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The roles and implications of several prominent unconformities in Neogene sediments of the greater Miri area, NW Sarawak

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Abstract: The greater Miri area in NW Sarawak can be seen as a basin extension of the NW Borneo Foredeep to the onshore with uplifted and exposed outcrops of Neogene sediments suitable for both lithological and chronostratigratigraphic investigations. The Neogene sequence contains also up to four prominent unconformities that can be studied in a number of outcrops including the well-established Mid-Miocene Unconformity and the less welldefined Shallow Regional Unconformity, Intra-Pliocene Unconformities observed are yet-to-be fully established due to a lack of detailed chrono-biostratigraphic investigations for age assignment of the exposed outcrops. Nonetheless, the stratigraphic importance and the presence of the mentioned unconformities may be related to other established regional tectonic events mapped in offshore Sarawak and Sabah with better seismic coverage. Their significance cannot be under-estimated and may provide a better insight on the regional uplift history and the tectonic evolution of the structurally complex NW Borneo margin.

Keywords: Miri, MMU, Neogene, NW Sarawak, unconformities

INTRODUCTION

The Neogene sediments of the greater Miri area are the extensional deposits of a much larger basin, the NW Borneo Foredeep. Geological studies in the area commenced with oil exploration at the onset of the 20^{th} century, and were further deepened by geologists of the Sarawak Geological Survey (e.g., Wilford, 1961; Haile, 1962) with summaries of the early onshore exploration history published by Tate (2001), Hutchison (2005), Wannier *et al.* (2011) and Jong *et al.* (2017). In recent years, field work by the authors and members of the Curtin University of Malaysia in Miri, as well as seismic and drilling activities of JX Nippon have helped to clarify a number of stratigraphic and tectonic problems, such as:

- The provenance, timing of erosion and the geochemical fingerprints of Neogene formations (Nagarajan *et al.*, 2017a & b).
- The likely course of the Baram/West Baram Line lineament (Kessler, 2005 & 2010, Kessler & Jong, 2016a).
- The nature of faulting and folding (Jong *et al.*, 2014 & 2015).
- The timing of uplift and inversion tectonism in the area (Jong *et al.*, 2014 &2016; Kessler & Jong, 2015a & 2016b).

In the greater context of the South China Sea tectonic evolution, unconformities are important from both stratigraphic as well as tectonic standpoints, given these erosional events can help to describe the history of compression and uplift, and by doing so provide a tool to temporally and stratigraphically link numerous sub-basins (e.g., Kessler & Jong, 2015a & 2016b).

This paper focuses on the study of outcrops in the greater Miri area to investigate the observed unconformities with the key objectives of estimating their geological timings with established tectonic events, and to compare with their established offshore seismic analogues, where applicable.

GEOLOGICAL SETTING AND REGIONAL STRATIGRAPHY

A summary for the geological setting of the study area is provided by Kessler (2010) and Jong *et al.* (2016). From a tectonic standpoint, the study area encompasses the Baram Delta Block and the adjacent footwall terrane of Luconia/Tinjar Block. The hanging-wall Baram Delta Block was rapidly subsiding with clastic sedimentation, whilst the Luconia/Tinjar Block had a lower subsidence rate. Being only moderately folded, the Luconia/Tinjar Block is characterized by a number of synclines with minor overthrusting (Figure 1). The Baram Line (or West Baram Line) acted as a tectonic discontinuity that links the relatively stable Luconia/Tinjar Block to the mobile and siliciclatic-dominated Baram Delta Block. The simplified chrono-stratigraphic summary for NW Sarawak/Brunei covering the study area is shown in Figure 2. On a more



Figure 1: Schematic block diagram of NW Sarawak with a regional perspective of Late Miocene/Pliocene times. Luconia/Tinjar Block constitutes the footwall, the Baram Delta the hanging-wall NW of the Baram Hinge Zone. The orange Baram/West Baram Line shown in the inset map constitutes an important facies boundary, with carbonates dominate in Luconia/Tinjar and clastics in the Baram Delta Block. Given the folding of areas such as the Belait-Badas Syncline, Bukit Lambir, Miri etc., NW Sarawak serves as an example of relief-inversion (from Kessler, 2010; Jong et al., 2016).



Figure 2: Simplified litho-stratigraphy scheme of the study area. The nomenclature of Miri Formation is generally used in the greater Miri area and is age-equivalent to the upper section of the Lambir Formation, Sandal (1996) however, placed the formation partially age-equivalent to the lower Tukau Formation. Likewise, the mid Early Miocene Sibuti Formation is more locally confined with the Subis Limestone Member in the lower part of the formation located along the central anticlinorium of the Sibuti Formation (Banda & Honza, 1997). Carbonates are also widespread in the Palaeogene section, and are seen in a number of outcrops and wells (e.g., Batu Niah, Engkabang-1; Jong *et al.*, 2016). The observed unconformity events from this study are as annotated with SRU (~10 Ma) not identified previously by the authors. Modified from Kessler & Jong (2015b).

regional context, the established chrono-stratigraphic scheme of NW Borneo is illustrated in Figure 3.

UNCONFORMITIES

Looking back on some 50 years of stratigraphic research in NW Borneo, the original approach of describing sequences by unconformities has stood the test of time (Kessler & Jong, 2015a), whereas the sequences encountered between the unconformities might be described best by local parameters. The problem of correlating sediments in Sarawak stems from the rather unique geology attributed to Borneo Island and the surrounding offshore areas that are affected by various episodes of uplift and inversion tectonism.

Recently, a noteworthy study by Morley *et al.* (2015) based on detailed chrono-stratigraphic correlations across the South China Sea using the concept of VIM (Vietnam-Indonesia-Malaysia) transgressive-regressive cycles has resulted in the recognition of six main unconformities, ranging from a Basal Miocene Unconformity to an Early Pliocene Unconformity. The mentioned study noted that some of these unconformities have previously been confused as a single Mid-Miocene Unconformity (MMU), which shows a maximum extent *ca.* 11-12 Ma associated with the end of Nan Con Son and offshore Sarawak rifting. Followed-up discussions on regionally extensive unconformities across the South China Sea have also been published lately by Morley (2016) and Kessler & Jong (2016b).

Figure 4 shows the outcrop locations of Neogene sediments with prominent unconformities observed in greater Miri area, and the following unconformities can be seen (and sometimes mapped) in the study area (Table 1).

The Mid-Miocene Unconformity (MMU, *ca.* 15.5 Ma)

Regional context: The MMU is strongly expressed on the Sarawak/Sabah section of the southern Sundaland margin only (Kessler & Jong, 2016b). It forms in Sarawak commonly the boundary between older clay-dominated

Aga (35)	Срести	II.AO Shurttarm Saala Illacland et. al. 69 RodRed by SSD 1990 ()	ivel Macar	HAQ NOMENCLATURE	BASE (SB) (MA)	SARA	WAK	BRU	INEI	SAE	BAH	DEEPWATER
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s	2 2		1.9	TB 3.8 TB 3.7 TB 3.7 1	1.9	Cyc	le VII	Cyc	le VII		Upper	
3	1000	5		TB 3,6	3.0 3.8	Cuelo	Upper		Upper Middle	Stage	Middle	Lingan Fan II
5	e P			TB 3.4	4.2	VI	Lower	Cycle VI	Lower	IV F	Lower	Lingan Fan I
6		5	5.6	TB 3.3	5.6				Lower	Stag	e IV E 📊	Pink Fan
8				TB 3.2	0.1	Cycle	Upper		Upper	Stag	e IV D SRU	Kamunsu Fan
9				TB 3.1	0.5	v	Lower	Cycle V	Middle	Stag	e IV C	Kinarut Fan
11		. 🧖	0.6	TB 262	10.6							Kebabangan Fan
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21			1.8		21.8							
23	Ħ			TB 1.4	22.2							
24				TB 13	23.7							
25	ene				24.9	Cycle I		Cyc	Cycle I		ge II	
26	Late			TB 1.2								
28	0			TB 1.1	27.3							
29				199 300	29.3							

Figure 3: Stratigraphic scheme of the NW Borneo shelf margin from Morrison & Wong (2003), showing correlation of Sabah, Sarawak, and Brunei cycles and stages with TB nomenclature and Shell deepwater terminology.

Table 1: Estimated geological timings and characteristics of four prominent unconformities in the Neogene sediments of greater

 Miri area.

Unconformity	Older than (Ma)	Sequence above	Sequence below	Outcrops	Characteristics	References
Lower Pleistocene Unconformity (LPU)	0.02 (onshore), 1.6-1.8 (offshore)	Black sands and lignitic materials of coastal terraces	Tukau and Miri formations	Along the coastline south of Miri (see Figure 4)	Peneplanation now 10-100 m above current sea level	Kessler and Jong, 2014; and dated 1.6-1.8 Ma in offshore Bunguran Trough by Barker et al. (in prep).
Intra-Pliocene Unconformity (IPU)	3.6	?Upper Pliocene Liang Formation silts	Folded Tukau Formation sands	Kpg. Lopeng (see Figure 4)	flat and truncating the underlying folded Tukau beds	Kessler and Jong (2016b); Barker et al. (in prep).
Shallow Regional Unconformity (SRU)	?8.5, 10 (a diachronous event)	Tukau sands and clays	Miri and Lambir sands and clays	See map, near Tusan Beach area (Figure 4)	In a few places the unconformity is angular	Levell, 1987; Kessler and Jong, 2016b
Mid-Miocene Unconformity (MMU)	15.5 (a diachronous event)	Miri and Lambir formations	Setap shale	See map, near Kpg. Bekenu and Pantai Bungai (Figure 4)	Conform or very low angle	Hutchison, 2005; Wannier et al., 2011; Kessler and Jong, 2015b & 2016b.

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Figure 4: Outcrop locations of Neogene sediments with prominent unconformities observed in the greater Miri area. Yellow = LPU, Pink = IPU, Blue = SRU, Green = MMU.

Setap Shale and upper sand-dominated Lambir/Miri formations (Kessler & Jong, 2015a & b). The MMU can be traced as a seismic event in the near offshore Sarawak area (Figure 5), but in Sabah there remain uncertainties in correlation with other events such as the Deep Regional Unconformity (DRU) (Cullen, 2010 & 2014). Other areas of the South China Sea show less evidence of this unconformity. Iver et al. (2012) established a context between the unconformity and uplift in Central/North Luconia, and a diachronism of the MMU towards the northeast was recognised. A missing section based on existing well data varies from 2 - 8.5 Ma (from south to north, Figure 6) but more well penetrations are essential to constrain the MMU time gap. Although uplift data of ca. 15 - 17 Ma are not uncommon, the context between uplift and this very important unconformity requires further data and analysis.

In onshore central Sarawak, the MMU is characterized by an angular unconformity and at eastern Tatau Horst it separates the strongly folded Bawang Member turbidites and overlying Rangsi Conglomerate (Hutchison, 2005). It is also seen separating the gray Upper Setap Shale from the Lambir Formation (Kessler & Jong, 2015b) in several locations in the area of Pantai Bungai, on the old interdivisional Miri-Bintulu Road in the Lambir Hills (Wannier *et al.*, 2011), and also at the road from Beluru to Long Lama (Kessler & Jong, 2015b; Figure 7). Fieldwork in Borneo showed that the MMU forms a boundary between neritic marine and shelfal deposits, as parts of the Borneo hinterlands where exhumed (Kessler & Jong, 2015a). In the study area, there is little or no dip change from the Setap to the Lambir formations (Figure 7).

The Late Miocene Shallow Regional Unconformity (SRU, *ca.* 10 Ma)

Regional context: The unconformity was previously interpreted to be the result of sea-level changes (Rice-Oxley, 1991), which is now believed to be the impact of trans-Borneo tectonics. The compression led to folding of the molasse basin edge equally affecting the Luconia/Tinjar Block and the adjacent Baram Delta Block. Likely, the unconformity points to a relatively short-lived period of compression and uplift on the Sundaland margin (Kessler & Jong, 2016b).

Field work carried out in the study area suggests that the unconformity might be angular in a few locations (Kessler & Jong, 2015b), however there are currently no good outcrops apart from a possible location located on the coastal road near Tusan Beach (Figure 4), that needs



Figure 5: (A) Seismic section immediately south of Central Luconia, showing the tightly compressed and eroded anticlines as a product of the Mid-Miocene Unconformity (Mat Zin & Tucker, 1999). The thrust-up and eroded anticlines have been commonly mistaken for horsts (Hutchison, 2005). (B) The cartoon suggests the cause of folding within the Balingian, Central Luconia and Miri Zones, and could point to the location of the Sundaland Plate margin located beneath the Rajang thrust belt. From Kessler & Jong (2016b) and modified from Hutchison & Vijayan (2010).

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Figure 6: Representative seismic profile across northern offshore Sarawak demonstrating the highly diachronous nature of the regional MMU. Missing section based on existing well data varies from 2 - 8.5 Ma (from south to north) but more well penetrations are essential to constraint the MMU time gap. CL=Central Luconia, WL=West Luconia and NL=North Luconia (from Iyer *et al.*, 2012). Post-MMU section is dominated by hemipelagics, interrupted by mass transport-dominated sequences.



Figure 7: Transition between gray Upper Setap Shale and Lambir Formation sandstones is marked by the presence of MMU with no significant change in dip. Note the colour change from light grey (carbonate debris) of Setap Shale to brownish-grey claystones and the scouring base of Lambir Formation (from Kessler & Jong, 2015b).

further investigation to underline the existing evidence. Given the significant facies change from the Lambir Formation (shelfal marine to intertidal) to the Tukau Formation (intertidal to estuarine with coal beds), the SRU might be indicative for tectonic activity such as regional uplift. In offshore Sabah, the existence of SRU has been first documented by Levell (1987). Figure 8 shows a seismic example located in Inboard Belt offshore Sabah with tremendous uplift, exhumation and amalgamation of unconformities (DRU=?MMU, SRU) and the development of mini-basins between ridges.

