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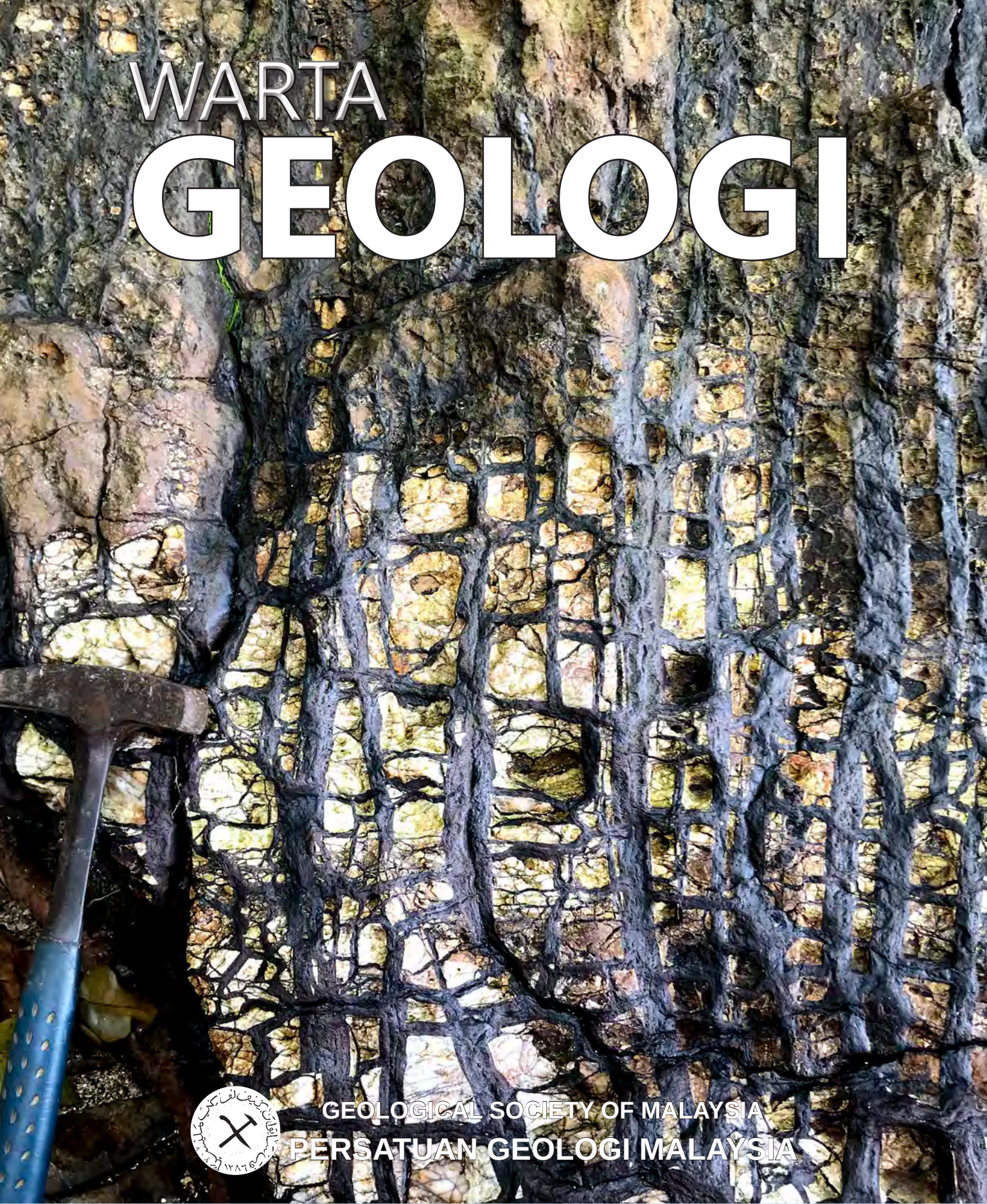

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Cover photo: Boxwork or cellular structure formed by infilling of joints by limonite in a quartz vein, Mersing, Johor. Photo by: Ng Tham Fatt

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The Paleo-Lupar: Bathymetric and seismic evidence for a submerged Late Pleistocene river valley on the Sunda Shelf, off Sarawak

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Abstract: This article presents bathymetric and seismic evidence of a submerged Late Pleistocene river valley on the Sunda Shelf, off Sarawak. The submarine feature identified as the Paleo-Lupar is detectable in digital elevation models (DEM) at water depths of about 40 m near the Lupar river mouth to more than 100 m to the north nearer the shelf edge. Bathymetric profiles revealed an ~30 km-wide submarine valley, with individual channels that, in places, can be more than 80 m deeper than the surrounding seabed. The Paleo-Lupar is one of several major paleo-rivers that drained the Sunda Shelf when sea level was lowest during the Last Glacial Maximum (LGM) around 21 ka BP and were subsequently submerged due to the sea level rise that has since occurred.

Keywords: Paleo-Lupar, Sunda Shelf, bathymetry, submerged river valley, incised valley

INTRODUCTION

It is well established that a large part of the Sunda Shelf (Figure 1), the broad continental shelf surrounding Southeast Asia, had been subaerially exposed during glacial periods when sea level was low, the lowest during the Last Glacial Maximum (LGM), some 21,000 years BP (Hanebuth *et al*., 2003). Due to its low gradients, a drop in sea level in the order of tens of metres would have resulted in the exposure of vast areas of the shelf, in the order of millions of square kilometres (Sathiamurthy & Rahman, 2017). Maximum exposure of the shelf occurred during the LGM, when sea level was ca. 120-130 m below present level (BPL), while the shoreline laid further seaward, although not reaching the present-day shelf break at the 180-200 m isobath (Hanebuth & Stattegger, 2003; Hanebuth *et al*., 2009; Sarr *et al*., 2019). As a result of the exposure, the Sunda Shelf essentially became a landmass (called "Sundaland") across which a network of "paleo-river systems" are believed to have developed (Voris, 2000; Sathiamurthy & Voris, 2006; Figure 1).

The term "paleo-river" is used here to mean simply the supposed submerged continuation of a modern river which extended seaward from the present coastline to the paleo-shoreline near but not quite reaching the present shelf edge at around 180 to 200 m water depth. It is generally assumed that paleo-rivers are now submerged beneath the shallow seas as the result of the rapid sea level rise over the Sunda Shelf since the LGM (e.g., Hanebuth *et al*., 2000; 2011).

Various authors have used different morphological terms for the sea floor features that they interpreted as paleo-rivers. Molengraaff (1921, p.104) described them as "gullies" while Keunen (1950, p. 482) called them "channels". Although these terms have no size connotation, some of the v-shaped gullies are wide enough (10-50 km) to be called "valleys" instead of "rivers" *per se*. Later workers used the term "paleo-valleys", particularly when referring to the wider segment of the North Sunda River closer to the shelf edge (Steinke *et al*., 2003; Hanebuth & Stattegger, 2004). Strictly, these features were probably drowned river valleys because presumably rivers flowed along their axes. As pointed out by Voris (2000), the location of the paleo-rivers is largely hypothetical, based on their modern sea floor expression, as their exact location may have changed over time due to meandering and avulsion.

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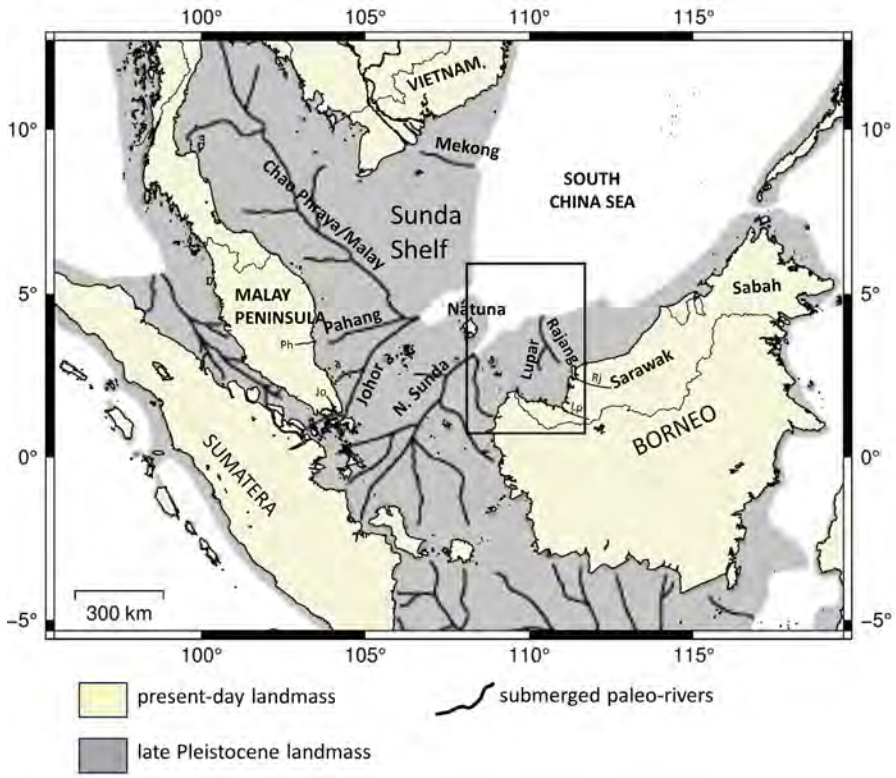

Figure 1: Map of Southeast Asia, modified from Voris (2000), depicting the approximate extent of the Late Pleistocene landmass (Sundaland) when sea level was 120 m BPL. As a result of the sea level drop, practically the entire Sunda Shelf was subaerially exposed and incised by major "paleo-river systems". The Paleo-Rajang-Lupar system (in the rectangle representing the present study area) is identified based on its proximity to the modern Rajang and Lupar rivers. Abbreviations: Ph – Pahang River, Jo – Johor River, Lp – Lupar River, Rj – Rajang River.

Whereas the positions of past shorelines may be inferred from present-day bathymetric contours based on digital elevation models (DEM) (e.g., Voris, 2000; Sathiamurthy & Voris, 2006), identifying submerged "paleo-rivers" or "paleo-valleys" is highly speculative without actual measured data, such as echo-sounding and shallow seismic. The advent of high-resolution 2D and 3D seismic reflection data has enabled more accurate and detailed geomorphological characterisation of paleo-rivers and their deposits. For example, in the Gulf of Thailand within 300 km south of the Chao Phraya river mouth, in water depths of about 70 m, these features were clearly discernible within the top 80 m of shelf sediments, including meandering channels up to 600 m wide in channel belts up to 10 km wide (Reijenstein *et al*., 2011). In the Malay Basin, about 500 km to the southeast, besides similar meandering and straight channel features (<3000 m wide), significantly wider (3.5–13 km) u-shaped features that are twice as deep (35-78 m) as the Thai ones have been observed within the top 300 ms (~200 m) of the seabed and have been interpreted as incised valleys that were formed during the LGM (Alqahtani *et al*., 2015, 2017).

These examples from the Gulf of Thailand and Malay Basin are part of what Voris (2000) called the "Siam" paleo-river system, which represents the submerged continuation of the Chao Phraya river into the Gulf of Thailand, Malay and West Natuna basins, and ultimately eastwards into the South China Sea basin (Figure 1). Unfortunately, Voris (2000) had been misquoted by Alqahtani *et al*. (2015, 2017) who mistakenly referred to the "Siam" paleo-river as the "Chao Phraya-Johore" river, while showing the "Siam" paleo-river as a separate east-flowing paleo-river originating from the present-day Pahang River (see Alqahtani *et al*., 2015, figure 12). On the contrary, Voris (2000) described the modern Johor River, which is a south-flowing river at the southern tip of the Malay Peninsula, as a tributary of the east-flowing Kampar paleo-river originating in Sumatra, which then joins with the "Siam" paleo-river at the triple junction between the Malay, Penyu and West Natuna basins (Figure 1). It would be more appropriate to call the Siam paleo-river the "Chao Phraya-Malay" paleo-river (Figure 1).

The North Sunda River (Figure 1), also known as the "Molengraaff River", is most well-known and has been studied in detail (Stattegger *et al*., 1997; Hanebuth *et al*.,

2000, 2011; Hanebuth & Stattegger, 2003). Two other paleo-rivers on Voris's (2000) map were not mentioned in his text; these are identified in Figure 1 as the Paleo-Mekong on the Vietnam shelf and the Paleo-Rajang-Lupar on the Sarawak shelf. While the Paleo-Mekong has been relatively well-studied (Tjallingii *et al*., 2010; Ta *et al*., 2021), the Paleo-Rajang-Lupar on the opposite margin is practically unknown. This paper describes for the first time some aspects of this submerged paleo-river offshore Sarawak based on bathymetric and seismic evidence. It is hoped that this study will stimulate interest for further investigation.

IDENTIFICATION OF SUBMERGED PALEO-RIVERS

The realisation that drowned paleo-rivers existed on the Sunda Shelf can be traced back to the 1920s with the early work by Molengraaff (1921) and Molengraaff & Weber (1921). Based on sparse bathymetric data available then, Molengraaff (1921) suggested that the submarine "gullies" were the continuation of the major rivers that were incised into the shelf during glacial lowstands. Over the subsequent decades, surveying methods and technologies, ranging from echo-sounding to high-resolution shallow 2D seismic to multi-channel 2D and 3D seismic, improved significantly. As summarised by Sathiamurthy & Rahman (2017), research on the paleo-river systems of Sundaland had evolved rapidly in tandem with the technological advances.

In the late 1990s, the advent of satellite-derived bathymetric models provided researchers with full bathymetric data coverage of the oceans that complements ship-based measurements and, as a result, it became possible to map on a regional scale paleo-shorelines and paleo-rivers in more detail. This type of analysis assumes that Sundaland is tectonically stable since at least 17 ka BP, as some authors have suggested (e.g., Tjia, 1980; Tjia *et al*., 1984; Tjia & Liew, 1996), such that its general morphology was not significantly affected by subsidence or uplift that may have occurred since the LGM. Other factors such as tidal scouring and sediment accumulation are also assumed to have had no significant effect on the large-scale morphology of the shelf (Sathiamurthy & Rahman, 2017). Under these assumptions, the present-day water depth contours have been used as proxies for past sea levels and shorelines. Consequently, any morphological features such as channels, gullies or valleys on the sea floor that are found landward of the paleo-shoreline could potentially be interpreted as paleo-rivers.

Building upon the pioneering works carried out up to the early 1990s, Voris (2000) mapped the paleo-shorelines and associated paleo-rivers of Sundaland using the now deprecated ETOPO5[1] digital elevation/bathymetry model (with 5'x5' or ca. 10 km grid resolution) and GEBCO[2] gridded bathymetry available at the time. Many studies have since confirmed the presence of major Late Pleistocene paleo-rivers on the Sunda Shelf and have described in detail their sedimentation histories, particularly the North Sunda River system (Steinke *et al*., 2003; Hanebuth & Stattegger, 2003, 2004; Hanebuth *et al*., 2002, 2009, 2011). Subsequently, Sathiamurthy & Voris (2006) expanded on the work of Voris (2000) using ETOPO2 bathymetric grid which has a 2'x2' (3.5 km) resolution. With the higher resolution, the authors were able to identify "depressions" on the sea floor which were interpreted as "paleo-lakes" that developed on the exposed shelf (Sundaland) during the LGM.

The type of analysis described above is highly reliant on the quality and resolution of DEMs, which are dependent upon the availability of measured bathymetric data used in building the grid; the less superior satellite-derived bathymetry is normally used to fill gaps in the measured data. Even with the latest global DEMs, with a 15 arc-seconds (~450 m) resolution, smaller channel-like features may not be resolved, especially when ship-borne data are lacking for calibration.

There is now publicly available higher resolution gridded global DEMs, which combine satellite-derived bathymetry grids with ship-borne bathymetric measurements, where available. They are useful for a general analysis and the identification of seafloor features. Figure 2 compares a number of global bathymetric grids over the study area on the Sunda Shelf, off Sarawak. All the DEMs used were versions released in 2022. It is difficult to tell the models apart, as they are not significantly different; the ETOPO and GMRT are almost identical. There is a slight difference, however, between the GMRT and SRTM+ grids. Glaring artefacts occur in all models due to track lines of the input bathymetric data, especially between 3° and 4° latitudes. There is also a hint of a channel-like feature emanating from the modern Lupar river mouth at the apex of the Lupar estuary. This feature is more pronounced in the SRTM+ model. The artefacts from ship tracks were minimised by applying a low-pass gaussian filter, and after re-gridding, a distinct submarine valley is observed to emanate from the Lupar river mouth (Figure 3).

The existence of a submerged river valley on the Sunda Shelf, off west Sarawak, was noted by previous authors. Citing Haile (1969), Hanebuth & Stattegger (2004) referred to a "Proto-Lupar" valley that emanates from the Lupar River, and manifests itself as a series of landward indentations of the bathymetric contours on the

[1] ETOPO https://www.ncei.noaa.gov/products/etopo-global-relief-model

[2] Global Elevation and Bathymetric Chart of the Oceans https://www.gebco.net/

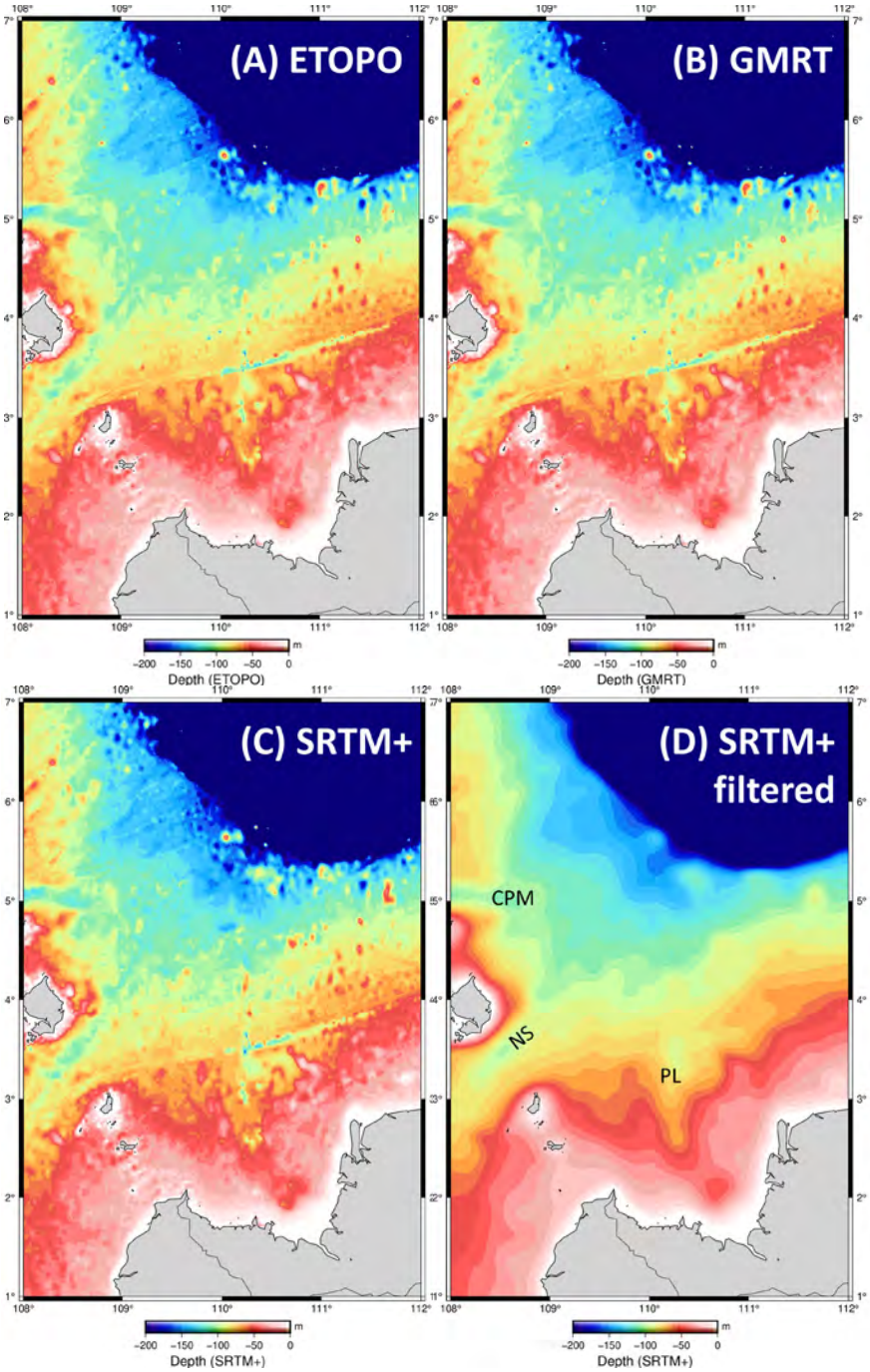

Figure 2: Bathymetric maps of the study area, offshore West Sarawak, based on various global digital elevation models (DEM). (A) ETOPO (NOAA, 2022a), 15 arc-seconds resolution. (B) GMRT v4.1 (2022) (Ryan *et al*., 2009), 7.5 arc-seconds resolution. (C) SRTM+ v2.5 (2022) (Tozer *et al*., 2019), 15 arc-seconds resolution. (D) filtered SRTM+, low-pass gaussian filter with 50 km search radius applied to remove ship-track artefacts. The submerged paleo-Lupar (PL) is more apparent, as are the North Sunda (NS) and Chao-Phraya/Malay (CPM) systems. Data processing (filtering) and mapping were done using GMT v.6 (Wessel *et al*., 2019).

shelf, off Sarawak. Independently, Sim & Jaeger (2004) interpreted this feature as the result of shelf incision during the latest low-stand phase in the Pleistocene, and called it the "Proto Rajang/Lupar River". This study will examine the bathymetric and complementary seismic evidence for this submerged paleo-river valley. Since the submerged river valley is only a bathymetric expression of the paleo-river, and probably represent a sediment bypass zone, seismic reflection data may provide insight into the associated river channel deposits in the subsurface.

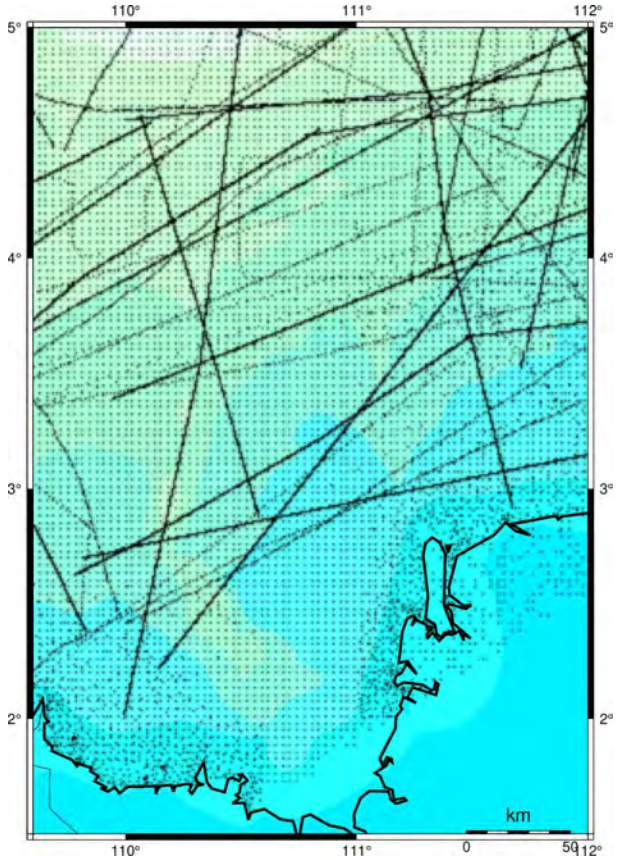

Figure 3: Map of the bathymetric data compiled in this study, comprising points, track-lines and grids described in the text.

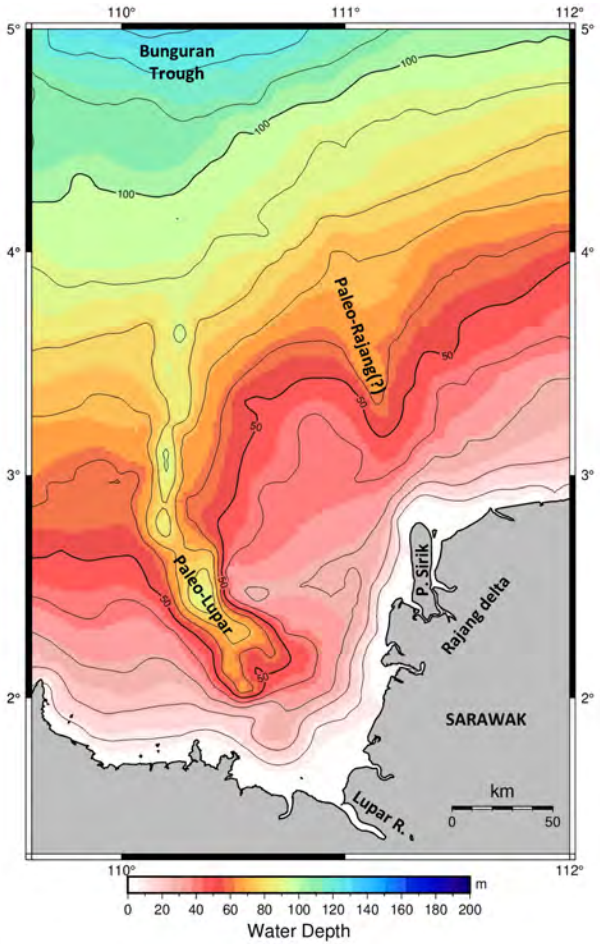

Figure 4: Bathymetric map generated from compiled data (Figure 3). Colour palette and 10 m contours are applied only for water depths less than 200 m. The prominent Paleo-Lupar river valley can be traced northwards directly into the region of Bunguran Trough. A similar but smaller feature could be related to the Paleo-Rajang river valley.

DATA AND METHOD

Besides the global DEMs mentioned above, additional bathymetric data were compiled from various sources for this study. As part of the Malaysian Continental Shelf Project (MCSP), bathymetric data based on multi-channel seismic reflection data were made available by PETRONAS (Hutchison & Vijayan, 2010; Vijayan *et al*., 2013). On seismic reflection profiles water depths were easily obtained from seabed reflections (in two-way time) converted to depth with an appropriate water velocity (1450 m/s) (Vijayan *et al*., 2013). Another source of bathymetric data is depth soundings from the nautical charts published by the Pusat Hidrografi Nasional (PHN). Last but not least, selected ship-borne bathymetric data were also downloaded from the NOAA website, traditionally referred to as "Geodas" (NOAA, 2022b). The full dataset compiled for this study is shown in Figure 3.

RESULTS

Figure 4 shows the bathymetric map generated from this compilation. The Paleo-Lupar river valley is easily identified as a sublinear trough (about 30 km wide measured at the 50 m water depth contour), starting with a NW-SE orientation, similar to that of the Lupar River, before striking N-S towards the shelf edge. Although some authors, such as Sim & Jaeger (2004), had assumed that this submerged river valley could be related to the Rajang River ("Paleo-Rajang"), the map clearly shows that it is directly on strike with the Lupar River. The modern Lupar River flows for 275 km on land and is the third longest river in Sarawak, after the Rajang and Baram. A sharp landward indentation of the isobaths north of Pulau Sirik, however, suggests the presence of a smaller submarine valley that could be related to the Rajang River. The map also indicates that the Rajang system may be feeding into some tributaries to the Paleo-Lupar (Figure 4). Both the Rajang and Lupar river systems most probably had provided the sediment supply to the Bunguran Trough, the main depocentre in West Luconia since the Late Miocene. The Paleo-Lupar may have persisted throughout the Pliocene to Holocene as a major sediment bypass route during sea level lowstands.

The geometry of the Paleo-Lupar valley was examined more closely in bathymetric profiles (Figure 5). These profiles cross the valley in an approximately ENE-WSE direction and therefore provide a cross-section image. The valley is wider and deeper nearer to the modern Lupar river mouth and becomes narrower and shallower further offshore. At the proximal end, the valley has an almost uniform width of about 30 km, with a maximum depth of about 80 m relative to the surrounding sea floor. The bathymetric profiles also suggest that in detail there may be several channels or distributaries forming a wider river valley that developed during lowstand periods. Towards the shelf edge to the north, the valley widens and becomes shallower and less distinct. A profile running approximately north-south, parallel to the paleo-depositional dip (Figure 5C) and also roughly parallel to the river valley appears to show two separate valleys in the same profile. However, this could be due to it being an oblique section along a bend in the paleo-valley.

Besides providing water depth profiles, multi-channel seismic reflection data show features that could be related to the sediment fill of the Paleo-Lupar river valley. Figure 6 shows segments of the seismic profiles from the SK2K survey and highlight some sedimentary features below the seabed. In SK2K-05 (Figure 6A), the main valley can be seen as a prominent unfilled depression, with the transport path perpendicular to the profile (to the north). Beneath the seabed there are indications of channelised

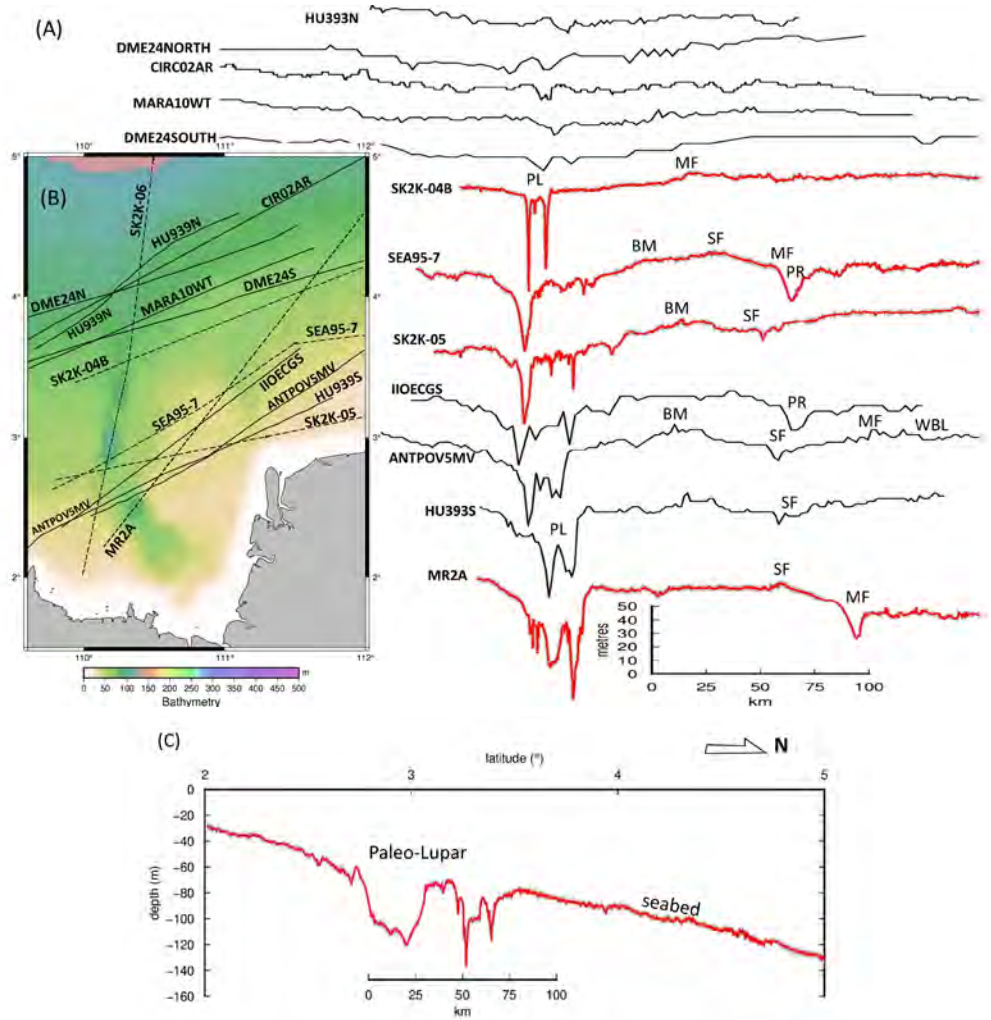

Figure 5: Bathymetric profiles across the study area on the western Sarawak Shelf. (A) Roughly E-W, shore-parallel seabed profiles along Geodas lines (black) and seismic lines (red), arranged from south (bottom) to north (top). (B) Location of profiles overlayed on bathymetric map generated from the compiled data. In (A), the Paleo-Lupar (PL) valley is clearly seen especially in the profiles across the southern half of the study area. Also identified on some lines are seabed features that coincide with major regional structural lineaments described by Madon & Jong (2022): Bukit Mersing Line (BM), Sirik Fault (SF), Mukah Fault (MF), West Balingian Line (WBL). The other major submarine valley is identified as Paleo-Rajang (PR) which seems to coincide with Mukah Fault along some profiles. (C) N-S profile between 2° and 5° latitudes, representing a roughly longitudinal section along the Paleo-Lupar valley.

