, climate change is a global issue that transcends national boundaries. Emissions from anywhere have an impact on people globally. It requires global coordination of solutions, as well as international collaboration to assist poor nations in transitioning to a low-carbon economy.

Humans that are able to control their minds are very powerful beings. We are highly adaptable and flexible. When the human mind engages in a fight or flight survival mode, they become extremely driven and focused. Our generation has to train their minds to control their actions, be willing to do things seriously, consciously and cautiously in accordance with the impacts of their responses. We have to start questioning ourselves, if we have the capacity to rebuild when it is too late. The current generation are the most accessible to information and networking all over the world. With the foundation and fundamentals of climate literacy, awareness within the community can be built. More working hands equal faster progress in helping our environment recover. We can change and we should leave Earth in a better condition than we have received it.

Because, if this place expires, human existence will become part of history. There is a vast horizon of the unknown around us. Thus, conceive the notion of how rare and beautiful it truly is, that we exist. I believe everyone is able to make a mark despite all the circumstances we are in. The only thing we lack is mindfulness. It is not about where we come from, but where we are going. If we living beings with a mind are able to compute our actions and understand the outcome towards the future well being of mother nature, then awareness will be amalgamated in us. It only takes a small leap of faith for us to coexist with nature. We have to take the initiative to learn, unlearn and relearn the mechanisms of Earth and adjust ourselves to it and not the other way around. It takes practice in discipline, a change in attitude and humbleness. One generation with a changed mindset will be able to ensure a higher probability of a better future generation. Break the pattern now, or else the cycle will repeat tomorrow. It's time we take care of our planet. Save the world, to save mankind.

Disediakan oleh,

Mohammad Faiz Bin Hedzir
Setiausaha Pertandingan Menulis Esei Sempena Hari Bumi 2022
Fakulti Sains dan Teknologi, Universiti Kebangsaan Malaysia
E-mel: a175392@siswa.ukm.edu.my
Tarikh: 9/5/2022

UPCOMING EVENTS

September 9-10, 2022: International Conference on Power-to-Gas Technologies ICPGT (Digital); Singapore. Website URL: <https://waset.org/power-to-gas-technologies-conference-in-september-2022-in-singapore>.

September 12-14, 2022: MEDiNA Conference and Exhibition (Mediterranean and North Africa Conference); Tunis, Tunisia. Please visit event organiser's website at <https://medinace.aapg.org/2022/> for more details.

September 13-15, 2022: Oil & Gas Asia (OGA) and Malaysia Oil, Gas & Services Exhibition and Conference (MOGSEC); Kuala Lumpur, Malaysia. Please contact oga-my@informa.com to find out more about the event.

September 13-15, 2022: Brazilian Petroleum Conference; Rio de Janeiro, Brazil. Contact abgp@abgp.com.br or +55 21 97287-0948 to obtain details about the conference.

September 14-15, 2022: Lithium, Battery and Energy Metals Conference; Perth, Australia. Link for conference details: <https://www.ausimm.com/conferences-and-events/lithium/program/call-for-abstracts/>.

September 19-23, 2022: International Conference on Physical Modelling in Geotechnics; KAIST, Daejeon, Korea. Check out <https://icpmg2022.org/> to find further details about the conference.

October 6-7, 2022: International Conference on Oil Spill Prevention and Management (Digital); Beijing, China. Website URL: <https://waset.org/oil-spill-prevention-and-management-conference-in-october-2022-in-beijing>.

October 14-16, 2022: 5th Biennial Field Conference of the American Association of Petroleum Geologists Mid-Continent Section (AAPG-MCS); Rolla, Missouri, USA. Visit event website <https://ggpe.mst.edu/aapg/> for more details.

October 17-21, 2022: XVII GEOSEA 2022; Langkawi, Malaysia. For details please contact Geological Society of Malaysia at email: geosea2022@gmail.com.

October 18-20, 2022: Series 2022 (Conference Of Sustainable Earth Resources And Engineering Technologies); Langkawi, Malaysia. Contact Centre For Sustainability of Ecosystem & Earth Resources (Earth Centre), Universiti Malaysia Pahang, series@ump.my or conference secretariat +6094316831 for further details.

November 29-30, 2022: ICGGICC 2022, International Conference on Greenhouse-Gas-Induced Climate Change (Digital). Website URL: <https://waset.org/greenhouse-gas-induced-climate-change-conference-in-november-2022-in-bangkok>.

December 6-7, 2022: Energy Engineering and Oil Reserves ICEEOR (Digital); Kuala Lumpur, Malaysia. Website URL: <https://waset.org/energy-engineering-and-oil-reserves-conference-in-december-2022-in-kuala-lumpur>.

February 1-3, 2023: NAPE Summit 2023, Houston, Texas. Please visit <https://napeexpo.com/contact> for further information.