The Intra-Pliocene Unconformity (IPU, *ca.* 3.6 Ma)

Regional context: The unconformity appears to postdate the compression of the Sundaland Plate margin by the neighboring plates. The event is likely a consequence of a collision in Taiwan interplayed with the docking of the Philippines Plate in the Early Pliocene, with NW Borneo aligned together with the Palawan/Philippines Margin (Longley, 2014). Uplift occurred likely all along the plate margin, and led to enhanced erosion of sediments. The IPU marks the boundary between the strong uplift/ erosion period, and a quiescence tectonic time interval that followed. It is noted, however, that uplift continued in the Quaternary in areas of NW Borneo and Taiwan (Kessler & Jong, 2016b). Possibly this could be interpreted as a consequence of the monsoonal effect, leading to enhanced erosion, largely, if not entirely, driven by climatic factors (e.g., Hall & Nichols, 2002). Based on offshore data, it is worth mentioning that an Early Pliocene Unconformity *ca*. 3.5 Ma has also been established by Morley *et al.* (2015).

There is not a lot of outcrop evidence of the IPU in the study area apart from one located in Kampong Lopeng (Figure 4), where the IPU separates flat-lying siltstone beds of the Upper Pliocene Liang Formation from an older, folded and thrusted Tukau Formation (Figure 9). Recently, based on well drilling outcomes in the Bunguran Trough, offshore Sarawak, a young erosional event has been identified at the Upper Miocene Top Cycle V section and is moderately expressed on seismic. This erosional event has been dated with biofacies technique and is established as the IPU (Kessler & Jong, 2016b; Barker *et al.*, in prep.; Figure 10).

The Lower Pleistocene Unconformity (LPU, *ca*.1.6-1.8 Ma)

Regional context: It appears uncertain, whether or not the LPU constitutes a local anomaly or if it is also present in other parts of the South China Sea. However, from the latest exploration well results and work carried out by JX Nippon in the Bunguran Trough, in particular based on the new information obtained from the 2014 exploration well "T-1", which targeted the very young Plio-Pleistocene sediments of Cycles VII and VIII has



Figure 8: Regional composite 2D seismic line with mapped TB sequences from Sabah Inboard Belt showing areas of tremendous uplift, exhumation and amalgamated unconformities with development of mini-basins between ridges. The above shown DRU might correspond to the MMU (from Kessler & Jong, 2016b).



Figure 9: A prominent IPU is observed at the base of the Upper Pliocene Liang Formation and truncating the folded and sub-vertically dipping Tukau Formation. Outcrop located near Kampong Lopeng.

provided a rich biostratigraphic dataset that show a new insight into these young sequences. The sequences are defined by sequence boundaries, which relate to calcareous nannofossil assemblages that are responding to the changes in sea-level and local factors, and interpreted in the context of the sequence stratigraphy and high resolution bio-stratigraphy has given rise to a proposed new "Cycle IX" (Barker *et al.*, in prep; Figure 10). The base of this newly-defined Cycle IX is marked by a 3rd order sequence boundary, with this low stand system tract event assigned an age of *ca.* 1.6-1.8 Ma and herein we defined as the LPU.

Onshore in the Miri area, the unconformity is widespread and constitutes a peneplanation surface, which truncates the Tukau and Lambir formations (Figure 11). In the study by Kessler & Jong (2014), radiometric C-14 based age determination in ten coastal terrace locations indicates an age range from Late Pleistocene to Early Holocene ($28,570 \pm 230$ to $8,170 \pm 50$ years BP). Given the terrace deposits were formed in the same environment, but are now located at different elevations and appear to be block-faulted, it might imply significant tectonic movements in the Holocene.

DISCUSSION AND FURTHER STUDY OBJECTIVES

Unconformity data of the South China Sea are mostly seismic events, with the occasional calibration by well data. For onshore however, seismic data especially modern 3D seismic coverage is rare and in many cases, well data if any, are of poor quality or incomplete. This means that unconformities can be easily overlooked or misinterpreted, particularly, if neither dipmeter nor image log data are available. Therefore, additional calibrations with onshore outcrop data are paramount to identify the key erosional events/unconformities such as those discussed in this paper that may be related to establish regional tectonic events. Their significance cannot be under-estimated and may provide a better insight on the regional uplift history and the tectonic evolution of the structurally complex NW Borneo margin.

Unfortunately, there is, with the exception of the MMU, very little knowledge about the duration of the hiatus related to the SRU, IPU and LPU events. Therefore, it is necessary in particular, to establish a proper age determination for:

• The age of the uppermost Lambir and Miri formations, either Late Miocene or Early Miocene, beneath the SRU;



Figure 10: Composite seismic section from 'T-1' to 'J-1ST1' across the Bunguran Trough. At 'T-1' well location an undifferentiated section at the base of the well TD was later dated as Upper Miocene Cycle V, whilst the overlying section is mainly Pleistocene Cycle VII and younger sequences. The dashed pink line is potentially the IPU observed in this area, whilst the dashed yellow line has been defined as the based of the new "Cycle IX" by Barker et al. (in prep). From Kessler & Jong, 2016b.



Figure 11: A prominent LPU is observed at the base of the uplifted coastal terrace deposits truncating the folded Miri Formation. Outcrop located along the coastal road in the vicinity of the Tusan Beach area.

• The age of the lowest beds in the Tukau Formation, overlying the SRU;

• The age of the beds in the Liang Formation above the IPU;

• The age of the youngest beds of the Miri and Tukau formations truncated by the LPU.

With the paucity of detailed biostratigraphic information from the outcrops to fully establish the geological timings of the discussed unconformities, it is therefore recommended that detailed and combined foraminifera, nannofossil and palynological biostratigraphic investigations of the outcrop samples to be undertaken to lend further support to the observations and unconformity events discussed in this paper.

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2D electrical resistivity survey for slope stability study at Taman Desa Ampang, Selangor

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Abstract: An electrical resistivity survey has been carried out at Taman Desa Ampang, Selangor to identify the slope failure plane for further engineering work to strengthen the slope. Several electrical resistivity tomography (ERT) lines have been carried out on the slope. Resistivity profiles were correlated with the existing borehole data for interpretation. The soil properties are found to correlate well with the processed resistivity results. Different soil types or rocks display different resistivity values. Hence subsurface soil can be interpreted by comparing the processed resistivity value with the standard value of known soil types. With these interpreted soil or rock, the failure plane can be identified. The result after the inversion model shows that the site is covered by top soil and water saturated residual soil with resistivity range of 100 - 1,000 Ω m, very stiff to hard sandy silty (residual soil and weathered schist) with resistivity range of 1,000 - 3,000 Ω m, and fresh schist or bodies of granite with resistivity range of more than 3,000 Ω m. Generally the residual soil is weathered sandy silt with maximum thickness of 5 m. The residual soil material is verified by borehole data. Schist from Hawthornden Formation is expected to underlain the residual soil. There were several high resistivity zones observed within the residual soil and schist layer. It is believed that this high resistivity values is related to fresh schist. During prolonged heavy rainfall, water infiltrated through top layer soil into subsurface thus decrease the binding between soil and boulders. Water saturated residual soil will also decrease the shear strength between the particles. When shear strength and friction of soil or rocks against slope failure is exceeded, over burden such as soil and boulders may slide downhill and cause a landslide.

Keywords: electrical resistivity, slope stability, landslide, Hawthornden Formation

INTRODUCTION

Landslides had resulted in large number of casualties and huge economic loss in hilly and mountainous areas in Malaysia. Due to rapid development since the 1980s, strategic and suitable low-lying areas for development have become increasingly unavailable in Malaysia. As a result, the development of highland or hilly terrain has increased, particularly in areas adjacent to densely populated cities thereby exposing urban communities to an increased risk of landslide occurrence. Since 1961, more than 15 major landslides including natural and man-made slopes have been reported near to or within highly populated cities in Malaysia (Suhaimi Jamaludin & Ahmad Nadzri Hussin, 2006). Landslides prone areas at west Malaysia includes Klang valley, Selangor, Pahang and Johor.

The study area is a hill of 20 m high located within Taman Desa Ampang, which is at the east of Kuala Lumpur with coordinates approximately at Lat 3°08'23.99" N, Long 101°46'33.64" E (WGS 84) and a maximum elevation of 110 m. The study area is surrounded by residential houses (Figure 1), where these people and properties will be at high risk when landslides occur. A small landslide has been reported in the NW face of the hill.

2D electrical resistivity is an accurate geophysical method to record subsurface resistivity changes in both



Figure 1: 3D view of Study Area.

vertical and horizontal direction along survey line. The 2D electrical resistivity method is also cost-effective and fast computer-controlled data acquisition with high resolution of colour-coded images for the subsurface geological patterns.

The aim of this study is to identify potential failure slips and soil over burdens in subsurface of Taman Desa Ampang using 2D imaging resistivity method. After data processing of the resistivity lines, interpretation shows

Table 1: Geology / Stratigraphy of the Kuala Lumpur areas(after Yin, 1976 and Ingham & Bradford, 1960).

Age	Geology of Kuala Lumpur
Quaternary	Alluvium (Young & Old Alluvium)
Triassic	Granite & Allied Rocks
Palaeozoic	 Kenny Hill Formation (quartzite / phyllite) Kuala Lumpur Limestone Hawthornden Formation

detail subsurface geological structures such as water saturated zone, residual soil and fresh schist or granite bodies. Slopes structures which are prone to failure can then be predicted.

GEOLOGICAL SETTING

The regional geology of the study area comprises of Hawthornden Formation (middle Ordovician to middle Silurian) which is overlain by Kuala Lumpur Limestone (middle Silurian to lower-middle Devonian) (Gobbett, 1964; Table 1). Hawthornden Formation experienced their first folding from Devonian, producing east-west folding axes due to karst of the Kuala Lumpur Limestone Formation. These lower Paleozoic formations are then later unconformably overlain by shales, mudstones and sandstones of Kenny Hill Formation (middle Carboniferous to late Permian) (Lee, 2009) and being folded for the second tectonic activity in late Triassic resulting in metamorphosed and folded strata follow a north-south trend. The country rock was then intruded by granite, estimated to be broadly younger than the second phase of folding. The last period of deformation is NE-SW and NW-SE trending faulting, which affected all formations, including granite.

HAWTHORNDEN FORMATION

Hawthornden Formation is the rock unit within the study area. This formation is made up of a mixture of quartz-mica amphibolites and carbonaceous schists, phyllites and quartzites.

FIELD MAPPING

Literature review indicates that the survey area falls within Hawthornden Formation, which is surrounded by Kuala Lumpur Limestone and Triassic granite in the northwest direction and southeast direction, respectively (Figure 2).

A geological mapping was carried out around the hill of Taman Desa Ampang. A few slope outcrops are found and their locations are as shown in Figure 3. Samples collected from the outcrops are shown in Figure 4 to Figure 8. The samples are metamorphic sedimentary rocks, probably belonging to the Hawthornden Formation. The finding indicates the Palaeozoic Hawthornden Formation is underlain by the Triassic granite body. Intrusion from the granite has caused contact metamorphism to the older sedimentary formation.



Figure 2: Geological setting of Kuala Lumpur (Yin, 1967).

RESISTIVITY THEORY: CONCEPTUAL INTRODUCTION

Electrical resistivity studies in geophysics may be understood in the context of current flow through a subsurface medium consisting of layers of materials with different individual resistivity. For simplicity, all layers are assumed to be horizontal. The resistivity, ρ of a material is a measure of how well the material retards the flow of electrical current. Resistivity varies tremendously from one material to another. For example, the resistivity of a good conductor such as copper is on the order of 10-8 Ω m, the resistivity of an intermediate conductor such as wet topsoil is $\sim 10 \Omega m$, and the resistivity of poor conductors such as sandstone is $\sim 108 \ \Omega m$. Hence, even with little information provided, unknown materials can be determined by measuring its electrical resistivity. In field studies, the resistivity of a material may be combined with reasoning along geologic lines to identify the materials that constitute the various underground layers.

SURVEY METHODOLOGY

Resistivity method is an electrical geophysical imaging method to measure subsurface apparent resistance distribution by injecting direct current into the ground using 2 current electrodes. A potential difference is measured using 2 potential electrodes. Electrical imaging system is now mainly carried out with a multi-electrode resistivity system. Such surveys use a number (usually 25 to 100) of electrodes laid out in a straight line with a constant spacing depending on array selected. A computer-controlled system is then used to automatically select the active electrodes for each measure (Griffiths & Barker, 1993).

Switching of the current and potential electrode pairs is done automatically using a console computer and relay box. The computer initially keeps the spacing between the electrodes fixed and moves the pairs along the line until the last electrode is reached. The spacing is then increased and the process repeated in order to provide an increased depth of investigation. Measurement of ground resistivity involves passing an electrical current into the ground using a pair of stainless steel electrodes and measuring the resulting potential difference within the subsurface using a second pair of stainless steel electrodes.