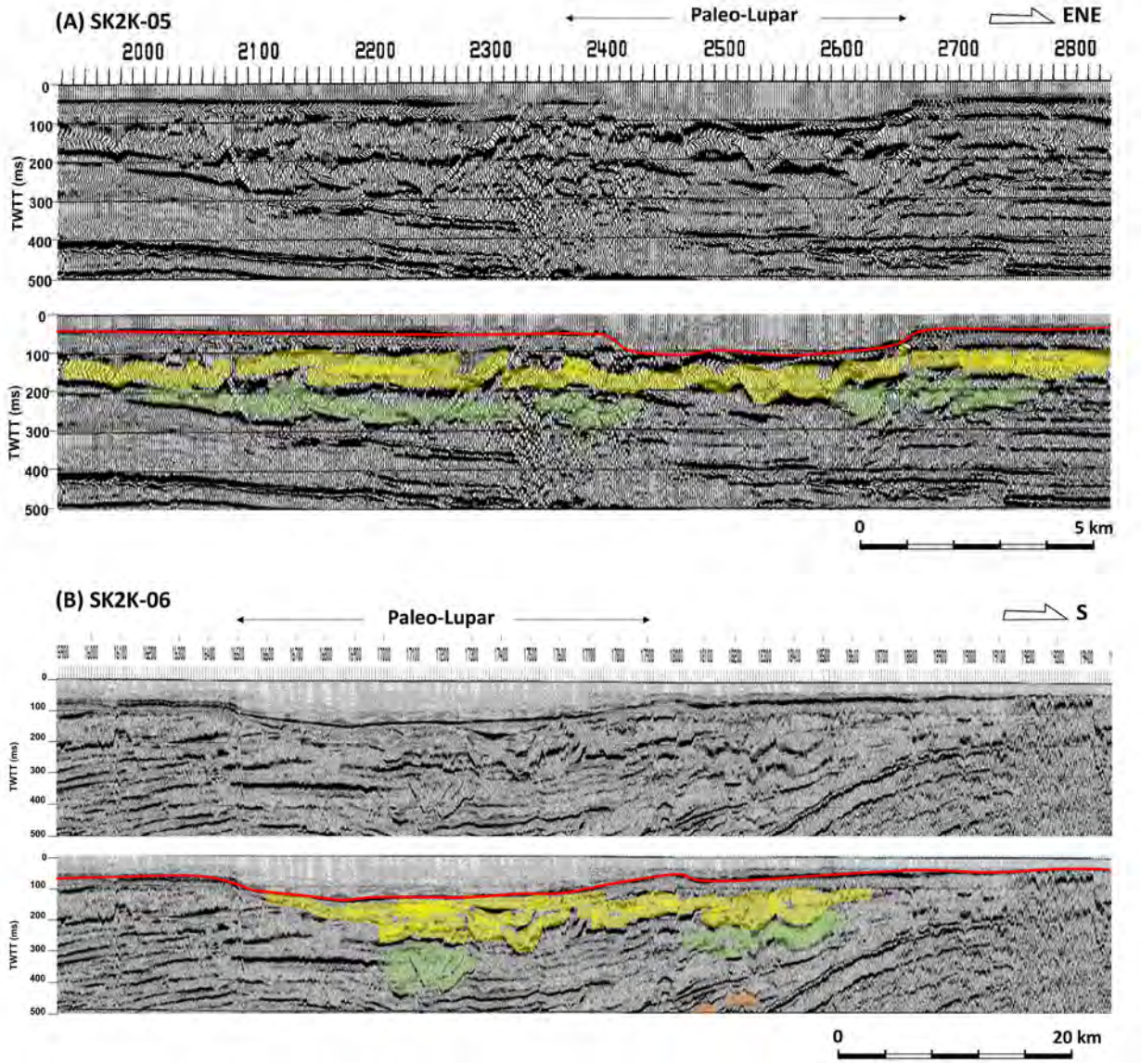

Figure 6: Examples of seismic section crossing the Paleo-Lupar valley and underlying deposits. (A) ENE-oriented SK2K-05 line (B) SK2K-06 line, oriented approximately N-S. The depression labelled "Paleo-Lupar" is the present-day seabed expression (red line) of the paleo-river system. In the lower panel of A and B, the interpreted seismic facies beneath the seabed, shaded yellow and green, probably represents Late Pleistocene deposits of the Paleo-Lupar river. Line locations shown in Figure 5. In the sediment column, 100 ms two-way travel time (TWTT) is approximately 75 m.

fluvial deposits down to about ~300 ms two-way time (ca. 150-180 m below seabed; Figure 6A) and ~450 ms beneath the seabed, suggesting that the course of the main river channels within a larger incised valley had changed over time. In SK2K-06 (Figure 6B), which is oriented sub-parallel to the main river valley, similar seismic facies indicate incised valley channel deposits down to ~450 ms (ca. 250 m below the seabed).

From Figure 6 we can identify two distinct packages of channelised fluvial deposits in the subsurface of the Paleo-Lupar valley; a younger, yellow-shaded unit underlain by an older, green-shaded unit. Both units extend laterally beyond the physical limits of the paleo-valley itself, which underlines the point made earlier that the paleo-valley only represents the most recent (modern) expression of a paleo-river, which is continuously changing its course over time. Since there are no core samples available, we may only speculate on the nature of these deposits based on similar studies elsewhere.

Paleo-rivers have also been documented in other parts of the Sunda Shelf using similar types of data, as reviewed by Sathiamurthy & Rahman (2017). One of the most extensive studies of Pleistocene incised valleys of the Sunda Shelf was during cruise SO-115

which focused on the North Sunda River (Stattegger *et al*., 1997). Based on extensive core and seismic data, regressive and transgressive sediments filling the incised paleo-valleys were described in detail by Hanebuth & Stattegger (2003, 2004). Incised valleys 45–50 m deep relative to surrounding seabed have been described from the Vietnamese shelf (Dung *et al*., 2013). Recent studies of the Paleo-Mekong river system also describe the evolution of the delta since ~13 ka through incised valley filling and delta progradation since the Late Pleistocene (Ta *et al*., 2021).

A close analogue for these deposits would be the incised valley sequences of the North Sunda River, located 200 km to the northwest of the Paleo-Lupar. According to these studies, there are two main Quaternary sedimentary units: an older pre-LGM regressive deposit, separated from an overlying transgressive unit by an erosional surface attributed to the LGM. The two units in North Sunda River may be tentatively correlated with the two packages of channelised fluvial deposits beneath the Paleo-Lupar valley. The boundary between the two represents the erosive surface marking the LGM event (equivalent to S_{LGM} in Fig. 3 of Hanebuth & Stattegger, 2004).

DISCUSSION

While bathymetric data showed the presence of a submarine valley as the most recent seabed expression of Late Pleistocene paleo-river, multi-channel seismic reflection data provide subsurface evidence for prior incisions and subsequent infilling by regressive and transgressive deposits both before and after the LGM. Post-LGM transgressive fluvio-marine deposits filling the Paleo-Lupar incised valley were deposited during the rapid sea level rise after the LGM (Hanebuth *et al*., 2000; Hanebuth & Stattegger, 2003) (Figure 7).

Detailed studies should be carried out in the future to further characterise the Paleo-Lupar. With more comprehensive seismic data, especially 3D seismic, and sediment cores, it is possible to work out the detailed erosional and depositional histories of this major river system, as was done in other parts of the South China Sea. In the Gulf of Tonkin, for example, point-bar migration and aggradational stacking of fluvial-estuarine sediments have been described from high-resolution seismic data (Wetzel *et al*., 2021). Palynological and geochemical studies of cores from the subsurface sediments and associated paleo-channel deposits have provided useful insights into past climates and vegetation during the glacial and intervening periods since the LGM, preserved in the pollen and mineral contents of the sediments (e.g., Cheng *et al*., 2023; Yu *et al*., 2023).

Apart from their geological importance, there is increasing interest on the potential archaeological/ anthropological significance in submerged paleo-river systems as records of past habitats and communities preserved in the paleo-landscapes over the last 1 million years. Considering the vast areal expanse of the Sunda Shelf, there is a high probability of finding ancient sites of pre-historic value, especially along major paleo-river systems, such as the Paleo-Lupar. Bailey (2004) has called for a systematic investigation of the submerged parts of the continental shelf for evidence of ancient coastal settlements that could be preserved underwater under the right conditions. Bicket & Tizzard (2015) reviewed the progress in research on Quaternary submerged prehistory of the British Isles. They reported that various materials have been recovered from the seabed at such sites around

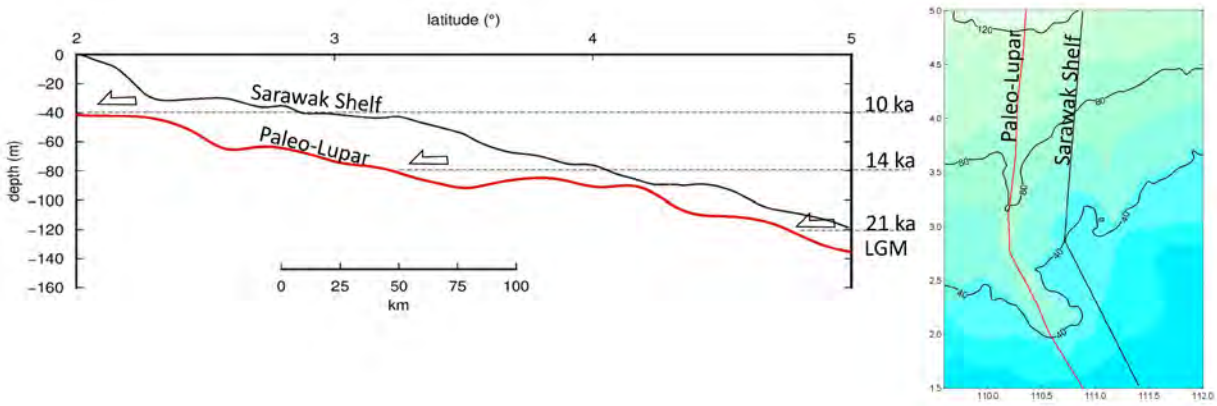

Figure 7: Synthetic longitudinal profile along the Paleo-Lupar (red) relative that of the adjacent seabed along a profile parallel to it to the east (black), showing the extent of vertical incision of the shelf due to sea level fall. The map to the right shows the location of the profiles in their corresponding colours. Horizontal dashed lines are approximate sea levels at 21, 14, and 10 ka during the sea level rise since the LGM, as estimated by Hanebuth & Stattegger (2003). Arrows indicate points of onlap of the sea level with the incised valley, representing the approximate paleo-shorelines at those times.

the British Isles, including bone and stone artefacts, extinct fauna, submerged forests and other relict landscapes. Submerged pre-history and landscapes are also actively being researched on other continental shelves of the world (Sturt *et al*., 2018).

As one of the world's largest submerged paleo-landmasses, with financial support and the right tools, technologies, and expertise, Sunda Shelf has the potential for exciting discoveries in this area. From the Malaysian perspective, the Paleo-Lupar would be a good place to start. Detailed integrated studies using seismic, bathymetric and other data should be carried out to further characterise this and other submerged Pleistocene river valleys around Borneo and the Sunda Shelf, as they may hold critical information, not only with regard to paleoclimates and paleoenvironments but also on human paleohabitats.

CONCLUSIONS

Bathymetric and seismic data confirmed the presence of a submerged river valley that appears to continue from the modern Lupar River and extends for more than 350 km across the Sunda Shelf, off Sarawak. Together, the modern and Paleo-Lupar river stretch for more than 650 km and acted as a major sediment transport route from West Borneo to the Bunguran Trough.

The Paleo-Lupar is interpreted as the offshore extension of the modern Lupar River that was incised into the Sunda Shelf when large parts of it were subaerially exposed due to lowering of sea level to about 120 m BPL during the LGM about 21,000 years ago.

Multi-channel seismic data revealed the presence of channelised deposits beneath the Paleo-Lupar that probably represent the fluvial and transgressive deposits filling the incised river valley at the end of the LGM.

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CONFLICT OF INTEREST

I declare that I do not have any conflict of interest with regard to the contents of this paper.

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Soil moisture retention characteristics of saprock in a weathering profile over rhyolite in Peninsular Malaysia

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Abstract: Three broad zones can be differentiated at the weathering profile; an upper 3.9 m thick pedological soil (zone I), an intermediate 21.4 m thick saprock (zone II), and the underlying bedrock (zone III). To determine the soil moisture retention characteristics of saprock, samples were collected at vertical depths of 5.7 m (sample A), 9.1 m (sample B), 12.7 m (sample C) and 16.9 m (sample D). Samples A and B with porosities of 39% and 48%, had 7% and 6% gravel fractions, 48% and 57% sand fractions, 32% and 30% silt fractions, and 13% and 7% clay fractions, respectively. Samples C and D with similar porosities of 46%, had 6% and 17% gravel fractions, 56% and 45% sand fractions, 32% silt fractions, and 6% clay fractions, respectively. Laboratory determinations employing the pressure plate method show increasing suctions from 0 kPa through 0.98 kPa and 9.8 kPa to 33 kPa and 1,500 kPa to result in gravimetric soil moisture retentions of 28.3% through 24.0% and 19.2% to 15.0% and 5.7% for sample A, and from 21.7% through 21.1% and 17.8% to 11.9% and 3.8% for sample B. Similarly increasing auctions yield gravimetric soil moisture retentions of 28.3% through 34.7% and 29.1% to 23.2% and 7.0% for sample C, and from 28.4% to 28.1% and 23.4% to 18.6% and 5.0% for sample D. Regression analyses of gravel, sand and clay fractions plotted against moisture contents retained at large suctions (33 kPa and 1500 kPa) yield variable trends with low correlation coefficients (R^2<0.179), though plots involving silt contents yield positive trends with larger correlation coefficients (R^2 >0.525). It is concluded that the adsorption of water on the surfaces of silt particles that most likely results in retention of soil moisture by saprock.

Keywords: Rhyolite, weathering profile, saprock, soil moisture retention, silt content

INTRODUCTION

Deep weathering profiles (several tens of meters thick) are found in Peninsular Malaysia as a result of favorable tectonic and environmental factors that have facilitated pervasive chemical weathering during a larger part of the Cenozoic era (Raj, 2009). The profiles are developed over a variety of bedrock and characterized by the indistinct to distinct preservation of the minerals, textures and structures of the original bedrock material and mass. As the earth materials of the profiles are often "able to be removed by commonly accepted excavating methods", they are known as residual soils in geotechnical literature in the Peninsula (USBR, 1974; JKR, 2007). These residual soils are considered to be unsaturated soils for unconfined groundwater tables are only found towards the base of weathering profiles in the hilly to mountainous terrain of the Peninsula (Faisal *et al.*, 2005; Bujang *et al*., 2005a; Raj, 2009).

Unsaturated soils are characterized by the presence of negative pore water pressures; the relationship between negative pore pressure and moisture content best expressed by the soil water characteristic curve (Agus *et al*., 2001). The soil water characteristic curve or soil moisture retention curve is considered to be a fundamental relationship that should be determined in investigations of unsaturated soils (Vanapalli *et al*., 1996). The soil moisture retention curve is also of importance in agriculture where it is essential to the development of effective irrigation and plant stress management techniques as suction/water relationships directly affect the yield and quality of crops (Scherer *et al*., 1996).

In Peninsular Malaysia, there is limited published data on the soil moisture retention characteristics of its unsaturated residual soils, especially those over granitic bedrock. In a study to evaluate the hydraulic conductivity

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of saprolite (IC soil horizon), samples were collected from 16 locations in the Peninsula and their soil moisture retention curves determined with the pressure plate method (Hamdan *et al*., 2006). Increasing suctions from 0 kPa to 1,500 kPa resulted in decreasing volumetric soil moisture retentions from 60% to 11% in the case of a granite saprolite, from 47% to 19% in the case of a schist saprolite, from 82% to 30% in the case of a shale saprolite, and from 94% to 35% in the case of a basalt saprolite (Hamdan *et al*., 2006).

In another study, also employing the pressure plate method, saprolite (IC soil horizon) samples from a weathering profile over porphyritic biotite granite experienced decreasing gravimetric moisture contents from 34.5% through 29.3% and 27.4% to 20.2% and 18.0% with increasing suctions from 0 kPa through 0.98 kPa and 9.8 kPa to 33 kPa and 1500 kPa (Raj, 2010). Under similar increasing suctions, saprock samples from the same profile experienced decreasing moisture contents on average from 27.9% through 25.3% and 16.9% to 12.6% and 5.2% (Raj, 2010).

Saprock samples from a weathering profile over biotite-muscovite granite also experienced decreasing moisture contents from 31.9% through 27.9% and 24.0% to 19.4% and 7.9% with increasing suctions from 0 kPa through 0.98 kPa and 9.8 kPa to 33 kPa and 1,500 kPa (Raj, 2021). Regression analyses of gravel, sand and clay contents plotted against moisture contents retained at large suctions (33 kPa and 1,500 kPa) yielded negative trends with variable low to moderate correlation coefficients (R^2<0.500), though plots involving silt contents yielded positive trends with large correlation coefficients (R^2 >0.997). It was concluded that the retention of soil moisture was due to absorption of water onto the surfaces of silt particles (Raj, 2021).

There is also limited published data on the soil moisture retention characteristics of earth materials in neighboring, humid tropical areas. A study involving residual soils over the sedimentary Jurong Formation and the Bukit Timah Granite in Singapore Island concluded that the depth of weathering did not have a consistent effect on their soil water characteristic curves, though soils over granite had a wider range of pore sizes (Agus *et al.*, 2001). Several multi-variate empirical equations using a number of basic soil properties were also proposed in the study to describe the soil water characteristic curves of the soils (Agus *et al*., 2001).

Published literature on topics related to soil moisture retention characteristics in Malaysia include a paper that discusses modifications to the standard shear box that allowed testing of samples under unsaturated conditions (Bujang *et al*., 2005a). Results of a series of direct shear tests with fixed suction on samples of saprolite (soil horizon IC) from a weathering profile over porphyritic biotite granite led to the conclusion that suction played a role in increasing the shear strength of unsaturated soil, though there was a non-linear failure envelope due to the non-linear soil water characteristic curve (Bujang *et al*., 2005b; Thamer *et al.,* 2006).

As a part of a study to characterize weathering profiles in Peninsular Malaysia (Raj, 1983) was investigated the profile developed over rhyolite at Km 38.2 of the Kuala Lumpur - Karak Highway. This short-note discusses the results of laboratory tests carried out to determine the soil moisture retention characteristics of saprock from the profile; physical characterization of the profile having been discussed earlier (Raj, 2018).

GEOLOGICAL SETTING OF INVESTIGATED WEATHERING PROFILE

The weathering profile, exposed at the slope cut at Km 38.2 of the Kuala Lumpur - Karak Highway, is developed over rhyolite that forms part of a broad, approximately north-south trending belt of acid volcanics within the Main Range of Peninsular Malaysia (Figure 1). The acid volcanics comprise rhyolitic to dacitic flows with minor tuffs and tuff breccias and are considered to be contemporaneous with the Sempah Conglomerate

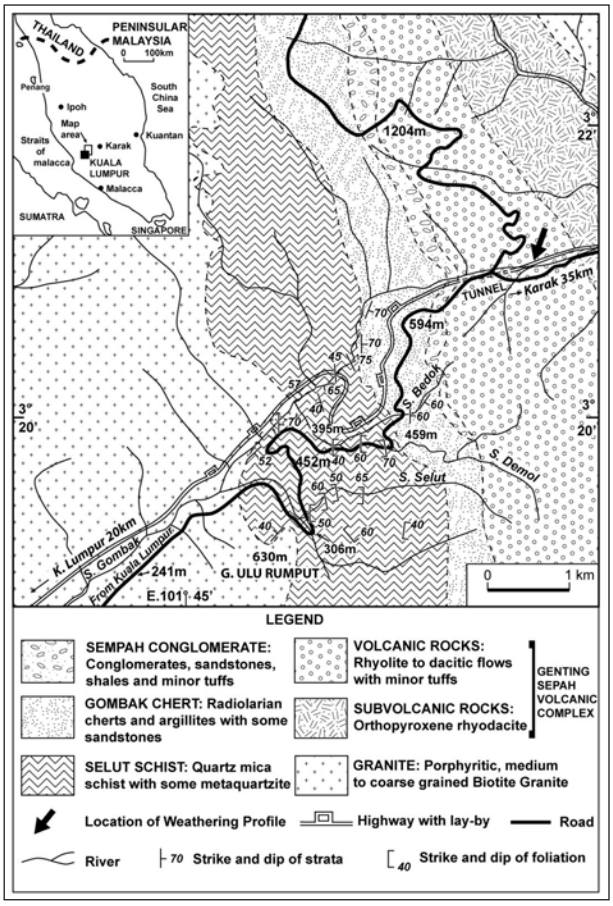

Figure 1: Geology map of the G. Ulu Rumput area (after Haile *et al*., 1977; Azman & Singh, 2005).

which outcrops to their immediate west (Haile *et al.*, 1977). Towards the east, however, the volcanics appear to be faulted against micro-granodiorite with an unusual mineralogy; consisting of abundant quartz, orthoclase, andesine and biotite together with orthopyroxene and labrodorite (Liew, 1977). Cobbing & Mallick (1987) consider this micro-granodiorite to be a subvolcanic rock that together with the acid volcanics constitutes their Genting Sempah Micro-granodiorite Pluton.

Chakraborty (1995), and Singh & Azman (2000), however, consider the acid volcanics (which they call 'orthopyroxene lacking rhyodacitic rocks' or 'rhyodacite') and the micro-granodiorite (which they call 'orthopyroxene bearing rhyodacite porphry' or 'orthopyroxene rhyodacite') to constitute their Genting Sempah Volcanic Complex. Azman & Singh (2005) furthermore, defined the Genting Sempah Volcanic Complex as consisting of two distinctive porphyry sub-volcanic units, i.e. rhyolite, and orthopyroxene rhyodacite, with minor tuffs and lavas. The Genting Sempah Volcanic Complex is considered to be one of the few examples of acid volcanism that is related, both temporally and spatially to the Triassic Main Range Granite; radiometric dating (U-Pb zircon data) yielding an age range between 211 and 219 Ma (million years) (Liew & Page, 1985).

The bedrock exposed at the bottom bench of the cut is bluish-grey in color and occurs as a massive, apparently structureless outcrop, though aligned biotite flakes (striking north-south and dipping 40° east) suggest magmatic flow. The bedrock is moderately to strongly jointed (with fracture spacings between 0.2 and 0.7 m) and often contains epidote along joint planes. In thin-sections, the rhyolite is seen to be hypidomorphic holocrystalline with phenocrysts (40-60 %) of quartz, plagioclase (andesine), biotite and alkali-feldspar set in an aphanitic, essentially quartzo-feldspathic groundmass (Liew, 1977). The groundmass shows minor variations in grain size with that surrounding most phenocrysts being finer grained than that not associated with reaction rims (Azman & Singh, 2005). Detailed descriptions of the mineralogy as seen in thin-sections have been published by Azman & Singh (2005).

Seepage along discontinuity planes is seen throughout the exposed bedrock at the foot of the cut and indicates the presence of an unconfined groundwater table just above the bedrock zone.

METHODOLOGY

Tape and compass traverses were first carried out along all berms of the cut to describe the exposed earth materials in terms of the Soil Survey Manual for Malayan Conditions (Leamy & Patton, 1966) and the Guidelines for Soil Description of the Food and Agriculture Organization (FAO, 2006). Pedological features that were described included the colour, consistency and soil structure of the earth materials as well as their content of concretions, stains and organic matter. Geological features were also mapped and described, in particular the minerals, textures and structures of the original bedrock material and mass now indistinctly to distinctly preserved in the earth materials. Lateral similarity in pedological and geological features was then used to distinguish weathering zones and sub-zones, i.e. layers of earth materials with similar morphological features as color, relict bedrock textures and structures as well as litho-relicts (core-stones and core-boulders) (Table 1 and Figure 2).

Brass rings of 4 cm length and 7.6 cm internal diameter were then used to collect constant volume samples from *in situ* weathered rhyolite (saprock) at depths of 5.7 m, 9.1 m, 12.7 m and 16.9 m (Figure 3). The rings had 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. A brass ring was first driven into the soil by hammering gently on its top until the top was flush with the ground surface. A second brass ring, with its cutting

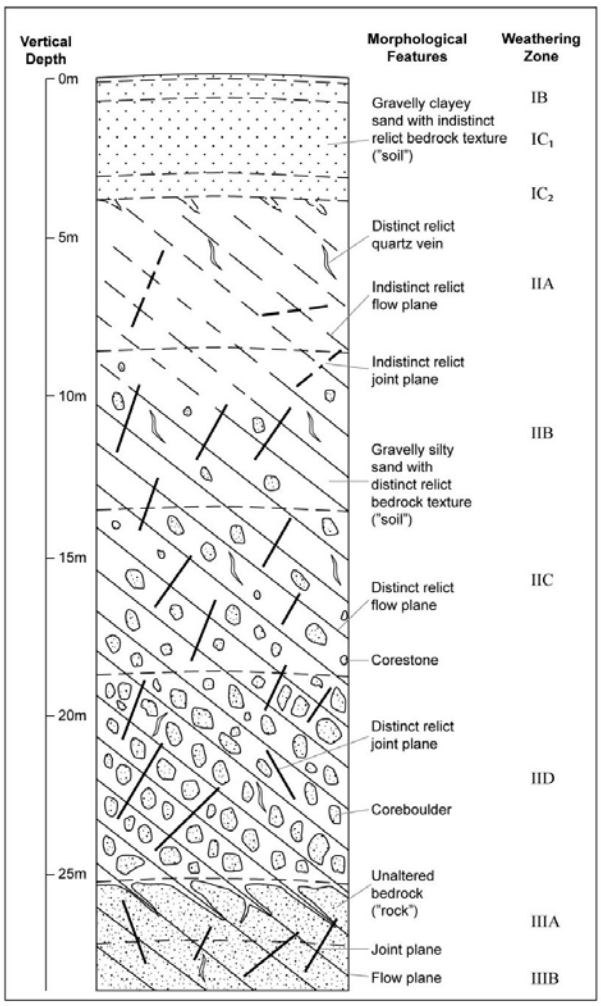

Figure 2: Schematic sketch of morphological features at the weathering profile (Raj, 2018).

Table 1: Morphological features of weathering zones and sub-zones (Raj, 2018).

Sub-zone	Thick-ness (m)	Sub-zone	Morphological Features	RMWG
IA	0.1 m	IA	Yellow to dark brown, porous, friable, clayey sand; some roots, boundary wavy, clear.	VI (6)
IB	0.6 m	IB	Red, firm, clayey sand; subangular blocky, moist; friable, dry; boundary irregular, gradual	
IC_1	2.4 m	IC_1	Red, stiff, gravelly clayey sand; some yellow brown mottles; friable, granular, dry; boundary irregular, diffuse	
IC_2	0.8 m	IC_2	Red, stiff, gravelly clayey; indistinct relict rhyolite texture & quartz veins; friable granular dry; boundary irregular, diffuse	
IIA	4.7 m	IIA	Red, friable, gravelly silty sand with yellow mottles; distinct relict rhyolite texture & quartz veins; some indistinct relict joint & flow planes; some core stones; boundary irregular, diffuse.	V (5)
IIB	4.9 m	IIB	Red, friable, gravelly silty sand; distinct relict rhyolite texture, quartz veins, joint & flow planes; several angular, core-stones; a few core-boulders (about 10% of sub-zone); boundary irregular, diffuse.	
IIC	5.1 m	IIC	Broad bands of friable, red, gravelly silty sand with distinct relict rhyolite texture, quartz veins, joint & flow planes in-between angular, core-stones & core-boulders (≈20-40% by area of sub-zone); boundary irregular, diffuse.	IV (4)
IID	6.7 m	IID	Predominantly angular to subrounded, core-stones & core-boulders (>50% by area of sub-zone) with thin to broad bands of friable, red, gravelly silty sand with distinct relict rhyolite texture, quartz veins, joint & flow planes; boundary irregular, sharp.	III (3)
IIIA	2.2 m	IIIA	Continuous bedrock outcrop with thin wedges & bands of red, gravelly silty sand with distinct relict rhyolite textures & structures, along & between discontinuity planes; boundary broken, diffuse.	II (2)
IIIB	>2 m	IIIB	Continuous bedrock outcrop with thin strips of red, gravelly silty sand with distinct relict rhyolite textures & structures along discontinuity planes only.	I (1)

Note: RMWG = Rock Mass Weathering Grade

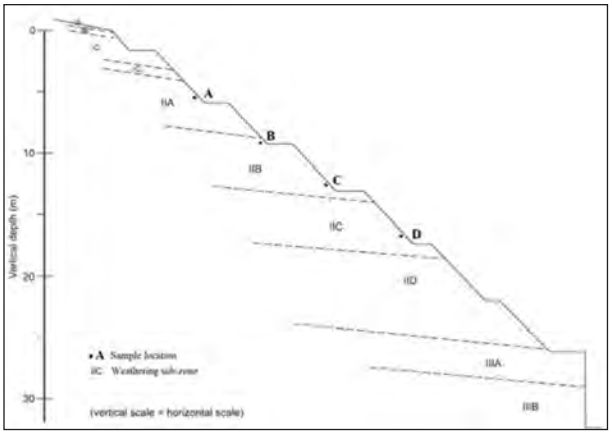

Figure 3: Sample locations and lateral extensions of weathering sub-zones.

edge facing upwards, was then placed on the top of the first ring which was then driven deeper into the soil by gently hammering on the top of the second ring; a piece of wood placed over the second ring to minimize damage and disturbance of the sample. Both rings were then dug out from the ground by excavating the surrounding and underlying soil. The sample in the upper ring was discarded whilst the sample in the lower ring was trimmed and sealed with rubber discs that were held in place by screwed-on metal plates. Prior to sampling, the rings were externally greased to facilitate entry into the soil, whilst materials on the slope were excavated to a depth of some 0.5 m to minimize surface disturbance. Prior to sampling, the soil was also trimmed into an approximately cylindrical shape, slightly larger than the ring diameter, to reduce

lateral compaction. Two constant volume samples were collected at each sampling point; one for determination of its physical and soil index properties, and the other for determination of its soil moisture retention characteristics.

The sample rings were taken to the laboratory where the moisture content, unit weight and density of one set of samples was determined before the specific gravity of the 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 limits of the fine fractions (<0.42 mm size) were determined (ASTM, 1970). The 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), grained fractions respectively (ASTM, 1970). The main minerals present in the gravel, sand and silt sized fractions were then 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 identify the minerals present (Thorez, 1975; Poppe *et al.*, 2001). It is to be noted, that the size limits for soil particles are based on the Wentworth (1922) Scale.