February 21-23, 2023: AAPG/EAGE Papua New Guinea Petroleum Conference and Exhibition; Port Moresby, Papua New Guinea. For further information, please contact Mahenoor Malik (AAPG) via email mmalik@aapg.org.

February 28 – March 2, 2023: International Petroleum Technology Conference (IPTC); Bangkok, Thailand. Available link for further details: <https://2023.iptcnet.org/call-for-papers>.

May 1-4, 2023: Offshore Technology Conference; Houston, Texas. For enquiries, please telephone: +1.972.952.9494 or fax: +1.713.779.4216. Email: meetingsotc@otcnet.org.

XVII GEOSEA 2022 LANGKAWI MALAYSIA



- 17th REGIONAL GEOSCIENCE CONGRESS OF SOUTHEAST ASIA
- 34th NATIONAL GEOSCIENCE CONFERENCE
- SUSTAINABLE EARTH RESOURCES ENGINEERING (SERIES 2022)
- REGIONAL COURSE ON UNESCO GLOBAL GEOPARK

4th CIRCULAR

Organized by:



Geological Society of Malaysia



Board of Geologists Malaysia

CPD APPROVED EVENT

OFFICIATED BY:

**THE HONORABLE
DATUK SERI TAKIYUDDIN HASSAN**
MINISTER OF ENERGY AND NATURAL RESOURCES
PATRON OF GEOSEA LANGKAWI 2022



17-21 OCTOBER 2022

ADVANCE GEOSCIENCE ADVANCE ASEAN

Jointly organised by:



Department of Mineral and Geoscience Malaysia



Institute of Geology Malaysia



Langkawi Development Authority (LADA)



Langkawi UNESCO Global Geopark

Partners:

ASEAN Federation of Geoscience Organization (AFGeO)



Ikatan Ahli Geologi Indonesia (IAGI)



Myanmar Geoscience Society (MGS)



Geological Society of the Philippines (GSP)



Geological Society of Thailand (GST)



Vietnam Union of Geological Sciences (VUGS)

Collaborators



<https://geosocmalaysia.org/geosea2022/>

Geological Society of Malaysia Publications

Instruction to Authors

GENERAL POLICY

Papers should be as concise as possible. They may include original results of basic, applied and policy research of national or international significance, current reviews, or discussions on techniques, research programs, organisations, information, or national and international policies in geoscience.

SUBMISSION OF PAPERS

Only papers that have not been published elsewhere (except those in the form of abstracts, published lectures or academic theses), including electronically, will be considered for publication. Authors must agree not to publish elsewhere the submitted or accepted articles in the same form, in English, Malay or other languages. Originality detection services may be used to check your manuscript to verify its originality.

All papers will be subjected to review by two or more reviewers. Authors wishing to include published and unmodified figures or text passages are required to obtain permission from the copyright owner(s). Authors of English papers are strongly urged to have their manuscript edited for language before submission by a person whose first language is English.

The Editor reserves the right to reject all or any part of the paper submitted. The Geological Society of Malaysia assumes no responsibility for statements made by authors.

The paper should be submitted to:

The Editor,
Geological Society of Malaysia
c/o Department of Geology
University of Malaya
50603 Kuala Lumpur,
Malaysia
Tel: (603) 7957 7036
Fax: (603) 7956 3900
Email: geologicalsociety@gmail.com

MANUSCRIPT

The paper can be written in Bahasa Malaysia (Malay) or English. For English papers, use either British or American spelling but not a combination of both. The paper should be checked thoroughly for spelling and grammar. The manuscript must be printed at 1.5 spacing in a single column on one side of A4 paper. All pages should be numbered. Length of paper should be between 3,000 and 8,000 words for the Bulletin and between 2,000 and 3,000 words for Warta Geologi, excluding tables and illustrations. Metric units should be used and all non-standard symbols, abbreviations and acronyms must be defined.

TITLE

Title must be informative and reflects the content of the paper. Title in Malay should include an English translation. It should be concise (less than 20 words). Avoid using abbreviation in the title.

AUTHOR'S ADDRESS

Addresses of all authors must be provided. The addresses should be sufficient for correspondence. Please include email address, telephone and fax of the corresponding author.

ABSTRACT

Abstract should not exceed 300 words. Articles written in Malay language should also be accompanied by English language abstracts and keywords.

KEYWORDS

Please include 3 to 8 keywords that best describe the content of the paper.

REFERENCES

In the text, references should be cited by author and year and listed chronologically (e.g. Smith, 1964; Jones et al., 1998; Smith & Tan, 2000). For both Malay and English paper, all references must be listed in English. Title of non-English articles should be translated to English.