Resistivity imaging is an inverted model of hundreds of four electrodes resistivity measurement. Hundreds of measurements of a site are required to produce 2D imaging model of the subsurface. A resistivity imaging is taken using an acquisition algorithm that collect data from a series of electrodes placed either on the surface or located in boreholes. Two-dimensional data are collected using linear array of electrodes and the image is developed using an inversion algorithm. The inversion algorithm uses the collected apparent resistivity data to create a model space of resistivity value that would replicate the collected data. Apparent resistivity can be seen as a weighted average of the different resistivity under the four electrodes. If the ground is homogeneous the apparent resistivity equals the true resistivity.

Figure 3 shows 7 surveyed resistivity lines within the study area. Wenner configuration is chosen to image the



Figure 3: Surveyed resistivity lines in study area (Google Earth View).



Figure 4: Samples from various observation point (with reference to Map in Figure 3).

subsurface resistivity due to its high sensitivity to vertical changes. All 7 surveyed lines comprises of 120 m spread length and 41 stainless steel electrodes with 3 m electrode spacing. These electrodes are connected to cables via stainless steel crocodile clips then cables are connected to multicore cables and into console for data acquisition.

RESULTS

Survey lines ML01, ML02 and ML09 were carried out in NE-SW direction along northwest slope on site. ML05 and ML07 on the other hand were carried out in NW-SE direction crossing the northwest slope. ML06 and ML08 were carried out crossing the northwest slope in W-E direction (Figure 3).

As concerned by the authority, minor landslide had occurs on site prior to resistivity survey work (Figure 7). Survey line ML02 is selected to cross at this landslide surface and to study the resistivity profile of landslide in 2D section (Figure 9).

One borehole drilling (BH 1) down to 10 m depth was conducted on the landslide slope along survey line ML02 (Figure 9). Borehole BH 1 obtained soft to stiff layer of residual soil consists of sandy silt with decayed woods. Below the residual soil unit, hard sandy silt is



Figure 5: Outcrop at Observation point, Ob1.



Figure 6: Outcrop at Observation point, Ob3.



Figure 7: Survey line ML02 crossing landslide body on site.

found between 5 m to 10 m depth. It is believed that the borehole results are actually schist from Hawthornden Formation with different degree of weathering.

Correlating this information to all seven 2D electrical profiles (Figure 8 to Figure 14) the subsurface geology of the study area can be classified into three different units based on its resistivity range. The top soil and water saturated residual soil unit has a resistivity values vary from $\leq 100 - 1000 \ \Omega m$. The thickness of residual soil layer is about 1 m to 5 m. In areas where the soil is water saturated, resistivity values of less than 100 Ωm can be observed. Underneath the residual soil layer, the very stiff to hard sandy silt, which is probably part of the Hawthornden Formation, has resistivity values that range from 1000 to 3000 Ωm . Areas with resistivity of more than 3000 Ωm is interpreted as fresh schist or granite bodies (Refer Figure 9, 10, 11 and 13).

Table	2:	Soil	material	with	corresponding	measured	resistivity.
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Soil Material	Resistivity range, Ωm
Top soil and water saturated residual soil	<100 - 1000
Very stiff to hard sandy silt (residual soil and weathered schist)	1000 - 3000
Fresh Schist or Granite	>3000

DISCUSSION AND CONCLUSION

The study area is a hill consisting of stiff to hard metamorphic rock (Probably schist from Hawthornden Formation). It is overlain by 1 to 5 metres thick water saturated and soft residual soil. Fresh schist is interpreted in several resistivity profiles at depth as shallow as 3 m (Refer Figure 9). Large fresh schist or granite bodies are found in deeper zone (Figure 10) or occur on the slope overlain by the residual soil layer (Figure 11 and 13), which has formed a discontinuity plane at the contact between residual soil and fresh schist or granite.

Line ML02 (Figure 9) runs across a slope failure where a mass of soil has moved downslope due to gravity in a landslide event. A small area of low resistivity (10 - 300 Ω m) due to weak and water saturated soil can be seen on the slope in ML02. Line M06 and M08 also show a layer of low resistivity residual soil on the slope contact with fresh schist or granite underneath. These water laden residual soil, when becomes heavier as more water accumulated in it, has a potential of sliding down the discontinuity on the fresh schist or granite plane due to gravity.

Another low resistivity region (500 - 600 Ω m) is also observed in ML02 (Figure 9) at the depth of 10 – 20 m





Figure 9: Survey line ML02.



Figure 10: Survey line ML05.





ML08

ML06

6888

9888

Figure 11: Survey line ML06.

Figure 12: Survey line ML07.

588

369



Figure 13: Survey line ML08.

SE

Top soil & residual soil boundary

.



Figure 14: Survey line ML09.

below the high resistivity fresh schist or granite (> 5,000 Ω m). This low resistivity region is possibly fractures zone within schist or granite saturated with residual soil and water. Water work as a great weathering agent in weakening particles binding physically and chemically, hence the schist or granite bodies has a possibility of becoming an unbearable burden onto this low resistivity region.

Since the borehole is only 10 m deep and did not reach high resistivity body in deeper zone. The area with resistivity value higher than 3000 Ω m cannot be proven by borehole data. Hence, the region of more than 3000 Ω m is generally interpreted as fresh schist or granite bodies. The authors are uncertain if this high resistivity body is related to fresh schist or granite body. Study area consists of Hawthornden Formation's metamorphic rocks, and located near to boundary with Kuala Lumpur Limestone (NW) and Triassic granite (NE). Existence of granite bodies underlie Hawthornden Formation is definited. However fresh schist made up of mica or quartz could correspondingly contribute to high resistivity values up to 10,000 Ω m. Hence the high resistivity body could be fresh schist or granite body.

2D electrical resistivity sections (ML05, ML06, ML08) imaging the northwest slope, reveal a distinctive resistivity contrast related to discontinuity planes between residual soil and fresh schist or granite bodies. The

discontinuity planes were almost parallel or formed curving planes underneath the slopes, which become potential surfaces for slope failure. Probability of landslide may occur when the water saturated soil overlie the schist or granite cannot be sustained due to shear strength and friction of soil between soil and granite being exceeded, the mass of soil will move downslope along the discontinuity plane due to gravity, and cause a landslide.

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Throwback Thursday: From geology to soil science

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Reading geology at UM

After HSC I was accepted as a student in the Faculty of Science, University of Malaya, Kuala Lumpur. It was way back in 1969 when there was only one public university in the country. For some reasons best known to me, I was drawn into making geology as a lifetime career. During the classes that followed, I was exposed to the realm of rocks and minerals, which became parts and parcels of my teaching materials later on in my working life. Plates 1, 2, 3 and 4 show my classmates looking at the rocks and minerals during geology field trips. Rocks are the parent materials of soils. For all you know, the fertility of soils under agricultural production in any country in the world is related much to the minerals present in the rocks.

On graduation from UM, I got a job at UPM, Serdang, after a short stint at MARDI. My first assignment at the Department of Soil Science, UPM, was to help identify rock collections by students in the Diploma of Agriculture program at the university. There was no one before me who was able to do so as they were all graduates of agriculture programs, either from UM or overseas such as US, UK, Australia or New Zealand. I considered myself lucky to be able to put my knowledge into good use at last. It was an exciting experience though.



Plate 1: Looking at the rocks and minerals during Langkawi field trip in 1970.





Plate 2: Students in full mining gear at Sg Lembing mine, Pahang in 1971.

beach in 1971.



Plate 4: A picture taken in front of Genting Hotel in 1971.

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Learning to become a soil scientist

UPM became a full-fledged university in 1971 by an act parliament. To be a qualified lecturer in a public university in Malaysia, I have to get at least master degree in my chosen field of expertise. So, in 1973, I went to Newcastle University, UK to read soil science (soil mineralogy) at MS level. For this study, I brought along with me to UK soils from Malaysia developed from basalt and andesite, which I happened to see at the geology field trips during my student's days at UM.

In 1980, I continued my education in soil science (soil mineralogy) at Ghent University, Belgium where I was awarded DSc on completion of the study in 1982. In Ghent University, I took several courses in geology and soil science, being taught by some of the best professors in business. For the research leading to the award of the degree, I again brought along soils from Malaysia found on T_2 -Terrace sporadically distributed throughout the lengths and breadths of the Malay Peninsula. T_2 -Terrace was formed by geological processes active during the Pleistocene. This goes to show that my knowledge of geology gained at UM has played a role in the development of my academic career at UPM. Further education in soil science was obtained in the University of Queensland, Australia during my sabbatical leave in 1988.

By then, I guessed my education was already completed. Hence, the next stage would be to contribute to nation building of which I did with excellence via teaching, research and public services. I have published my research papers in the like of Soil Science Society of America Journal, European Journal of Soil Science, Soil Science, Geoderma, Plant and Soil, Catena, Science for Total Environment, Advances in Agronomy and others. I have travelled far and wide for meetings and conferences during the course of my academic career at UPM. There I met many colleagues in soil science fraternity and most of them are my friends till today.

Life in the Academia

I have been working at UPM for past 43 years. I was appointed as Professor of Soil Science in the Faculty Agriculture, UPM in 1993. In 2012, I delivered a public lecture in commemoration with the 40th Anniversary of teaching soil science (Plate 5).

I am an active member of the Geological Society of Malaysia (GSM) and the Institute of Geology Malaysia (IGM). From time to time, I attended their functions and meetings, especially conferences organized by GSM.

I have been conferred with various awards during the course of my career as an academic. Among the awards are the Top Research Scientists Malaysia (TRSM) in 2013 and Malaysia Toray Science Foundation (MTSF) in 2014, which are shown in Plates 6 and 7, respectively. These pictures were taken during the award ceremony in Kuala Lumpur. I have to mention specifically here that I would not achieved this far in academia without the contribution from my students, colleagues and professors, either in the country or overseas. With all my heart, I wish to thank them all for their help.

I also have received recognition from various scientific organizations in the country and overseas for my academic contributions. I was elected as a Fellow of the Malaysian Society of Soil Science (FSoil) in recognition of my contribution to soil science. I was once the President of the Society. I was also the Past President of the East and Southeast Asia Federation of Soil Science Societies. In 1997, I was elected to the membership of the Belgian Royal Academy for Overseas Sciences (ROAS). I was then nominated by my former professor in Ghent University, who later became the President of the Academy. In 2013, on reaching the age of 65, the membership of the Academy was elevated to the Honorary Member with the blessing of the Belgian Minister of Science. Last but not least, in 2014,



Plate 5: A picture taken with the family members in 2012 after delivering a public lecture in commemoration with the 40^{th} anniversary of teaching soil science at UPM.

THROWBACK THURSDAY: FROM GEOLOGY TO SOIL SCIENCE



Plate 6: A picture taken in 2013 at the TRSM Award ceremony in Kuala Lumpur.



Plate 7: A picture taken in 2014 at the MTSF award ceremony in Kuala Lumpur.

I was conferred the prestigious Fellow of the Academy of Sciences Malaysia (FASc). The investiture was graced at a glittering ceremony held in Kuala Lumpur by no less than the PM of Malaysia himself.

Concluding remark

I am really proud of being a student of geology at UM. It was there that the seed of becoming what I am today was sown with the help of UM professors and students. It was further nurtured in various institutions that I went to after graduating from UM. I will never forget my friends and colleagues who stayed with me through thick and thin when I was reading geology at UM.

National Geoscience Conference (NGC) 2017

Report of the Organising Chairman

Introduction

The National Geoscience Conference (NGC) 2017, held at Hotel Istana, Kuala Lumpur, on 9-10 October, is the 30th edition of this historic conference. This event is also special because it was held in conjunction with the Society's 50th anniversary celebrations. The Society's annual conference first convened in -1986 and since then, the number of participants consistently increasing with topics over a wide range of areas. The conference has been a landmark event for the geosciences sector in Malaysia, with participants ranging from students and professionals, both from the private and public sectors, as well as local institutions and international bodies (e.g. British Geological Survey), aiming to share knowledge and expertise with the Malaysian geoscience community.

The NGC 2017 was organised by the Geological Society Malaysia with the cooperation of Minerals and Geoscience Department Malaysia and Newton-Ungku Omar Fund.

The event was launched by YBhg. Dato' Sri Dr. Haji Wan Junaidi Bin Tuanku Jaafar, Minister of Natural Resources and Environment of Malaysia.



YBhg. Dato' Sri Dr. Haji Wan Junaidi Bin Tuanku Jaafar, Minister of Natural Resources and Environment, launched the National Geoscience Conference and Exhibition 2017.



Hononary Membership Awards and Long Service Award by the Society given to Past Presidents of the Society and Mr. Tan Boon Kong, respectively for their outstanding contributions in promoting geoscience for national development (From left:Ahmad Said, Dr. Hamzah Mohamad, Leong K.M., Dr. Abdul Ghani Rafek, Abd Rasid Jaapar, Dato' Sri Dr. Haji Wan Junaidi Bin Tuanku Jaafar, Tuan Haji Shahar Effendi, Dr. John Kuna Raj, Dr. Lee Chai Peng, Dato' Yunus Abdul Razak and Tan Boon Kong).

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

Forums, plenary and session keynotes, special lectures, oral presentations and posters from numerous researchers are presented in this event (Table below).