Samples from the second set of brass rings were extracted in the laboratory and cut into five pieces of about similar volumes which were then saturated by allowing them to stand in water overnight. The moisture content of one of the five saturated samples was determined, whilst the remaining samples were placed on water saturated ceramic porous plates in four separate chambers. The air pressures in the pressure chambers were then adjusted to subject the samples to different pressures; the lower side of the porous plates being exposed to atmospheric pressure. The pressures were kept constant for one week until the overflow of excess water had stopped. After release of the pressures, the samples were removed and their moisture contents determined. The pressure plate tests were carried out at the Soils Laboratory of Universiti Pertanian Malaysia (now Universiti Putra Malaysia) where such tests were being routinely carried out for agricultural soil surveys.

RESULTS

Descriptions of saprock samples

Binocular microscope examinations show the gravel and sand sized fractions to consist almost entirely of quartz grains with a few altered (whitish) and fresh (cloudy) feldspar grains, whilst the silt sized particles consist entirely of sericite flakes. X-ray diffractograms of the clay fractions show kaolinite and illite to be the clay minerals present (Table 2).

Physical properties of saprock samples

As the samples were collected at different depths, there are some variations in physical properties (Table 3). Sample A from sub-zone IIA has a dry density of 1586 kg/m^3 and dry unit weight of 15.56 kN/m^3, whilst sample B from upper sub-zone IIB has corresponding values of 1364 kg/m^3 and 13.39 kN/m^3, respectively. Samples C, and D, from sub-zones IIB and IIC have dry densities of 1410, and 1399, kg/m^3, and dry unit weights of 13.83 and 13.72, kN/m^3, respectively.

The specific gravity of soil particles shows little variation, ranging from 2.59 to 2.61, though this is to be expected in view of the similarity in mineral compositions (Table 2). Values of porosity are somewhat variable; sample A with a porosity of 39% and the other samples with porosities of 46% and 48%. Void ratios are similarly variable with sample A having a value of 0.65, and the other samples with values of 0.85 and 0.91. Field moisture contents are variable; samples A and B with contents of 5.1%, and 4.0%, and samples C and D with contents of 3.8%, and 8.9%, respectively.

Table 2: Descriptions of saprock samples.

Sample	Sub-zone	Vertical Depth	Description
A	IIA	5.7 m	Red, friable, gravelly silty sand with yellow mottles; distinct relict rhyolite texture. Coarse fraction of quartz grains & sericite flakes with some altered feldspar fragments. Clay fraction of kaolinite & illite.
B	IIB	9.1 m	Red, friable, gravelly silty sand with distinct relict rhyolite texture. Coarse fraction of quartz grains & sericite flakes with some altered feldspar fragments. Clay fraction of kaolinite & illite.
C	IIB	12.7 m	Red, friable, gravelly silty sand with distinct relict rhyolite texture. Coarse fraction of quartz grains & sericite flakes with some unaltered feldspar fragments. Clay fraction of illite.
D	IIC	16.9 m	Red, friable, gravelly silty sand with distinct relict rhyolite texture. Coarse fraction of quartz grains & sericite flakes with some unaltered feldspar fragments. Clay fraction of illite.

Soil index properties of saprock samples

Differences in depth result in some variations in soil index properties; samples A, B and C with gravel contents of 6% to 7% and sample D with a gravel content of 17% (Table 4). Sand contents are more variable; A, B, C and D having contents of 48%, 57%, 56% and 45%, respectively. Total sand and gravel contents in samples A, B, C and D are thus 55%, 63%, 62%, and 62%, respectively (Table 4). Silt contents are surprisingly of little variation; samples A, C and D with 32%, and sample B with 30% (Table 4) Clay contents are more variable; samples A and B with 13%, and 7%, and samples C and D with 6%, respectively (Table 4).

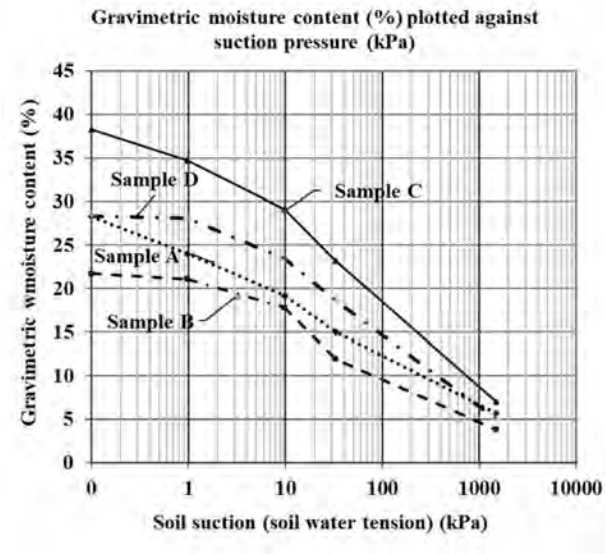

Figure 4: Gravimetric moisture retention curves of saprock samples.

Soil moisture retention under different suction pressures

The pressure plate tests show gravimetric moisture contents of the samples to decrease with increasing suctions (Figure 4). In samples A and B, gravimetric moisture contents decrease from 28.3% through 24.0% and 19.2% to 15.0% and 5.7%, and from 21.7% through 21.2% and 17.8% to 11.9% and 3.8%, respectively under increasing suctions from 0 kPa through 0.98 kPa and 9.8 kPa to 33 kPa and 1,500 kPa (Table 5). Exactly similar increasing suctions furthermore, result in decreasing gravimetric moisture from 38.3% through 34.7% and 29.1% and 23.2% and 7.0% in sample C, and from 28.4% through 28.1% and 23.4% to 18.6% and 5.0% in sample D (Table 5).

Storage and drainage pores in saprock samples

In agriculture, soil suction or soil moisture tension is considered to be the most important soil moisture characteristic for a growing plant and is usually defined in units of bars (where 1 bar = 100 kPa). A saturated soil has a soil moisture tension of about 0.1 kPa or less, whilst at field capacity, most soils have a soil moisture tension between 5 kPa and 33 kPa; field capacity defined as the level of soil moisture left in the soil after drainage of gravitational water which frequently takes a few days

Table 3: Physical properties of saprock samples.

Sample	Depth (m)	Dry Unit Weight (kN/m^3)	Dry Density (kg/m^3)	Mineral Grain SG	Porosity (%)	Void Ratio	Moisture Content (%)
A	5.7	15.56	1586	2.61	39	0.65	5.1
B	9.1	13.39	1364	2.60	48	0.91	4.0
C	12.7	13.83	1410	2.61	46	0.85	3.8
D	16.9	13.72	1399	2.59	46	0.85	8.9

Note: SG refers to specific gravity

Table 4: Soil index properties of saprock samples.

Sample	Depth (m)	Sub-zone	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Gravel & Sand (%)
A	5.7	IIA	7	48	32	13	55
B	9.1	IIB	6	57	30	7	63
C	12.7	IIB	6	56	32	6	62
D	16.9	IIC	17	45	32	6	62
Average	-	-	9	52	32	6	61

Table 5: Gravimetric moisture contents retained under different suction pressures.

Sample	Vertical Depth	Gravimetric Moisture Content (%)				
		0 kPa	0.98 kPa	9.8 kPa	33 kPa	1500 kPa
A	5.7 m	28.3	24.0	19.2	15.0	5.7
B	9.1 m	21.7	21.1	17.8	11.9	3.8
C	12.7 m	38.3	34.7	29.1	23.2	7.0
D	16.9 m	28.4	28.1	23.4	18.6	5.0
Average	-	29.2	27.0	22.4	17.2	5.4

Table 6: Different sized pores in saprock samples.

Sample	Vertical Depth	Quick Drainage Pores (%)	Slow Drainage Pores (%)	Total Drainage Pores (%)	Storage Pores (%)
A	5.7 m	9.1	4.2	13.3	9.3
B	9.1 m	3.9	5.9	9.8	8.1
C	12.7 m	9.2	6.0	15.2	16.2
D	16.9 m	5.0	4.8	9.8	13.6
Average	-	6.8	5.2	12.0	11.8

to drain through the soil profile. The wilting point, which is defined as the soil moisture content where most plants cannot exert enough force to remove water from small pores in the soils, is at about 1,500 kPa soil moisture tension for most agronomic crops. Water, held between field capacity and the wilting point is available for plant use, whilst capillary water held in the soil beyond the wilting point can only be removed by evaporation (Scherer *et al.*, 1996). In view of these relationships, results of soil water retention curves are often expressed in terms of 'quick' and 'slow' drainage pores as well as 'storage' pores; these values being determined from the following equations, i.e.

Quick drainage pores (%) =
moisture content (0.0 kPa) - moisture content (0.98 kPa)
Slow drainage pores (%) =
moisture content (9.8 kPa) - moisture content (33 kPa)
Storage pores (%) =
moisture content (33 kPa) - moisture content (1,500 kPa)

Percentages of quick and slow drainage pores in the samples are quite variable, though the total drainage pores of samples B and D are exactly similar with a value of 9.8%, and those of samples A, and C, some 13.3%, and 15.2%, respectively (Table 6). The total percentage of storage pores is more variable with samples A and B having values of 9.3%, and 8.1%, and samples C and D having values of 16.2% and 13.6%, respectively (Table 6).

DISCUSSION

Comparison with published data

In earlier publications, it has been emphasized that there are variations with depth in the textures and compositions of the earth materials of weathering profiles as well as differences in the extent of preservation of the original bedrock minerals and structures (Raj, 1985; Raj, 2018). Discussions on the physical and soil index properties of these earth materials as well as their soil moisture retention characteristics must therefore, be carried out with reference to the locations of samples. Results of the present study can therefore, only be compared with those involving saprock samples from the weathering profile over porphyritic biotite granite (Raj, 2010) and that over biotite-muscovite granite (Raj, 2021).

In the present study, gravimetric moisture contents of the saprock samples decrease on average from 29.2% through 27.0% and 22.4% to 17.2% and 5.4% with increasing suctions from 0 kPa through 0.98 kPa and 9.8 kPa to 33 kPa and 1,500 kPa (Table 5). These values are quite similar with those of saprock samples from the weathering profile over biotite-muscovite granite where increasing suctions from 0 kPa through 0.98 kPa and 9.8 kPa to 33 kPa and 1,500 kPa result in decreasing moisture contents on average from 31.9% through 27.9% and 24.0% to 19.4% and 7.9% (Raj, 2021). A similar pattern is shown by saprock samples from the weathering profile over porphyritic biotite granite where increasing suctions from 0 kPa through 0.98 kPa and 9.8 kPa to 33 kPa and 1,500 kPa result in decreasing moisture contents on average of 27.9% through 25.3% and 16.9% to 12.6% and 5.2% (Raj, 2010). Decreasing moisture contents with increasing suctions amongst the individual saprock samples from the different weathering profiles are, however, not exactly identical for there are differences in their textures and mineral compositions.

Quick and slow drainage pores in the present saprock samples are on average, 6.8%, and 5.2%, respectively, whilst the total drainage porosity is 12.0%, and total storage porosity 11.8% (Table 6). These values are very similar to those from the profile over biotite-muscovite granite where quick and slow drainage pores are on average some 7.8%, and 4.7%, respectively, and the total drainage porosity 12.5%, and the total storage porosity 11.5% (Raj, 2021). These results are also quite similar to those of saprock samples from the weathering profile over porphyritic biotite granite where quick and slow drainage pores were found on average to be 9.7%, and 4.1%, whilst the total drainage porosity was 13.8%, and the total storage porosity 11.0% (Raj, 2010). Volumes of drainage and storage pores in the individual samples from the different weathering profiles are, however, not exactly identical for there are differences in textures and mineral compositions.

Reason for retention of soil-moisture

The pressure plate tests show the soil moisture contents retained under different suctions to be variable with particle size distributions (Tables 4 and 5). Regression analyses of sand and gravel contents plotted against moisture contents retained at different suctions, however, yield extremely low correlation coefficients (R^2<0.098), whilst similar plots involving clay contents yield low correlation coefficients (R^2<0.273). Regression analyses of silt contents plotted against moisture contents retained at low suctions (0.98 and 9.8 kPa) furthermore, yield positive trends with moderate correlation coefficients (R^2=0.441 and R^2=0.361), whilst those involving large suctions (33 and 1500 kPa) yield positive trends with larger correlation coefficients (R^2=0.525 and R^2=0.616).

Adsorption of water onto the surfaces of silt particles thus appears to be most likely responsible for the retention of soil moisture in the saprock samples; the silt particles having relatively large specific areas. Van der Waal forces furthermore, have been considered to be primarily responsible for such particle surface hydration (Lu, 2016). A similar conclusion was reached in the earlier study involving saprock samples from the weathering profile over biotite-muscovite granite where regression analyses of silt contents plotted against moisture contents retained at large suctions (33 kPa and 1,500 kPa) yielded positive trends with very large correlation coefficients (R^2 >0.9966) (Raj, 2021).

CONCLUSION

Three broad zones were differentiated at the weathering profile; an upper 3.9 m thick pedological soil (zone I), an intermediate 21.4 m thick saprock (zone II), and the underlying rhyolite (zone III). Laboratory determinations with the pressure plate method show increasing suctions from 0 kPa through 0.98 kPa and 9.8 kPa to 33 kPa and 1,500 kPa to result in gravimetric soil moisture retentions of 28.3% through 24.0% and 19.2% to 15.0% and 5.7% for sample A (collected at a depth of 5.7 m), and from 21.7% through 21.1% and 17.8% to 11.9% and 3.8% for sample B (collected at a depth of 9.1 m). Similarly increasing suctions yielded gravimetric moisture contents of 28.3% through 34.7% and 29.1% to 23.2% and 7.0% for sample C (collected at a depth of 12.7 m), and from 28.4% to 28.1% and 23.4% to 18.6% and 5.0% for sample D (collected at a depth of 16.9 m).

Regression analyses of silt fractions plotted against moisture contents retained at large suctions (33 and 1500 kPa) yield positive trends with moderate correlation coefficients (R^2=0.525 and R^2=0.616) indicating that adsorption of water on the surfaces of silt particles that results in the retention of soil moisture.

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CONFLICT OF INTEREST

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

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57th ANNUAL GENERAL MEETING & ANNUAL REPORT 2022

PERSATUAN GEOLOGI MALAYSIA
GEOLOGICAL SOCIETY OF MALAYSIA

57th ANNUAL GENERAL MEETING & ANNUAL REPORT 2022

28th April 2023
i) Sheraton Hotel, Petaling Jaya
ii) ZOOM Online Meeting Platform

Agenda

The Agenda for the Annual General Meeting is as follows:

1. Welcome Address by the President for Session 2022/2023
2. Confirmation of Minutes of the 56th AGM
3. Matters Arising
4. Annual Report for Session 2022/2023
   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 & Board of Trustees Report
6. Other Matters
7. Announcement of New Council for 2023/2024
8. Presidential Address for 2023/2024

Confirmation of Minutes of the 56th AGM

PERSATUAN GEOLOGI MALAYSIA
GEOLOGICAL SOCIETY OF MALAYSIA (GSM)

MINUTES OF 56th ANNUAL GENERAL MEETING

Date: 22nd April 2022
Time: 4.30 p.m.
Venue/Platform: Sheraton PJ / ZOOM Online Meeting

Member Attendance:

Online

1. A Halim A Latiff
2. Abd Hanan Ahmad Nadzeri
3. Abdul Ghani Md Rafek
4. Ahmad Nizam Hasan
5. Amir Huzairy Yahya
6. Askury Abd Kadir
7. Chan Chin Sin
8. Dr. Abdull Halim
9. Dr. Khairul Azlan
10. Farah Fazulah Abdullah
11. Mohd Idham Mansor
12. Muhammad Hatta Roselee
13. Muhammad Niqmatullah
14. Nor Shahidah Mohd Nazer
15. Nur Iskandar Taib
16. P. Loganathan
17. Wan Hasiah Abdullah
18. Wan Nizam
19. Wendy Teoh Hoon Ping
20. Mazlan Madon
21. Yong Wai Yen
22. Yunusija Saumanovic
23. Zakaria Mohamad
24. Mohamad Shaufi Sokiman
25. Mohd Badzran Mat Taib
26. Ramany Maniam
27. Fateh Chand
28. Fathiyah Jamaludin
29. Felix Tongkul
30. Isa Kamaruddin
31. Joy Pereira
32. Khor Peng Seong
33. Kong Wai Loon
34. Lakam Mejus
35. Lee Chai Peng
36. Lee Kim Yik
37. Lutfi Hamidee
38. Meor Hakif

Sheraton Hotel PJ

39. Ahmad Nizam Hasan (ANH)
40. Abdul Rasid Jaapar (ARJ)
41. Lim Choun Sian (LCS)
42. Norazianti Asmari (NAA)
43. Dato Yunus Abdul Razak
44. Mirsha Arshad
45. Dr. Mohd Hariri Arifin (MHA)
46. Dr. Nur Iskandar Taib (NIT)
47. Mohd Fairuz bin Mohd Isa

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

Mr. Ahmad Nizam Hasan the President of Geological Society of Malaysia acted as the Chairperson of the AGM and called the meeting to order at 3.00 pm.

Adoption of Agenda

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

1. Welcome 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. Other Matters
6. Announcement of New Council for 2022/2023
7. Presidential Address for 2022/2023

The agenda was adopted by Abdul Hanan and seconded by Dato' Yunus Abd Razak.

2. Confirmation of Minutes of the 55th AGM

The Minutes of the 55th AGM was tabled for confirmation.

Dato' Yunus proposed that the minutes be confirmed, seconded by Tan Boon Kong. The minutes were unanimously confirmed without any amendment.

3. Matters Arising (55th AGM Minutes)

Item No. 4 under Treasurer Report was presented by Treasurer, and in the Honorary Auditor section.
All other sections were presented and accepted. Action: Information

4. Annual Report for Session 2020/2021

a. President's Report
Ahmad Nizam Hasan tabled the President's Report, and thanked council members and secretary/secretariat for the support.

The AGM discussed the following matters:

- No comments were made.

Tan Boon Kong proposed that the President's Report be accepted, seconded by Askury Abd Kadir.

b. Secretary's Report
Farah Fazulah Abdullah tabled the Secretary's Report and Assistant Secretary's Report on behalf of Norazianti Asmari. Council position had a change-over during mid-term (Tan Boon Kong) with no further changes throughout the term.

The AGM discussed the following matters:

- Tan Boon Kong's attendance should reflect 5/5 attendance, considering first meeting was prior to his appointment into position. Action: Incoming Council

Prof Joy Pereira proposed that the Secretary's and the Assistant Secretary's Report be accepted, seconded by Prof Wan Hasiah Abdullah.

c. Editor's Report
Wan Hasiah Abdullah tabled the Editor's Report.

The AGM discussed the following matters:
- Prof Joy Pereira advice the members to continuously citing journals to increase impact factor, and supporting the indexing effort. Action: Incoming Council

Abd Hanan B Ahmad Nadzeri proposed that the Editor's Report be accepted, seconded by Dato Yunus Abd Razak.

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

The AGM discussed the following matters:
- Seeking clarification on the itemized number of laptops donated to students.
- Azianti clarified that there were eleven (11) laptops donated & distributed to the geology students across UKM, University Malaysia Kelantan, UTP, USM, UM and University Malaysia Sabah.

e. Honorary Auditor's Report
The AGM discussed the following matters:
- Treasurer requested S.F. Lee be reappointed as auditor, and was supported by Prof Wan Hasiah. Action: Incoming Council

Mr. Loganathan proposed that Treasurer's Report and Honorary Auditor's Report be accepted, seconded by Dato Yunus Abd Razak.

f. GSM Endowment Fund Report
Dato Yunus Abd Razak, Chairman on the Board of Trustees of the GSM Endowment Fund, recommended the society actively manage the inactive funds from the operating account into Endowment Fund to increase interest gains. He also seeks Council to manage the interest accrued from Dato Sia's donation.

The AGM discussed the following matters:
- Seeking clarification on Dato Sia's contribution, if that is considered donation or contribution (for tax purpose).
- Council seeks opinion or ideas on managing the interest from Dato Sia's donation.
- Dato Sia's condition was that the benefit of the fund be Economic Geology-related, in the form of research grants or scholarships. This will be managed by the Council , with further discussions during Council meetings. Action: Incoming Council

Mr. Loganathan proposed that report and recommendations from the Board of Trustees be accepted by AGM, seconded by Zakaria Mohammad.

5. Other Matters

Newly added topic: GSM Vendors and Service Providers.

The Board of Geologists is anticipated to make Continuous Professional Development (CPD) a mandatory requirement for its annual registration. Thus, there is much opportunity for GSM Members to become vendors or service providers for training and other events. The AGM is requested to note that in order to be accountable, consistent and transparent, the GSM Council endeavours to provide equal opportunities for all members by advertising opportunities on its website. Efforts taken in this regard will be reported at the next AGM.

The AGM discussed the following matters:
- The topic was not submitted prior to the AGM, as such this will be discussed in the next AGM.

6. Announcement of New Council for 2022/2023

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

The Council for 2022/2023:

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 2022/2023:

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

Councillors 2022/2024 who will serve for two years:

i. Abdul Halim Abdul Latiff
ii. Amie Norsyazan Amir
iii. Joy Jacqueline Pereira
iv. Nur Iskandar Taib

First-time councillors were asked to introduce themselves to the AGM audience.

Prof Wan Hasiah proposed that the new Council announcement be accepted, seconded by Dr. Mazlan Madon.

Information

7. Presidential Address for 2022/2023

The President, En Ahmad Nizam expressed his gratitude to current, outgoing, and new incoming council members in supporting his presidency.
Whilst COVID has placed restriction on activity, the council has managed to overcome and introduce alternative options, such as introducing virtual program to keep the momentum going.
In the upcoming term, GSM will be hosting the GEOSEA and look forward to serving the society with the support of the council members. The president is also excited to launch the new and improved website. 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 2022/2023
22nd April 2022

Annual Report for Session 2022/2023

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 formalize collaborations and alliances with key institutions within the geoscience fraternity. The spirit of `GSM Cares GSM Prihatin' continues; GSM was also called to participate in various Corporate Social Responsibility (CSR) programmes not only focusing on the financial needs of geology students in various universities but also to the community that faced geohazard catastrophies. In support of post-pandemic COVID 19 activities, GSM aligned and focused more on the back-to-basics programmes, especially for the affected student members during the pandemic period.

Programmes and Collaborations

During the 2022/23 term, GSM was actively promoting student outreach programmes in other than mainstream or specific majoring courses that are strongly embedded with geology subjects.

Throughout the terms, GSM as well as the GSM University Students Chapter flagship have actively organised various physical career fair programmes like the Geology Industrial Week (GIW 2022) by Kelab Geologi University Malaya (KAGUM), Science Career and innovation fair (SCI-FAIR), Festival Kelestarian dan Pembangunan Fakulti Sains dan Teknologi (FLARE FST) by Kelab Geologi Universiti Kebangsaan Malaysia (KGUKM). We believe that these continuous promotional and collaborative programmes would be an excellent effort in tapping especially into GSM student members as part of our transformation planning to produce future geoscience leaders and to continue supporting the GSM programmes in the future.

GSM under the flagship of the Working Group, has jointly organised or collaborated consistently in various technical webinars or Virtual Technical Talk Programmes. More than 50 virtual programmes were organized for the public and industry. These included a monthly technical talk from the Working Group Engineering Geology (WGEG) led by Mr Tan Boon Kong that featured professional geotechnical engineers sharing their experience and views on the importance of Engineering Geological subject matters in solving geotechnical engineering designs. Others were Siri Pendidikan Bencana Alam by NDRC Universiti Malaysia Sabah (UMS), Siri Ceramah Teknik GSM-UKM 2022 by Program Geologi University Kebangsaan Malaysia, Geologi Malaysia "Bootcamp" by Working Group Promotion, by the Working Group Economic Geology under Dr KK Cheang and Dr Zakaria Endut; GSM-IGM an international Virtual Advanced Seminar on Mining Geology & Mineral Resources where the president was given the honour of officiating and presenting the paper on Engineering Geology In Mining, GSM-IGM-MCOM Future of the Tin Industry in Malaysia and Advances Economic Geology Webinar Series by international speakers such as Dr Charles Makoundi. The Working Group Hydrogeology led by En. Ismail Tawnie together with IGM and NAHRIM organised the Technical Talk "Slope Hydrogeology" by Professor Jimmy Jiao from University of Hong Kong covering the hydrogeology application aspect of fundamental groundwater characteristics, behavior analysis on geotechnical stability of slopes.

Meanwhile the Working Group of Geophysics under Dr Ahmad Halim Abdul Latif and Dr Mohd Hariri Arifin, were continuously having a series of 10 Advances in Geophysics Webinar virtual technical talks on various case studies and introduced the new application of geophysics as a tool in research and industry. The new GSM Working Group of Karst and Caves led by Dr Rosfatihah jointly organised the virtual talk on Geology and Archeology Marvels of Baling Karst. The Working Group and other related subject matter experts such as speleologists, palaeontologists and archaeologists elicited very positive interest from the public and geoscientists. GSM is committed to expanding and uplifting the subject to the mainstream under the working group flagship in the future.

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; it organised a virtual webinar Geoscience for Building Disaster Resilience in December 2022, presented and discussed the ongoing initiatives on the development of a Geohazards Knowledge Hub and formulation

of Technical Guidance on Terrain Mapping and Area Business Continuity Plans. And on January 2023, together with the British Geological Survey (BGS) researcher, organised a physical seminar on Advances in Mineral Development & Landslide Mapping that was held at the GSM house of geology at the Geology Department University Malaya.

The IGM-GSM Joint Committee (JC) had met twice 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 time, the JC was invited by JMGM to collaborate in a scientific site visit to the Father's Organic Farm Campsite Batang Kali areas that were affected by a landslide tragedy in which 31 people were killed. Further to the visit, the JC organised the Geology Technical Talk Series 2023 – "Perbincangan Intelek: Perspektif Geologi Kejuruteraan Terhadap Kejadian Terkini Tanah Runtuh Batang Kali" where the president was a moderator, discussing the geological prospective outcome of the investigation conducted by JMG Selangor.

Further initiatives continue in enhancing the application of geology knowledge in multi cross-sectoral context. GSM continues the task as panel in reviewing the application of geological aspects in the existing `JKR Standard For Road Works Section 17: Site Investigation (JKR/SPJ/2013-S17)' documents; represented by the President and Vice President at the Geotechnic Division of JKR since 2021 that would be concluded in August 2023.

And on 17th March 2023, GSM had a fruitful meeting with the president and the high council of Malaysia Geotechnical Society (MGS) at the JKR Geotechnical Division office where various aspects from paper publications, bi-annual conferences, roundtable technical committee and bilateral affiliate membership were discussed. The meeting agreed that the inspirational, collaborative and harmonious commitment in both the fraternity is important.

GEOSEA LANGKAWI 2022

GSM together with the organising partners of the Institute of Geology Malaysia (IGM), the Department of Minerals and Geosciences Malaysia (JMG) and the Langkawi Development Authority (LADA), strategic partners of Universiti Malaysia Pahang (UMP) and Langkawi Research Center (PPL), collaborators of UMT, UMK, UMS, USM, UTP, UM, UKM had devised and planned the organisation of the ASEAN region's biggest geoscience congress, namely the Regional Geoscience Congress of Southeast Asia 2022 GEOSEA 2022 for the 17th time in Langkawi, despite various challenges in the transition from the pandemic to the endemic phase of COVID 19.

The president who is also the chairman of the organising committee, proudly welcomed the Honourable Setiausaha Bahagian Kanan (Mineral dan Geosains) Kementerian Air Tanah dan Sumber Asli (KETSA), Tuan Haji Shamsul Shahril Badliza bin Mohd Noor to officiate, and all the dignitaries who were present to inaugurate and enliven this bi-annual GEOSEA 2022 event.

The event reflected the overwhelming support from all fellow leaders of Geoscience Societies from Southeast Asia and delegates from Philippines, Thailand, Indonesia, and Myanmar that were present.

"Alah bisa tegal biasa..." is a Malay proverb meaning "No Retreat No Surrender" that tells of the many challenges that we, as organisers, had to overcome. There were various obstacles and constraints in organising an international scale conference in physical mode during the COVID 19 post-pandemic phase. The organising committee was made up of various professional disciplines of geologists, academics and industry; there were various layers of generations involved, management meetings virtually and physically for hundreds of hours. All the work was done with an unfading spirit and with determination and desire for one goal: to forge conference organising history!

The GEOSEA2022 congress made society history in that it was a reset moment for the successors of the tradition and true aspirations of the return of the conference in a normal, fully physical manner after the pandemic. And praise be to Allah SWT, this congress managed to gather more than 300 geoscientists from home and abroad at a geoscience conference outside the city of Kuala Lumpur; it was held in Langkawi Island. History was also made when this congress witnessed the physical and coordinated signing and exchange of a Memorandum of Understanding (MOU) in conjunction with the establishment of the ASEAN Federation of Geoscience Organisations (AFGeo) by geological associations from ASEAN countries.

It made historical record in responding to the success of the challenges in conducting fieldwork specifically as part of the compulsory congress schedule; known as the Midfield Excursion this was done throughout the afternoon of the second day of the congress. What is Langkawi for a geologist if he doesn't experience, see for himself and appreciate the extraordinary geological features from Cambrian to Quaternary rocks formation; this can happen only in the ever-beautiful Langkawi Island!

And finally, this event gathered and presented the diversity of geological science in ONE conference; from the mainstream fundamentals of geological science in the 34th National Geology Conference and 17th Regional Geoscience Congress of Southeast Asia, GEOSEA 2022, and the diversity of geological mineral resources and processing in Sustainable Earth Resources Engineering, Series 2022 to the diversity of geological heritage in the Regional Course

on UNESCO Global Geopark – all presented in oral form, posters, fieldwork and workshop. GSM offered a One Combo Congress Package during the one-week conference. Therefore, with these various historical achievements, we as the organisers are proud to label the GEOSEA 2022 congress in Langkawi as the biggest Geoscience `Olympic' Conference of the year. GSM has set a new benchmark for future organisers of AFGEO members with the creative agenda offered to the delegates.

With the theme, Advance Geoscience Advance ASEAN, GEOSEA XVII Langkawi has been relevant and significant in considering the development scenario of current world issues; from facing the challenges of natural disasters to the phenomenon of global climate change which is beginning to show signs of increased and drastic impact, especially related to geological disasters.

All this while facing various crises of global economic survival challenges and the scenario of the world economic recession which began during this endemic phase of COVID 19. Here, the role of all geoscientists is coveted especially in the context of economic and environmental geology that involves the exploration of mineral resources that can contribute and even support the country's economic income in the short, medium and long term, in a sustainable, dynamic and viable way. The Congress provided a forum for critical discussion in an innovative and inclusive way in exploring the diversity of geological resources such as geo-tourism products through geological heritage, and economic mineral geological resources that are sustainable and have the potential to advance the country as an alternative to buck the tide of the current global economic recession phase.

According to the Hadith of Rasulullah (peace be upon him), narrated by Bukhari and Muslim, "whoever teaches or shares knowledge and such person practices it, then there is a reward, for the person who gives such knowledge without reducing the reward of the person who practices it". Therefore, as the president of the Geological Society Malaysia, the association responsible for the publication of an impactful journal, BULETIN GSM, I call on all presenters of research papers in the GEOSEA 2022 Congress, to continue working on the results of the presentations to form a journal and publish it for the benefit of the community of geologists and the general public. May the published research be used as continuous reference material; as a piece of useful knowledge that will be rewarded by Allah swt, God willing.

During the GEOSEA XVII 2022, a meeting was held by the members of the ASEAN Federation of Geoscience Organisation (AFGEO). The meeting marks a historical moment where an official MOU signing ceremony on the formation by leaders from Philippines, Thailand, Indonesia, and Myanmar was successfully held. All participating leaders hope that all other members would be follow this step, and bring the rest of the ASEAN countries under a formal flagship of AFGEO as a structured ASEAN geoscience organisation. The collaboration would be a roadmap that will cross borders and enhance the sharing of knowledge and professionalism within the ASEAN-registered Professional Geologists countries. During the meeting, it was announced that the Geological Society of Thailand (GST) will host the 18th Regional Congress on Geology of Southeast Asia (GEOSEA XVIII) in 2024.