The list of references should only include articles cited in the text. The list should be arranged in alphabetical order. Please ensure that the reference list is complete and the bibliographical details are accurate. The references should be in the following manner:

Journal article:

Suntharalingam, T., 1968. Upper Palaeozoic stratigraphy of the area west of Kampar, Perak. *Geol. Soc. Malaysia Bull.*, 1, 1-15.

Book:

Hutchison, C.S., 1989. *Geological Evolution of South-east Asia*. Clarendon Press, Oxford. 368 p.

Chapter of book and Symposium volume:

Hosking, K.F.G., 1973. Primary mineral deposits. In: Gobbett, D.J. and Hutchison, C.S. (Eds.), *Geology of the Malay Peninsular (West Malaysia and Singapore)*. Wiley-Interscience, New York, 335-390.

Article in Malay:

Lim, C.H. & Mohd. Shafeea Leman, 1994. The occurrence of Lambir Formation in Ulu Bok Syncline, North Sarawak. *Geol. Soc. Malaysia Bull.*, 35, 1-5. (in Malay with English abstract)

TABLES

All tables should be cited in the text and numbered consecutively. Tables should have a title and a legend explaining any abbreviation or symbol used. Each table must be printed on a separate piece of paper. Do not insert the tables within the text. Data in tables should be aligned using tab stops rather than spaces. Avoid excessive tabulation of data.

ILLUSTRATIONS

Please make sure that all illustrations are useful, necessary and of good quality. A maximum of ten (10) illustrations (photographs, graphs and diagrams) are allowed and these should be cited in the text and numbered consecutively as Figures. The papers are usually published in black-and-white but it may sometimes be possible to include colour figures at the author's expense. The scales for maps and photomicrographs should be drawn on the figure and not given as a magnification. Originals should not be greater than A4 size and annotations should be capable of being reduced down to 50 percent. The caption should be listed on a separate piece of paper. Do not insert the illustration within the text.

SUBMISSION OF ELECTRONIC FILES

Authors are required to submit electronic files in a CD-ROM or email as attachments. The submission should be accompanied with a listing of all files and the software (name and version) used. The file names should reflect the content of the files (e.g. Ali_Fig1.tif). Please make sure that the files and the hardcopies are the same.

PREFERRED SOFTWARE

Text: Microsoft Word. Do not insert tables and illustration within the text.

Tables: Microsoft Word or Microsoft Excel. Please submit as separate files.

Illustrations – Vector Graphics: Adobe Illustrator (preferred), CorelDraw and Freehand. Final line thickness should be at least 0.5 point or 0.17 mm. For other software, please submit one copy in the native file format and export one copy as a PDF file with all fonts embedded and one copy as a high resolution TIFF or JPEG image.

Photographs or bitmap (raster) images: Adobe Photoshop. Please save as TIFF or PSD files. Save/scan line art at 600 to 1200 dpi and greyscale figures at 300 to 600 dpi. High resolution JPEG, TIFF or GIF files from other sources are also acceptable. The resolution must be high enough for printing at 300 dpi.

WARTA GEOLOGI PERSATUAN GEOLOGI MALAYSIA

Jilid 48, No. 2 • Volume 48, No. 2 • August 2022

KANDUNGAN (CONTENTS)

CATATAN GEOLOGI (Geological Notes)

- JOHN KUNA RAJ : Characterizing a weathering profile over serpentinite in the Senaling area, Negeri Sembilan Darul Khusus 55
- WAN HASIAH ABDULLAH, SIA SAY GEE : Geology, resource potential and organic petrography of the Neogene coals in the Miri area of Northwest Sarawak, Malaysia 66

PERTEMUAN PERSATUAN (Meetings of the Society)

- 56th Annual General Meeting & Annual Report 2021 72
- Presidential Address For 2022/2023 116
- VINCENT WONG KHIEN NGIE : Hillside development management and case study 118
- WAN SALMI BIN WAN HARUN : Aplikasi data geospasial dan penderiaan jauh dalam kajian kejadian bencana geologi tanah runtuh dan aliran puing Gunung Jerai, Kedah 119
- JOHN KUNA RAJ : Why failures occur at soil cuts and natural ground slopes in the granitic bedrock areas of Malaysia 120

BERITA-BERITA PERSATUAN (News of the Society)

- Laporan Persatuan Geologi Malaysia Menandatangani Dua Dokumen Perjanjian Persefahaman Dengan Universiti Sains Malaysia Dan Universiti Malaysia Terengganu 122
- GSM Council Members 124
- New Membership 130

BERITA-BERITA LAIN (Other News)

- GSM-UMS Geology Club Programs Held In December 2021 131
- Laporan Pertandingan Menulis Esei Sempena Hari Bumi 2022 132
- Esei Pemenang Pertandingan Menulis Esei Sempena Hari Bumi 2022 135
- Upcoming Events 145