	2		
No.	Name	Position	Title
1	Prof. Dr. John Kuna Raj	Consultant Geologist	Historical Perspective of the Geological Society of Malaysia
2	Prof. Emeritus Dato' Dr. Ibrahim Komoo	Head, Natural Resource and Environmen- tal Cluster	Ahli Geologi Ikhtisas di Malaysia: Peluang dan Cabaran (Professonal Geologists in Malaysia: Op- portunities and Challenges)
3	Tuan Haji Shahar Ef- fendi Bin Abdullah Azizi	Director General, Mineral and Geoscience Department	JMG's Past Achievements and Future Challenge
4	Dato' Seri Dr. Mohd Ajib Anuar	President, Chamber of Mines Malaysia	Dynamic Business Models for Sustainability and the Roles of Geosciencetists

1. Plenary and Session Keyno	tes
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Session Keynote

No.	Name	Category	Title
1	Andrew Malone	Engineering Geology and Rock Me- chanics	Understanding the Movement Behaviour of the Pos Selim Landslide, Malaysia
2	S. L. Wu, J. Kiyono, A. S. Fajar, Y. Maeda, T. Nakatani, S.Y. Li	Engineering Geology and Rock Me- chanics	Earthquake Design Ground Motion Taking Into Account Active Fault Displacement
3	Abdul Ghani Md Rafek	Engineering Geology and Rock Me- chanics	Geological Discontinuity's Quantification: From Theory to Practice
4	Tsutomu Sato	Mineral Resources and Renewable Energy	Social and Economic Impacts of Applied Mineralogy
5	Hashim Hussin	Mineral Resources and Renewable Energy	Silica Sand Processing
6	Cheang Kok Keong	Mineral Resources and Renewable Energy	Critical Minerals in Facing the Challenges of a Suistanable Tomorrow
7	Mazlan Madon	Petroleum Geology	The Continental Shelf – Five Decades of Progress
8	Md Yazid Mansor	Petroleum Geology	Malay Basin: The Impact of Tectonics and Basin Architecture on Petroleum Resources and Future Potential
9	Jawati Bin Abu Naim	Petroleum Geology	Sabah Oil and Gas Exploration – New Opportunities

2. Special Lectures

No.	Name	Position/Affiliation	Title
1	Datuk Ir. Dr. Azuhan Mohamed	National Hydraulic Reserach Institute of Malaysia (NAHRIM)	Groundwater is Naturally Better
2	Mohd Nazan Awang	Minerals and Geoscience Department, Malaysia	Prospect and Potential of Regional Groundwater Basin in Malaysia
3	Saim Suratman	Consulting Hydrogeologist	The significance of Groundwater Modelling Prac- tices for Resources Evaluation in Malaysia
4	Tan Boon Kong	Consultant Engineering Geologist	Engineering Geology in Malaysia- Some Case Histories
5	S. Bricker, S.D.G. Campbell, H.J, Reeves, J.C Gill & V. Banks	British Geological Society	Geoscientists' Oppurtinities to Contribute to Di- saster Risk Reduction and Management of Geo- physical Hazards in Cities

6	Dr. Khamarrul Azahari Razak	UTM Razak School of Engineering and Advanced Technology	Multi-geohazard and Disaster Risk Assessment: A Technological's Perspective
7	Norwahidah Mahiyud- din & Kamar S. Ariffin	Universiti Sains Malaysia	Investigation and Evaluation of Sericitic Kaolin- itic Clay Resources of Bukit Lata and Ulu Sukor, Kelantan as Ceramic Raw Materials
8	Yves Cheze	Axcel Geoservices Sdn Bhd	Mineral Exploration from Grassroots to Feasibil- ity: Overview of Projects in Malaysia and Papua New Guinea
9	Low Keng Lok	Webson Mining Sdn Bhd	The Kuantan Bauxite Debacle
10	Muhammad Naim Nas- ruddin, Hassan Baioumy & Ahmad Muzakkir	Department of Geoscience, Universiti Teknologi Petronas	Mechanism of Intense Chemical Weathering of Gabbro to Bauxite in Bukit jebong, Sarawak
11	Masatoshi Sone	Geology Department, University of Ma- laya	Phanerozoic Palaeography of Peninsular Malay- sia: Overviews in Selected Time Periods
12	Azman A. Ghani	Geology Department, University of Ma- laya	A-Type Granite of Peninsular Malaysia and Com- ments on Tectonic Setting
13	Edlic Sathiamurthy School of Marine Science and Environ- ment, Universiti Malaysia Terengganu		Last Glacial Maximum (LGM) to Present Day Sea Level change for Sunda Land Based on Geo- logical Research, Tide Gauges and Satellite Data
14	Habibah Hj. Jamil & Abdul Hadi Hashim	Pusat Pengajian Sains Sekitaran dan Sum- ber Alam, Universiti Kebangsaan Malay- sia	Perubahan Aras Laut Kuno di Barat Daya Se- menanjung Malaysia: Bukti Litologi dan Tingga- lan Cengkerang di dalam Sampel Teras Gerudi di Pontian, Johor

Oral Presentations

Oral presentations were given throughout the first and second days of the event. They cover a wide range of topics which included geoheritage, engineering geology and rock mechanics, mineral resources and renewable energy, petroleum geology, regional geology, climate change and geohazards.



Posters

Posters were presented by undergraduate and postgraduate students from several universities such as Universiti Kebangsaan Malaysia, Universiti Malaya, Universiti Teknologi Petronas, Universiti Malaysia Kelantan, and SEADPRI-UKM. The poster presentation were allocated 5 minutes each, including Q&As, for evaluation by expert judges for the best poster competition.

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)



Exhibitors

There were exhibitors from various industries that cover engineering geology, geospatial and geomatic, software provider etc. Each of the exhibitors promoted their specialities and capabilities in their respective sector of the industry.



Closing Ceremony

The event ended with an official closing caremony by the organising chairman of NGC 2017 who is also the President of the Geological Society of Malaysia. Tokens of appreciation were given to all exhibitors and partcipants including the speakers, helpers and committee members. Five best poster presenters were chosen and received a prize for their efforts at the ceremony. During the closing ceremony, Prof. Madya Dr. Kamar Shah Ariffin received on behalf of Universiti Sains Malaysia the GSM sledgehammer as a symbolic hand-over of chairmanship of the next NGC in 2018 which will be held in Penang.

No.	Presenter	Institution	Title of poster
1st Place	Yen Jun Lim	Universiti Teknologi Petronas	Integrated Reservoir Characterisation with Three Dimen- sional Modeling in Thin Bed Low Resistivity Natural Gas Exploration
2nd Place	Nur Aishah Zarime	Universiti Kebangsaan Malaysia	Mobility of Cadmium in Granitic Soil Using Batch and Mini Column Tests
3rd Place	Loo Sheau Huey	Universiti Teknologi Petronas	The search for stratigraphic traps: A case study in X field, Malay Basin
4th Place	Muhammad Mustadza Mazni	Universiti Kebangsaan Malaysia	Tahap Keterancaman dan Zon Bahaya Tebing Bukit Batu Kapur di Sekitar Bukit Lagi, Kangar, Perlis
5th Place	Islahuda Hani Sahak	Universiti Malaya	Discovery of Murinae Fossils in Calcified Cave Breccia from Western Belt Caves in Peninsular Malaysia and implications to Quarternary palaeoenvironment



Forum on "Ethics, Professionalism and Professional Development" by the expert panelists; Dato' Yunus Abd Razak, Datuk Meor Sallehhuddin, Prof. Dr. Andrew Malone and Dr. Diamand Campbell.



Exhibition booths on the day before the event started.



An exhibitor explaining his exhibits to the YBhg. Dato' Sri Dr. Haji Wan Junaidi Bin Tuanku Jaafar, Minister of Natural Resources and Environment.



Another exhibitor having a conversation with the YBhg. Dato' Sri Dr. Haji Wan Junaidi Bin Tuanku Jaafar, Minister of Natural Resources and Environment.

National Geoscience Conference (NGC) 2017

Ucapan YB. Dato Sri Dr. Hj. Wan Junaidi Bin Tuanku Jaafar, Menteri Sumber Asli Dan Alam Sekitar Malaysia pada majlis perasmian National Geoscience Conference & Exhibition Ke 30 (NGC2017) dan pelancaran Ulang Tahun Ke 50, Persatuan Geologi Malaysia (GSM)

YBrs. Tuan Hj. Shahar Effendi bin Abdullah Azizi
Ketua Pengarah Jabatan Mineral dan Geosains Malaysia
Yang Dihormati En Abd Rasid bin Jaapar
Presiden Persatuan Geologi Malaysia,
Yang Berbahagia Dato' Yunus Abdul Razak
Pengerusi, Lembaga Ahli Geologi Malaysia
Yang Berbahagia Dato' Seri Dr Mohd Ajib Anuar
President, Dewan Perniagaan Lombong Malaysia
Yang Berbahagia Datuk Mior Sallehhuddin Mior Jadid
Presiden, Institut Geologi Malaysia
Dato'-Dato', tuan-tuan dan puan-puan,

Assalamualaikum w.b.t., Salam 1Malaysia, Salam Negaraku, Alam Sekitarku dan selamat tengah hari. Alhamdulillah, marilah kita bersama-sama memanjatkan kesyukuran ke hadrat Allah SWT kerana dengan limpah kurnia dan izin Nya, kita dapat berhimpun dalam satu majlis yang bermakna pada hari ini.

Terlebih dahulu saya ingin merakamkan ucapan penghargaan dan terima kasih kepada Persatuan Geologi Malaysia (GSM) kerana sudi menjemput saya untuk merasmikan National Geoscience Conference and Exhibition (NGC2017) dan pelancaran ulang tahun ke-50, Persatuan Geologi Malaysia (GSM).

Pada hari ini, saya berasa sungguh gembira kerana dapat bersama tuan-tuan dan puan-puan, yang merupakan kumpulan profesional penting dalam pembangunan dan kemakmuran negara. Saya difahamkan bahawa para peserta terdiri daripada Ahli Geologi dari Universiti Tempatan, Jabatan Kerajaan, Badan Berkanun dan Sektor Swasta di Malaysia.

Saya difahamkan bahawa tahun ini merupakan persidangan kali ke-30 semenjak Persatuan Geologi Malaysia (*Geological Society of Malaysia*) ditubuhkan pada tahun 1967. Persidangan Geologi merupakan acara tahunan Persatuan Geologi Malaysia yang diadakan secara bergilir-gilir di negeri-negeri di Semenanjung Malaysia, Sabah dan Sarawak. Persidangan kali ini juga amat bermakna kerana ianya bersempena genap 50 tahun penubuhan Persatuan Geologi Malaysia.

Dato'-Dato', tuan-tuan dan puan-puan yang saya hormati,

"Geologi" mengingatkan saya kepada Jabatan Mineral dan Geosains Malaysia (JMG) iaitu agensi kerajaan di bawah Kementerian saya, yang mempunyai autoriti dan kepakaran dalam menerajui penyiasatan, perkhidmatan dan penyelidikan dalam bidang mineral dan geosains dalam negara.

Sebagai Ahli Geologi, tuan-tuan dan puan-puan terlibat secara langsung di dalam mencarigali sumber asli seperti bahan batuan, bijih, arang batu, air tanah dan minyak serta turut membantu di dalam pembinaan jalanraya, lebuhraya, terowong, empangan, bangunan dan sebagainya. Dalam masa yang sama, tuan-tuan dan puan-puan juga memainkan peranan penting dalam pemuliharaan geotapak dan geopark serta kesiapsiagaan menghadapi bencana geologi seperti tanah runtuh, gempa bumi dan lubang benam.

Pada abad ke-21 ini, peranan Ahli Geologi yang bertitik-tolak daripada explorasi sumber bumi telah berkembang merentas bidang fundemental kepada bidang-bidang aplikasi, sehingga kepada yang bersifat explorasi, konservasi dan seterusnya pembangunan mampan.

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

Hari ini, kita bersama-sama dalam National Geoscience Conference and Exhibition (NGC2017) iaitu persidangan geosains kebangsaan yang paling berprestij di rantau ini yang telah berjaya mengumpulkan lebih 200 orang pakar dan pengamal di serata dunia untuk berkongsi pengetahuan terkini, inovasi dan pembangunan geosains sebagai satu profesion. Diantara mereka yang hadir adalah di dalam bidang-bidang;

- Petroleum Geology & Mineral Resources Dahulunya geologi terkenal dalam bidang explorasi sumber dari perut bumi, kini geologis pada masa yang sama juga memainkan peranan yang penting dalam mengoptimumkan sumber. Memastikan sumber diterokasi secara berhemat dan impak yang minima kepada alam sekitar.
- Geoheritage, Geoparks and Geotourism Batuan ialah asas kepada bahan sejarah bumi dan landskap indah. Di utara Semenanjung, terdapat Geopark Langkawi yang dibina oleh batuan tertua di Malaysia berusia lebih 500 juta tahun. Tidak ketinggalan Tapak Warisan Dunia: gua terbesar di dunia iaitu Gunung Mulu dan puncak Kinabalu yang tertinggi di Borneo. Lahirnya bidang baharu iaitu **Geologi Pemuliharaan** dalam pemuliharaan objek warisan geologi dan pada masa yang sama menjadi tarikan kepada geo-pelancongan dan eko-pelancongan. Pendapatan daripada aktiviti pelancongan pada tahun 2016 ialah RM82.1 billion.
- Geologi Kejuruteraan dan Mekanik Batuan beserta Geologi Sekitaran dan Hidrogeologi Proses pembangunan pesat menyaksikan kawasan berbukit dan tanah tinggi menjadi tumpuan projek pembangunan. Aspek geologi kejuruteraan diperlukan dalam menilai kos dan impak pembangunan tersebut bagi mengelakkan kecelakaan seperti tanah runtuh dan banjir lumpur. Selain itu, aspek hidrogeologi juga semakin menjadi tumpuan sebagai alternatif terhadap sumber air mentah sedia ada.
- Disaster Risk Reduction and Climate Change Adaptation Perubahan iklim dunia sejak kebelakangan ini yang boleh mengakibatkan kekerapan dan kadar luar biasa bencana alam seperti banjir, kemarau, hakisan pantai, tebing sungai dan sebagainya yang boleh mengancam keselamatan nyawa dan harta benda orang awam. Menurut Intergovermental Panel on Climate Change, (IPCC), suhu dunia akan meningkat sebanyak 1.5 darjah Celsius. Walaupun kelihatan kecil, perubahan ini sudah mampu membawa kepada peningkatan kadar bencana alam seperti ribut taufan dan kematian terumbu karang.
- Professionalism, Ethics and Professional Development in Geosciences Akta Ahli Geologi 689 yang diwartakan pada tahun 2008 memantapkan bidang profesion Geologist di Malaysia. Dengan kewujudan akta ini, sebuah Lembaga Ahli Geologi telah tertubuh bagi memantau dan mengawal selia profesion geologist. Hal ini memastikan etika dan profesionalisme terus terjamin dalam memperkasakan bidang geologi di Malaysia.