In preparing for the event in Langkawi, the president together with IGM and JMG teams managed to get the full support and commitment from the Langkawi Development Authority (LADA) in officially recognising GEOSEA LANGKAWI 2022 as one of the events for the year. The main organising committee was 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 were together appointed as co-chairman; the GSM vice president, Dr Mohd Hariri Ariffin as secretary and treasurer Dr Lim Choun Sian. As the event was also in conjunction with NGC 2022, more than 10 geological themes were highlighted, with involvement from representatives from all universities offering geological subjects assigned as convenors.

To highlight Langkawi as a UNESCO Geopark, on the afternoon of the second day at the three-day event, a compulsory field excursion was organised for all participants to enjoy selected prominent geosites. The arrangement was supported by the Langkawi Research Centre (PPL) UKM. Further to that, the event was also more fieldwork-oriented with various packages of pre- or post-conference field excursions from the main island to other surroundings of Langkawi Island.

In the spirit of geoscience, there were two other geoscience events that have their own prominent branding. These are SERIES 2022 organised by UMP and RCL 2022 that is an established annual event organised by LADA; together they joined the celebration of GEOSEAXVII as an 'Olympic' congress of Geoscience.

As the Malay proverb states, a heavy burden is borne together, light is carried together, climb the hill together and go down the ravine together, a pipe shapes flowing water, consensus shapes flowing words. Much thanks to all the participants and there would have been no event of this magnitude without the extraordinary help and support of the organisers together with the Department of Mineral and Geoscience Malaysia (JMG), the Langkawi Development Authority (LADA) and the Geological Institute of Malaysia (IGM); together with the strategic partnership of Universiti

Malaysia Pahang (UMP) and Langkawi Research Center (PPL), and collaborations with UMT, UMK, UMS, USM, UTP, UM, UKM.

GSM again would like to officially record its utmost appreciation to all our generous strategic partners of exhibitors and sponsors. GSM has proven that working together for a mutual benefit is the mark of the most successful historical event: the hosting of GEOSEA XVII 2022 that was held at the Bay View Hotel Langkawi as a full physical conference and exhibition after the COVID 19 pandemic in 2019.

Publications

The GSM magazine, Warta Geologi has been given a new look since 2022 and was submitted for Scopus indexing in June 2022 and alhamdullilah, was successfully accepted in January 2023. In addition to the Scopus index, Warta Geologi is also indexed in the Malaysian Citation Index / MyCite. In March 2023, the CiteScore based on recent citation (2018-2021) updated by Scopus shows a very positive trend of ranking which is 98/128 or 23rd citation in Earth and Planetary Sciences Category.

But unfortunately, the application for indexing of the Bulletin in the Web Of Science in January 2022 was unsuccessful due to technical issues related to the e-ISSN status of the journal. Another application will be made in the near future. A detailed report will be presented in the Editor's Report.

The new GSM website was soft launched in late 2022; all currently published articles from every digital Bulletin and Warta Geologi have been uploaded to the new website, although remedial work is ongoing to ensure every article is correctly linked.

I would like to thank the Editorial Team lead 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 (to be on time) two volumes of the Bulletin and three issues of Warta Geologi a year.

GSM is currently in the progress of publishing two books: `Topi Bulat Geologi' by Dr Hariri & Dr C.S. Lim and 'Book of Fossil in Malaysia' by Dr Meor Hakif & Dr Mazlan Madon . These books are currently in the writing and data gathering stage. Hopefully, the books can be ready by next year. GSM would appreciate and encourage members to contribute in the form of ideas, time and financial sponsorship to ensure that the books will be completed on schedule.

GSM Website

The GSM website is undergoing a total revamp. It is important that the website be more interactive, dynamic and vibrant, catering to all aspects of publications, archives, manuscript submission, conference management, membership updating, payment system and promotion, as part of the GSM digitalisation program in making our geoscience resources available online.

Way Forward

The President strongly urges the members of GSM to support the society by giving comments and recommendations that could improve the management of GSM. GSM needs to be managed professionally, like an enterprise. The president welcomes Pn Athirah, our new Administration Executive who will manage key administration matters like finance, promotion, marketing, multimedia as well the re-branding of the GSM website pertaining to the online payment system, online technical papers submission, etc. that needs routine management and updating. In support of the Continuous Professional Development (CPD) agenda, GSM is being given exclusivity from Board of Geology (BOG) together with IGM, to conduct the program that provides CPD points to professional geologist (P.Geol) members. Therefore, an initiative to organise more CPD-points oriented programs either fee-charged or free will be organised as part of GSM's main agenda and responsibility to members.

Closing Remarks

Just a final remark on closing the curtains for the term of 2022/23, and my term as president and an executive council member. I have been calling myself `the fill in the blank guy' all along for almost 20 years while in the Council, and it has been the most memorable journey in my life! There have been a lot of challenges serving as treasurer to almost eight presidents, raising cash in the GSM bank from a few hundred thousand or less to alhamdullilah, a few million Ringgit. I have even been called the kedekut bendahari; but despite this we have managed to make a most challenging and bold decision about PGCE, taking it from hotel scale to become a well-known international premier Asia Geoscience conferences in KLCC; though, sadly witnessing the endgame of PGCE by GSM and being replaced with APGCE by Petronas for good.

Becoming the president of this knowledge-based organisation was unexpected, as it was never an ambition given my limited academic qualifications. Realising my handicap, I thought about how to bring the GSM to the next level, to become a more robust and relevant geoscience society for the next generation. My tenure saw the marks of a TRANSFORMATION PLANNING PROGRAM where the society underwent a refreshing transition with young geoscientists in the council in various positions. This critical planning was crucial for the survival of the GSM in the mid- to long-term. I believe our young geoscientists should be given as many opportunities and responsibilities as possible to shape the GSM with their new millennial perspective, with the guidance and in alignment with the constitution of the GSM. This led to the introduction of the GSM tagline "GSM CARES GSM PERIHITIN" which was an idea by consensus of the young during the COVID 19 pandemic and national lockdown. There was positive response when the agenda was realised in the form of CSR programs to help needy geoscience students or their community affected by geohazard tragedies. The officially endorsed GSM Student Chapter helped almost all universities with a geoscience department and subsidised most of the webinar programs that offered CPD to all its members.

In the very short period as the president, my main agenda, as an entrepreneur, was to do my best to manage and plan the uplifting and improvement of the basic infrastructure of GSM. I put all my effort into this goal with the hope for the continuation and sustainability of this society. Therefore, with this updated, refreshed rebranding and friendly technology, the website underwent a major revamp into a geoscience public domain. I really hope that it will be taken to the next level in execution or implementation by the next Council. Sincere hard and tireless work was the best recipe for our success. We proved this by raising and setting a high bar in organising the GEOSEA Langkawi 2022 to our AFGEO members.

Currently, GSM has a total of 1082 memberships in various categories and I hope the newly-elected council will serve responsibly; and come up with a well-structured promotional and outreach program to increase the membership, especially professional members.

Throughout the year, GSM together with IGM and BOG (Board of Geologists) put in a lot of effort to achieve a solid national geoscience agenda, and outreach awareness to the public on the importance of geoscience for nation building.

As the outgoing president and council member, before I remove my glove and hang up my boots and racquet, I would like to add that throughout my journey here, I have tried my level best and with pure intentions; as the famous hadith where the Prophet ṣallallāhu 'alayhi wa sallam (peace and blessings of Allāh be upon him) said: "The deeds are considered by the intentions, and a person will get the reward according to his intentions…" [Sahih Bukhari].

I reminded myself that sincerity is the key, the real purpose is to gain the pleasure of Allah subhanahu wa ta'āla (glorified and exalted be He). Everything else is a delusion! I was passionate and took seriously whatever I did: "For them who have done good is the best [reward] and extra.." [Qur'an: Chapter 10, Verse 26].

Finally, I would like to thank all the council members who together gave their fullest, volunteering to serve for these successful years together; not forgetting my warmest appreciation to the outgoing council members for their contributions as well as to all members for their ideas and support. Thanks to all the organising chairs for the various events, working group chairs, student chapters committees, and regional representatives on your contribution in making all our events a success. Last but not least, a big thank you and salute to the one and only secretariat member, Ms Anna Lee; and welcome to the newly appointed admin executive Pn Athirah; all the best for another excellent year of contributions in managing GSM.

P.Geol AHMAD NIZAM HASAN, F.I.G.M, FGS (London)
President 2022/2023
Geological Society of Malaysia (GSM)

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 2022/2023.

The Structure of the Society

The Society's stakeholders are the members of the Society led by an elected Council. The Council's functions are to set directions to promote the advancement of geosciences, collaborate with other geological governing bodies for CPD, endorse activities and provide guidance for the execution of the activities of the Society. The Council is supported by 16 Working Groups, and an Editorial Committee (formerly known as the Editorial Group).

There has been no regional representative as of the past two (2) terms. The Working Groups were increased from 10 to 16 in the year 2022, details to be tabled in a subsequent section.

The Council

The Council for the Geological Society of Malaysia for 2022/2023 session resumed their office after the 55th AGM in April 2021. Upon the closing of nominations, only single nominations were received respectively for the positions of president, vice president, secretary, treasurer, assistant secretary, editor and councillors.

The GSM Council line-up for 2022/2023 are:

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

Councillors 2021-2023:
- Abdull Halim bin Abdul
- Ahmad Zulqurnain bin Ghazali
- Nor Shahidah bt. Mohd. Nazer (UKM)
- Tan Boon Kong

Councillors 2022-2024:
- Abdul Halim Abdul Latiff (UTP)
- Amie Norsyazan Amir (IHS)
- Joy Jacqueline Pereira (UKM)
- Nur Iskandar Taib (UM)

Council Meetings

During the 2022/2023 session, with the post COVID-19 and challenging geographical situation (Australia & UK), a virtual meeting was preferred and held on various occasions throughout the term.

The Council met virtually 6 times on these dates:

i. May 13th 2022
ii. July 22nd 2022
iii. September 23rd 2022
iv. November 11th 2022
v. January 27th 2023
vi. March 24th 2023

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

Attendance of Council Members at Council Meetings:

	Name	1 (Zoom)	2 (Zoom)	3 (Zoom)	4 (Zoom)	5 (Zoom)	6 (Zoom)	Total
1	Mr. Ahmad Nizam Hasan	/	/	/	/	/	/	6 / 6
2	Dr. Mohd Hariri Ariffin	/	0	/	/	/	/	5 / 6
3	Mr. Abd Rasid Jaapar	0	0	0	0	0	0	0 / 6
4	Ms. Farah Fazulah	/	/	/	/	/	/	6 / 6
5	Ms. Norazianti Asmari	/	0	0	/	/	/	4 / 6
6	Dr. Lim Choun Sian	/	/	/	/	0	/	5 / 6
7	Dr. Wan Hasiah Abdullah	/	/	/	0	/	/	5 / 6
8	Abdull Halim bin Abdul	/	/	/	/	0	/	6 / 6
9	Ahmad Zulqarnain Ghazali	/	0	/	0	/	0	3 / 6
10	Tan Boon Kong	/	/	/	/	/	/	6 / 6
11	Nor Shahidah Mohd Nazer	/	/	/	0	0	/	4/ 6
12	Abdul Halim Abdul Latiff	/	0	0	/	/	0	3 / 6
13	Amie Norsyazan Amir	0	/	/	0	/	0	3 / 6
14	Joy Jacqueline Pereira	/	/	/	/	/	/	6 / 6
15	Nur Iskandar Taib	/	/	/	/	/	/	6 / 6

Six (6) online meetings were conducted via Zoom Meeting and none was attempted via physical face to face. In contrast to 2021/22, this term's, overall attendance was a rather mix bag of consistency or minor absence among the council member. The opening of all industries post pandemic, business travels and conferences has impacted some members' attendance.

There was a small group meeting to discuss arising matters between the council meetings. Mainly to get alignment and forging the way forward for website vendor discussion, GEOSEA and AGM preparation. This enables more efficiency for decision making without waiting for the Council Meeting which happens once in two months.

Working Groups

The Working Groups (WG) and the Chairs for the session were appointed during the Council Meeting as follows;

	Working Group	Chair Person & support person
1	**Engineering Geology**	**Chair: Mr. Tan Boon Kong** Ahmad Nizam, Ahmad Zulqarnain, Dr. Abdull Halim, Dr. Shahidah
2	**Hydrogeology**	**Chair : En Ismail Tawnie**
3	**Promotion of Geoscience, Social Media & Digital Content**	**Chair: Azianti** Ahmad Zulqarnain
4	**Economic Geology & Mineral Resources**	**Chair: Dr. Zakaria Endut (USM)**
5	**Regional Geology**	**Chair: Dr. Iskandar** Dr. Meor Hakif
6	**Geophysics**	**Chair: Dr. Halim Latiff**
7	**Petroleum Geoscience**	**Chair: Suhaileen Shahar** Amie Amir

8	**Young Geologist & Student outreach**	**Chair: Dr. Nor Shahidah**
9	**GSM-IGM Joint Committee**	**Chair: Dr. Hariri Ariffin & Ahmad Nizam Hassan**
10	**IT & Website**	**Chair: Dr. Lim CS**
11	**GSM-IGM Flagship on Geoscience to Action for Disaster Risk Reduction (G2A-4DRR)**	**Chair: Prof Joy Pereira (UKM)** Dr. Nurfashareena Mohamad & Dr. Ng Tham Fatt IGM Liaison: Ling Nan Ley
12	**CPD Liason**	**Chair: Norazianti**
13	**Membership Database**	**Chair: Anna & Dr. Iskandar**
14	**Quarternary & Marine Geology**	**Chair: Mohd Shaufi Sukiman** Abdullah Sulaiman
15	**GeoHeritage**	**Chair: Dr. Nursufiah Sulaiman**
16	**Karst & Caves**	**Chair: Dr. Ros Fatihah**

The guest chair consists of expertise from the industry and academic representative along with current council members. This expands the support and wider reach of support within the GSM members.

To welcome the guest Chair working group, a virtual meetup with president was held on 24th June 2022. Scope of work, budgets & planned activities timeline was advised to all, with a gentle reminder to ensure the activities held to be followed by write ups for Warta submission.

Membership

As at 31st December 2022, the total number of members in the Society stands at 1086; this has increased from 1057 as of 2021. The increase is mainly from Associate and Life member categories and there has been a slight drop or decrease in student category, probably attributing to lesser student enrolment. The table below presents the breakdown in membership categories and their geographical breakdown.

Breakdown of Membership

COUNTRY	Hon	Life	Full	Assoc.	Student	Inst.	Total 2022	Total 2021	Total 2020	Total 2019
Malaysia	12	476	119	10	366	-	983	983	1013	672
Australia	1	22	-	-	-	-	23	23	18	22
Bangladesh	-	2	-	-	-	-	2	2	1	2
Brunei	-	2	-	-	-	-	2	2	2	2
Canada	-	4	-	-	-	-	4	4	3	2
China	-	1	-	-	-	-	1	1	1	1
Europe	-	15	-	-	-	1	16	16	17	15
Hong Kong	-	1	-	-	-	-	1	1	1	1
India	-	1	-	-	-	-	1	1	1	1
Indonesia	-	11	-	-	-	-	11	11	8	10
Japan	-	4	-	-	-	-	4	4	3	3
Libya	-	3	-	-	-	-	3	3	3	3
New Zealand	-	1	-	-	-	-	1	1	2	2
Philliphines	-	4	-	-	-	-	4	4	2	1

Qatar	-	1	-	-	-	-	1	1	1	0
Singapore	-	10	-	-	-	-	10	10	9	9
Thailand	-	2	-	-	-	-	2	2	2	3
USA	-	17	-	-	-	-	17	17	12	12
Total 2022	**13**	**577**	**119**	**10**	**366**	**1**	**1086**			
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**

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

At every council meeting, the new membership submission is vetted through the roundtable. However since the virtual meeting, the chair working group for membership (Dr. Iskandar) has been the proxy in checking the membership forms at the GSM Office, University Malaya.

Project, Agreement, Secretariat and Working Groups Activities

Research Project:

The project on "Promotion of Social Entrepreneurship in Disaster Risk Reduction to Build Community Resilience" commenced on 1 September 2019, funded by the International Development Research Centre (IDRC) for a duration of three years. The general objective of the Project is to foster long-term community climate resilience in Malaysia and Cambodia by empowering young female social entrepreneurs to develop their own disaster resilience plans. Led by Universiti Kebangsaan Malaysia's Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM), with Geological Society of Malaysia (GSM) as the key partners and Malaysian DRR Service Organisation (MDRRSO).

The 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).

Joint Committee:

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

- 29 November 2022
- 24 March 2023

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.

Activities

Overall, there have been active organisers, and participation from all the GSM fraternity, be it the working group and the members. Online events have gained so much traction over the past few years, enabling almost weekly events to be held by the society. Facebook live, zoom meetings and webinars have been the main contributors for the events.

The society had successfully organised its GEOSEA in Langkawi in October 2022, with details to be shared by the organising committee.

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)

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

Bil	Date	Topic / Activity	Speaker	Moderator
1	18/05/2022	Technical Talk- Hillside Development Management & amp; Case Study.	Ir. Vincent Wong Khien Ngie (Consultant)	
2	22/06/2022	Technical Talk- Aplikasi Geospatial dan Penderiaan Jauh Dalam Kajian Kejadian Bencana Geologi Tanah Runtuh dan Aliran Debris Di Gunung Jerai, Kedah.	P. Geol. Wan Salmi Bin Wan Harun (JMG)	
3	24-26/6/2022	GEOLOGI MALAYSIA "BOOTCAMP"	Keynote Speaker (Granite Of Peninsular Malaysia) Prof. Dr. Azman Bin Abd Ghani Department Of Geology, University Malaya (UM)	
			Presentation Of Geology Of Central Region Assoc. Prof. Dr. Habibah Jamil, Jabatan Sains Bumi Dan Alam Sekitar, Universiti Kebangsaan Malaysia (UKM)	
			Presentation Of Geological Evolution Of The Southern Peninsular Malaysia Dr. Choong Chee Meng, Geoscience Department, University Teknologi Petronas (UTP)	
			Presentation Of Geology Of Eastern Region Of Peninsular Malaysia Tn Haji Askury Abd Kadir Chief Executive Officer, Geodream Sdn Bhd	
			Presentation Of Geology Of Northern Region Associate Prof. Dr. Meor Hakif Bin Amir Hassan Department Of Geology, University Malaya (UM)	
4	29/06/2022	Webinar Siri Pendidikan Bencana Alam NDRC (Siri 3/2022): Panduan Reka Bentuk Gempa Bumi Untuk Bangunan	Prof. Ir. Dr. Azlan Adnan	Ts. Dr. Noor Sheena Herayani Harith
5	5/07/2022	Future of the Tin Industry in Malaysia	Dato' Sia Hok Kiang Executive Chairman, Malaco Mining, Sdn Bhd Ms Arfidea Dwi Saraswati, Partner, AKSET Law Firm Jakarta, Indonesia Mr Rocky Dimaculangan Vice President for Communications and National Coordinator for "Towards Sustainable Mining", Chamber of Mines of the Philippines The Philippines Mr James Willoughby Market Analyst, International Tin Association London, United Kingdom	Mr Teoh Lay Hock, Technical Consultant, Malaysian Chamber of Mines
6	20/07/2022	Technical Talk- Why failures occur at soil cuts and natural ground slopes in the granitic bedrock areas of Malaysia?	P. Geol. Dr, JK Raj (Consultant)	
7	20/07/2022	Pembangunan Ciri Geoteknik CPT Menggunakan Kaedah Pemodelan Geoteknik SSPT 2D.	P. Geol. Dr. Abdull Halim bin Abdul CEO Ground Wave SSPT Sdn Bhd	
8	26/07/2022	CERAMAH TEKNIK GEOLOGI SIRI 3/2022 Hypogenic KARST in Peninsular Malaysia - Implications for active tectonics. Seashells on the mountaintop - Holocene waters pout sediments located at high elevation (Langkawi Islands, Malaysia?	Prof. Dr. Miklos Kazmer Head Mobile Earth Lab Eotvos University, Budapest, Hungary	Prof. Emeritus Dr. Mohd. Shafeea Leman

9	24-26/8/2022	Seminar Bencana Alam 2022: Memperkasakan Kedayatahanan Bencana Alam Terhadap Perubahan Iklim Era Pasca COVID-19		
10	26/08/2022	Webinar on Geocareer Talk 2.0	En. Ahmad Nizam bin Hasan Presiden Persatuan Geologi Malaysia En. Abdul Rasid bin Jaapar Presiden Institut Geologi Malaysia (IGM Tuan Rusli bin Tuan Mohamed, Pengarah Jabatan Mineral dan Geosains Selangor/ Wilayah Persekutuan	
11	29/08/2022	Technical Talk: Rainfall Induced Landslides in Malaysia	Ir. Dr. Mohd Asbi Othman (Asbi & Associates)	
12	21/09/2022	Technical Talk: Usefulness of Cut Slope Stability Analysis- Should Greater Emphasis be on Risk Management?	Ir. Dr. Toh Cheng Teik (Dr. Toh Associates)	
13	22-23/9/2022	Multiphysics Imaging: G&G Data Integration for Resource & Environmental Investigations	Dr. Maxwell Azuka Meju	Suhaileen Shahar (PETRONAS)
14	20/10/2022	Webinar Siri Pendidikan Awam Bencana Alam NDRC Siri 4/2022: Perubahan Iklim dan Pemanasan Global: Memahami bukti-bukti saintifik masa lampau perubahan sistem iklim dunia dan unjuran masa hadapan.	Prof. Dr. Fredolin Tangang	Prof. Madya Dr. Justin Sentian
15	17-21/10/2022	XVII GEOSEA 2022 Langkawi Malaysia		
16	27/10/2022	Webinar Siri Pendidikan Awam Bencana Alam NDRC Siri 5/2022: Pilihan adaptasi perubahan iklim untuk komuniti pesisir pantai dan pihak berkuasa tempatan di Sabah.	Prof. Madya Ts. Dr. Ejria Saleh	Prof. Madya Ts. Gs. Dr. Carolyn Melissa Payus
17	9/11/2022	Advances in Geophysics Webinar Series 01- Electrical Imaging and Geophysical Method for Subsurface Mapping	Prof Dr Mohd Nawawi Mohd Nordin (Universiti Sains Malaysia)	Nurul Fatin Izzatie binti Salman (UTP)
18	9/11/2022	Pembangunan Bahan Komposit Nano Valensi Sifar (nZVI) dan Potensi Rawatan Terhadap Pewarna Sintetik dan Logam Berat di Persekitaran	Dr. Nur 'Aishah Zarime Penyelidik Post-Doctoral Universiti Tenaga Nasional (UNITEN)	Dr. Norsyafina binti Roslan, Pensyarah Jabatan Sains Bumi dan Alam Sekitar, FST
19	16/11/2022	Technical Talk- Geological Assessment on Rock Slope and Limestone Hill	P. Geol. Philip Tiong Chong Ngu (G & P)	En. Ahmad Nizam bin Hasan (GSM)
20	23/11/2022	Advances in Geophysics Webinar Series 02- Machine Learning Application in Seismic Interpretation	Assoc. Prof. Dr Mohamed Elsaadany (Universiti Teknologi PETRONAS)	Nurul Fatin Izzatie binti Salman (UTP)
21	2/12/2022	Advances in Economic Geology Webinar Series- Hydrothermal fluid and Significant in Exploration and Ore Genesis	Dr. Charles Makoundi	Dr Zakaria Endut (GSM)
22	7/12/2022	Advances in Geophysics Webinar Series 03- Radio-echo Sounding (RES) Profiling and Numerical Modelling	Gs. Dr Muhammad Hafeez Jeofry (Universiti Malaysia Terengganu)	Nurul Fatin Izzatie binti Salman (UTP)
23	14/12/2022	Advances in Geophysics Webinar Series 04- UKM Geophysics: Past, Present & Future	Associate Professor Ts. Dr Mohd Hariri Arifin (Universiti Kebangsaan Malaysia)	Nurul Fatin Izzatie binti Salman (UTP)
24	21/12/2022	Ground Evaluation & Earthworks Design for Train Depot in Hilly Area	Mr. Vigneshwaran Karunanidee & Pn. Nur Amanina Mazlan (MRTC)	
25	21/12/2022	Advances in Geophysics Webinar Series 05- Geophysical Monitoring of Subsurface & Near-Surface: Challenge & Way Forward	Ts. Dr. Hardianshah Bin Saleh, P.Geol. (Universiti Malaysia Sabah) Nurul Fatin Izzatie binti Salman (UTP)	Nurul Fatin Izzatie binti Salma (UTP)

26	23/12/2022	Geoscience for Building Disaster Resilience	Geoscience to Build Community Resilience: The IDRC Initiative, Professor Joy Jacqueline Pereira, P.Geol. Terminologies in Disaster Risk Reduction, Dr Lim Choun Sian, P.Geol. Geoscience Terminologies & Multi-hazard Assessments, Lead Discussant: Mr. Ahmad Nizam bin Hasan, P.Geol. Geoscience Inputs for Development of Area Business Continuity Plans, Mr. Mohd Faruq Syahmi Md Aripin, P.Geol. Advancing Geoscience for Area Business Continuity Plans, Lead Discussant: Mr. Abd Rasid Jaapar, P.Geol. Geoscience Communication and Community Awareness Ms. Azianti Asmari, P.Geol. Advancing Geoscience for Building Disaster Resilience, Lead Discussant Professor Joy Jacqueline Pereira, P.Geol.	
27	11/01/2023	Advances in Geophysics Webinar Series 06- Geological Aspects in Earthquake Engineering	Professor Ir. Dr Azlan bin Adnan (Universiti Teknologi Malaysia)	Nurul Fatin Izzatie binti Salman (UTP)
28	19/01/2023	Geology Technical Talk Series 01/2023- Slope Hydrogeology	Professor Jimmy Jiao Department of Earth Sciences, The University of Hong Kong	Dr. Norsyafina binti Roslan, Pensyarah Jabatan Sains Bumi dan Alam Sekitar, FST
29	25/01/2023	Advances in Geophysics Webinar Series 07- Understanding Earthquake Seismology	Professor Dr Amin Esmail Khalil (Helwan University, Egypt)	Nurul Fatin Izzatie binti Salman (UTP)
30	26/01/2023	Geology Technical Talk Series 02/2023- Perbincangan Intelek: Perspektif Geologi Kejuruteraan Terhadap Kejadian Terkini Tanah Runtuh Batang Kali	Tuan Rusli bin Tuan Mohamed, Pengarah Jabatan Mineral dan Geosains Selangor/ Wilayah Persekutuan En. Abdul Rasid bin Jaapar Presiden Institut Geologi Malaysia (IGM) Dr. Nor Shahidah binti Mohd. Nazer Pensyarah Jabatan Sains Bumi dan Alam Sekitar, FST	En. Ahmad Nizam bin Hasan Presiden Persatuan Geologi Malaysia
31	31/01/2023	British Geological Survey: Advances in Mineral Development & Landslide Mapping	Dr. Tom Bide BGS Mineral Resource Geologist Dr. Clive Mitchell BGS Industrial Minerals Geologist Dr. Alessandro Novellino BGS Remote Sensing Geoscientist	
32	31/01/2023	Seminar Geologi Muda 2023 (SGM)	Dr. Nor Shahidah binti Mohd. Nazer	
33	8/02/2023	Advances in Geophysics Webinar Series 08- New Ocean Bottom Seismometer Exploration for Crustal Imaging in Arctic Ocean	Dr Xiongwei Niu (Second Institute of Oceanography, MNR, China)	Nurul Fatin Izzatie binti Salman (UTP)
34	15/02/2023	Technical Talk- Engineering Geological Challenges in Urban Development: From Conventional to Unconventional Approach.	P. Geol. Tuan Haji Ahmad Nizam Hasan (President, GSM; Geosolution Resources)	

35	28/02/2022	IGCP 667 World Map of Orogen Dissemination Activity in Malaysia	Dr Siti Nur Fathiyah bt Jamaludin, Head of IGCP667 in Malaysia Universiti Teknologi PETRONAS Prof. Dr. Manuel Pubellier, co-PI of IGCP667, CGMW President Dr Camille Francois, co-PI of IGCP667, CGMW Dr Benjamin Sautter World5 M, DDE CGMW	
36	1/03/2023	Advances in Geophysics Webinar Series 09- Groundwater Investigation: Fundamental & Application	Dr Stefan Herwig GÖdeke (Universiti Brunei Darussalam)	Nurul Fatin Izzatie binti Salman (UTP)
37	11/03/2023	Field excursion at Batu Caves	Dr. RosFatihah& MCKC – Malaysian Cave and Karst Conservancy	
38	11-12/3/2023	Geophysical Workshop Series 1: Seismic refraction method.	Prof Dr Rosli Saad, Honorary Professor (USM)	Assoc. Prof. Dr. Nordiana bt Mohd Muztaza (USM)
39	15/03/2023	Characterizing Weathering Profiles in Peninsular Malaysia.	P. Geol. Dr John Kuna Raj (Consultant)	En Ahmad Nizam bin Hasan
40	15/03/2023	Advances in Geophysics Webinar Series 10- Earthquakes and Geothermal Resources of Malay Peninsula	Associate Professor Dr. Helmut Dürrast Prince of Songkla University	Nurul Fatin Izzatie binti Salman (UTP)
41	22/03/2023	Geology Technical Talk Series 03/2023- Potensi Ekonomi Sedimen Kuaternar dan Dampak Alam Sekitar	Prof Madya Dr Habibah bt Hj Jamil	Dr. Norsyafina binti Roslan Pensyarah Jabatan Sains Bumi dan Alam Sekitar, FST
42	12/04/2023	Geology Technical Talk Series 04/2023- Aplikasi Geosains dalam Kajian Kapal Karam Bidong, Terengganu, Malaysia	Prof. Madya. Dr. Hasrizal bin Shaari Director Centre of Research and Field Services (CRaFS), UMT	
43	27/04/2023	Technical Talk: When Hillside Collapsed – Story of Landslides in Malaysia	P. Geol. En Abd. Rasid Jaapar President IGM, GMT Group	
44	28/04/2023	PRE-AGM Technical Talk : Classification of Geothermal Systems	Dr. Arnout J. Everts	

• For the Student's Geological Club Collaboration; AAPG Student Chapter of University of Malaya, UMK, UMS etc.

Acknowledgement

The Society would like to record its utmost appreciation to all the individuals and organisations in supporting the physical presence and virtual activities. Special mention must be made about the tremendous support by the Head and staff of the Geology Department, University of Malaya especially for the use of its premises for most of the Society's meetings and activities. The continued cooperation and support extended by JMG, PETRONAS, BOG, UKM, IDRC, UMS, UTP, IGM and ANCST.

I would also like to thank the external support of guest chair working group, and speakers who volunteered for the activities and talks under the GSM umbrella. The unwavering support of soon departing Ms. Anna Lee and Ms Wan Aida of the administration of GSM is also very much appreciated. I would also like to welcome Pn. Athirah and hope for a seamless transition into her role with the guidance of Anna.

Last but not least, the Council also wishes to record its appreciation to all GSM members for their advice, and special mention to Dr Lim Choun Sian (previous secretary, currently treasurer) on your guidance and support throughout the session.

I am grateful to the Society for the opportunity given to serve since 2018. From being a councillor, to assistant secretary and to become the secretary. This is my last year of service to the GSM Council and I sincerely apologise for any shortcomings.

FARAH FAZULAH ABDULLAH
Secretary 2022/2023
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 2022 (Bulletin only)

Publications	Sales 2022	Stock remaining by end of 2022	Remarks
Bulletin 1	**Out of Stock**		
Bulletin 2	0	59	
Bulletin 3	0	85	
Bulletin 4	0	69	
Bulletin 5	**Out of Stock**		
Bulletin 6	0	312	
Bulletin 7	0	216	
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	0	7	
Bulletin 14	**Out of Stock**		
Bulletin 15	0	4	
Bulletin 16	**Out of Stock**		
Bulletin 17	**Out of Stock**		
Bulletin 18	**Out of Stock**		
Bulletin 19	1	314	
Bulletin 20	1	284	
Bulletin 21	2	74	
Bulletin 22	1	153	
Bulletin 23	0	154	
Bulletin 24	0	324	
Bulletin 25	0	111	
Bulletin 26	0	137	
Bulletin 27	**Out of Stock**		
Bulletin 28	0	90	
Bulletin 29	0	65	
Bulletin 30	0	359	

Publications	Sales 2022	Stock remaining by end of 2022	Remarks
Bulletin 31	0	54	
Bulletin 32	0	38	
Bulletin 33	0	92	
Bulletin 34	0	20	
Bulletin 35	**Out of Stock**		
Bulletin 36	0	49	
Bulletin 37	0	188	
Bulletin 38	0	309	
Bulletin 39	**Out of Stock**		
Bulletin 40	0	27	
Bulletin 41	0	2	
Bulletin 42	**Out of Stock**		
Bulletin 43	0	53	
Bulletin 44	**Out of Stock**		
Bulletin 45	0	3	
Bulletin 46	0	3	
Bulletin 47	0	3	
Bulletin 48	0	15	
Bulletin 49	0	202	
Bulletin 50	0	317	
Bulletin 51	0	156	
Bulletin 52	0	180	
Bulletin 53	0	213	
Bulletin 54	0	291	
Bulletin 55	0	409	
Bulletin 56	0	138	
Bulletin 57	0	195	
Bulletin 58	0	16	
Bulletin 59	0	11	
Bulletin 60	0	19	
Bulletin 61	0	111	
Bulletin 62	0	125	
Bulletin 63	0	20	
Bulletin 64	0	108	
Bulletin 65	0	95	
Bulletin 66	0	346	
E-Bulletin 67	0	196	
E-Bulletin 68	0	5	
Bulletin 69	0	16	

Bulletin 70	1	20	
Bulletin 71	1	32	
Bulletin 72	2	31	
Bulletin 73	13	20	
Bulletin 74	12	36	

Sales and stock of publications for 2022 (All other GSM publication)

Other Publications	Sales 2020	Stock remaining by end of 2020
Proceeding AGC 2000	**Out of Stock**	
Proceeding AGC 2001	0	77
Malaysian Stratigraphic guide	**Out of Stock**	
Lexicon of stratigraphy	0	14
Stratigraphic correlation	**Out of Stock**	
Rocks poster	**Out of Stock**	
Geology of Borneo (CD)	**Out of Stock**	
Geology of Borneo (Map)	0	677
Geol. Evolution of SEA	33	307
Geology of P. Malaysia	108	1296

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
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 & Geoscience Department Malaysia, Headquarters	Malaysia
19	Minerals and Geoscience Department Malaysia, Ipoh	Malaysia
20	Minerals and Geoscience Department Malaysia, Kuching	Malaysia
21	Minerals & 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 2022/2023
Geological Society of Malaysia

c) Editor's Report

In 2022, three issues of Warta Geologi volume 48 were published (in April, August and December), while two volumes of the GSM Bulletin (Volume 73 and 74) were published in May and November, respectively. The publication status is currently up to date.

The Society is grateful to all the 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. A list of all reviewers for Bulletin and Warta Geologi during 2022 submissions, regardless of whether they were eventually accepted or declined, is provided in Warta Geologi volume 49(1).

A new GSM website was launched in late 2022. Following this, the online publication sites for the Bulletin and Warta Geologi have also changed, but the online manuscript submission site for the Bulletin via Open Journal System (OJS) remains unchanged. All currently published articles from every Bulletin and Warta Geologi have been uploaded to the new website, although remedial work is ongoing to ensure every article is correctly linked.

Indexing

Warta Geologi was submitted for Scopus indexing in June 2022 and was successfully accepted in January 2023. In addition to the Scopus index, Warta Geologi is also indexed in the Malaysian Citation Index / MyCite.

The application in January 2022 for indexing of the Bulletin in the Web of Science was unsuccessful due to a technical issue related to the e-ISSN status of the journal. Another application will be made in the near future.

Impact factor of the Bulletin

The CiteScore based on recent citation (2018-2021) updated by Scopus on 5/03/2023 is as shown below:

I would like to thank all the editorial committee members and council members for their support during the editorial process, especially Associate Prof. Dr. Ng Tham Fatt, Ms Wan Aida Wan Zahari and Ms Anna Lee. I am grateful to the Society for the opportunity given to serve since 2016. This is my last year of service as the Editor and I sincerely apologise for any shortcomings.

WAN HASIAH ABDULLAH
Editor 2022/2023
Geological Society of Malaysia

d) Treasurer's Report

For the Financial Year 2022, the society posted a small deficit of RM 175 compared to a net surplus of RM 42,806 in year 2021 in its General Fund.

Total income decreased from RM 171,680 in 2021 to RM 165,309 in 2022. The previous year 2021 reflected higher income was partly also because of a withdrawal of RM 50,000 from Endowment Fund into General Fund while there was no withdrawal from Endowment Fund as in this financial year.

Total operating expenditure increased from RM 84,002 (year 2021) to RM 120,359 (year 2022). The year 2022 posted higher expenditures due two major activities:

- GSM hosted the GEOSEA Congress/National Geoscience Conference in October 2022 in Langkawi; and
- The development of GSM website, involving revamp of overall interface and indexing requirement to support online publication compliance.

Sales of publication in the form of royalty shows further increases since last few years. Sales of publications was RM 72,165 (year 2022), compared to RM 48,651 (year 2021) and RM 41,060 (year 2020).

Membership subscription increased slightly from RM 19,584 (year 2021) to RM 20,449 (year 2022).

Further decline in interest rates in fixed deposits reduced the income from bank interest, from RM 51,639 (year 2021) to RM 46,610 (year 2022). There is also an increase in postage to RM1,617 from RM 433 (year 2021).

Printing of Warta Geologi and Bulletin shows a slight decrease in cost. GSM spent RM 7,150 and RM 10,000 respectively as compared to RM 8,450 and RM 10,000 in the previous year 2021.

A note on the balances in the GSM General Fund; total in Fixed Deposits RM 537,701 and Current Account (CA) RM 561,194. Within the sum of the CA, the 42% belong to the active projects (IDRC, Formation Evaluation Society of Malaysia (FESM) and AAPG-UM Student Chapter).

The Treasurer would like to express a great appreciation to the donors, sponsors and all parties on their contributions and support throughout the year. Credit 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 on her contribution managing the accounts and many miscellaneous matters throughout the year.

LIM CHOUN SIAN
Treasurer 2022/2023
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 2022

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

THE CORPORATE INFORMATION FOR 2022 / 2023

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)
	:	Nor Shahidah Bt. Mohd Nazer
	:	Ahmad Zulqurnain Bin Ghazali
	:	Abdul Halim Bin Abdul
	:	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 Office	:	c/o Department of Geology, University of Malaya, 50603 Kuala Lumpur.
Bankers	:	United Overseas Bank (Malaysia) Berhad
	:	Standard Chartered Bank

PERSATUAN GEOLOGI MALAYSIA
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FINANCIAL STATEMENTS
31 DECEMBER 2022

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PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
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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 5 to 16 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 2022, and of the financial performance and cash flows of the Society for the year then ended.

Signed on behalf of the Council: 04 APR 2023

Ahmad Nizam Hasan
President

Lim Choun Sian
Treasurer

Dated: 23/03/2023

Kuala Lumpur

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 5 to 16 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

04 APR 2023

Lim Choun Sian

Before me:

Kuala Lumpur

PESURUHJAYA SUMPAH
W 465
KAPT (B) JASNI BIN YUSOFF
01 JAN 2023 - 31 DIS 20[illegible]
MALAYSIA

Lot 1.08, Tingkat 1,
Bangunan KWSP, Jln Raja Laut,
50350 Kuala Lumpur.
Tel: 019-6680745

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

No. 5-3, Jalan 1/64A,
Kompleks Udarama, Off Jalan Ipoh,
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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 2022, the statement of comprehensive income 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 5 to 16.

In our opinion, the accompanying financial statements give a true and fair view of the financial position of the Society as at 31 December 2022, 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.

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.

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

PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)
(Society No: PPM-001-14-10011967)
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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.

- 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.

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

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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
01179/09/2024 (J)
CHARTERED ACCOUNTANT

Kuala Lumpur
Dated: 04 APR 2023

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PERSATUAN GEOLOGI MALAYSIA
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STATEMENT OF FINANCIAL POSITION
As at 31 December 2022

	Note	2022 RM	2021 RM
FUND ACCOUNTS			
GENERAL FUND	4	859,290	859,465
ENDOWMENT FUND	5	1,982,502	1,944,987
STUDENT LOAN FUND		1,755	1,755
YOUNG GEOSCIENTIST AWARD FUND		3,143	3,143
		2,846,690	2,809,350
Represented by:			
NON-CURRENT ASSETS			
PROPERTY, PLANT AND EQUIPMENT	6	8,611	6,822
CURRENT ASSETS			
Deposits		-	600
Fixed deposits with licensed bank	7	2,379,701	2,379,701
Cash and bank balances		701,696	767,981
		3,081,397	3,148,282
CURRENT LIABILITIES			
Other payables and accrued expenses	8	241,789	343,725
Current tax liabilities		1,529	2,029
		243,318	345,754
NET CURRENT ASSETS		2,838,079	2,802,528
		2,846,690	2,809,350

The annexed notes form an integral part of the financial statements.

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PERSATUAN GEOLOGI MALAYSIA
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STATEMENT OF COMPREHENSIVE INCOME
For the year ended 31 December 2022

	Note	2022	2021
		RM	RM
INCOME			
Sundry income	9	118,699	120,041
Time deposit interest		46,610	51,639
		165,309	171,680
EXPENDITURE			
Administrative and operating expenses	10	120,359	84,002
Surplus before taxation		44,950	87,678
Tax expense	11	(7,610)	(1,979)
Surplus for the financial year		37,340	85,699
Represented By:			
General fund		(175)	42,806
Endowment fund		37,515	42,893
		37,340	85,699

The annexed notes form an integral part of the financial statements.

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PERSATUAN GEOLOGI MALAYSIA
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STATEMENT OF CHANGES IN FUND
For the year ended 31 December 2022

	Endowment Fund RM	General Fund RM	Total RM
At 1 January 2021	1,902,094	816,659	2,718,753
Surplus of income over expenditure for the year	42,893	42,806	85,699
At 31 December 2021	1,944,987	859,465	2,804,452
Surplus of income over expenditure for the year	37,515	(175)	37,340
At 31 December 2022	1,982,502	859,290	2,841,792

The accompanying notes are an integral part of the financial statements

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PERSATUAN GEOLOGI MALAYSIA
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STATEMENT OF CASH FLOWS
For the year ended 31 December 2022

	2022 RM	2021 RM
Cash flows from operating activities		
Surplus of income over expenditure for the year	44,950	87,678
Adjustments for:-		
Depreciation on property, plant & equipment	1,710	1,214
Depreciation on property, plant and equipment overprovided in prior year	-	(1,085)
Interest income	(46,610)	(51,639)
Surplus before working capital changes	50	36,168
Decrease in receivables	600	-
Decrease in other payables	(101,936)	(60,869)
Cash used in operations	(101,286)	(24,701)
Tax paid	(8,110)	(81)
Interest income	46,610	51,639
Net cash (used in) / generated from operating activities	(62,786)	26,857
Cash flows from investing activities		
Purchase of property, plant and equipment	(3,499)	(2,990)
Net cash used in investing activities	(3,499)	(2,990)
Net (decrease) / increase in cash and cash equivalents	(66,285)	23,867
Cash and cash equivalents at beginning of the year	3,147,682	3,123,815
Cash and cash equivalents at end of the year	3,081,397	3,147,682

	2022 RM	2021 RM
Cash and cash equivalents comprised of:		
Deposits held with licensed banks	2,379,701	2,379,701
Cash at bank	701,696	767,954
Cash in hand	-	27
	3,081,397	3,147,682

The accompanying notes are an integral part of the financial statements

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PERSATUAN GEOLOGI MALAYSIA
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NOTES TO THE FINANCIAL STATEMENTS –31 DECEMBER 2022

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 Board Committee on 04 APR 2023

2. BASIS OF PREPARATION

(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) Use of 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.

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3. SUMMARY OF ACCOUNTING POLICIES

(a) Plant and equipment and depreciation

All items of plant and equipment are initially recorded at cost. The cost of an item of 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, 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 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 profit or loss 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.

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 the income statement. Impairment losses recognised in respect of cash-generating units are allocated to reduce the carrying amounts of cash generating unit 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 profit or loss 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 (including transaction costs except in the initial measurement of a financial asset or financial liability that is measured at fair value through profit or loss) unless the arrangement constitutes, in effect, a financing transaction. If the 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.

(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 profit or loss.

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.

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(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 profit or loss.

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 profit or loss.

(d) Revenue Recognition

(i) Membership subscription is payable annually at the beginning of the financial year and is recognised on receipt basis.

(ii) Interest earned from time deposit placements are recognized on time proportionate basis.

(iii) Sale 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.

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4. GENERAL FUND

	2022 RM	2021 RM
At 1 January	859,465	816,659
(Deficit) / surplus for the year	(175)	42,806
At 31 December	859,290	859,465

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

5. ENDOWMENT FUND

	2022 RM	2021 RM
At 1 January	1,944,987	1,902,094
Surplus for the year	37,515	42,893
At 31 December	1,982,502	1,944,987

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

6. PLANT AND EQUIPMENT

	Information technology equipment	Office equipment	Total
	RM	RM	RM
Cost			
At 1 January 2022	8,225	18,826	27,051
Additions	3,499	-	3,499
Disposal and deletion	-	-	-
At 31 December 2022	11,724	18,826	30,550
Accumulated depreciation and impairment losses			
At 1 January 2022	4,941	15,288	20,229
Charge for the year	1,356	354	1,710
Disposal and deletion	-	-	-
At 31 December 2022	6,297	15,642	21,939
Carrying amounts at 1 January 2022	3,284	3,538	6,822
Carrying amounts at 1 December 2022	5,427	3,184	8,611

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7. TIME DEPOSITS WITH LICENSED BANKS

	2022 RM	2021 RM
General fund	537,701	537,701
Endowment fund	1,842,000	1,842,000
	2,379,701	2,379,701

The time deposits with licensed banks have an average maturity of between 3 to 15 months (2021: 3 to 15 months). Interest rates for the deposits ranged from 1.60% to 2.00% (2021: 1.55% to 2.50%) per annum.

8. OTHER PAYABLES AND ACCRUED EXPENSES

	2022 RM	2021 RM
Other payables	239,789	341,725
Accrued expenses	2,000	2,000
	241,789	343,725

9. SUNDRY INCOME

	2022 RM	2021 RM
Atosice donation	1,967	-
Advanced Seminar On Economic Geology	9,033	50
Entrance fee	960	1,400
Membership fee	20,449	19,584
Sales of publications	1,595	437
Geology of Peninsular Malaysia	10,300	8,410
National Geoscience Conference	-	41,109
AAPG royalties	72,165	48,651
Geological Evolution of Southeast Asia	2,230	400
	118,699	120,041

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10. ADMINISTRATIVE AND OPERATING EXPENSES

Audit fee	2,000	2,000
Best student award	2,000	4,000
Depreciation on property, plant and equipment	1,710	1,214
Department of geology	12,000	-
Donation of laptops	-	10,200
Geosea	27,860	-
Honorarium	24,040	24,000
Printing and stationary	18,772	21,313
Professional fee	800	850
Other expenses	9,442	15,002
Subscription	2,545	2,923
Website maintenance	19,190	2,500
	120,359	84,002

11. TAX EXPENSE

Income tax is provided for investment income and on surplus arising from transactions with non-members.

	2022 RM	2021 RM
Current tax:		
On result for the year	1,529	2,029
Under / (over) provision in prior year	6,081	(50)
	7,610	1,979

12. FINANCIAL INSTRUMENTS

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

	2022 RM	2021 RM
Financial assets measured at amortised cost less impairment		
Deposits	-	600
Time deposits with licensed bank	2,379,701	2,379,701
Cash at bank	701,696	767,981
	3,081,397	3,148,282
Financial liabilities carried at amortised cost		
Other payables and accrued expenses	241,789	343,725

PERSATUAN GEOLOGI MALAYSIA
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STATEMENT OF INCOME AND EXPENDITURE
For the year ended 31 December 2022

	Note	2022 RM	2021 RM
INCOME			
Atosice donation		1,967	-
Advanced Seminar On Economic Geology		9,033	50
Entrance fee		960	1,400
Time deposits interest income		46,610	51,639
Membership fee		20,449	19,584
Sales of publications		1,595	437
Geology of Peninsular Malaysia		10,300	8,410
National Geoscience Conference		-	41,109
AAPG royalties		72,165	48,651
Geological Evolution of Southeast Asia		2,230	400
		165,309	171,680
EXPENDITURE			
Annual dinner		1,536	3,230
Audit fee		2,000	2,000
Audit fee underprovided in prior year		-	1,500
Bank charges		64	189
Best Student's award (UKM and UM)		2,000	4,000
Board of geologist fee		600	-
Depreciation on property, plant and equipment		1,710	1,214
Depreciation overprovided in prior year		-	(1,085)
Department of Geology		12,000	-
Departmental club activity		699	-
Donation of laptop to B40 students		-	10,200
Event attendance		1,274	-
Geosea		27,860	-
Honorarium		24,040	24,000
Miscellaneous expenses		1,246	3,346
Penalty		914	-
Postages		1,617	433
Photo competition		-	4,150
Printing and Stationery			
- Warta Geologi		7,150	8,450
- Bulletin		10,000	10,000
- Stationery		1,622	2,863
Professional fee		800	850
Refreshment		77	797
Service tax		120	-
Souvenirs		400	1,110
Subscription fee		2,545	2,923
Telephone and fax		895	1,332
Website maintenance		19,190	2,500
		120,359	84,002
Surplus before tax		44,950	87,678
Income tax expense	9	(7,610)	(1,979)
Net surplus for the year		37,340	85,699
Represented by:			
General fund		(175)	42,806
Endowment fund		37,515	42,893
		37,340	85,699

f) GSM Endowment Fund Report

GSM ENDOWMENT FUND: BOARD OF TRUSTEES REPORT FOR THE 57th ANNUAL GENERAL MEETING OF THE GEOLOGICAL SOCIETY OF MALAYSIA

28 April 2023

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 56th AGM held on 22 April 2022 are as follows:

(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.

Report of the Board of Trustees

1. This report covers the period from 1 January 2022 to 31 December 2022. The Board of Trustees met on a hybrid mode 14 April 2023 (Friday) to scrutinize the administration of the GSM Endowment Fund. The meeting was moderated by the Chair, YBhg. Dato' Yunus Abd Razak. Members in attendance were the GSM President, Mr. Ahmad Nizam Hasan; Immediate Past President, Mr. Abd Rasid Jaapar; Treasurer, Dr. Lim Choun Sian; and GSM Members Dr. Lee Chai Peng, Prof Joy Pereira and Dr. Mazlan Madon.

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.

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 2022 is RM 37,545.09. The balance in the current account of the Endowment Fund as of 31 December 2022 is RM 140,502.48. The balance in the current account of the Endowment Fund in the previous year (as of 31 December 2021) was RM 102,987.39.

4. The GSM Council did not transfer any funds from the GSM operating account to the Endowment Fund to increase the principal amount.

5. The accumulated interest earned from the donation of RM 50,000.00 by YBhg. Dato' Sia Hok Kiang to the GSM Endowment Fund in 2014 for research on economic geology is RM 13,633.90 as of 31 December 2022. The

GSM Council has discussed the modality for disbursement of the research grant. The GSM Council will advertise periodically for research proposals on economic geology from graduate and postgraduate students, with a mandatory requirement for publication in an indexed journal.

6. The GSM Council did not transfer the sum of RM 40,000.00 from the GSM current account at UOBM to its operational account of GSM at the Standard Chartered Bank Bhd. as approved by the AGM in 2022 to be used for publication purposes.

Recommendations to the 57th AGM of the GSM

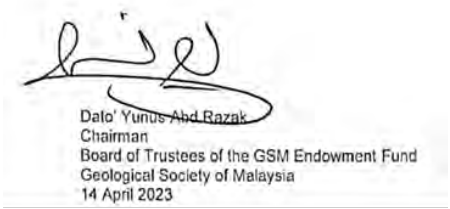
(i) The AGM is recommended to approve the sum of RM 40,000 that is requested by the GSM Council for publications for the year 2023.

(ii) The In-Coming Council is recommended to transfer RM 100,000 from the UOBM Current Account to the UOBM Fixed Deposit account to increase the principal amount of the GSM Endowment Fund.

(iii) The modality proposed for using the accumulated interest earned (RM 13,633.90) from the donation of RM 50,000.00 by YBhg. Dato' Sia Hok Kiang to the GSM Endowment Fund in 2014 is welcomed. The GSM Council is requested to implement the proposed suggestion as soon as possible, and report the progress to Board of Trustees of the GSM Endowment Fund.

(iv) 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" has to be appointed at the AGM in 2023. The AGM is requested to appoint the Chair and at least three independent Full Members in good-standing until 2026.

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 57th AGM of the GSM.



Dato' Yunus Abd Razak
Chairman
Board of Trustees of the GSM Endowment Fund
Geological Society of Malaysia
14 April 2023

Election of Honorary Auditor & Board of Trustees Report

Based on the recommendations from the Board of Trustee report, the AGM is requested and required to appoint the Chair and at least three independent Full Members "in good standing: to serve on the "Board of Trustees of the GSM Endowment Fund" until 2024.

Other Matters

There is no other matters.

Announcement of New Council for 2023/2024

PERSATUAN GEOLOGI MALAYSIA
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

REPORT TITLE: **GSM COUNCIL ELECTION TERM 2023/2024 RESULT**
REPORT DATE: **28 DECEMBER 2022**

This document contains the result of the Geological Society of Malaysia (GSM) Council Election for the term 2023/2024. At the end of the nomination period on 30 September 2022, nominations were received for all Council positions. Only a single nomination was received for all positions except for the four (4) two-year term Councillor posts, for which six (6) nominations were received. (see Nominations Committee Note, dated 2 December 2022).

The Council decided to conduct email balloting for the four (4) Council posts that will be vacated at the end of the term in April 2023.

On 25 October 2022, ballot papers were sent out to all members by email through geologicalsociety@gmail.com account, followed by the profile of all 6 candidates for selection reference on 14 November 2022.

With the closing of balloting on 15 December 2022, the votes were counted and verified by Elections Officer Amie Amir and two Scrutineers, Prof Dr. Azman A. Ghani and Dr. Ng Tham Fatt. Candidates with the 4 highest votes (names in bold) shall be elected as Councillors for a two-year term (2023/2024 – 2024/2025) at the forthcoming 57th AGM in April 2023.

The ballot count result in descending order:

1.	**Muhammad Hatta Roselee**	**(31 votes)**
2.	**Cindy Simba Ngumbang**	**(30 votes)**
3.	**Mohd Shafiq Firdaus Abdul Razak**	**(28 votes)**
4.	**Siti Nur Fathiyah Jamaludin**	**(28 votes)**
5.	Farah Fazulah Abdullah	(23 votes)
6.	Nur Iskandar Taib	(20 votes)

With the above results, the Council office for the term 2023/2024 shall be filled as follows:

President:	Mohd Hariri Arifin
Vice-President:	Meor Hakif Amir Hassan
Immediate Past President:	Ahmad Nizam Hasan
Secretary:	Ling Nan Ley
Treasurer:	Lim Choun Sian
Assistant Secretary:	Norazianti Asmari
Editor:	Joy Jacqueline Pereira

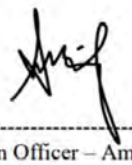
Councillors for Term 2023/2024 (serving the second year of their two-year term)

- Abdull Halim Bin Abdul
- Ahmad Zulqurnain Bin Ghazali
- Nor Shahidah Binti Mohd. Nazer
- Tan Boon Kong

Councillors for Term 2023/2024 – 2024/2025 (two-year term)

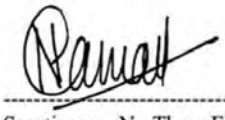
- Cindy Simba Ngumbang
- Mohd Shafiq Firdaus Abdul Razak
- Muhammad Hatta Roselee
- Siti Nur Fathiyah Jamaludin

End of report.
Report prepared by Election Officer dated 28 December 2022.



Election Officer – Amie Amir

Scrutineer – Azman Abd. Ghani



Scrutineer – Ng Tham Fatt

CERAMAH TEKNIK TECHNICAL TALK

Sea bed mapping

Abdull Halim bin Abdul
Ground Wave SSPT Sdn Bhd
Date: 24 May 2023
Platform: Zoom

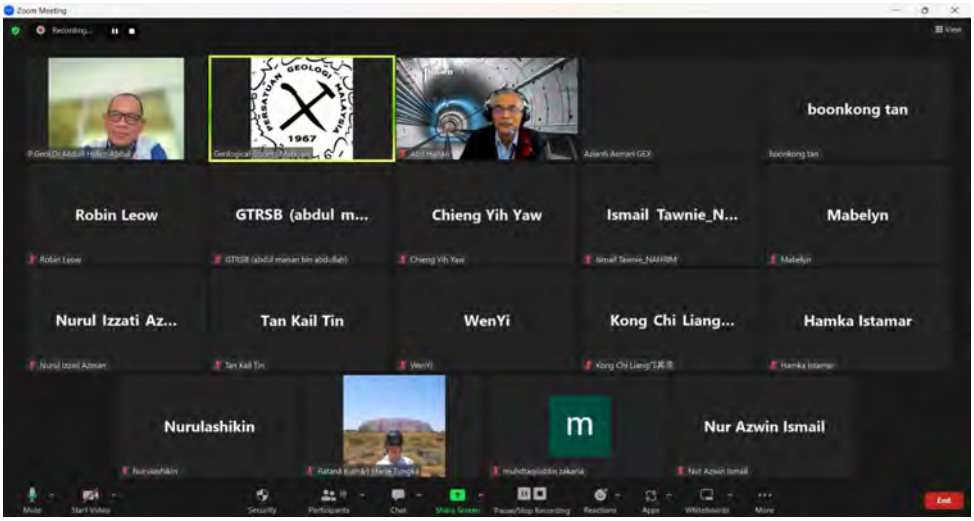
The above talk was delivered by P.Geol. Dr Abdull Halim Bin Abdul (Ground Wave SSPT Sdn Bhd) on 24th May, 2023 via Zoom. Some 20 members participated. An abstract of the talk is given below:

Abstract: The hydrographic survey was conducted to execute the geophysical survey at Grid maintenance - North cable, Penang, Malaysia. The objective of the geophysical survey was to locate the submarine power cable within the survey area. Within survey the survey corridor, the main purpose of this survey to identify AU existing power cable, telecom communication, other utilities, structure, shipwrecks, anchor scan and seabed topography, to plot anchor scar surrounding the cable to determine whether the existing cable is exposed and to determine depth of the cable is not exposed. The work scope that been conducted in this survey are sub bottom profiler survey, side scan sonar survey, bathymetric profiling and magnetometer. The sub bottom profiler survey conducted to identify and determine the profile and physical properties / layer of sediment deposition at respective area as well as to study all relevant information provided / available and obtain additional data, if necessary, for the proper execution of the works. The side scan sonar survey conducted to map seabed feature such as as coral outcrops, gas seepage, sand ripples trawl marks, pipelines, shipwrecks, and other sizeable man-made objects. Bathymetric profiling conducted to measure and map the water depths. While magnetometer survey conducted to measure and mapping any anomaly or detect submarine power cable. The finding was described on the observation of the morphology of the survey area.

Keyword: Geophysical survey, sediment deposition, bathymetric profiling

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

Tan Boon Kong
Chairman, Working Group on Engineering Geology
24th May, 2023



CERAMAH TEKNIK TECHNICAL TALK

When hillsides collapse – Story of landslides in Malaysia

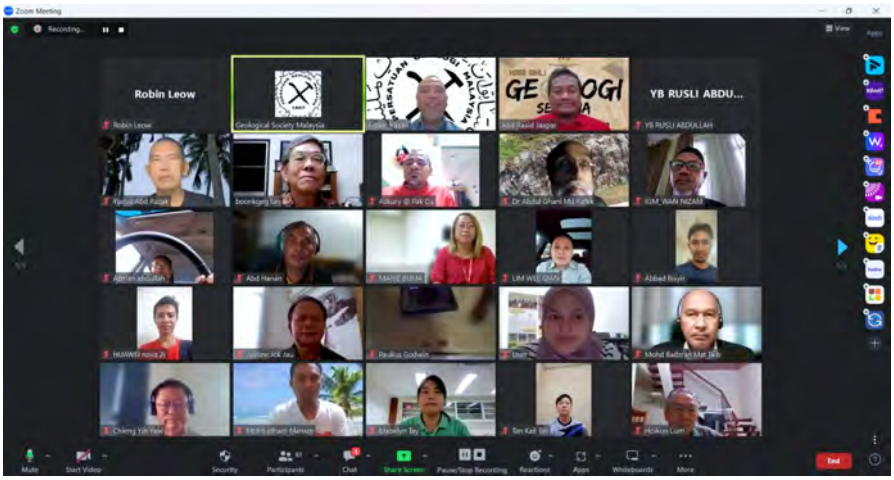
Abdul Rasid Jaapar
Institute of Geology Malaysia; GMT Group
Date: 27 April 2023
Platform: Zoom

The above talk was delivered by P.Geol. Abdul Rasid Jaapar (President, IGM; GMT Group) on 27th April, 2023 via Zoom. Some 100 members participated. An abstract of the talk is given below:

Abstrak: The earliest written record of landslide in Malaysia as far as the writer is aware is the rockfall incident that occurred on 7th December 1919 at Bukit Tunggal, Perak, which claimed 12 lives and loss of properties. The recent landslide disaster in Batang Kali occurred on 16th December 2022 and claimed 31 lives happened slightly more than 100 years after the first recorded landslide incident. Are we still dancing the same tango after 100 years of numerous landslide experiences? We faced the same scenarios after every landslide incident, deadly or not! The recent Batang Kali disaster has just manifested our weaknesses, in many aspects of managing landslide disasters. This technical talk will try to discuss the historical perspective of landslides in Malaysia, responses from the authorities, professional organisations as well as from the mass media on some of the deadliest landslide disaster events in Malaysia. The presenter will also try to discuss the understanding and practice in landslide and/or slope investigation especially on rock slope engineering practices. Some case studies on landslide and/or slope investigation will be discussed including the emerging disastrous multiple debris flow. The talk will be closed with some discussion on policy intervention, steps on building community resilience towards landslide risk and some recommendations of way forward.

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

Tan Boon Kong
Chairman, Working Group on Engineering Geology
29th April 2023



CERAMAH TEKNIK TECHNICAL TALK

Classification of geothermal systems from a Geology and Resource Assessment perspective

Arnout JW Everts
AFGeo Sdn Bhd
Date: 28 April 2023
Venue and platform: Sheraton Hotel, Petaling Jaya, Selangor, Zoom and Facebook Live GSM

A special pre-GSM Annual General Meeting talk was delivered by Dr. Arnout JW Everts on 28th April, 2023, at the Sheraton Hotel, Petaling Jaya and via Zoom and Facebook Live. Some 90 members participated. An abstract of the talk is given below:

Abstract: Geothermal energy is the thermal energy in the Earth's crust which originates from the formation of the planet and from radioactive decay of materials. Geothermal energy can be exploited by directly tapping into hot surface-springs, or by drilling wells to flow heat to surface via a convective carrier (a working fluid). Conventional "open systems" produce formation fluid from the subsurface and pass these through a heat exchanger to recover heat. Alternative to this is a "closed loop system" where a suitable heat carrier (like water or supercritical CO_2) is circulated down in a cased well, warmed up by conductive heat transfer and then circulated back up and passed through a heat exchanger. Harvested heat can be used for direct heating or, where conditions are favourable, for electric power generation. Technologies in use for power generation include dry steam power stations, flash steam power stations and binary cycle power stations. Geothermal electricity generation is currently used in 26 countries, while geothermal heating is in use in 70 countries. Geothermal systems occupy a wide variety of geological settings, temperatures and phase-behaviour of geothermal fluids. Objective of this paper is to discuss classification of geothermal systems from a point of view of geology and how to address them from a point of view of classifying resource potential.