Dato'-Dato', tuan-tuan dan puan-puan yang saya hormati,

Akhir kata, selaras dengan tema National Geoscience Conference and Exhibition (NGC2017) tahun ini iaitu "Geoscience for a Sustainable Future", saya menggesa dan mencabar para geologist, Persatuan Geologi Malaysia dan JMG untuk terus bersaing bukan sahaja di dalam negara, malah menjadi peneraju di peringkat global. Saya ingin melihat para ahli geologi kita menjadi model kepada pembangunan bidang geologi ini di peringkat serantau. Ahli geologi kita sudah melihat perkembangan dan kejatuhan industri komoditi perlombongan namun komuniti ahli geologi yang saya lihat hari ini membuktikan betapa profesion ini begitu relevan dan penting kepada pembangunan negara.

Sebelum saya akhiri ucapan ini, izinkan saya memberikan serangkap pantun;

Indah sungguh si batu permata Dipadan pula dengan emas suasa Ahli geologi bersatu berganding tenaga Bersama memperkasa ekonomi negara

Dengan lafaz Bismillah.....

Saya Rasmikan National Geoscience Conference and Exhibition (NGC2017) dan melancarkan ulang tahun ke-50 Persatuan Geologi Malaysia.

Sekian, terima kasih.

National Geoscience Conference (NGC) 2017

Ucapan En. Abd. Rasid Jaapar, Presiden, Persatuan Geologi Malaysia pada majlis perasmian National Geoscience Conference & Exhibition Ke 30 (NGC2017) dan pelancaran Ulang Tahun Ke 50, Persatuan Geologi Malaysia (GSM)

Yang Berhormat DATO SRI DR. HJ. WAN JUNAIDI BIN TUANKU JAAFAR MENTERI SUMBER ASLI DAN ALAM SEKITAR MALAYSIA Yang Berusaha Tuan Hj. Shahar Effendi bin Abdullah Azizi Ketua Pengarah Jabatan Mineral dan Geosains Malaysia Yang Berbahagia Dato' Yunus Abdul Razak Pengerusi, Lembaga Ahli Geologi Malaysia Yang Berbahagia Dato' Seri Dr Mohd Ajib Anuar President, Dewan Perniagaan Lombong Malaysia Yang Berbahagia Datuk Mior Sallehhuddin Mior Jadid Presiden, Institut Geologi Malaysia Dato'-Dato', tuan-tuan dan puan-puan,

Assalamualaikum w.b.t., selamat tengah hari and good afternoon.

Alhamdulillah, marilah kita bersama-sama memanjatkan kesyukuran ke hadrat Allah SWT kerana dengan limpah kurnia dan izin Nya, kita dapat berhimpun dalam satu majlis yang amat bermakna pada hari ini.

Pertama-tamanya saya ingin merakamkan jutaan ucapan penghargaan dan terima kasih kepada Yang Berhormat Menteri Sumber Asli dan Alam Sekitar, Dato Sri Dr Haji Wan Junaidi Tuanku Jaafar kerana sudi hadir disebalik jadual yang ketat untuk merasmikan Persidangan Geosains Kebangsaan ke-30 (30th National Geoscience Conference and Exhibition - NGC2017) seterusnya melancarkan sambutan ulang tahun ke-50, Persatuan Geologi Malaysia (GSM).

This 30th edition of National Geoscience Conference & Exhibition is special as 2017 marked the 50th anniversary of the Geological Society of Malaysia which was founded in 1967 by a group of British lecturers and exploration geologists in the University of Malaya. The National Geoscience Conference is now becoming a single major annual event for GSM after our another annual event, the Petroleum Geology Conference & Exhibition is no longer organised by GSM. We do hope that very soon this National Geoscience Conference will be recognised internationally. After 50 years, Geological Society of Malaysia remains the most active and dynamic geologically-related association in Southeast Asia. We have slightly less than 1,000 members worldwide. Currently, GSM is the permanent secretariat of GEOSEA, the biennial Regional Congress on Geology, Mineral and Energy Resources of Southeast Asia. The next GEOSEA will be in Hanoi, Vietnam between 13th and 21st October 2018. You are all welcomed to join the event.

Geology is now becoming more applied then ever. Suit with the main theme of Geoscience for Sustainable Future, geologists or geoscientists have played significant roles in;

- i. exploration and exploitation of natural resources; petroleum, minerals, aggregates, etc.
- ii. infrastructures development; dams, highways, trains, tunnels, etc.
- iii. in landuse planning; in identifying potential geohazards, elements of instabilities, etc.
- iv. conservation and tourism; developing geopark, geosites, etc.
- v. in disaster risk reduction and management.
- Therefore, the sub-theme choosen on;
- i. Petroleum Geology, Mineral Resources & Renewable Energy
- ii. Geoheritage, Geoparks and Geotourism
- iii. Engineering Geology, Rock Mechanics & Hydrogeology
- iv. Disaster Risk Reduction and Climate Change Adaptation
- v. Ethics, Professionalism, and Professional Development in Geosciences are timely.

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

For this year conference, we registered almost 300 participants. We have 4 plenary keynotes delivered by outstanding and prominent leaders in geoscience in Malaysia. We have 9 session keynotes and 22 special lectures delivered by prominent experts on respective field of geology from UK, Japan, Hong Kong, Indonesia, Thailand, Vietnam and of course from Malaysia. We also have 60 papers for Oral Presentation and 91 papers for Poster Presentation. Poster prepared by student is entitled to participate in Poster Presentation Competition where the first prize is RM500, second RM350 and 3rd RM150 with 5 consolation prizes for the next five winners.

We have 2 days post-conference field trip and training to visit geo-heritage sites in Ipoh and geo-disaster sites in Cameron Highlands organised by SEADPRI, UKM, JMG supported by CKC, JKR. We also have 1-day Postconference Short Course on Minerals and 3-days Post-conference Short Course on Rock Slope by Rocscience.

In conjunction with its 50th anniversary, the Society would like to award the Honorary Membership to all our past presidents who served prior to 2010. The Society will also present Long Service Award to Council Member and Secretariat. Two special anniversary issues (Bulletin No.63 & No.64) were published.

Dato'-Dato', tuan-tuan dan puan-puan yang saya hormati,

Saya juga ingin mengucapkan ribuan terima kasih kepada semua yang hadir pada hari ini kerana tanpa tuantuan dan puan-puan, program kita tidak mungkin dapat dilaksanakan. Terima kasih kepada rakan-rakan dari Jabatan Kerajaan; dari Jabatan Mineral dan Geosains Malaysia, Institut Kajian Hidraulik Kebangsaan (NAHRIM), Agensi Pengurusan Bencana Kebangsaan (NADMA), Jabatan Kerja Raya Malaysia, Agensi Nuklear Malaysia dan yang lainlainnya. Terima kasih juga kepada rakan-rakan dan pelajar-pelajar dari university tempatan; Universiti Kebangsaan Malaysia, Universiti Malaya, Universiti Teknologi Petronas, Universiti Malaysia Kelantan, Universiti Malaysia Terengganu, Universiti Sains Malaysia, Universiti Teknologi Malaysia dan Universiti Malaysia Sabah. Tidak lupa juga kepada rakan-rakan dari sektor swasta.

Terima kasih kepada Ahli Jawatankuasa Penganjur yang bertungkus lumus untuk menjayakan persidangan kali ini. Saya juga ingin mengucapkan setinggi penghargaan kepada Ketua Pengarah Jabatan Mineral dan Geosains Malaysia, Tuan Haji Shahar Effendi Abdullah Azizi dan pasukan dari JMG sebagai penganjur bersama dan banyak membantu dalam penganjuran acara ini terutamanya bagi acara perasmian ini.

The Society would like to thank the Institute of Geology Malaysia, Malaysian Chamber of Mines, the Institute of Mineral Engineering Malaysia, Southeast Asia Disaster Prevention Research Initiative, UKM, Malaysian Geological Heritage Group, Society for Engineering Geology and Rock Mechanics Malaysia for the support that we received. Thank you also to Ministry of Natural Resources and Environments, Board of Geologists Malaysia, International Association for Engineering Geology and the Environments and Society of Exploration Geophysicists for endorsing this event.

We also would like to thank our friends from British Geological Survey, UK, Japan, Indonesia, Thailand, Vietnam and Singapore. My special appreciation goes to my mentor, Prof Andrew Malone from University of Hong Kong for supporting this event. Thank you to all of you!

The society would also like to thanks all our exhibitors and sponsors namely; nrgEDGE, MMC-Gamuda, JMG, Rocscience, Onyx Engineering, OST Slope Protection, E. J. Mottiwalla, Global-Trek System, Geodelta Systems, Soil Instruments, Bruker Singapore and Geosolution Resources for valuable contributions.

Dato'-Dato', distinguihed guests,

Before I end my speech, let me bring you all the way from England, Madam Maureen Haile, the widow of the Society founding father and the first President, Prof Dr Neville Haile to deliver her speech. Please bear with me for a moment.

VIDEO: Maureen Haile

Thank you Dr Mazlan Madon, Immediate Past President for the initiative. Sekian, Wabillahi taufik walhidayah, wassalamualaikum warahmatullahi wabarakatuh. Terima kasih.

Profile of a professional geologist

Mr. Abd. Rasid Jaapar, President, Geological Society of Malaysia Date: 20 September 2017

Venue: Bilik Mesyuarat Program Geologi, Bangunan Geologi, FST, Universiti Kebangsaan Malaysia, Bangi

Synopsis: This presentation will discuss on the route or process required by undergraduate geological student to be Professional Geologist. The practice of professional geology (geoscience) is the performing of any activity that requires application of the principles of the geological sciences, and that concerns the safeguarding of public welfare, life, health, property, or economic interests, including but not limited to; i) investigations, interpretations, evaluations, consultations or management aimed at discovery or development of metallic or non-metallic minerals, rocks, nuclear, fossil fuels, precious stones and water resources, ii) investigations, interpretations, evaluations, consultations, or management relating to geoscientific properties, conditions or processes that may affect the well-being of the general public, including those pertaining to preservation of natural environment (Geoscientist Canada, 2014). Geology (Geoscience) is now a regulated profession in Malaysia after the enactment of Geologist Act (Act 689) in 2008. To practice, one must register with the Board of Geologist (BOG) Malaysia. It is a legal requirement to be registered as a Professional Geologist to practice geology/geoscience. Like architects, doctors, lawyers, engineers, accountants and chemists, Registered Professional Geologists are held accountable and responsible for the works they do. Only in this way do we earn respect of the public our profession exists to protect. Professional competence refers to the ability, in a given practice situation, to act in a safe, effective and ethical manner. Competence is enabled by the ability to perform specific practice tasks with acceptable levels of proficiency. Competency is the ability to perform a practice task with a specified level of proficiency. Regulating the profession by standards of basic minimum appropriate education, professional responsibilities code of ethics and promoting continuing professional development is essential for quality practice and protection of the public. This presentation will also discuss on developing soft skills as well as entrepreneurship skill.

GEOSCIENCE IDEAS XCHANGE

Formation of IGM-GSM Geoscience Business Working Group

LEAD DISCUSSANT: MR. ABD RASID JAAPAR, PGEOL, MIGM

Date: 28 September 2017

Venue: Geology Department, University of Malaya, Kuala Lumpur

Geoscience Ideas Xchange is a joint platform of the Institute of Geology Malaysia (IGM) and Geological Society of Malaysia (GSM), to discuss developments in geoscience practice in the country. The purpose of the platform is to get inputs from practitioners on their issues and identify pathways to resolve them. The focus of the inaugural session



PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

is on enhancing linkages between geoscience business entities in Malaysia. This has become an increasingly pressing issue since the regulation of the practice of geoscience in the country under the Geologists Act 2008 (Act 689). The session will involve a "thought starter" presentation by the lead discussant. This will be followed by a moderated open exchange involving the participants, where the goal is to identify key follow-up actions for implementation by geoscience entities such as IGM and GSM, among others.