P. Geol. Dr. Hariri Arifin
President, Geological Society of Malaysia
29th April, 2023

CERAMAH TEKNIK TECHNICAL TALK

Modified-slope mass rating (M-SMR) system: Application to rock slopes underlain by ultramafic rock in Telupid, Sabah, Malaysia

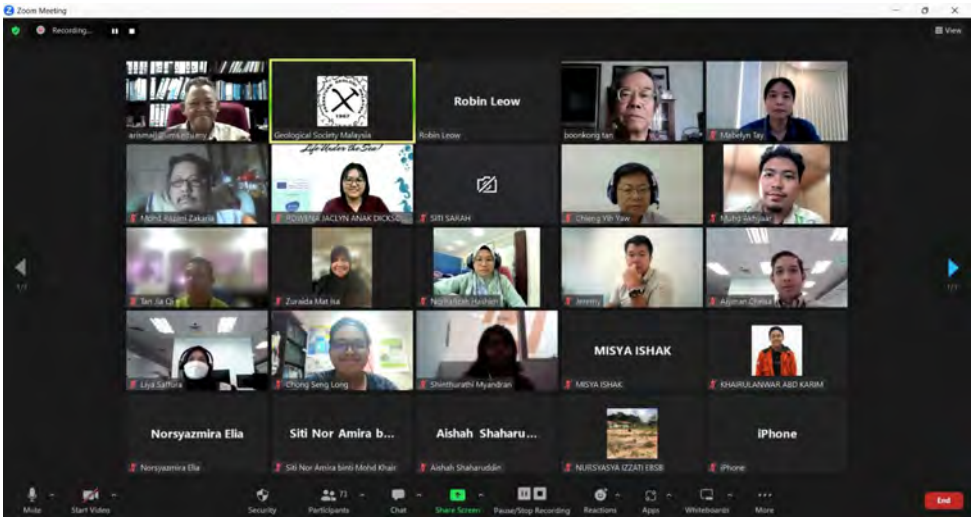
Ismail Abd Rahim
Universiti Malaysia Sabah
Date: 14 June 2023
Platform: Zoom

The above talk was delivered by P.Geol. Dr Ismail Abd Rahim (UMS) on 14th June, 2023 via Zoom. Some 75 members participated. An abstract of the talk is given below:

Abstract: The Modified Slope Mass Rating (M-SMR) was applied on ultramafic rock cut slopes in Telupid, Sabah, Malaysia. This system was used to characterize and propose preliminary rock cut slope stabilization, protection measures, and recommendation levels for slope re-investigation. The uniaxial compressive strength (UCS), RQD, discontinuity spacing, discontinuity condition, water flow, and discontinuity orientation parameters were assessed using the UCS test, Deere's RQD method, weighted average of discontinuity set spacing, weighted average and statistical mode, weighted average, and new approach of adjustment factor (NAAF), respectively. In this study, six ultramafic rock cut slopes were chosen. The result of the analysis shows that the M-SMR classes for all slopes in ultramafic rocks are classified as class III (moderate), class IV (poor), and class V (very poor). Therefore, it is recommended for slope re-investigation by a well-trained engineering geologist or geotechnical engineer for slopes with class III. Slope re-investigation by an experienced engineering geologist or geotechnical engineer is highly recommended for classes IV. For class V, slope re-investigation by an expert engineering geologist or geotechnical engineer is required. The proposed recommendations for slope stabilization and protection measures are local trimming, surface drainage, horizontal drains and weep holes, systematic bolting, dowels, concrete detention or buttresses, shotcrete, wire mesh or rope nets, and rock trap ditches.

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

Tan Boon Kong
Chairman, Working Group on Engineering Geology
14th June, 2023



CERAMAH TEKNIK TECHNICAL TALK

Neogene palaeoceanography of the northern Indian Ocean: Evidence from the microfossils

Arindam Chakraborty
Universiti Malaya
Date: 16 June 2023
Platform: Zoom

The above talk was delivered by Dr Arindam Chakraborty (UM) on 16th June, 2023 via Zoom. Some 30 members participated. An abstract of the talk is given below:

Abstract: The Neogene was a geological time period of great climatic, floral and faunal changes across the globe. The Miocene-Pliocene epoch has gained lots of attention due to the potential for understanding the climate sensitivity to CO_2 forcing and projected near future temperature rise. During this period, northern Indian Ocean experienced several climatic events. Among the various Neogene sequences in India, Andaman-Nicobar is most important for representing the marine deep-water facies and few shallow water sequences in the northern Indian Ocean. The rocks of deep-water origin in the offshore region have large inputs of biogenic. These sediments contain abundant foraminifera, nannofossils, radiolarians, diatoms, calcareous algae etc. The Neogene marine deep water and more rarely shallow water sediments exposed on Andaman and Nicobar group of islands in the northern Indian Ocean endows an excellent opportunity to reconstruct paleoenvironments based on qualitative and quantitative analysis of the marine biogenic components and in turn to document changing climate and its influence on the evolution of marine biota. For the reconstruction of past oceanographic changes, retrieval of proxy biotic records from the marine realms is a unique tool. The microfossils those can be used as proxies for marine temperature, nutrient levels and other environmental parameters. The calcareous and siliceous microfossils from the outcrops on Andaman and Nicobar group of islands and the recovered offshore cores show a diverse assemblage with tropical low latitude marker forms. Dominance of warm water microfossils during the early to middle Miocene is correlatable to the Miocene Climate Optimum (MCO). The nannofossil assemblages of this age also reflect strong preference for warm tropical climate and nutricline condition i.e., depth dependent high variation of nutrient content. The presence of relatively unusual assemblage compositions, especially abundant sphenoliths and small reticulofenestrids, in conjunction with rare discoasters and alongside common diatoms, are indicative of high-productivity surface waters and probably upwelling conditions in the late Miocene. In the Tortonian (upper Miocene), low abundance of discoasters and high abundance of small reticulofenestrids (<3 μm) indicate eutrophic condition. The high-productivity surface-water environments can be linked to the intensification of the Indian Summer Monsoon.
Siliceous microfossils from the early Pliocene sediments shows that there was decrease and cessation of biogenic silica in the region that may be due to nutrient depletion as an impact of Indonesian Through Flow (ITF) constriction. Well-preserved calcareous nannofossils have also been recovered from the Zanclean (lower Pliocene). During the Zanclean, warm water condition prevailed and a transgressive event was recognised in the northern Indian Ocean. The assemblages of calcareous algae (including both coralline red and halimedacean green algae) and benthic as well as planktic foraminifera recorded from the Serravallian, Tortonian and Piacenzian sediments of Little Andaman (Hut Bay) and Car Nicobar Islands indicate a fairly conducive benthic environment for the survival of the algal forms along with other biogenic components. Variety of characteristic growth-forms and taphonomic features have been noticed in the coralline algal taxa. Several biofacies have been identified from the three outcrops of Little Andaman (Hut Bay) and Car Nicobar Islands. Moderate environmental interference, hydrodynamic conditions and availability of substrate may have played a major role in the diversity of calcareous algae. The overall coralline algal and benthic foraminiferal assemblages indicate a shallow to relatively deeper bathymetry of approximately 20 to 40 m that corresponds to a more or less moderate to slightly higher hydrodynamic activity.

We thank Dr Arindam for his support and contribution to the Society's activities.

Meor Hakif Amir Hassan
Chairman, Working Group on Regional Geology and Stratigraphy
16th June, 2023

CERAMAH TEKNIK TECHNICAL TALK

Deep marine, channel-to-lobe transition deposits of the Oligocene – Miocene Tajau Sandstone Member, Kudat Formation, Sabah

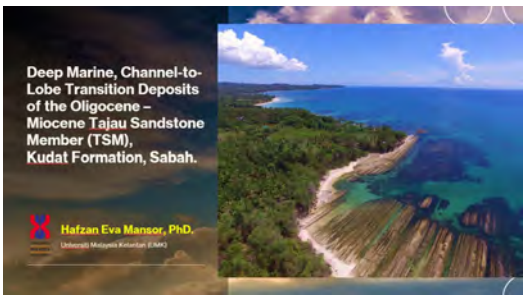
Hafzan Eva Mansor
Universiti Malaysia Kelantan
Date: 22 June 2023
Platform: Zoom

The above talk was delivered by Dr Hafzan Eva Mansor (UMK) on 22nd June, 2023 via Zoom. Some 80 members participated. An abstract of the talk is given below:

Abstract: Channel-lobe transition zones (CLTZs) are identified in many modern deep-water systems, but few exhumed examples have been identified. Exposures of the Oligocene-Miocene Tajau Sandstone Member (TSM), Kudat Formation, northern Sabah, Malaysia, provides the opportunity to document a CLTZ from an active basin margin. This work provides the first detailed field-based sedimentological logging to produce a quantitative database on facies, sedimentary structures, bed type, and statistical analysis. This is particularly important to produce a robust stratigraphic framework of the TSM. Sedimentary facies support interpretation of subaqueous sediment density flows, and key features, including scour-fills, antidunes, and dune-scale bedforms, suggest changes in gradient and/or flow confinement and the development of hydraulic jumps. Eight bed types are recognized including: (a) tripartite beds with a debrite (BT1), interpreted as hybrid event beds recording downslope flow transformation between turbulent and laminar states; (b) beds with a mixture of depositional, erosional, and bypass features (BT2, BT4, BT5), interpreted as recording the transitions between supercritical and subcritical flow conditions triggered by hydraulic jumps; (c) bipartite beds with a basal massive sandstone overlain by fine-grained facies (BT3), interpreted as hyperconcentrated flow deposits with evidence of downcurrent flow transformation; (d) bipartite beds with a basal high-density turbidite sharply overlain by a low-density turbidite (BT6), interpreted as turbidites with evidence of sediment bypass; (e) basal tractive structures capped by fine-grained facies as the product of reworking of very coarse- to coarse-grained sediments caused by lateral spreading of turbulent flows; and (f) Bouma Tbcde sequences (BT8) interpreted as high-to-low-density turbidites. Our depositional model for the TSM comprises: (a) an aggradational channel-lobe transition zone (CLTZs/BTA 1 and BTA 2) which was dominated by hydraulic jumps and sediment bypass; and (b) stacked lobe (i.e., lobe-axis/BTA 3a, lobe-off axis/BTA 3b, frontal lobe fringe/BTA 3c, and distal lobe fringe/BTA 3d) located in the northern and southern parts of the study area, which is dominated by tabular, sheet-like elements bioturbated with the Nereites ichnofacies. The aggradational stacking of CLTZs deposits observed in the TSM may be explained by high subsidence rates combined with high sediment supply rates associated with a tectonically active margin setting.

We thank Dr Hafzan for her support and contribution to the Society's activities.

Meor Hakif Amir Hassan
Chairman, Working Group on Regional Geology and Stratigraphy
22nd June, 2023



CERAMAH TEKNIK TECHNICAL TALK

The Sabah Melange and mass movement

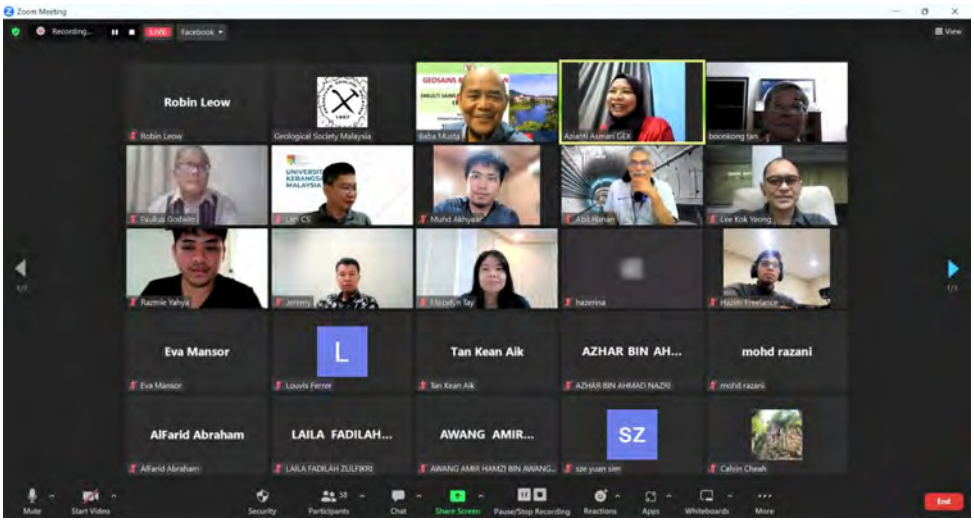
Baba Musta
Universiti Malaysia Sabah
Date: 12 July 2023
Platform: Zoom

The above talk was delivered by P.Geol. Prof. Dr Baba Musta (UMS) on 12th July, 2023 via Zoom. Some 70 members participated. An abstract of the talk is given below:

Abstract: The term "melange" refers to the admixture of various sizes of rock, which are sheared and crushed in a finer grained matrix. Tectonic mélange demonstrates the sheared rocks in the matrix with lithological units ruptured, producing separate blocks and a lack of stratal continuity. Aside from tectonic activity, the formation of melange was also due to the diapiric process. In this paper, we describe the distribution of Sabah melanges and how it connects to the mass movements at the outcrops along the main roadways. In Sabah, the mélanges were formerly known as the Garinono Formation, Kuamut Formation, Wariu Formation, Ayer Formation, and Chert-Spilite Formation. Sabah mélanges contain various blocks of rocks from older formations, including amphibolite, serpentinite, schist, gabbro, spilite, chert, graywackes, limestone, and shale. The mechanical behaviour of rock mixtures composed of fragmented various lithologies surrounded by a weak clayey matrix is highly heterogeneous. Clayey soil behaviour in the matrix of mélange is one of the most dominant problems that affects their poor performance and threatens the mass movements. The difference in parent rock and various matrix compositions has significant implications for the physico-chemical properties, engineering properties, and type of minerals, which are closely connected with the mass movement occurrences on the slope. The movement rate of slope should be monitored, and the surrounding area regularly investigated for the development of other potentially unstable sections of the mass movements. In addition, a full geotechnical characterization of all types of Sabah melange needs to be more thoroughly investigated. Therefore, it is highly recommended to do intensive geological mapping of Sabah to identify the distribution of Sabah melange.

We thank Prof Baba for his support and contribution to the Society's activities.

Tan Boon Kong
Chairman, Working Group on Engineering Geology
12th July, 2023



CERAMAH TEKNIK TECHNICAL TALK

Debris flow and the mud flood disaster in Sugud-Maang, Penampang, Sabah: Its impact and possible cause

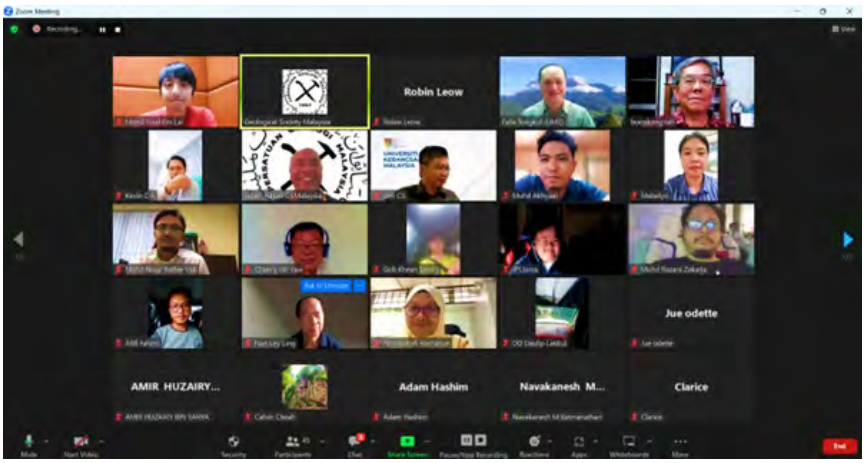
Felix Tongkul
Universiti Malaysia Sabah
Date: 16 August 2023
Platform: Zoom

The above talk was delivered by P.Geol. Prof. Dr Felix Tongkul (UMS) on 16th August, 2023 via Zoom. Some 100 members participated. An abstract of the talk is given below:

Abstract: On 15 September 2021, a debris flow and mud flood disaster occurred in Sugud-Maang in the Penampang district. Although no lives were lost, this debris flow and mud flood disaster is one of the worst that have occurred in Sabah whereby it destroyed an enormous amount of public and private properties. It is estimated that three hundred families were affected by the flood. Fifteen houses and fifty cars were swept by the mud flood. Electric supply was cut, and gravity-fed pipe water supply of several villages were also destroyed. After 4 weeks several villages are still without water and electricity. Although no lives were lost, this mud flood disaster is one of the worst that have occurred in Sabah whereby it destroyed an enormous amount of public and private properties. The mud flood or debris flow in Sugud-Maang areas was caused by heavy rainfall and widespread landslides. The extremely high intensity rainfall was associated with a mini typhoon on the west coast of Sabah. The intense rainfall made the soil super saturated with water, reduced its shear strength and caused widespread landslides. The landslides brought enormous amount of rock, soil and wood debris into the streams that was subsequently washed down by flood water to produce the mud flood. The landslide materials also caused blockages of streams at several sites upstream that produced temporary mini dams and mini lakes. A sudden released of the water stored in these mini lakes occurred when these temporary dams burst, resulting in the series of mud floods. The huge debris brought by the devastating mud flood was contributed by the widespread occurrence of landslides. A large proportion of these landslides occurred on unstable slope areas associated with terraced slopes for rubber plantation and fruit orchards.

We thank Prof Felix for his support and contribution to the Society's activities.

Tan Boon Kong
Chairman, Working Group on Engineering Geology
17th August, 2023



REPORT

Webinar series on Advances in Geophysics

Abdul Halim Abdul Latiff
Chairperson, Geophysics Working Group 2022 – 2023
Geological Society of Malaysia

The Geophysics Working Group of the Geological Society of Malaysia (GSM) had organised a series of online talks between November 2022 and March 2023. A total of 10 webinars were delivered by distinguish speakers and experts from various institution from within Malaysia as well as from Egypt, Thailand, Brunei and China. All the talk were supported and moderated by Centre for Subsurface Imaging (CSI), Universiti Teknologi PETRONAS and broadcast through Microsoft Teams platform for GSM members and local and international geoscience community.

With all the speakers were coming from academic and research institution, the webinar series was focusing on research and development in geophysical technology, particularly by local university researchers. The aim is to promote geophysics and the technology associated with it to the students and local community, for the benefit of the society. It is our intention this webinar series had stir up further interest among the students and younger generation in geosciences, particularly in geophysics discipline. Each of the talk under the series is delivered within an hour, with the additional 30 minutes for question & answer session. It is reported that most of the talk series has been well received with the average attendance of 40 participants. The Q&A session also had provided further avenue for the participants to interact with the speakers. In addition, each of the webinar talk had received approval from Board of Geologist (BoG) for one (1) CPD point.

In summary, the concluded webinar series is as per table below:

Series	Date	Time	Speaker	Affiliation	Talk Title	Recorded Video (Link to Youtube)
1.	9th Nov. 2022 (Wednesday)	3.00pm – 4.30pm	Prof Dr Mohd Nawawi Nordin	Universiti Sains Malaysia	Electrical Imaging and Geophysical Method for Subsurface Mapping	Recording not available
2.	23rd Nov. 2022 (Wednesday)	3.00pm – 4.30pm	A.P. Dr Mohamed Elsadany	Univesiti Teknologi PETRONAS	Machine Learning Application in Seismic Interpretation	https://youtu.be/eHpgGOPO2_0
3.	7th Dec. 2022 (Wednesday)	3.00pm – 4.30pm	Gs. Dr Muhammad Hafeez Jeofry	Universiti Malaysia Terengganu	Radio-echo Sounding (RES) Profiling and Numerical Modelling	Recording not available
4.	14th Dec. 2022 (Wednesday)	1.00pm – 2.30pm	A.P. Ts. Dr Mohd Hariri Arifin	Universiti Kebangsaan Malaysia	UKM Geophysics: Past, Present and Future	https://youtu.be/BBPEvyQG8O4
5.	21st Dec. 2022 (Wednesday)	3.00pm – 4.30pm	Ts. Dr Hardianshah Saleh	Universiti Malaysia Sabah	Geophysical Monitoring of Subsurface & Near-Surface: Challenge & Way Forward	https://youtu.be/Xq21OeUsJSs

6.	11th January 2023 (Wednesday)	3.00pm – 4.30pm	Prof Ir. Dr Azlan Adnan	Universiti Teknologi Malaysia	Geological Aspects in Earthquake Engineering	Recording not available
7.	25th Jan. 2023 (Wednesday)	3.00pm – 4.30pm	Prof. Dr Amin Esmail Khalil	Helwan University, Egypt	Understanding Earthquake Seismology	https://youtu.be/40GLKYR1txk
8.	8th Feb. 2023 (Wednesday)	3.00pm – 4.30pm	Dr Xiongwei Niu	Second Institute of Oceanography, China	New Ocean Bottom Seismometer Exploration for Crustal Imaging in Arctic Ocean	https://youtu.be/UGrTfwzzmjs
9.	1st March 2023 (Wednesday)	3.00pm – 4.30pm	Dr Stefan Herwig GÖdeke	Universiti Brunei Darussalam, Brunei	Groundwater Investigation: Fundamental & Application	https://youtu.be/VAG4LG-PXBk
10.	15th March 2023 (Wednesday)	3.00pm – 4.30pm	A.P. Dr Helmut Dürrast	Prince of Songkla University, Thailand	Earthquakes and Geothermal Resources of Malay Peninsula	https://youtu.be/C3yL2Uhd2Gc

Figure: A collage of poster for 10 online talks by distinguish speakers and experts.

REPORT

GSM engages in Setiu Book Seminar and Scientific Exploration, hosted by Universiti Sultan Zainal Abidin (UniSZA)

Mohd Hariri Arifin
President, Geological Society of Malaysia

1. Opening ceremony

On June 1, 2023, the Geological Society of Malaysia (GSM) received an invitation from UniSZA (University Sultan Zainal Abidin, Kuala Terengganu, Terengganu) to participate in a significant event. The occasion, Setiu Book Seminar and Scientific Exploration took place at the distinguished Auditorium Hall of the UniSZA Library. At first, the seminar and exploration were supposedly a programme for students of the Faculty of Social Sciences at UniSZA. However, more than 100 people responded positively to this event. These were also included, with the participation of Universiti Islam Antarabangsa Malaysia (UIAM) and Geological Society of Malaysia (GSM) representatives. Representing the esteemed society was none other than the President of the Geological Society of Malaysia (GSM), Associate Professor Dr. Mohd Hariri Arifin, who was accompanied by two future promising geologists from Universiti Kebangsaan Malaysia (UKM), Mohamad Hazim Bin Md Zin and Mohammad Aiman Syafeeq Bin Azly.

The Vice-Chancellor of UKM (University Kebangsaan Malaysia), Prof. Dato' Ts. Gs. Dr. Mohd Ekhwan bin Hj. Toriman, delivered the opening remarks at the beginning of the seminar. The event's tone was set by Prof. Mohd Ekhwan's lecture, which emphasised the value of book authoring and exploratory projects in the fields of geography and social science. The ceremony continued with a speech from Prof. Madya Ts. Dr. Mohd Khairul, Deputy Dean of Research and Development (UniSZA), and Dr. Wan Norazilawanie, coordinator of the seminar. The seminar was further enlivened with an entertaining gimmick video presentation showcasing various exciting activities that would take place throughout the programme. The afternoon session began with a sharing session by representatives from TNB Research (TNBR). The dialogue encompassed lake management and the integrated pollution management development implemented by TNBR to guarantee the lake's consistency in cleanliness and safety. At 4 p.m., the participant discussion session began with the distribution of agreed-upon topics. The discussion also included group allocation, study schedules, and transportation modes for the start of the research day. The Setiu Book Writing and Exploration Seminar opening ceremony was concluded with a photo-taking session.

Photo 1: Speech from the Vice Chancellor of UKM, Prof. Dato' Ts. Gs. Dr. Mohd Ekhwan bin Hj. Toriman.

Photo 2: Speech from Deputy Dean of Research and Development (UniSZA), Prof. Madya Ts. Dr. Mohd Khairul.

Photo 3: Dr. Wan Norazilawanie, coordinator of the Setiu Book Seminar & Scientific Exploration.

Photo 4: Dr. Mohd Hariri Arifin (President of GSM) with Dr. Khairul Amri (Deputy Dean of R&D), Dr. Mohd Zubairy (UIAM lecturer) and TNBR representatives.

2. Bukit Bucu fossils and Panchor Merah hot springs

On June 2, 2023, the Setiu Exploration began with a fieldwork of fossil searches at Bukit Bucu, Kuala Terengganu, in the early morning. The outcrop, consisting of Carboniferous-Permian age sandstone and shale layers, is believably an area rich in various types of fossils (Brachiopoda, Mollusca, Bryozoa, Echinodermata, Trilobita, and Plantae), with the highest abundance of fossils being Echinodermata. Thus, based on lithofacies, the depositional environment of Bukit Bucu focused on deltaic deposits. The experience of fossil hunting at Bukit Bucu is an invaluable memory due to how effortless and delightful the search was conducted. This site should be conserved and safeguarded as it holds significant heritage value not just for geologists but also for locals.

The second locality is an area rich in white silica sand. This area is located in Kampung Bari Kecil, near the Terengganu Silica Consortium sand mine. Silica sand is a type of sand consisting of small particles made of silica or silicon dioxide (SiO_2). Silica is the most abundant mineral in the Earth's crust and is one of the main components of sand. Silica sand possesses physical and chemical properties that make it highly useful in various industrial applications. Several samples of silica sand are collected from this area and sent to laboratories for the purpose of analysing the quality of the sand.

The exploration continues at a third site, namely Kampung Panchor Merah, located in Setiu, Kuala Terengganu. A hot spring was discovered in this area, which was situated within the Felcra Panchor Merah oil palm plantation. A reservoir pond has been built in the hot spring area to serve as a source of drinking water and bathing for livestock (mainly cattle). Upon observation, there were bubbles emerging from the surface of the reservoir pond. These bubbles indicate the initial signs of a hot spring, which flows through fractures in the granite rocks. A hot spring water sample was collected for laboratory analysis to examine its geochemical properties.

The following outcrop of low-grade metamorphic rock is found in the hilly area leading towards Felcra Panchor Merah. In this locality, there is the presence of chiastolite, a variety of andalusite that exhibits an intriguing needle-like mineral shape. This mineral is commonly found in metamorphic rocks, particularly schists and gneisses. Chiastolite is typically brown in colour, although it can range from grey to greenish-grey as well. Its most notable feature is the presence of dark carbonaceous inclusions that form a natural cross pattern within the crystal. These inclusions are usually graphite, which gives chiastolite its characteristic appearance. After that, the journey was thereafter resumed to Rhu Glam, Setiu.

Photo 5: Shale layer that contains an abundant variety of fossils at Bukit Bucu, Kuala Terengganu. Fossils of brachiopods found on the rocks (left picture).

Photo 6: Participants taking photos in front of Terengganu Silica Consortium that is located in Kampung Bari Kecil, Kuala Terengganu.

Photo 7: The process of taking silica sand sample for the quality analysis.

Photo 8: Panchor Merah hot spring that is located inside Felcra Panchor Merah Palm Plantation.

Photo 9: The process of collecting samples from the Panchor Merah hot spring for the purpose of geochemical analysis.

Photo 10: Chiastolite mineral found in the shists rock near Felcra Panchor Merah.

3. A night at Rhu Glam

The journey to Rhu Glam began on the same date, which was June 2, 2023. This approximately 15-minute journey was carried out using local fishermen's boats as the mode of water transportation. Rhu Glam, located in Setiu Wetlands, is a camping and recreational site situated between the sea and mangrove swamps. According to the stories from the local community, Rhu Glam used to be a settlement area for the villagers 50 years ago. Due to severe coastal erosion, these communities were forced to relocate to the mainland, leaving their village behind. Subsequently, this area was revisited and developed by the new generation of Kampung Payang as a camping and recreational area. There were various activities available at Rhu Glam, such as dart games, archery, beach play, stargazing, and catching crabs and cockles for barbeque.

In the evening, the activities continue with a sharing session among the expedition participants. The sharing session focuses on the findings and data obtained from the conducted study, as well as preliminary conclusions. The research findings will be used in the future in the production of the Setiu Scientific Exploration Book. The programme is further enriched with community engagement activities in the presence of several representatives from Kampung Payang. One of them was Tengku Mohd Ali Tengku Mansor, affectionately known as Pok Ku, who was an important figure in the local community. Pok Ku shared his experience of collecting over 9,000 empty bottles that had been abandoned on the coastline for more than 17 years. The collected bottles are neatly arranged in his house, known as Ayahku Rumah Botol. Pok Ku also stated that he hopes the younger generation can join him in preserving the cleanliness of the Rhu Glam so that this blessing can be inherited by future generations.

Photo 11: The journey to Rhu Glam is made by water transportation, specifically by the local fishermen's boat. Rhu Glam is a famous camping and recreational site for team building activities.

Photo 12: Tengku Mohd Ali Tengku Mansor (Pok Ku) sharing his personal experience as a senior local in Kampung Payang to participants.

4. Redang Island

On June 3, 2023, the expedition continued with a journey to Pulau Redang, taking a boat ride of approximately 30 minutes. Pulau Redang is renowned as a tourist destination, offering beautiful beaches and a unique variety of flora and fauna. Geologically, Pulau Redang is divided into two types of lithology: granite rocks (75%), and sedimentary rocks. The sedimentary rocks on the island are classified as the Pinang Formation, Redang Formation, and Tumbu Kili Conglomerate. The first locality mentioned is Beting Pasir Pulau Kerengga, which is only visible during low tide. The white sandy beach is a major attraction that must be visited by tourists coming to Pulau Redang. The activities continued with island-hopping and snorkelling. There are seven interesting snorkelling sites available, each offering its own unique attractions. The first site is a habitat for clownfish (Nemo), while the third site is an area with green coral reefs. The fifth site is a major highlight, as it is home to friendly turtles. The expedition concludes at 5 p.m., and participants then return to Rhu Glam.

After everyone has returned to Rhu Glam, those who came from Pulau Redang are treated to grilled cockles and clams collected by other participants. The Scientific Expedition closes at 6:00 PM with concluding remarks from the programme coordinator, Dr. Wan Norazilawanie. Everyone then returns to Setiu via boat to Permaisuri Jetty. The Setiu Scientific Expedition successfully concludes, bringing the journey to a finish.

Photo 13: The atmosphere during snorkelling activities at Redang Island with the exploration participants. It is also noted that there are exposed granite rocks on the island's cliffs.

REPORT

GSM Scientific Expedition to Sira Harimau, Ulu Selama Forest Reserve - In collaboration with PENCINTA and the Selama District Council

Mohammad Noor Akmal Anuar
Geological Society of Malaysia

1. Selama Inn @ Rumah Rehat Selama

On June 16, 2023, at 3.30 p.m., a warm welcome was given during the opening ceremony by Mr. Nor Akmal bin Yang Ghazali, Selama district officer, who was excited with the congregation of scientists from all over Peninsular Malaysia, including the geology team from the Geological Society of Malaysia. Most of the previous expeditions had mainly focused on the biodiversity of flora and fauna in the forest reserve. He emphasized his enthusiasm for the expedition's outcome i.e., the discovery of "hidden gems," such as new species of flora, and described the uniqueness of Selama District. While Mr. Mohd Syaiful bin Mohammad, the secretary of PENCINTA expressed his gratitude for the sponsorship given to the organisation by the Selama District Council and Perak State Forestry Department. He also conveyed the message that the outcome of the expedition will be documented in a simple book to compile the botanical, ichthyological, entomological, zoological, remote sensing, and geological findings. P.Geol. Mohd Noor Akmal, on behalf of A.P. Ts. P.Geol. Dr. Mohd Hariri Arifin, President of GSM, was also present to witness the commendable effort of PENCINTA in organising the expedition.

2. Ulu Selama forest reserve / Hutan simpan Ulu Selama

The convoy started the journey by entering the Sungai Selama mini-hydro site and climbed uphill to reach the basecamp. All the participants built their tents and rested. On the next day, after breakfast, the participants took part in an aerobic exercise session, then started the expedition by jungle trekking and traversing the upper reach of Sungai Selama. After almost 4 hours of trekking, at 5°1536.9 N and 100°5251.2 E, the group reached the anthropogenically undisturbed hot springs known as Sira Harimau by the locals, or tiger salt lick area, due to high faunal activities as it is a point for animals to obtain their mineral needs. Based on Universiti Kebangsaan Malaysia's geothermal exploration records, this is a new finding that has never been published to the public before. It has a typical non-volcanic geothermal surface manifestation of naturally flowing hot groundwater at a low-lying area near the river, exerted through the fracture zone of the Late Triassic Bintang Granite Batholith. Remarkably, this hot spring is the second recorded spring found in Malaysia flowing in such a waterfall manner, with water cascading on the granite outcrop 10 metres above the river and entering the Sungai Selama distributaries. The highest surface temperature recorded using a forward-Looking Infrared (FLIR) thermography camera is 44.2 °C, while the water temperature ranges from 39.0°C to 44.2°C. In contradiction, the river water temperature ranges from 22°C to 25°C during the day. Also present in the hot spring pool is thermophilic algae with vibrant colors of blue, reddish, and white algae that seems to be dancing following the hot spring flow.

This expedition is considered a stepping stone for GSM in its real definition of popularising our national geology treasure to the public. There were also two German citizens who actively participated in this expedition, Andreas and his wife, Julia.

A report by apakhabartv.com writer who was also a participant, Mr. Rosli Zakaria, is available at https://apakhabartv.com/2023/06/21/selama-means-forever/.

Photo 1: (A) Representatives from the Geological Society of Malaysia, Selama District Council, and PENCINTA successfully ascending to the Sira Harimau hot spring in a group portrait. (B) FLIR thermography image by P.Geol Mohd Noor Akmal (GSM).

Photo 2: Tapirus indicus, or Malayan Tapir, was preserved in a no-glow infrared photography lens using a camera trap set up near Sira Harimau hot spring by Mr. Muhammad Khaidir Ariff (PENCINTA).

Photo 3: (A) A granite outcrop covered by waterfall of hot spring water from Sira Harimau that empties into the Sungai Selama distributary canal. (B) The hot spring of Sira Harimau can be seen flowing from the granite outcrop in this aerial image. Photos by Mr. Ahmad Amiruddin Al Hilmi (PENCINTA).

REPORT

Lawatan ke tapak projek East Coast Rail Line (ECRL)

Penganjur: Young Geology & Student Outreach Working Group GSM
& Jabatan Sains Bumi & Alam Sekitar, UKM
Pengerusi: Dr. Nor Shahidah Mohd Nazer
Tarikh lawatan: 10 Julai 2023

Lawatan ke tapak projek East Coast Rail Line (ECRL) berhampiran Terowong Genting Sempah telah diadakan pada 10 Julai 2023 melibatkan 17 orang pelajar pra-siswazah dan siswazah daripada program Geologi dan Sains Sekitaran di bawah Jabatan Sains Bumi & Alam Sekitar, serta 5 ahli Persatuan Geologi Malaysia (GSM). Penglibatan GSM adalah melalui usahasama *Working Group: Young Geology & Student Outreach* di bawah kendalian Dr. Nor Shahidah Mohd Nazer yang juga merangkap penyelaras Sarjana Kerja Kursus Geologi Kejuruteraan dan Geofizik Kejuruteraan & Persekitaran. Program ini menyasarkan peluang pendedahan kerja-kerja pembinaan terowong yang memotong kawasan perbukitan granit di Banjaran Utama menggunakan mesin *Tunnel Boring Machine* (TBM) juga kaedah pengorekan biasa secara *Drill & Blast* di beberapa adit terpilih. Pihak ECRL turut menjelaskan penggunakan konsep *New Austrian Tunneling Method* (NATM) yang digunapakai di dalam kerja-kerja pengorekan terowong ECRL selain perkongsian isu dan masalah geologi yang dihadapi semasa kerja-kerja pengorekan berlangsung. Sesi pembentangan daripada pihak ECRL dijalankan oleh jurutera dan ahli geologi yang terlibat dilapangan dan diakhiri dengan sesi soal jawab dengan peserta yang hadir. Para peserta kemudian dibawa melawat ke ruang pameran yang menempatkan prototaip TBM serta model jajaran ECRL di kawasan Bentong. Para peserta turut dibawa meninjau bilik tinjauan operasi yang dilengkapi sistem CCTV canggih yang menunjukkan aktiviti-aktiviti yang berlaku disepanjang tapak projek secara langsung. Sistem TBM juga dipaparkan secara langsung membolehkan peserta di luar terowong untuk mengetahui status pengorekan terkini. Lawatan diakhiri dengan lawatan ke tapak pembinaan di sekitar hadapan terowong. Program yang berlangsung kira-kira 4 jam ini telah memberi peluang pembelajaran dan pendedahan industri yang menarik buat para pelajar dan ahli GSM khususnya dan diharapkan dapat diteruskan lagi di masa-masa akan datang.

Foto 1: Barisan pelajar UKM.

Foto 2: Barisan pihak ECRL. Turut kelihatan ahli GSM, Encik Azman Abdullah (kiri) dan Mr Low Keng Lok (dua dari kiri).

Foto 3: Bilik pemantaun Genting Tunnel. Turut kelihatan Dr. Nor Shahidah Mohd Nazer bersama En. Yusni bin Shahadan, Regional Construction Manager negeri Selangor dari Malaysia Rail Link Sdn Bhd.

Foto 4: Penerangan oleh Safety Officer berkaitan keselamatan di tapak projek.

Foto 5: Laluan masuk ke terowong yang masih di dalam pembinaan menggunakan teknik TBM.

Foto 6: Bergambar di hadapan terowong yang dikorek menggunakan TBM.

NEW MEMBERSHIP

Student Membership

1. Afiqah Ismail
2. A'li Naufal Allias
3. Aw Kah Ching
4. Fatin Farahdaliya Mohamad Fadzir
5. Fatinah Afiqah Suhaini
6. Goh Xuen Yuan
7. Lam Joo Yee
8. Michelle Vanesha Prasena Charles Samuel
9. Mohammad Yusnizam Mohamed Yusof
10. Muhammad Aarif Mohd Foudzi
11. Muhammad Faqih Az-Zuhri Azrul Sham
12. Muhammad Fauzi Rodzee
13. Muhammad Thareq A Aziz
14. Muhmmad Ridhuan Mohd Risha
15. Nur Aisya Zamri
16. Nurulhuda Abd Aziz
17. Olivia Eva Apeng
18. Sarah Razaruddin
19. Siti Izzatie Hasnul

Associate Membership

1. Nurul Eilmy Zainuddin

Full Membership

1. Arnout Johannes Walter Everts
2. Ibrahim Ghazali
3. Mohd Haniff Mohd Rahim
4. Muhammad Akmal Alias
5. Muhammad Hanif Haziq Mohammad
6. Nisha Devi Ramaya
7. Nurul Izzati Azman
8. Sheelajini Turpeinen
9. Yuheyn Jairaj Kumar R Radhakrishnan
10. Zulqarnain Ibrahim

From Student To Full Membership

1. Nur Adila Roslan
2. Nur Syasya Khaisah Saidi Ali
3. Susie Cahyanti Tasman

From Full To Life Membership

1. Ahmad Zulqurnain Ghazalli

CONTACT DETAILS REQUIRED

Dear members,

The GSM secretariat urgently requires the latest email addresses of the members whose names are listed below and would appreciate it very much if members who know them could relay this message to them.

1. Abang Shahjahon Abang Mahmud
2. Afdlina Hazwa Rodzuan
3. Amir Haziq Helmy
4. Azida Alia Natasha Awang
5. Ezmanisha Nurqistina Balqis Mohd Faezan
6. Leong Hui Xin
7. Muhamad Zaim Azraf Mohamed Saidi
8. Muhammad Ammar Aziz Mohd Nassir
9. Muhammad Asyraf Hasbollah
10. Muhammad Shazwan Aris
11. Neeza Hidayu Ramlee
12. Nik Ilyana Chayrin Nik Khairul Hapizi
13. Nur Ayuni Nabihah Azmi
14. Nur Azwin Ismail
15. Nur Fathihah Abdullah
16. Nur Fatihah Mohd Yusof
17. Nur Fatihah Mohd Yusof
18. Nur Rahidatul Hani Ab Rahman
19. Siti Aishah Mohd Zaidi
20. Siti Atiqah Ayub
21. Siti Nurassila Anang
22. Zulqarnain Ibrahim

IN MEMORIAM

Mr. Effendy Cheng bin Abdullah joined DIALOG in 2018 as Director of Upstream Oil and Gas. Prior to that he served in PETRONAS, amassing four decades of global oil and gas industry experience across a wide range of functions including exploration management, business development, asset management and strategy development. Before his retirement, he was the Vice President & CEO of PETRONAS Exploration. He obtained a first-class honors degree in geology from University of Malaya. He is a registered professional geologist with the Board of Geology Malaysia.

Mr. Effendy Cheng is a former Council Member of GSM. He was extremely instrumental in securing the GSM Endowment Fund by facilitating sponsorship for the GSM Petroleum Geology Conference and Exhibition (PGCE). The geology fraternity has benefited much over his behind the scenes contribution. News of his passing at 70 years of age was shared with the GSM Council Past President, who worked with him and his team in generating funds for the PGCE. Some excerpts from those who know him are included below.

Mr. Ahmad Nizam, former Treasurer and Past President of GSM & Mr. Mohd Badri bin Amat:
DIALOG: Dear All. It's with a heavy heart that I have to let you know that our friend and colleague Effendy has passed away at almost midnight today (Sunday 30/7/2023) due to a cardiac arrest. The medical team tried valiantly to revive him but to no avail. It's a very sad day for all of us in the upstream industry - "Chief" was well known and liked by so many people and his loss will be felt by everyone. May Allah forgive him and place him in Jannah.

Dr. Lee Chai Peng, former Treasurer and Past President of GSM: Deepest condolences to Andrew's family. I remember him fondly as my senior in UM who helped me with my studies together with Yappie, Ho Swee Chee and Ahmad Said. That friendship carried on after graduation through our close involvement with GSM especially in PGCE. RIP Andrew.

Mr. Chen Shick Pei, former Technical Secretariat Director of CCOP: It is with great sadness that we learnt of the passing of the late Effendy Cheng. I first knew him when he was in senior management in PETRONAS and Carigali. I got to know him well when he regularly attended meetings of the Coordinating Committee for Geoscience Programmes in East and Southeast Asia (CCOP) as a Member of the Malaysian Delegation. He was well respected in the CCOP family. Always gave valuable inputs in discussion of cross boundary geoscience issues and offered pragmatic suggestions on the way forward. He was always very friendly to everyone. Our deepest condolences to the family.

Mr. Wong Kuan Sing: It is with great shock and sadness to learn the passing of the late Effendy Cheng. Most of us knew him well both in MU and PETRONAS where he had a very successful career. For those in the private sector in oil and gas business, he assisted us and directing us on possible co-operation with PETRONAS etc. Though he was one of the Senior management in PETRONAS he was always friendly, smart, accessible and provided the best way forward. A gem in PETRONAS that we could talk to and seek advice. Effendi, we will miss you. Condolences to the family. MAY YOUR SOUL REST IN PEACE.

Mr. Choo Mun Keong: Sorry to hear the sad news on the demise of Effendy. Nice man. Got to know him and his colleagues in PETRONAS better during my stint in the oil & gas sector. Deepest condolences to his family. May his soul rest in peace.

Mr. Leong Khee Meng: Mr. Ahmad Said and the late Effendy Cheng Abdullah were buddies and both my former staff in PETRONAS Exploration Department. As far as I am aware, Effendy Cheng Abdullah is the first of my former staff in PETRONAS Exploration Dept., who had passed away. RIP

Dr. Vijay: My deepest condolence to Andrew Cheng and family. I personally knew him well. It's a shocking news. May his soul rest in peace.

Low Keng Lok, former Council Member of GSM: Sincere condolences to the family of Effendy aka Andrew Cheng. RIP.

Datuk Fateh Chand, Past President of GSM: Heartfelt condolences to the family. May his soul RIP.

Mr. Seet Chin Peng: I knew Andrew from university days as yamaha bike- trotting long hair guy. Met him once after he changed his name and joined PETRONAS. Condolences to his family.

Mr. Teoh Lay Hock: Heartfelt condolence to the family of Effendy Cheng.

Mr P. Loganathan: Condolences to Effendy's family. May his soul rest in peace.

Mr. Chin Lik Suan: Deepest condolences to Effendy's family.

Mr. Suntharalingam: Heartfelt condolences to the family of Andrew. Knew him from my CCOP days. May his soul RIP.

Ms. Anna Lee, GSM Secretariat: Rest in peace, Effendy. My deepest regards to his family.

The GSM Council wishes heartfelt condolences to the family of the late Mr. Effendy Cheng bin Abdullah.

IN MEMORIAM

Dr. Kamarudin dalam kenangan

Kamarudin bin Samuding. Anak kelahiran Sabah, jauh merantau ke bumi semenanjung demi segulung ijazah. Bapa kepada empat orang cahaya mata ini merupakan pemegang ijazah dalam bidang Sains Geologi dari Universiti Kebangsaan Malaysia (UKM). Ajal maut jodoh pertemuan di tangan Tuhan, beliau bertemu jodoh dengan seorang guru berasal dari Utara Semenanjung yang juga merupakan alumni UKM. Semangat untuk menimba ilmu tidak terhenti di situ sahaja apabila beliau terus menyambung pengajian di Universiti Sains Malaysia (USM) sehingga memperoleh ijazah Doktor Falsafah (PhD) pada tahun 2010.

Memulakan bertugas di Agensi Nuklear Malaysia sebagai pekerja kontrak sebelum diserap ke jawatan tetap sebagai Pegawai Penyelidik pada 1 Mac 2000. Walaupun laluan kerjaya beliau agak berliku, namun itu bukanlah penyebab untuk beliau terus mengorak langkah maju ke hadapan. Terlalu banyak jasa beliau sepanjang menabur jasa sebagai penjawat awam.

Sepanjang lebih dari 23 tahun menabur bakti di Nuklear Malaysia, sumbangan beliau tidak terhad di dalam negara sahaja malah juga di peringkat antarabangsa. Melalui peruntukan diperolehi dari Agensi Tenaga Atom Antarabangsa (IAEA), beliau telah berjaya menyumbang keringat kepada kemajuan 2 projek penting iaitu 'Assessing Deep Groundwater Resources for Sustainable Management through the Utilization of Isotopic Techniques' (IAEA/RCA RAS/7/030) dan juga 'Strengthening Technical Capabilities for Assessing the Impact of Radioactive Waste Disposal

Dr. Kamaruddin berbaju melayu warna hijau di tengah.

Options on Sustainable Water Resources' (IAEA TC project MAL 7006). Melalui projek ini juga, Nuklear Malaysia telah menerima 2 peralatan penting dari IAEA. Kemudahan yang diberikan ini sememangnya ditunggu-tunggu oleh Nuklear Malaysia demi pembangunan kajian alam sekitar yang rancak berlangsung. Kedua-dua projek ini merupakan antara projek terakhir diketuai beliau sebelum menemui Pencipta-Nya.

Lebih dari sedekad mengenali beliau, tiada apa yang tidak akan dirindui setelah beliau tiada. Pertama kali mengenali beliau, beliau masih dalam tempoh pengajian menghabiskan ijazah PhD. Lemah lembut orangnya. Tidak pernah saya mendengar atau melihat beliau meninggikan suaranya walaupun setelah menyandang jawatan Pengarah Bahagian Teknologi Sisa & Alam Sekitar (BAS). Ya, pada saya amat sukar untuk kita temui seorang insan seperti beliau. Dengan tutur kata yang lembut serta seorang bapa dan suami yang penyayang, beliau sememangnya akan dirindui oleh kami di Nuklear Malaysia. Semoga rohnya dicucuri rahmat serta ditempatkan di kalangan orang-orang beriman dan dikasihi-Nya.

Disediakan oleh:
Nor Dalila bt. Desa, Life Member of GSM

The GSM Council wishes heartfelt condolences to the family of the late Dr. Kamarudin Samuding, who joined the Society in 2012 and became a Life Member in 2017.

PRESENTATION

Potensi ekonomi sedimen Kuaterner dan dampak alam sekitar

Habibah Jamil
Universiti Kebangsaan Malaysia
Date: 22 March 2023
Venue/platform: 1-Bilik Mesyuarat Geologi FST, UKM, 2- Zoom/Facebook Live FST, UKM

Ceramah Teknik ini disampaikan oleh P.M. Dr. Habibah Jamil pada 22 Mac 2023, secara hibrid iaitu di Bilik Mesyuarat Geologi, JSBAS, FST, UKM dan atas talian di platform Zoom/Facebook Live Fakulti Sains dan Teknologi, UKM. Jumlah peserta adalah seramai 83 orang.

Berikut merupakan abstrak pembentangan:

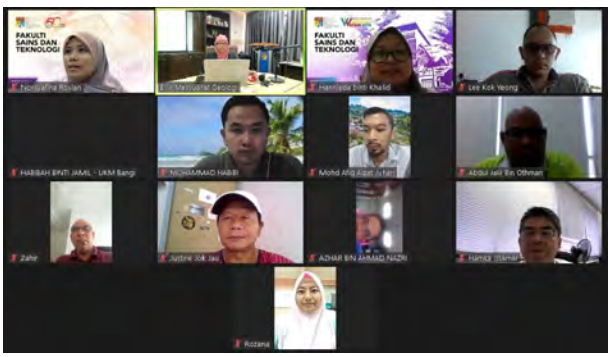
Proses denudasi di Semenanjung Malaysia dan perubahan aras laut sepanjang Kuaterner telah menghasilkan sumber sedimen yang berpotensi ekonomi. Antaranya adalah sumber kelikir, pasir dan tanah liat yang diperlukan untuk pembangunan bandar dan infrastruktur, sumber bijih timah dan emas plaser, sumber air bawah tanah, dan geopelancongan. Sebahagian aktiviti pemerolehan sumber mempunyai dampak alam sekitar secara fizikal (geomorfologi), kimia (kualiti air, tanah dan udara), biologi (biodiversiti) dan antropogenik (kesejahteraan hidup dan infrastruktur). Keseimbangan antara kepentingan ekonomi dan dampak alam sekitar perlu diutamakan dalam pengurusan sumber bumi. Pendekatan kajian kuantitatif dan pemetaan perlu dijalankan untuk menyediakan inventori sumber ekonomi, membantu pembangunan polisi dan garis panduan, serta kaedah pemantauan yang berkesan.

Kata kunci: sedimen, potensi ekonomi, dampak alam sekitar

Setinggi-tinggi ucapan terima kasih diucapkan kepada pembentang atas sokongan dan sumbangan kepada UKM dan aktiviti persatuan.

Dr Norsyafina Roslan
Moderator Slot Ceramah Teknik (UKM)

Gambar 1: Dr Habibah Jamil menyampaikan ceramah teknik.



Gambar 2: Antara peserta yang hadir.

PRESENTATION

Aplikasi geosains dalam kajian kapal karam Bidong, Terengganu, Malaysia

Hasrizal bin Shaari
Universiti Malaysia Terengganu
Date: 12 April 2023
Platform: Zoom/Facebook Live FST, UKM

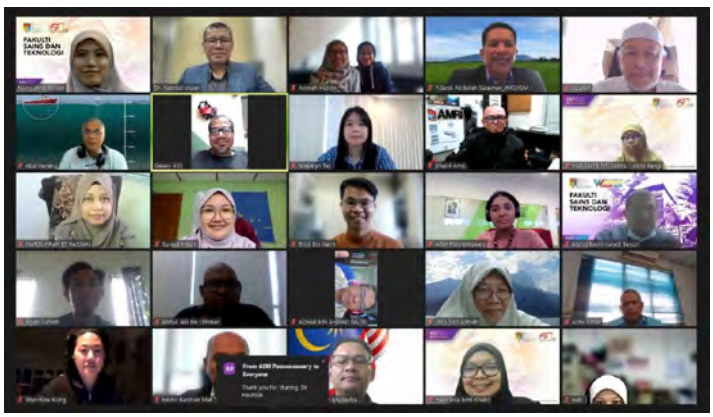
Ceramah Teknik ini disampaikan oleh P.M. Madya Dr. Hasrizal bin Shaari pada 12 April 2023, secara atas talian di platform Zoom/Facebook Live Fakulti Sains dan Teknologi, UKM. Jumlah peserta adalah seramai 143 orang.

Berikut merupakan abstrak pembentangan:

> Perkembangan kajian kapal karam adalah unik kerana ianya bukan semata-mata tertumpu di dalam disiplin ilmu arkeologi sahaja malahan ianya telah menjadi satu percambahan ilmu yang multidisiplin. Salah satu bidang yang mampu menyumbang kepada perkembangan kajian kapal karam ialah bidang geosains. Terdapat dua aplikasi penting bidang geosains dalam kajian kapal karam iaitu melibatkan fasa pra- dan pasca-eskavasi. Penemuan Kapal Karam Bidong pada 2012 yang terletak tidak jauh daripada Stesen Penyelidikan Alami Marin UMT amat menarik kerana ia umpama kapsul masa yang menyimpan banyak maklumat untuk didedahkan. Fasa pra-eskavasi kapal karam Bidong adalah melibatkan skop geofizik iaitu bagi pemetaan keluasan tapak eskavasi kapal karam Bidong dan penentuan tinggalan kapal karam di lapisan sub-permukaan yang telah ditimbusi sedimen. Manakala, eksperimen fasa pasca-eskavasi adalah melibatkan penentuan usia kapal karam, jenis-jenis, komposisi kimia dan mineralogi seramik. Sebanyak 306 artifak seramik telah diselamatkan semasa penggalian pertama pada tahun 2017 dan beberapa sampel semasa penggalian fasa kedua pada tahun 2022. Kebanyakan seramik yang ditemui adalah tembikar batu Thai yang terdiri daripada dua jenis utama iaitu Si Satchanalai dan Maenam Noi. Serpihan-serpihan seramik Thai yang telah diperolehi telah dilakukan analisa komposisi kimia dan mineralogi. Penentuan usia kapal karam Bidong dilakukan dengan menggunakan kaedah radiokarbon daripada pokok yang telah ditentusahkan genus dan spesis. Analisis radiokarbon menunjukkan bahawa sampel kayu boleh dibahagikan kepada dua tempoh masa, 1395-1444 Masihi untuk kayu rangka kapal dan 1437-1522 Masihi untuk kayu lantai. Jenis dan spesies kayu terdiri daripada Giam (*Hopea Sp.*) pada bahagian kayu rangka kapal dan Meranti Temak Nipis (*Shorea roxburghii*) bagi bahagian kayu lantai. Melihat kepada dapatan-dapatan menarik ini, kita melihat terdapat potensi yang luas bidang geosains dalam membantu perkembangan kajian kapal karam di Pulau Bidong khususnya dan Malaysia umumnya.

Setinggi-tinggi ucapan terima kasih diucapkan kepada pembentang atas sokongan dan sumbangan kepada UKM dan aktiviti persatuan.

Dr Norsyafina Roslan
Moderator Slot Ceramah Teknik (UKM)



Gambar 1: Antara peserta yang hadir.

PRESENTATION

Conodont biostratigraphy in dating limestone of northwest Peninsular Malaysia

Atilia binti Bashardin
Jabatan Mineral dan Geosains (Kelantan)
Date: 3 May 2023
Venue/platform: 1-Bilik Mesyuarat Geologi FST, UKM, 2- Zoom/Facebook Live FST, UKM

Pada 3hb Mei 2023, Program Geologi, Jabatan Sains Bumi dan Alam Sekitar (JSBAS), Fakulti Sains dan Teknologi telah mengadakan Ceramah Teknik Geologi Siri 5/2023 (Geology Technical Series 5/2023) secara hibrid bertempat di Bilik Mesyuarat Geologi, Program Geologi Universiti Kebangsaan Malaysia. Ceramah kali ini disampaikan oleh Cik Atilia binti Bashardin, iaitu Penolong Pengarah Unit Geosains daripada Jabatan Mineral dan Geosains (Kelantan). Beliau telah menyampaikan ceramah dan perkongsian bertajuk *Conodont Biostratigraphy in Dating Limestone of Northwest Peninsular Malaysia*.

Semasa sesi pembentangan, beliau berkongsi tentang dapatan dan kepentingan kajian fosil Konodon di kawasan utara tanah air yang mana merupakan sebahagian daripada hasil kajian Sarjana beliau di Universiti Teknologi Petronas, Perak. Direkodkan seramai hampir 90 peserta telah mengikuti ceramah ini baik secara bersemuka, melalui platform Zoom dan menerusi siaran langsung di Facebook rasmi Fakulti Sains dan Teknologi, UKM. Rakaman video sesi ceramah ini boleh ditonton semula di pautan berikut: https://www.facebook.com/fstukmbangi/videos/1418080588927705.

Upacara penyampaian cenderamata telah disempurnakan oleh YBhg. Profesor Emeritus Dr. Mohd Shafeea Leman. Pihak program geologi UKM merakamkan ucapan jutaan terima kasih kepada Pengarah, Jabatan Mineral dan Geosains Malaysia Kelantan atas kebenaran dan sokongan kepaa Cik Atilia untuk berkongsi ilmu geologi. Tidak lupa juga kepada Institut Geologi Malaysia (IGM) dan Persatuan Geologi Malaysia atas kerjasama penganjuran sesi ceramah teknik ini. *Geology to the Fore!!*

Suasana di bilik mesyuarat geologi, UKM ketika penyampaian ceramah teknik. Pelajar yang mengambil kursus mikropaleontologi mengambil peluang mendengar dan bersoal jawab bersama Cik Atilia.

Gelagat penyampai ketika berceramah dan fotograf kenang-kenangan semasa penyampaian cenderahati oleh Prof. Emeritus Mohd Shafeea Leman.

PRESENTATION

A GPS-based strain rate in groundwater extraction-induced land subsidence study in Kelantan

Yong Chien Zheng
University of Otago
Date: 24 May 2023
Platform: Zoom/Facebook Live FST, UKM

The above talk was delivered by Dr. Yong Chien Zheng on 24th May 2023 via Zoom and Facebook Live of Faculty Science and Technology UKM. The total attendees were 90 persons.

Below is the synopsis of the presentation:

Groundwater extraction provides an alternative solution for accessing a fresh water supply. However, groundwater over-exploitation can lead to harmful geomorphological consequences. Kelantan is one of the highest groundwater consumption states in Malaysia, which raises concerns about the possibility of groundwater extraction-induced land subsidence. Global Positioning System (GPS) is known for its reliability and positioning performance in crustal deformation study and ground motion monitoring. We investigate a 17-year of GPS time series (1999.0 – 2016.0) recorded at 11 GPS sites on the northeast coast of Peninsular Malaysia, particularly in Kelantan. Our findings suggest that northern Kelantan subsides at a maximum rate of 4.22 ± 0.17 mm/yr (1σ confidence level). The region also shows higher ground deformation rates than the other parts of Peninsular Malaysia (0.22 ppm/yr). In addition to the observed vertical subsidence, a corresponding horizontal deformation signal manifests as strain accumulation. The dilatation strain rate shows a clear contractional pattern along the SW-NE trend of the Kelantan River, which is associated with the extensional signal in the surrounding regions.

Keywords: land subsidence, groundwater extraction, GPS, geodetic strain analysis, Kelantan

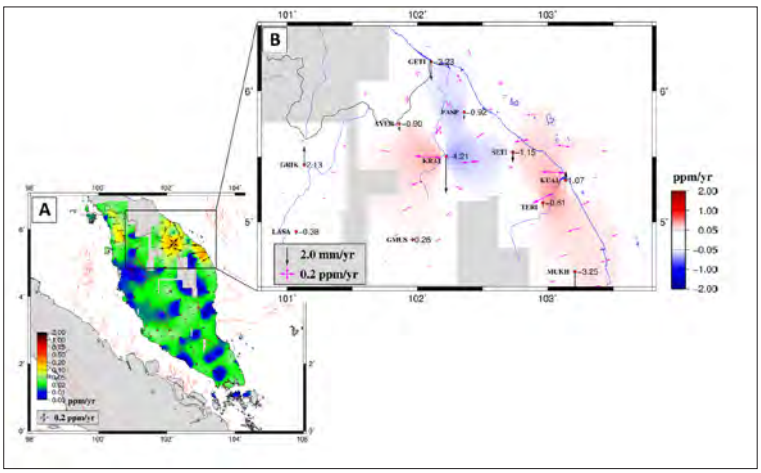


Figure 1: (A) The shear strain rate of peninsular Malaysia. (B) The inset shows the dilatation strain rate in the Kelantan State based on selected GPS CORS. The colour bar of the dilatation rate field indicates contraction in blue (negative) and extension in red (positive); the grey region represents the areas where there are too few data to reliably estimate strain rates. Magenta strain rate tensors indicate the scale of strain rate in a regular grid with a cell size of 0.04˚ (~4.5 km). The black arrows designate the GPS vertical measurements. Red circles denote GPS CORS stations used in dilatation strain rate estimation.

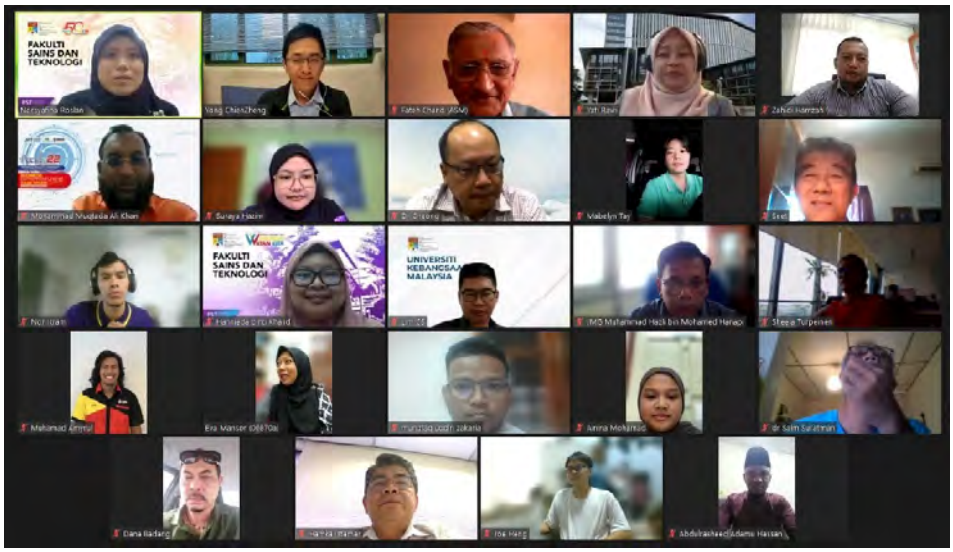


Figure 2: The participants of the online technical talk.