CERAMAH TEKNIK TECHNICAL TALK

Signature of mass mortality of fauna and high temperature pressure event preserved in Late Cretaceous bone bed of Fatehgrah Formation of Barmer Basin, India

Prof. Dr. Mathur S.C. (Department of Geology, J.N.Vyas University, Jodhpur, India) Email: sureshsushma09@gmail.com Date: 4 October 2017 Venue: Geology Program Meeting Room, Geology Building, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, Bangi

Abstract: Bone bed of Fatehgarh Formation (FGF) is an important entity of the petroliferous Barmer Basin, western Rajasthan, India as it preserved signatures to endorse various global events such as Late Cretaceous phosphogenesis, K/T boundary, mass extinction of fauna, and unusual impact event. The 12 meter thick phosphorite facies of FGF display almost all spectrums of phosphorite types and representing global Late Cretaceous phosphogenic event in N-W India. Among these types, the 15cm thick bone bed (event bed) is a principle phosphorite facies of FGF. It is characterized by their significant biogenic and unusual magnetic framework elements. The biogenic framework elements include vertebrae, dental plates, teeth, spines and scales of microvertibrates along with teeth, bones, bone fragments, cranium, vertebrae, phosphatic dungs of crocodile, dinosaur and turtles. Maastrichian age is suggested from the close faunestic association of biota of the bone bed represent the K/T boundary which is characterized by the presence of ejecta material including magnetic spherules, fine magnetic dusts and microbracciated matrix. The petrographic and geochemical analysis of these high temperature pressure objects indicate impact event that brought significant biological changes perhaps Mass extinction of the Fatehgarh biota. To recognize impact structure, at first instance, geomorphologically, the potential candidate in western India, seems to be Siwana Ring Complex (SRC) which is situated about 130kms from Barmer city.

The SRC is composed of rings of granites nestling around Siwana and covers an area of 290 km². To recognize, it as impact crater, following evidences are significant: Mathur *et al.* (2009) and Tripathi *et al.* (2010) reported the presence of coesite and stishovite minerals from the magnetic particles recovered from the SRC. Additionally, the deformational field features such as shatter cones, impact melt and lithic breccias, pseudotachylite, impact melt sheets and microscopic features such as diaplectic glasses; planar deformation features (PDFs) in minerals, diagnostic textures and microstructures of the impact melt. These evidences are diagnostic target rock deformation features derived due to an impact at SRC (Mathur 2016, under communication).

Modelling the evolution of submarine channels and their deposits

Bill McCaffrey (University of Leeds, UK) Date: 2 November 2017

Venue: Department of Geology, University Malaya

Prof. Dr. Bill McCaffrey presented a talk on "Modelling the evolution of submarine channels and their deposits" at 3 pm, 2nd November 2017 at the Department of Geology, University of Malaya. The talk was attended by about 30 geologists from the industry, academics and graduate students. The talk started with a brief introduction on University of Leeds, particularly the Turbidites Research Group. Bill graduated with a degree in Geology from Oxford in 1987 and a PhD from Leeds in 1991 and is now Chair of Clastic Sedimentology at Leeds University and Research Director of Petroleum Leeds. His principal research interest is in deep marine clastics; he is Principal Investigator of the long-running Turbidites Research Group (TRG) joint industry project. The TRG follows field, theoretical, experimental and computation research approaches to better understand deep marine sedimentation. In addition he has interests in fluvial and shallow marine sedimentology.

Abstract: Deep marine clastic systems are volumetrically the most important sedimentary environment on the surface of the earth. Built by particulate gravity currents (turbidity currents, debris flows, hybrid flows), they can develop a bewilderingly complex array of depositional landforms, such as canyons, channels, levees and semi- or unconfined depositional lobes, and the transitions between them. On the modern sea floor and in the ancient rock record, submarine channels are seen to form in complex patterns, sometimes progressively shifting their position with time, sometimes abruptly shifting to new locations through channel avulsions. A key challenge in deep marine studies is to assess the relative roles of autogenic (internal) vs. allogenic (external)



Aerial photo of the submarine channels of the Gorgoglione Flysch and the village of Pietrapertosa, Southern Italy.

forcing in the development of individual submarine channels and of submarine channel networks. Here, three complementary strands of research are described that attempt, at least in part, to address some of these challenges. 1) Simple numerical models can be deployed which show that individual channel-levees are inherently unstable, and must progress to the point of avulsion without external forcing; however they are likely to become increasing sensitive to allogenic forcing as they approach their autogenic limit. 2) Combined numerical and experimental approaches show the important role that aggradational channels play in tuning the flows that traverse them, giving insights into the two-way coupling between landform and flow field. 3) Meta data studies, though in their infancy, show promise in unravelling multi-factorial influence on channel development.



Fauna Ediacara Mistaken Point, Kanada – apabila organisma bersaiz besar muncul di dunia

Prof. Dr. Mohd Shafeea Leman

Date: 8 November 2017

Venue: Bilik Mesyuarat Program Geologi, Pusat Pengajian Sains Sekitaran dan Sumber Alam Fakulti Sains dan Teknologi, Universiti Kebangsaan Malaysia

Abstrak: Bukti saintifik menunjukkan bahawa hidupan telah muncul sebaik sahaja permukaan Bumi benar-benar sejuk dan lautan menutupi lembangan di permukaan bumi sekitar 3.8 bilion tahun dahulu (Eon Archean). Rekod hidupan terawal berupa cyanobacteria berusia 3.7 b.t. dari Greenland. Sehingga ke akhir Archean bumi hanya didiami oleh hidupan prokayot. Hidupan eukaryot terawal berusia 2.7 b.t. (Proterozoik) ditemui di Australia. Ini diikuti oleh kemunculan fosil embrio berusia 630 j.t. yang banyak ditemui di China. Fosil metazoa tertua dianggarkan berusia 600 j.t. yang ditemui di Sonora, Mexico, namun kebanyakannya berkembang pesat sewaktu Avalon Explosion sejurus selepas berakhirnya Zaman Glasier Gaskier sekitar 580 j.t. lalu. Fauna ini dikenali sebagai fauna Ediacara sempena Ediacara Hill, di Flinders Range, Australia Selatan di mana hidupan sebegini pertama kali dilaporkan oleh Reg Sprigg pada tahun 1946. Fauna ini juga dijadikan asas penamaan Period Ediacaran, di antara Cryogenian dengan Kambria (635-541 j.t.). Mistaken Point terletak di hujung tenggara Semenanjung Avalon, di tenggara Pulau Newfoundland, di tenggara Kanada. Fosil Fauna Ediacara terawet dengan baik dalam batuan sedimen turbidit laut dalam yang menindih enapan tillit Formasi Gaskier daripada Gaskier Ice Age (583.7 hingga 582.1 j.t.). Pengawetan disempurnakan oleh kehadiran lapisan nipis tuf di bahagian atas setiap unit turbidit yang turut mengandungi hablur zirkon yang telah digunakan untuk menentukan usia lapisan-lapisan fosil utama. Jujukan batuan berfosil ditemui bermula daripada bahagian atas jujukan Formasi Drook (~578.8 j.t.), berterusan melepasi formasi-formasi Briscal, Mistaken Point, Trepasseydan Fermeusehinggalah ke Formasi Renews Head dengan jumlah ketebalan melebihi 2000 m. Keseluruhan fosil Ediacara Mistaken Point merupakan fosil cap, terdiri daripada 13 spesies Rangiomorpha termasuklah Avalofractus abaculus, Biothukis mistakensis, Bradgatia lindfordensis, Charnia masoni, Culmofrons plumosa, Fractofusus andersoni, F. misrai, Frondophyllas grandis, Hapsidophyllas flexibilis, Pectinifrons abyssalis, Primocandelabrum hiemaloranum, Trepassia wardae dan Vinlandia antecedens, 3 spesies Arboreomorpha iaitu Charniodiscus arboreus, C. spinosus, dan C. procerus, 1 spesies Porifera(?) Thectardis avalonensis, 1 spesies fosil enigmatik Ivesheadia lobata, serta dua species cakera pangkal yang sering disalah tafsir sebagai fosil obor-obor iaitu Aspidella terranovica (cakera kepada Charniodiscus) dan Hiemalora stellaris (cakera bagi Primocandelabrum). Kesemua hidupan ini ditafsirkan sebagai hidupan bentos laut dalam. Himpunan fauna dalam Formasi Drook di Daley's point merupakan himpunan Fauna Ediacara tertua di dunia. Kemunculan haiwan bersaiz besar ini membawa kepada kejadian Avalon Explosion yang dipamerkan pada Permukaan D dan E dalam Formasi Mistaken Point. Jujukan yang mengandungi fauna Mistaken Point mewakili keseluruhan usia Ediacaran Tengah, lebih tua daripada semua jujukan yang mengandungi Fauna Ediacara di seluruh dunia termasuk fauna di Ediacara Hill (Australia) sendiri. Kelimpahan dan kepelbagaian fauna dan kepentingan usianya membolehkan garis pantai Mistaken Point dimartabat sebagai Tapak Warisan Dunia UNESCO pada tahun 2016.

Schlumberger Industrial Technical Talk

Date: 6 December 2017 Venue: University Kebangsaan Malaysia, Bangi, UKM

Portfolio optimisation and capital management: NOC integrated e-Workflows as catalyst to optimized growth and efficiently manage E&P investment activities

By: Lim Choong Heng, José Manuel Rodriguez Villaseñor & Azrin Kassim

Oil and Gas industry faces its unprecedented prolonged downturn since the oil price plunged starting June 2014 with no obvious sign of recovery to date.

NOCs are facing increasing challenges in its operating environment since then as a result of falling revenue and profit hence continue to be cautious on every single capital investment. The NOC plays a vital role to collectively reshape and take transformative measures to maintain the momentum of upstream growth.

In addition to low oil price hurdle, portfolio management at corporate level is required due to significant disconnect between corporate and its operation units thus leading. This silo management between regional operation lead inefficient utilization of investment.

NOCs have adopted an integrated e-workflow to address the above needs to remain competitive and resilient. The approach are as following:

Step 1: Operator's Work Program, Budget, Resource and Reserves are submitted, reviewed and approved on line by NOC using standardized workflow and data format. Actual expenditures are tracked based on approved budget on monthly basis. The consolidated budget expenditure against its approved value will be submitted and reviewed to determine if the contractor is eligible to carry over the unfinished budget to the following year or request for additional budget if required.

Step 2: Enterprise registers all the exploratory prospects and notional projects and track its maturation electronically. PSC terms and commitments are materialized and tracked on contract by contract basis. Production supply and demand are pre optimized to balance the available sales and obligated supply.

Step 3: Data seamlessly transform to required format and granularity to prepare for economics evaluations incorporating the application of risk and uncertainty analysis in estimating the economic worth of an investment within the available capital.

Step 4: Portfolio optimization systems ensure that NOC maintains the best portfolio of investment options to achieve business goals while honor constraints, effective balance of value and risk management and making timely decision based on up to date data, reliable and consistent factual information with analytics foresight.

We would like to present the solution workflow and present the general benefits that NOC has obtain from this workflow.

Application of geophysics in oil and gas industry

By: Kian Wei Tan

Petrel is an E&P software which is used widely in the oil and gas industry. This powerful software can handle large data and many geophysics and geological workflow can be run, covering workflow from exploration, development and production. An introduction to the geophysics domain workflow in Petrel will be presented. The general geophysics workflow such as structural and stratigraphic interpretation, seismic attribute computation, seismic to well tie, velocity modeling and quantitative interpretation in both technical and software domain will be discussed.

Skill to survive in O&G and why it's exciting

By: Syaiful Mustapa

Without synopsis.









Enhancing Geological Terrain Mapping for Development Proposals and Environmentally Sensitive Areas – Preliminary Viewpoints

ABD RASID JAAPAR¹, AFIQ FARHAN ABDUL RAHIM¹, MUSTAPHA ATTA¹ & JOY JACQUELINE PEREIRA²

¹Geomapping Technology Sdn. Bhd.

²Southeast Asia Disaster Prevention Research Initiative, Univ. Kebangsaan Malaysia (SEADPRI-UKM)

INTRODUCTION

The pilot project on Disaster Resilient Cities: Forecasting Local level Climate Extremes and Physical Hazards for Kuala Lumpur is supported by the Newton-Ungku Omar Fund (NUOF), jointly administered by the Malaysian Industry Government Group for High Technology (MIGHT) and Innovate UK. As part of the project activity, a Roundtable Discussion on "Enhancing Geological Terrain Mapping for Development Proposals and Environmentally Sensitive Areas" was convened on 23 November 2017 at Puri Pujangga, Universiti Kebangsaan Malaysia. Led by NUOF project members Geomapping Technology Sdn. Bhd. and the Mineral and Geoscience Department Malaysia (JMG), the purpose of the discussion was to obtain initial inputs to review the current manual on Geological Terrain Mapping (GTM). A total of 42 participants attended the event, representing the private sector, government agencies and universities. The Roundtable Discussion commenced with an opening session. This was followed by three technical presentations and a discussion session in four break-out groups. A general discussion session was held before the event concluded.

The welcome remarks of Ms. Ida Semurni Abdullah, the Programme Director for MIGHT, applauded the effort of NUOF project members to enhance the Geological Terrain Mapping in Malaysia, given the emerging challenges posed by incidences of geohazards in urban areas due to climate extremes. In officiating the event, Mr. Kamal bin Daril, Deputy Director General (Corporate and Mineral Economics) of JMG welcomed inputs to improve GTM in the country and looked forward to the outcome of the discussion.

HIGHLIGHTS

Geological Terrain Mapping (GTM) is a legal requirement when preparing the Development Proposal Report (LCP) and Environmental Impact Assessment (EIA) in certain states of Malaysia (Qalam Azad 2017). The legal and technical aspects of Geological Terrain Mapping (GTM) is still not well understood among practitioners. There is a misconception that GTM has limited geohazard and engineering geology aspects. These aspects are mentioned in the manual on GTM but tend to be overlooked in practice. Landform and surface processes are among the information documented in GTM at various scales. This information is then analysed to produce among others, thematic maps on construction suitability, engineering geology, physical constraints as well as erosion and instability (where geohazards are implicitly indicated). The competency of GTM service providers and the level of compliance to the GTM procedure is currently a major challenge. The overreliance of GTM service providers on remote sensing data, instead of fieldwork and verified site-specific information, has been noted. It is important that geoscience practitioners have a sound understanding of GTM and conduct ample fieldwork in order to provide quality products to end-users such as planners and engineers.



PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

The manual on GTM specifies explicitly the geological parameters required for development projects based on context and characteristics of an area. Critical parameters include regional and local geology, geomorphology, geo-materials, hydrogeology, structural geology, geohazards and minerals of economic significance. In the case of landslides, it is important to differentiate both new and relict features as well as detect large-scale landslides, to delineate potentially problematic areas that have to be avoided or managed carefully for development (Tajul Anuar 2017). There are several approaches to enhance GTM and these include using the total geological approach, with preparation of an explicit geohazards map, a geohazard risk register and geomaterial-based planning guidance to supplement the current products (Abd Rasid Jaapar 2017). Pilot studies in Selayang, Selangor (100-acre development project) and Ulu Kinta, Perak (800-acre development project) have indicated that this is a viable option. The findings of the pilot study could serve as the basis for enhancing GTM in Malaysia.

Participants highlighted many suggestions to enhance GTM in the country. A key point was the need to improve clarity of the current guidance on GTM with respect to its purpose, approach, scale of assessment, area of coverage, base-map selection, types of detailed studies required, checklists targeting regulators, service providers and end-users, synchronisation of colours etc.; and stress the importance of "development specific geological inputs". Additional investigations were also proposed to improve GTM, including subsurface evaluation, soil and weathering profile assessment, as well as appraisal of coastal and other climate-driven hazards. The need to enhance capacity of practitioners involved in GTM, including regulators and service providers, was also emphasized. Another aspect of significance is to increase awareness of the importance of geological inputs among end-users, in particular, planners and other regulatory agencies involved in development control.

CONCLUDING REMARKS

It is important to note that GTM should be conducted in the earliest stage of planning, even before the development plan layout is sketched. This is more cost effective in the long-run and will help to minimise conflict between the parties involved in a development project. Geologists registered with the Board of Geologists should be engaged to conduct GTM for quality assurance. Clear guidance is also required to strengthen the practice of GTM and enhance the capacity of regulators and service providers. Increased awareness of the importance of geological inputs among end-users involved in development control is also vital. The inputs from the Roundtable Discussion has been documented and will now serve as the basis for enhancing existing guidance on GTM in Malaysia.

REFERENCE

- Abd Rasid Jaapar 2017. Proposed Enhancement of Geological Terrain Mapping: Case Studies from Private and Public Projects. Presentation Slides, Roundtable Discussion on Enhancing Geological Terrain Mapping for Development Proposals and Environmentally Sensitive Areas, 23 November 2017, Puri Pujangga, Universiti Kebangsaan Malaysia.
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- Tajul Anuar Jamaluddin 2017. Geoscience Inputs for Landuse Planning: Case Studies from Cameron Highlands and Kinta Heights. Presentation Slides, Roundtable Discussion on Enhancing Geological Terrain Mapping for Development Proposals and Environmentally Sensitive Areas, 23 November 2017, Puri Pujangga, Universiti Kebangsaan Malaysia.



Dr. Ferdaus bin Ahmad of JMG (right) moderated a breakout group discussion at the event.

NEW MEMBERSHIP

Full Membership

- 1. Fakhzan Azwan Che Arshad
- 2. Frederick Francis Tating
- 3. Hanif Mohamad
- 4. Muhammad Asyraaf Abd Muhet
- 5. Prasanna Mohan Viswanathan
- 6. Siti Aishah Abdullah
- 7. Wang Hui Zhi

Student Membership

- 1. Ahmad Kamil Ahmad Nadzri
- 2. Aina Afiqah Suhaimi
- 3. Chang Ee Von
- 4. Hamizah Mohamad
- 5. Ili Nurizzati Hanim
- 6. Joannemarie Estelle Liew
- 7. Lee Vui Hua
- 8. Lim Yen Jun
- 9. Mah Choon Hong
- 10. Mark Jeeva Anthony Jayakaran
- 11. Mas Assiqim Mahasan
- 12. Mohamad Ezame Abu Samah
- 13. Mohamad Yusof Kamaruzzaman
- 14. Muhammad Ardiansyah
- 15. Muhammad Fuad Razali
- 16. Muhammad Naim Nasaruddin
- 17. Muhammad Qamarul Asyraf Baharrudin

- 18. Muhammad Rezky
- 19. Muhd Nur Ismail Abdul Rahman
- 20. Nadhirah Mohd Rosdi
- 21. Nadiah Anuar
- 22. Nadzirah Khalisah Mohd Zakari
- 23. Nasriza Ismail
- 24. Naziha Nordin
- 25. Nur Afiqah Ismail
- 26. Nur Aina Azmi
- 27. Nur Syaza Azahar
- 28. Nursyafiqah Zaini
- 29. Nurul Haziqah Hamdan
- 30. Nurul Najihah Elias
- 31. Puteri Najihah Mohamad Zamzani
- 32. Rabieahtul Abu Bakar
- 33. Raja Ainin Sofiya Raja Haniff
- 34. Salimah Salleh
- 35. Saw Bing Bing
- 36. Siti Azhani Amran
- 37. Siti Nurkhalidah Husainy
- 38. Siti Salins Sulong
- 39. Siti Sarah Mohd Zain
- 40. Siti Zaharah Ngah @ Jusoh
- 41. Spariharijaona Andriamihaja
- 42. Syed Muhammad Ibad Mahmoodi
- 43. Udi Kurnia Gusti
- 44. Yong Yuen Zhao

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Dr. Sven Monrad Jensen Lystoftevej 20B, 1tv 2800 Lyngby Denmark

University of Malaya American Association of Petroleum Geologists Student Chapter (UM AAPG Student Chapter)

2017/2018 Session

Report of Events (July 2017 - November 2017)

New board committees were selected for 2017/2018 session. Shakirah Hazlan has been elected as the President of UM AAPG SC. The Faculty Advisor is Dr Meor Hakif.

The events organized and our participation in other events are as follows:

- 17 & 18 July 2017 Outcrop presentation during Geoscience Exhibition & Competition (GEnC) 2017 at Universiti Teknologi Petronas.
 6 October 2017
- University of Malaya AAPG SC Committee Recruitment Interview
- 9 & 10 October 2017
 Paper presentation during the National Geoscience Conference (NGC) 2017
- 14 October 2017
 ConocoPhillips Petroleum Geoscience Workshop for Students
- 2 & 3 November 2017
- Participation in GeoQuiz during SPE Malaysian Oil and Gas Convention (SMOGC) 2017
 13 November 2017
- GeoIntro 2.0 with SMK Cyberjaya in collaboration with the Geology Department
- 17 19 November 2017
 - UM AAPG Field Trip: Uncover the Beauty of Miri
- 20 21 November 2017
 Participation in GeoQuiz during the Asia Petroleum Geoscience Conference & Exhibition (APGCE) 2017
- 20 21 November 2017
 Workshop for students in collaboration with CGG Company during APGCE at KLCC
- 24 November 2017
- Technical Talk: An Overview of PETREL Software by Mrs Salwa Mohd Noor & Mr Kian Wei Tan (Schlumberger)
 27 November 2017
- LinkedIn Workshop by Mr. Zaim Mohzani

Outcrop presentation during Geoscience Exhibition & Competition (GEnC) 2017 at Universiti Teknologi Petronas

The Geoscience Exhibition and Competition (GENC) at Universiti Teknologi PETRONAS (UTP) was an international competition participated by many local and international universities. It was held on 17th and 18th July 2017. The competing teams were required to do a presentation of a selected geological outcrop and display their findings at the exhibition booth. The University of Malaya was represented by 2 teams this year, which consisted of 10 undergraduates.

The members of UM Charbon Team were Yasmin Iman, Nor Fatihah, Intan Irwani, Noor Mohammed, Praveena Selvam and Farisha Emmalin. The topic chosen was Geotourism Potential And Conservation Of Batu Arang Coal Mine, Selangor. The main objective was to conserve an abandoned coal mine and increase awareness and attraction for coal mining industry and geoscience as a whole.

The Georillaz Team consisted of four members, i.e. Shakirah Hazlan, Fatin NurAdilah, Fakhrul Radzi and Zulhanis. Their topic was "Malaysia Potential in Developing Feldspar Mining: Gua Musang". The main idea of this project was to reduce the unemployment



UM Charbon Team during the Q&A session.

rate in Kelantan state by developing feldspar mining in Gua Musang as a geotourim as well as providing job opportunities for the locals.

On day 1, we had successfully conducted our presentation in front of the judges who were also the distinguished lecturers from the UTP. Throughout the rest of day 1, besides preparing the booth for the judging session on the next day, we were given an opportunity to have a tour around the campus.

On day 2, we were required to present our poster and findings at the exhibition booth such as rock samples to the judges and visitors. Creativity, description of the outcrop, decoration of booth and presentation of findings were taken into consideration for the evaluation.

Although we did not manage to bring home any trophies, knowledge and experience were acquired by our participation in this event. We would like to thank Dr. Khairul Azlan Mustapha, Dr. Jasmi Hafiz Abdul Aziz and Prof. Wan Hasiah Abdullah for all the guidance throughout the competition. Not to forget, En. Mohamad Kherman Bin Mahali for helping us with transportation.



The Georillaz Team.

UNIVERSITY OF MALAYA

Gua Musang: Malaysia

FATIN NUR ADILAH

MUHD ZULHANE FAKHRULRADZI

Report prepared by: Shakirah Hazlan & Intan Irwani University of Malaya AAPG SC

Paper presentation during National Geoscience Conference (NGC) 2017

In conjunction with National Geoscience Conference held by Geological Society of Malaysia (GSM) on the last 9th & 10th October 2017, we would like to congratulate the former Secretary of University of Malaya AAPG SC 2016/2017, Nur Ain Arbain for her intersting presentation and research on the Geochemistry of Ordovician to Silurian felsic volcanics from Gerik, Perak.

Her achievement is surely an inspiration to all. We wish her all success in her future endeavours!

Summary prepared by: Shakirah Hazlan Presidentt, University of Malaya AAPG SC



Ain Arbain with her research poster on the Geochemistry of Ordovician to Silurian Felsic Volcanics from Gerik, Perak.

ConocoPhillips Workshop for the geology students of University of Malaya

A fruitful workshop was conducted by G&G professionals from ConocoPhillips for the students of Geology Department of University of Malaya on 14th October 2017.

Our perspective on the oil and energy industry was widened throughout the 7 hour-workshop, which focused on basin modeling, hydrocarbon exploration as well as career development in the industry.

Cheerful faces were seen from the start until the end of the event, with valuable advice from Mr. Michael Challis near the end of the workshop: "Keep learning and always follow your passion".

UM AAPG SC would like to extend our gratitude to all the visiting staff from COP and the UM lecturers who were involved in ensuring this workshop a success. We look forward to future collaborations with COP for the benefit of students.

Summary prepared by: Shakirah Hazlan President, University of Malaya AAPG SC



Participants with the professionals from ConocoPhillips.

Participation in Geoquiz during SMOGC 2017

A big congratulation to third-year geology students of University of Malaya, especially to one of our very own AAPG high committee members, Puteri Maisarah Haziqah, for competing in a quiz at SPE's Student Malaysian Oil and Gas Conference (SMOGC). We highly encourage students from the University of Malaya to not just acquire experience in handling conferences and organizing talks but to also take part in competitions outside of UM.

On a side note, UM AAPG SC high committee members who were not participants of the quiz made an appearance to support the competing team, to attend the technical talks and to support the SPE event altogether.

Summary prepared by: Yasmin Iman Vice President, University of Malaya AAPG SC



The High Committee members of UM AAPG SC as delegates from University of Malaya.



UM Team. From left: Puteri Maisarah, Ain and Aainaa.

Warta Geologi, Vol. 43, No. 4, October – December 2017

Geointro 2.0 with SMK Cyberjaya in collaboration with Department of Geology

On 13th November 2017, the Department of Geology, University of Malaya welcomed a visit of 80 Form 1 students and teachers from SMK Cyberjaya who were keen to catch a glimpse into the magnificent world of geology. This event is in collaboration with the lecturers of the Geology Department.

Various exciting workshops were coordinated by the University of Malaya AAPG SC to expose the students on the basic knowledge of geology such as introducing them to the 3 main types of rocks, minerals, fossils, coals, LiDAR, and others.

In addition, the students were thrilled to experience observing thin sections of rocks under a microscope, polishing rocks and measuring dip and strike by using a geological compass during the technical workshops.

A Volcano Competition was also held to boost the students' creativity while exploring geology in a casual environment. The judges were Assoc. Prof. Dr. Ng Tham Fatt and Prof Dr. Azman, the Head of Department of Geology. Three groups with brilliant presentations and two outstanding students were awarded at the end of the event.

We from University of Malaya AAPG SC would like to express our gratitude to all the lecturers and staff who made GEOINTRO 2.0 a huge success!

Report prepared by: Shakirah Hazlan President, University of Malaya AAPG SC



A token of appreciation from the SMK Cyberjaya to Dr Jasmi, the event coordinator.



A group photo of the students, teachers, lecturers and the committee of the University of Malaya AAPG SC.