PRESENTATION

Geologi dan pelantar benua dalam undang-undang laut

Mazlan Madon
Date: 21 June 2023
Venue & platform: Bilik Mesyuarat Program Geologi, FST, UKM, and Zoom/Facebook Live FST, UKM

The above talk was delivered by Dr. Mazlan Bin Madon on 21st June 2023, at Bilik Mesyuarat Geologi, Faculty Science and Technology, Universiti Kebangsaan Malaysia and also via Zoom/Facebook Live of Faculty Science and Technology, UKM. The total attendees were 100 persons. An abstract of the talk is given below:

Abstract: Geologi dan Pelantar Benua dalam Undang-Undang LautArtikel 76 dalam Konvensyen Undang-Undang Laut PBB 1982 (UNCLOS) memberi hak kepada negara berpantai (pesisir) menentukan had luar kawasan pelantar benua yang terletak melebihi 200 batu nautika (bn) dari garis pangkal (pantai), bagi tujuan mengeksplorasi dan eksplostasi sumber asli dasar laut. Penentuan had pelantar benua amat penting bagi pengiktirafan dunia ke atas hak berdaulat sesebuah negara pesisir ke atas sumber asli dasar laut di kawasan yang melepasi garisan 200 bn.
Konsep "pelantar benua" dalam konteks Artikel 76 dipinjam dari bidang geologi dan merupakan konsep utama dalam penentuan had luar pelantar benua. Selain itu, beberapa lagi konsep geologi diadaptasi dan digunapakai dalam proses penentuan had pelantar benua. Ceramah kali ini memberi pengenalan mengenai konsep geologi berkaitan pelantar benua dalam artikel 76 dan kaedah penentuan had pelantar benua mengikut undang-undang laut.

We thank Dr. Mazlan for his continuous support and contribution to the Society's activities.

Figure 1: Dr Mazlan is presenting his talk at Bilik Mesyuarat Geologi, UKM.

Figure 2: The participants that joined the session at Bilik Mesyuarat Program Geologi, UKM.

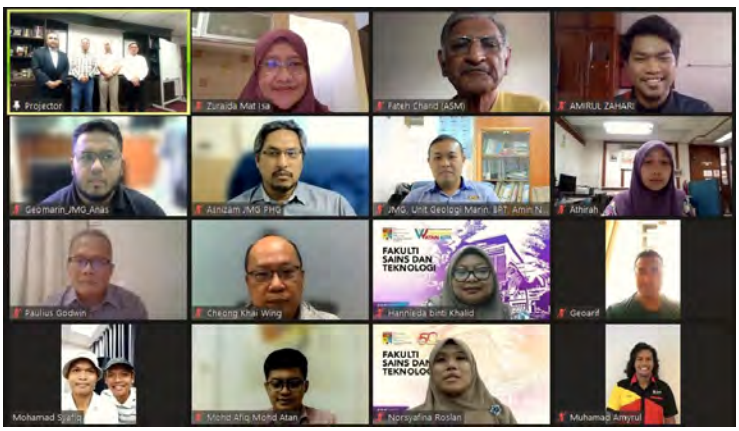


Figure 3: The participants that joined the session through Zoom.

REPORT

Geoscience Week 2023 Sarawak

Richard Mani Banda
Chairman of Organising Committee
Geoscience Week 2023 Sarawak

The Geoscience Week Sarawak 2023 was held at the Waterfront Hotel Kuching from June 7th to 9th, 2023. The event was organized by the Board of Geologists (BOG) and supported by the Institute of Geology Malaysia (IGM), Jabatan Mineral dan Geosains Malaysia (JMG) Sarawak, Geological Society of Malaysia (GSM) and Malaysian Geoscience Consultants and Services Association (MyGeo).

The objective of the event was to engage with stakeholders from 22 government agencies in Sarawak and highlight the importance of geoscience in the sustainable and resilience cities in Sarawak. The event ran for three days, with the first day dedicated to stakeholder engagement, the second day for the Board of Geologist Malaysia meeting, and the third day for a seminar on the geological resources of Sarawak.

ENGAGEMENT WITH STAKEHOLDERS

The first day of the event, June 7, 2023, was an engagement with stakeholders. A total of 100 participants from 22 state government agencies attended the event.

This event was officiated by Datuk Roland Sagah Wee Win, Minister of Education, Innovation and Talent Development.

The panel session, which was the last event, was particularly fruitful. The stakeholders were able to voice their needs and the type of geological input required for their development to the state of Sarawak.

SEMINAR MINERAL RESOURCES SARAWAK

The third day of Geoscience Week 2023 was dedicated to lectures on the mineral resources of Sarawak. The response was overwhelming, with a full house of 100 participants. The topics covered included geology and geology structure of Sarawak, minerals resources and their exploration methods, geohazards, geo-heritage and geo-tourism, engineering geology and sustainable development.

We would like to express our gratitude to the stakeholders and professional geologists in Sarawak who attended this seminar. Your participation and engagement made this event a great success.

We would also like to extend our thanks to the Secretariat of BOG and IGM for their support and arrangements that contributed to the success of this event. Without their efforts, this seminar would not have been possible.

We hope that the knowledge and insights gained from this seminar will contribute to the sustainable development of Sarawak's natural resources and benefit the people of Sarawak for generations to come.

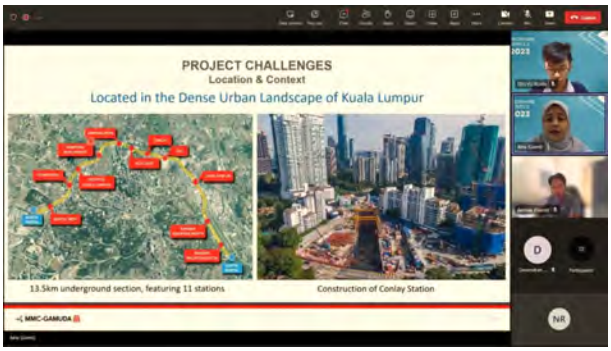
STUDENTS' REPORT

Geoshare series 02 2023: Geological consideration in tunnelling

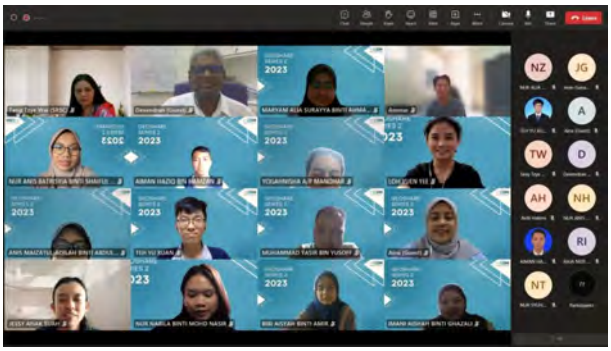
Program Geoshare Series 02 yang dilaksanakan secara atas talian di aplikasi Microsoft Team pada 24 Mac 2023 merupakan program tahunan anjuran Universiti Malaya Geological Society of Malaysia Student Chapter (UMGSM SC). Program ini dijalankan untuk memberi pencerahan yang lebih meluas kepada pelajar dalam bentuk ceramah terhadap beberapa cabang geologi yang dipilih. Tajuk ceramah bagi Geoshare Series 02 ialah *Geological Consideration in Tunnelling* yang telah disampaikan oleh Ms Ainatun Nadhrah. Program yang berbentuk ceramah ini dijalankan bertujuan bagi memberikan ilmu pengetahuan yang lebih mendalam terhadap cabang geologi tersebut di luar dewan kuliah. Seramai 79 orang peserta yang terdiri daripada pelajar serta ahli geologi telah menyertai program ini.

Aturcara program ini bermula dengan majlis perasmian pada pukul 8:50 pagi dan seterusnya diikuti dengan sesi ceramah. Ceramah yang disampaikan telah memberikan pendedahan dan pemindahan ilmu hidrologi kepada para peserta seterusnya membuka mata peserta akan kepentingan dan peranan ahli hidrologi kepada masyarakat. Sesi ceramah ini tamat pada pukul 11:00 pagi, diikuti dengan majlis penutup dan sesi bergambar. Berikut disertakan lampiran beberapa gambar sepanjang program ini berlangsung.

Kesimpulannya, Program Geoshare Series 02 ini bertujuan memberi maklumat luar dalam sektor kejuruteraan, lebih spesifik lagi ialah cabaran dan kerja bagi membina MRT laluan Putrajaya yang boleh dikongsikan bersama agar dapat mempertingkatkan motivasi bagi kecemerlangan akademik. Dalam pada itu, kami juga berharap agar objektif dan tujuan utama program ini tercapai dengan melahirkan pelajar seterusnya graduan yang berkualiti selaras dengan wawasan pendidikan negara kita. Semoga program ini dapat menambah pengetahuan serta pengalaman mereka ke arah kecemerlangan.



Rajah 1: Cik Ainatun Nadhrah daripada MMC Gamuda sedang menyampaikan ceramah beliau.



Rajah 2: Sesi bergambar bersama penceramah, Cik Ainatun Nadhrah daripada MMC Gamuda.

Disediakan oleh:
Nur Anis Batrisyia Binti Shaiful Hamidi
Pengarah, Geoshare Series 2023

STUDENTS' REPORT

Summary report of GSM-UMS Geology Club programs held in April 2023

KOTA KINABALU – The GSM-UMS Geology Club has organized an online talk, entitled 'GEO- PETROLEUM TECHNICAL TALK SERIES 1 – Exploration and Development: Role of a Petroleum Geologist' on 8th of April, 2023. This programme was participated by students with geology and oil and gas engineering background from University Malaysia Sabah (UMS). The speaker invited was a Senior Geoscientist with around 12 years of working experience, Mohd Asraf bin Khamis. This programme was held to educate the students about the partnership between engineers and geologists in the oil and gas industry. At the same time, students were exposed about the challenges in oil and gas industry from the perspective of both geologists and oil and gas engineers.

In addition, on April 16, 2023, the GSM-UMS Geology Club has also conducted 'Ramadhan Geo- Iftar' at Rumah Amal Kasih, Kingfisher. This programme is an annual programme that is usually held among the geology students. What makes it different and unique this year was this programme was hosted at Rumah Amal Kasih, Kingfisher in order to nourish the relationship between the students, lecturers and the community at Rumah Amal Kasih which also encourages the students for volunteerism at the same time.

Lastly, all of the programmes are carried out smoothly, with positive feedbacks from the participants. We truly want to host more interactive and beneficial geology-related programmes in the future in conjunction with GSM and GSM-UMS Geology Club. Thank you very much.

Posters of GEO-PETROLEUM TECHNICAL TALK SERIES 1: Exploration and Development: Role of a Petroleum Geologist. Photo by: Publicity Unit of GEO-PETROLEUM TECHNICAL TALK SERIES 1 – Exploration and Development: Role of a Petroleum Geologist.

Poster of Ramadhan Geo-Iftar.
Photo by: Publicity Unit of Ramadhan Geo-Iftar

Photographs taken during the Ramadhan Geo-Iftar programme. Photo by: Publicity Unit of Ramadhan Geo-Iftar.

Prepared by:
B. Maha Letchummy
Vice-Secretary, GSM-UMS Geology Club

STUDENTS' REPORT

Geoshare series 03 2023: Introduction to the geothermal resources in Malaysia

Program Geoshare Series merupakan sebuah projek yang dijalankan secara tahunan oleh Universiti Malaya Geological Society of Malaysia Student Chapter (UMGSM SC) yang bertujuan memberi pencerahan yang lebih meluas kepada pelajar terhadap beberapa cabang geologi yang dipilih. Program ini mempunyai beberapa siri dan pada 6 Mei 2023 telah berlangsungnya siri ke-3 yang bertema dan bertajuk "*Introduction To The Geothermal Resources in Malaysia*". Berlangsung di Dewan Kuliah Cempaka, program berbentuk ceramah ini telah disampaikan oleh Prof. Madya Ts. Dr. Mohd Hariri Arifin yang sememangnya banyak melakukan kajian-kajian berkaitan geoterma di Malaysia.

Bermula jam 9.30 pagi, program bermula dengan majlis perasmian dan diikuti dengan sesi ceramah. Program ini merupakan satu aktiviti interaktif antara penceramah dan para pelajar. Terdapat sesi soal jawab di akhir program dan beberapa pelajar berjaya mendapat saguhati berbentuk buku yang bertemakan geoterma yang diharapkan akan digunapakai untuk mengetahui lebih banyak info-info berkaitan geoterma. Program berakhir pada jam 11.30 pagi dengan penyampaian cenderamata kepada penceramah seterusnya sesi bergambar sebagai tanda kenang-kenangan.

Secara keseluruhannya, program Geoshare pada siri ini telah memberi banyak input dan juga pendedahan tentang geoterma yang kurang diberikan perhatian di dalam negara kita. Diharapkan agar semua maklumat yang telah diterima akan digunapakai serta memberi impak yang positif kepada para pelajar lebih-lebih lagi apabila mula memasuki dunia industri nanti. Diharapkan program sebegini akan teruskan lagi agar pelajar sentiasa mendapat pendedahan dan info-info yang terbaharu.

Antara pelajar yang bertuah semasa sesi soal jawab.

P.M. Dr. Mohd Hariri Arifin sedang memberikan ceramah.

Disediakan oleh:
Siti Fatimah binti Shuhaimi
Timb. Pengarah, Geoshare Series 2023

STUDENTS' REPORT

Geoscience Industrial Week 2023

Geoscience Industrial Week 2023 (GIW23) merupakan salah satu acara tahunan yang dianjurkan oleh Universiti Malaya Geological Society of Malaysia Student Chapter (UMGSM SC) dan Jabatan Geologi Universiti Malaya pada 13 dan 14 Mei 2023. Program ini bertempat di Kompleks Dewan Kuliah Fakulti Sains, Universiti Malaya. GIW23 diadakan untuk memberi pendedahan kepada para pelajar, tidak kira murid sekolah mahupun mahasiswa universiti terhadap bidang geosains melalui aktiviti-aktiviti yang dianjurkan. Acara ini juga menjadi platform perbincangan tentang isu-isu geosains yang hangat pada ketika ini.

Antara aktiviti yang dijalankan pada hari kejadian ialah forum serta ceramah industri dan kerjaya. Sesi perkongsian ini telah disampaikan oleh beberapa penceramah jemputan, antaranya; 1) Encik Wan Ahmed Syarafie (PETRONAS), 2) Cik Rashidah Binti Abdul Aziz (Fortress Mining Sdn Bhd), 3) Dr Dana Anak Badang (Jabatan Mineralogi dan Geosains), 4) Encik Oskar Pakpahan (UMD Petroleum), dan 5) Encik Arie Krisna Lopulisa (SLB). Selain itu, terdapat juga pameran geosains yang diadakan oleh beberapa organisasi dan industri seperti: 1) Universiti Malaya Geological Society of Malaysia Student Chapter; 2) American Association of Petroleum Geoscientists Universiti Malaya Student Chapter; 3) Universiti Malaya European Association of Geoscientists and Engineers Student Chapter; 4) Universiti Malaya Society of Petroleum Engineers Student Chapter; 5) Institute of Geology Malaysia (IGM); 6) Hurricane Geo Inspection Sdn. Bhd.; 7) Jabatan Mineral dan Geosains (JMG) Malaysia; 8) EeHSSE Consulting Sdn. Bhd. dan; 9) Kelab Geologi Universiti Malaysia Sabah. GIW23 juga menganjurkan beberapa pertandingan seperti: 1) *Volcano Model Building*; 2) *Oil Pump Model Building*; 3) *Case Study* dan; 4) *Short Video*.

Geoscience Industrial Week 2023 (GIW 23) telah menjadi suatu platform yang sempurna untuk mengumpulkan pelajar, ahli akademik, dan ahli geologi untuk bersama-sama mengambil bahagian dalam pertukaran wacana intelektual melalui aktiviti yang telah kami rancang. GIW tahun ini telah berorientasikan tema dengan lebih progresif, serta menjadi pemangkin bagi potensi perkongsian dan peluang kerjaya kepada pelajar. Malah, impak positif yang didapati melalui program ini adalah pelajar geosains dan peserta lain dapat mengenali dan mengetahui kerjaya dan latihan amali (*career and internship*) lebih mendalam melalui idea-idea geosains baharu yang dipersembahkan oleh pakar geosains selari dengan perubahan zaman yang semakin moden. Namun, keadaan cuaca semasa yang agak membimbangkan telah mengurangkan jumlah peserta yang dapat hadir pada hari kejadian berikutan perintah pihak kerajaan berkaitan larangan aktiviti luar bilik darjah. Secara keseluruhan, GIW 23 telah berjaya menyediakan satu platform perkongsian ilmu geosains dan wajar diteruskan pada masa akan datang.

Foto 1: Dekan Fakulti Sains, Prof Dr. Zulqarnain memberikan ucapan perasmian.

Disediakan oleh:
Aiman Haziq bin Hamzah
Geoscience Industrial Week 2023

Foto 2: Dekan Fakulti Sains, Prof Dr Zulqarnain merasmikan program Geoscience Industrial Week 2023.

Foto 3: Murid MRSM Sg Besar melawat pameran bahagian Universiti Malaysia Sabah.

Foto 4: 'Career Talk' oleh Encik Arie Krisna Lopulisa.

Foto 5: Murid SBP Integrasi Rawang di pameran UM GSM SC.

Foto 6: Sesi forum dengan Cik Nur Rashidah dan Encik Wan Ahmed Syarafie.

Foto 7: Dr Muhammad Hatta Roselee dengan peserta pertandingan 'Volcano Model Building'.

Foto 8: Majlis penutupan program GIW 2023.

STUDENTS' REPORT

Summary report of GSM-UMS Geology Club programs held in July 2023

KOTA KINABALU – On July 1, 2023, the GSM-UMS Geology Club in collaboration with Pertubuhan Kebajikan Impak Komuniti Sabah (PIKOS) has organized a charity run, entitled 'GeoRun: Costume Fun Run'. This programme was participated by students from Univestiti Malaysia Sabah (UMS) and the public. This program was held to help raise funds for the groundwater exploration project in Pitas, Sabah as well as to raise awareness of involvement of the public in practicing charitable acts to help people in need.

In addition, a webminar, 'Geotalk 12.0: Geohazard' was held on July 8, 2023 which was participated by geology students from UMS and the public with geological background. The panellist invited was Mr. Lee Kun You, P. Geol, one of the alumni of UMS geology program. The objective of this program was to exposed geology students and the public to geohazards such as landslides and the intervention of geologists in landslide prevention and recovery.

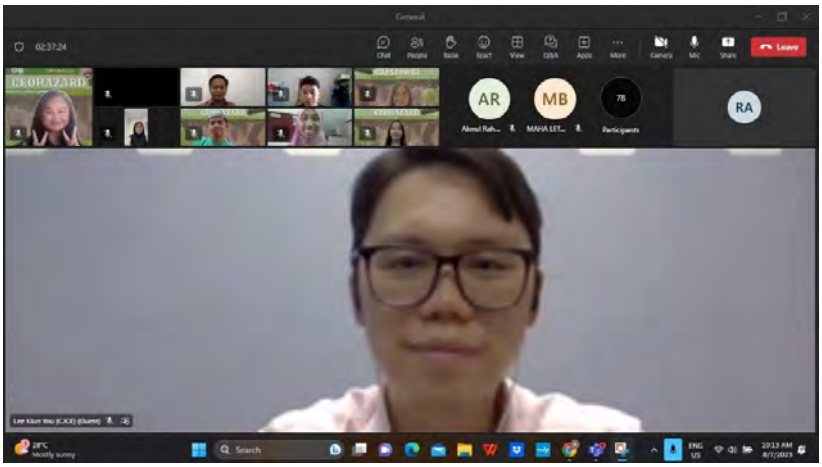
Opening ceremony of GeoRun: Costume Fun Run.
Photo by: GeoRun Publicity Team.

Participants running during the program.
Photo by: GeoRun Publicity Team.

Group photo of all participants and organizing committee.
Photo by: GeoRun Publicity Team.

Winner of the Best Costume prize.
Photo by: GeoRun Publicity Team.

Poster of 'Geotalk 12.0: Geohazard' programme. Photo by: Geotalk 12.0 Publicity Team.



Group photo of the participants of the programme with panellist. Photo by: Geotalk 12.0 Publicity Team.

Prepared by:
Wong Yee Huey
Secretary, GSM-UMS Geology Club

NEWS

Kalisada Beach Cleaning Project

Peter Mark Lloyd
Bali, Indonesia

The famous Kehena Beach (Dolphin Beach) and Punalu'u Beach in Hawaii are two of the World's top-rated black sand beaches. Our vision is to make Kalisada's Beaches in Bali, Indonesia, just as beautiful!

March 2016: Motivate and educate the kids. Police chief Budiaso making hot dogs.

The Young Kalisadians and community get fully engaged.



By 2022, the beach had become very clean, so clean that people used it far more than previously. Little warungs were set up AND the plastic crisis started! The government had stopped villages throwing waste into rivers and this helped clean up the sea garbage. But beach goers and people using the coastal pathway (built generously by the government) thoughtlessly trashed and ruined the setting!





The 2023 crisis! People thoughtlessly dumped plastics bags and bottles, the warung did not clean up rubbish after their bins were stolen, low lying vegetation got out of control. Regular clean ups were no longer conducted by the Young Kalisadians...and the environment was spoiled!



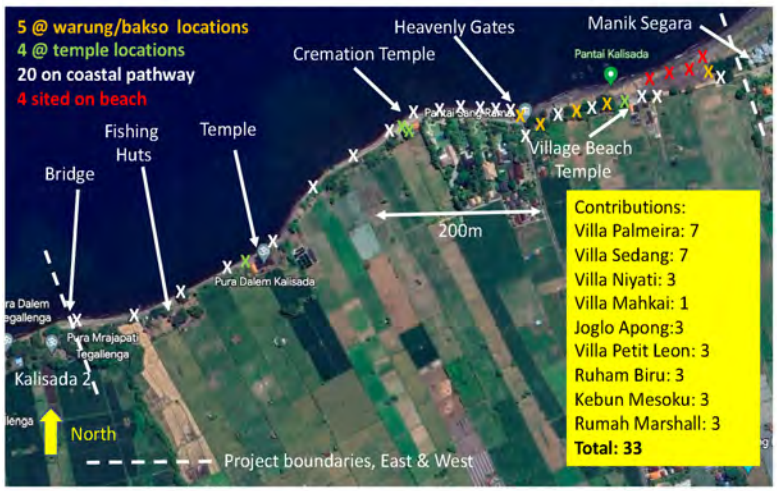
Crisis meeting with the village elders.

Rebuild the beach cleaning teams.

Collect the rubbish...

Haul it off...

Put out rubbish receptacles...



The new rubbish receptacles that cannot be stolen!

The Big Test: How much of the beach-front could be cleaned? 12 people worked for 75 minutes and completely cleaned 500 meters all along the coastal path and beaches!

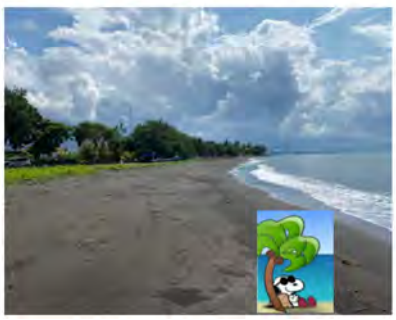
The coastal pathway from Pura Dalem and the beach areas in front of the villa's, to the heavenly gate, further on to the bakso wagon and the two adjacent warungs between the fishing boats, are now perfectly clean, clear of plastics and unwanted undergrowth.

A similar beach clean has been conducted to the East on the beach and around the far eastern warung with excellent results.

People are slowly learning how to use the rubbish receptacles, and with bi-weekly clean-ups of just an hour by such teams, the whole Kalisada Beach area and coastal pathway can be kept beautiful.

Before: Several back beach areas overgrown with lots of plastics and other unsightly waste.

After: Vegetated shady areas to pull up the fishing boats, clean little warungs for the villagers to enjoy cool drinks and snacks, and a black sandy beach as good, and as clean, as anywhere in the world!



Sustainability: Beach cleaning field trips are now part of the "curriculum" for the school kids: 600 joined our March 2023 deep clean. And it's infectious: the Kalisada population keeping this pretty little village clean!

UPCOMING EVENTS

August 28-September 1, 2023: The International Meeting for Applied Geoscience & Energy (IMAGE) 2023; Houston, Texas. More details about the event at https://www.imageevent.org/.

September 4-6, 2023: APPEC 2023 (39th Annual Asia Pacific Petroleum Conference); Singapore. Website: https://commodityinsights.spglobal.com/appec2023.html.

September 26-29, 2023: Colloquium of African Geology (CAG) organized by Geological Society of Africa (GSAf): The earth sciences and Africa's development: Current realities, future projections; Safari Hotel Conference Centre, Windhoek, Namibia. More details about the event at https://cag29gsaf.org/.

October 2-3, 2023: AAPG/EAGE New Discoveries in Mature Basins; Kuala Lumpur. Details about the event can be found at https://www.aapg.org/global/asiapacific/events /announcement/articleid/64460.

October 7-10, 2023: AAPG Midcontinent Sectional-'Finding New Oil and Gas the Old-Fashioned Way'; Oklahoma City Convention Center, Oklahoma. Event website: https://www.aapgmcs2023.org/.

October 9-11, 2023: 5th Edition: Siliciclastic Reservoirs of the Middle East; Khobar, Saudi Arabia. More details at https://www.aapg.org/global/middleeast/events/workshop/articleid/64426.

October 24-26, 2023: Offshore Technology Conference 2023; Brazil. More details can be found at https://otcbrasil.org/.

October 25-27, 2023: 21st Southeast Asian Geotechnical Conference and 4th AGSSEA Conference (SEAGC-AGSSEA 2023); Bangkok, Thailand. Visit website https://seagcagssea2023.com/ or email seagc2023@gmail.com to obtain more information.

October 30-November 2, 2023: International Geomechanics Symposium (IGS); Abu Dhabi, UAE. Details about the event is at https://www.igsevent.org/.

November 6-8, 2023: 2023 International Conference and Exhibition (ICE); Riu Hotel Plaza Espana, Madrid. Visit the event website for more details: https://madrid2023.iceevent.org/.

November 7-9, 2023: 36th National Geoscience Conference, NGC 2023, Putrajaya. Contact 03-79577036 or send an email to geologicalsociety@gmail.com for enquiries.

December 4-6, 2023: Latin America Unconventional Resources Technology Conference; Hilton Buenos Aires. For further details, visit https://urtec.org/latinamerica/2023/.

December 18, 2023: Asian Conference on Science, Technology & Medicine (ACSTM); Dubai, UAE. More details at https://acstm.org/.

February 12-14, 2024: International Petroleum Technology Conference (IPTC); Dhahran Expo, Kingdom of Saudi Arabia. Visit https://www.iptcnet.org/ for more information about the event.

February 20-23, 2024: 18th Regional Geoscience Conference of Southeast Asia : GEOSEA 2024; Khon Kaen, Thailand. Contact information@geosea2024.com for general information.

February 26-29, 2024: 14th Asian Regional Conference (ARC14) of International Association for Engineering Geology and the Environment (IAEG); Kota Kinabalu, Sabah, Malaysia. More details at https://www.arc14.asia/.

April 1-11, 2024: Grand Canyon IUGS Geoheritage Adventure; Arizona. For further details, visit https://iugs-geoheritage.rg/iugs-adventure/ or contact iugs.globalgeosites@igme.es.

May 6-9, 2024: Offshore Technology Conference 2024; Houstan, Texas, USA. See details at https://2024.otcnet.org/.

June 17-19, 2024: Unconventional Resources Technology Conference (URTeC) 2024; Houstan, Texas, US. More details at https://urtec.org/2024/save-the-date.

August 25-31, 2024: 37th International Geological Congress (IGC 2024), Busan, Republic of Korea. Further information about the conference can be found athttps://www.iugs.org/igc.

ORGANISER

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NGC 2023

THE 36TH NATIONAL GEOSCIENCE CONFERENCE

7-9 NOVEMBER 2023
THE EVERLY PUTRAJAYA

CALL FOR PAPERS

Full manuscripts that clear the review process will be published in the Bulletin of the Geological Society of Malaysia or Warta Geologi, which are indexed by Scopus, AAPG Datapages and MyJurnal/MyCite.

2ND CIRCULAR

- **DEADLINE FOR ABSTRACT SUBMISSION**
  30 SEPTEMBER 2023
- **DEADLINE FOR FULL MANUSCRIPT SUBMISSION**
  30 OCTOBER 2023

03-7957 7036

geologicalsociety@gmail.com

2ND ANNOUNCEMENT: CALL FOR PAPERS

The Geological Society of Malaysia is pleased to announce that the 36th National Geoscience Conference (NGC) will be held at The Everly Putrajaya from 7-9th November 2023. The NGC 2023 will continue the tradition as the premier geoscience event in the country; well attended by geologists from academia as well as the public and private sectors. The organisers will be applying for CPD Points from the Board of Geologists Malaysia for the event.

SCOPE

- Disaster Risk Reduction, Climate Hazards and Engineering Geology
- Climate Change, Renewable Energy and Carbon Sequestration
- Mineral Resources Development and the Environment
- Groundwater Resources and Water Security
- Conservation Geology, Geoarcheology and Geotourism
- Quaternary, Coastal and Marine Geology
- Tectonics and Structural Geology
- Stratigraphy, Sedimentology and Paleontology
- Geochemistry and Its Applications
- Geophysics, Geospatial Applications and Geotechnology
- Policies, Ethics and Professional Practice

FIELDWORK AND SPECIAL EVENTS

- Fieldwork in Putrajaya and surroundings (9 November 2023)
- Launch of the GSM-Seadpri-UKM Program for Social Entrepreneurship in Disaster Risk Reduction
- Dialogue: Exploring the Geoscience, Climate Change and Biodiversity Nexus

IMPORTANT DATES

- 30 September 2023: Abstract Submission (200-300 words)
- 30 October 2023: Full Manuscript Submission
- 30 October 2023: Notice of Abstract Acceptance
- 30 October 2023: Early Bird Payment

CONFERENCE FEES

- RM 400 for GSM/IGM Member, with submission of full manuscript by 30 October 2023
- RM 500 for GSM/IGM Member, with submission of abstract (200-300 words) by 30 September 2023
- RM 600 for GSM/IGM Members
- RM 700 for non-GSM Members inclusive of 1-year membership subscription to GSM
- RM 400 for student members of GSM
- RM 100 add-on for late payment and on-site registration for each category

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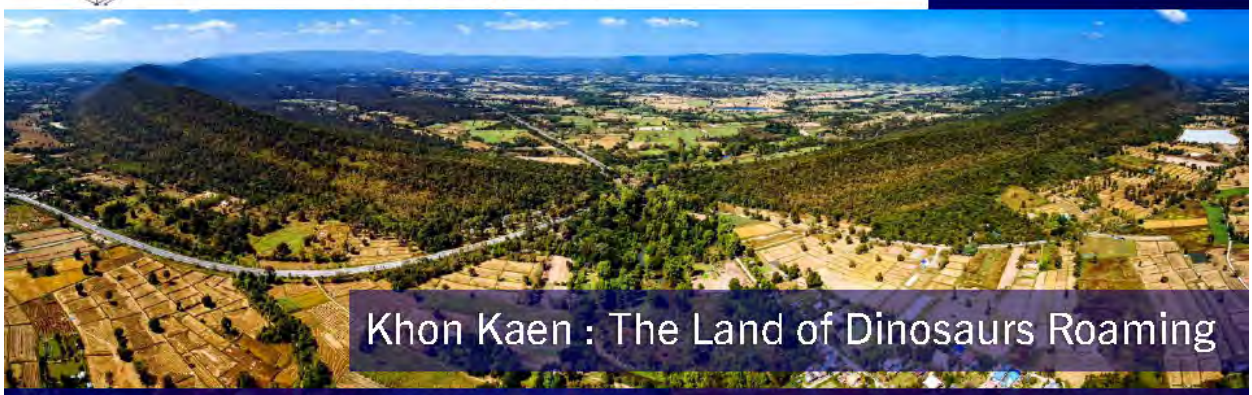
The 18th Regional Geoscience Conference of Southeast Asia : GEOSEA 2024

GEOSEA 2024
THAILAND

GEOSCIENCE FOR SOCIETY

February 20-23, 2024
Pullman Khon Kaen Raja Orchid Hotel,
Khon Kaen, Thailand



Khon Kaen : The Land of Dinosaurs Roaming

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SECOND CIRCULAR
July 12, 2023

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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.

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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)

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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.

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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.

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