UM AAPG field trip: Uncover the beauty of Miri

University of Malaya AAPG SC recently organized a field trip entitled 'Uncover the Beauty of Miri' on 17th – 19th November 2017. It was participated by 10 undergraduates, including two UM AAPG Committee members; Shakirah Hazlan as the Project Director and Nor Fatihah Salim as the Vice Director. The participants were selected based on their outstanding academic performance by our instructor, Dr. Meor Hakif Amir Hassan.

On 17th November 2017, after we checked in into our accommodation and had our lunch, we straightly went to our first outcrop, Bukit Song, to study the Lambir Formation which was deposited during the Middle Miocene. At Bukit Song South, the lithology was mainly characterised by interbedding of fine grained sandstone and mudstone. A variety of sedimentary structures were observed, such as cross beds, mud clasts, planar laminations, and ripples. Hence, it is not surprising that the Lambir Hills is a world-class outcrop for studying sedimentary structures. Coal clasts were also abundantly found in coarse sandstone. Trace fossils such as *Ophiomorpha* were observed, indicating marine and fluvial depositional environments. Next, we went to Bukit Song North which generally had the same lithological units, but dipped in the opposite direction. The opposing dip orientations mark the Riam-Buri anticline. We discussed the concept of anticlinal structural traps while at Bukit Song. At night, we enjoyed the great view of Miri Town from the Grand Old Lady and Pantai Labong.

On the next day, we departed for Gua Niah at 8 a.m. After 2 hours of journey, we finally reached Niah National Park. The entrance fee was only RM10/person, however the view of the cave was magnificent and priceless. Visitors were required to cross Niah River by boat before hiking for another 2 km into the jungle to reach the well-known Niah Cave. Limestone was exposed alongside the hiking tracks. Niah is part of the Subis Limestone, which was deposited during the Early Miocene. In comparison with Gua Tempurung which was more confined, Gua Niah consisted of huge pores, allowing sunlight into the cave hence escalating the growth of algae. Besides, we could tell that Gua Niah was relatively younger as the fallen boulders had not undergone cementation yet. After taking pictures as memories around the cave, we left the national park and headed for an aerial overview of Niah from the top of a nearby hill.

At this outcrop, the participants were amazed by the breathtaking view of Subis Limestone which stood 350 m on Setap Shale. Based on the karst features, we could predict that the sea level rose rapidly during 16-23 Ma ago and the growth of carbonate platform could not catch up with the rising sea level, hence forming a wedding cake structure. Furthermore, Subis Limestones consisted of steep-sided walls and an elongated flat surface on top of the platform. Niah is a good analogue for the hydrocarbon-bearing Luconia Province carbonated offshore Sarawak.

On 19th November 2017, the last outcrop we visited was Airport Road Anticline, just near our stay. Lithologically, the strata comprised fine grained sandstone and mudstone. Planar laminations, Hummocky cross stratification, ripples, mud clasts and other sedimentological structures were found. As it was deposited in a shallow marine environment, trace fossils were abundantly observed everywhere around the outcrop. Some of the fossils were preserved in 3D as they were replaced by siderite. In addition, at the south area, we identified a set of normal faults associated with the anticline crest.

Before we departed for home, we went to several local attraction places around Miri such as the Grand Old Lady, Mi Sapi Kuching Restaurant, Tamu Muhibbah and Bintang MegaMall.

All in all, this field trip definitely had widened our perspective on the oil-bearing sedimentary strata in Miri. On top of that, our knowledge about sedimentology was well freshened during this 3 day/2 night field trip.

Nevertheless, this field trip would not be possible and a huge success without the financial assistance given by various parties. This project had received RM3,000.00 of sponsorship from University of Malaya AAPG SC and RM300.00 as a personal funding from Deputy Dean of Postgraduate, Professor Dr. Ismail Yusoff.

Thank you to all our sponsors and our instructor, Dr. Meor Hakif Amir Hassan for the very well coordinated field trip.

Report provided by: Shakirah Hazlan President, University of Malaya AAPG SC



A group photo of the participants and Dr. Meor while hiking to Gua Niah.



After we completed our field trip at Bukit Song North on Lambir FM.

Participation in Geoquiz during Asia Petroleum Geoscience Conference & Exhibition (APGCE) 2017

Four geology students recently represented the University of Malaya in the Geoquiz Competition held by EAGE & PETRONAS during APGCE 2017 on the 20th & 21st November.

The participants were Lokman Hakimi, Hidayah Anuar and two High Committee members of University of Malaya AAPG SC, Shakirah Hazlan the President of UM AAPG SC and Intan Irwani, the Academics Officer.

We would like to congratulate Shakirah Hazlan and Lokman Hakimi for making it to the final round of Geoquiz and being one of the top 8 teams! The other delegates from the University of Malaya were Imtiyaz Kamaruddin and Munirah Stapah.

Besides that, the other UM AAPG SC High Committee members had also made an appearance to support the competing teams.

Summary provided by: Yasmin Iman Vice President, University of Malaya AAPG SC



UM AAPG High Committee with the representatives from PETRONAS.



The Delegates from University of Malaya.

Asia Petroleum Geoscience Conference & Exhibition (APGCE): CGG Workshop – student series collaboration with American Association of Petroleum Geologists (AAPG) Student Chapter

On the 20th and 21st November 2017, the Asia Pacific Geoscience Conference and Exhibition (APGCE) 2017 was held at the Kuala Lumpur Convention Centre. This was a big event for many, including the people in the industry and students who sought information on what the industry is like, and importantly getting to know what companies to target for after graduating. The American Association of Petroleum Geologists of University of Malaya Student Chapter collaborated with CGG for their education series of student workshop. The workshop introduces Geophysics application in Oil & Gas.

The workshop covered the basics of Geophysics application when making seismic interpretations. The aim is to educate possible future petroleum geologists or petrophysicist to drill effectively, as the cost of drilling is very high. University of Malaya American Association of Petroleum Geologists (AAPG) Student Chapter were in charge of giving out invitations to other AAPG Student Chapters in Malaysia, specifically, Universiti Kebangsaan Malaysia, Universiti Teknologi Petronas, Heriot Watt University, Curtin University Sarawak Campus and Universiti Malaysia Kelantan.

On a bigger picture, the club aimed to also grasp all kinds of knowledge related to the Oil and Gas industry altogether by attending APGCE. By collaborating with CGG, students from the University of Malaya, and geology students from other universities would have the chance to share the same interest, as they will be able to get an access pass to this event.

The first Education Series was on Basic Quantitative Seismic Reservoir which was presented by Chung Shen Lee. He explained on how to interpret and analyze inversion results for reservoir characterization. The talk

introduced the background of the science and technology of seismic reservoir characterization and provided exposure on modern applications as practiced by the Oil and Gas industry. The first session also focused on basics of seismic inversion and deterministic inversion, followed by case studies.

The second Education Series was on Basic Quantitative Seismic Reservoir by Chung Shen Lee which focused on geostatistical inversion concept, algorithm and the value of quantifying uncertainty through probabilities of various scenarios. Case studies were also featured during this session.

It was a rewarding experience as I, personally, would like to major in Geophysics myself. Although there were many technical things I could not understand, we were guided throughout the entire session. The speaker was friendly and would explain things in the simplest way possible. On top of that, a Kahoot session was held, so all participants had the chance to answer a few quizzes.

Participation wise, I am very pleased to say that not only students of the University of Malaya were there to attend these two sessions. Many organizations and students from other universities attended as well. Some of them are Sri Wijaya University Indonesia, Gadjah Mada University Indonesia, Universiti Malaysia Kelantan, AAPG & SPE Universiti Teknologi Petronas and SPE Universiti Teknologi Malaysia. Participation was overwhelming as the seats were all filled, with the rest of the students standing throughout this whole session. Participants were very interactive. In the first session, Nur Azwa from the University of Malaya won first place. In the second session, Muhammad Asriq from the University of Malaya won first



University of Malaya students who participated in the CGG workshop.



Workshop at CGG booth during APGCE 2017, by Mr. Chung Shen Lee.

place. This award was given to the individual who answers the fastest and has the highest number of correct answers. On behalf of each American Association of Petroleum Geologists of University of Malaya Student Chapter, I would say that, overall, APGCE 2017 was a rewarding experience as we got to learn many things, especially on how softwares work, as this was not something that was taught in the classroom. I also had the chance to build my networking as we met many people from the industry.

Report provided by: Yasmin Iman Vice President, University of Malaya AAPG SC

Schlumberger Talk: An overview of Petrel software

On the 24th of November 2017, a Technical Talk: An Overview of PETREL Software was held at the Department of Geology, University of Malaya (UM) hosted by the University of Malaya American Association of Petroleum Geologists Student Chapter (UM AAPG SC). The talk was delivered by two representatives from Schlumberger, i.e. Mrs. Salwa Mohd Noor and Mr. Kian Wei Tan. The topics covered were structural geology, mapping and the applications of geophysics in the oil and gas industries, and was attended by more than 40 geology students.

A brief introduction of the speakers' background, Mrs. Salwa was an alumnus of UM and now currently working as a Business Development Manager, while Mr. Kian is a geology graduate from Universiti Malaysia Sabah (UMS) and working as a Geophysicist.

The event started at 9 a.m. with a welcoming speech by the emcee, Khaleeda. Next, Mr. Kian delivered a talk on the process of mapping by



Talk by Mr. Kian on applications of Geophysics in oil and gas industry.



Students focused on the talk.



Students with the speakers and lecturer, Dr Khairul Azlan.

applying PETREL software. He also taught the processes of how the data were managed from the very first step until it had reached the point where the models are built for the interpretations. Besides that, he had also provided a fruitful exposure on the Quantitative and Qualitative Interpretation. Not only that, he emphasized the importance of the geophysics and basic geology knowledge as well as having skills in software as an extra credit in the Oil & Gas Industries.

At 10 a.m., it was Mrs. Salwa's turn to take over the talk. Her parts were divided into two sections in which the first section, she did touch on using the PETREL software for structural modelling. Whereby, for the second section, she generously shared the crucial skills required by the industries such as the ability to learn, teamwork, communication skills and others. She advised the students to not focus on the academics and technical skills only but to be a whole-rounded package student by having good soft skills for better opportunities upon entering the working life.

The talk officially ended at 12 p.m. but some of the students met personally with the speakers to ask a few more questions regarding the PETREL software and many more. All in all, the students had widened their perspective on oil and gas industry and developed a great basic understanding on the PETREL software.

Hence, we from UM AAPG SC would like to thank Mrs. Salwa and Mr. Kian for the wonderful talk given to the geology students of UM. We are also looking forward to future training/workshop with Schlumberger.

Report prepared by: Shakirah Hazlan & Siti Nor Adila University of Malaya AAPG SC

UM AAPG LinkedIn Workshop

On the 27th of November 2017, a LinkedIn Workshop: A Workshop for Future Colleagues, Professionals, & Job-Seekers was held at the Department of Geology, University of Malaya (UM) hosted by the University of Malaya American Association of Petroleum Geologists Student Chapter (UM AAPG SC) in collaboration with the Science Society of the University of Malaya. The workshop was delivered by our guest speaker, Mr.Zaim Mohzani. The workshop provided an effective guide on professional networking through a hands-on approach using Linkedin as a platform. 37 students attended the workshop.

The guest speaker, Mr. Zain Mohzani is a Monash University graduate from Australia who majored in political science and international relations. He is the co-founder of Nation Building School (NBS), the former founder of Perdana Fellows Alumni Association and the former Vice President of Organisation for National Empowerment (ONE). He is currently a youth influencer of the World Economic Forum (WEF) who specialises in youth development.

At 3 p.m., the event started with a welcoming speech by the emcee, Praveena A/P Pannir Selvam. Next, Mr. Zaim began the workshop by giving a brief introduction of himself. The participants were given insights of professional networking via Linkedin and the opportunities that come along with it. After 10 minutes of introduction and briefing, Mr. Zaim proceeded by giving live tutorials on how to create a proper Linkedin account using 8 simple steps. Each step was elaborated further by Mr. Zaim who enthusiastically guided every participant all the way throughout the workshop. Participants were able to inquire and rectify problems immediately.

The workshop officially ended at 5.40 p.m. Some of the participants met Mr. Zaim personally for further inquiries and to thank him for his guidance. Refreshments were provided at the end of the workshop. As a whole, the workshop went smoothly and the objectives were successfully achieved. At the end of the workshop, participants were more informed on how to professionally present themselves and broaden their professional network interface using Linkedin.

Therefore, the UM AAPG SC would like to express our full gratitude to Mr. Zaim Mohzani for all his guidance and knowledge sharing. We hope to organize similar workshops in the future for the benefit of the students of the University of Malaya.

Report prepared by: Nur Khaleeda Muhamad Adzrill University of Malaya AAPG SC



Mr. Zaim Mohzani and the participants.



Mr. Zaim Mohzani delivering his talk.



UM AAPG SC committee members.

UPCOMING EVENTS

March 21-23, 2018: Sustainable Energy Technology Asia 2018 (SETA 2018), Bangkok International Trade & Exhibition Centre, Bangkok, Thailand. For more information, visit website at www.seta.asia.

March 25-28, 2018: SPE EOR Conference at OGWA, Oman Convention and Exhibition Centre Muscat, Oman. Details at: http://www.spe.org/events/en/2018/ conference/180gwa/homepage.html

March 26-28, 2018: Mining Investment Asia Conference & Exposition 2018, Marina Bay Sands, Singapore. For details, visit www.mininginvestmentasia.com

March 27-28, 2018: Geochemistry Group Research in Progress meeting, University of St Andrews, Scotland. Contact Geochemistry Group, email address: c.r.pearce@noc.ac.uk for enquiries.

March 27-29, 2018: AAPG Global Super Basins Leadership Conference, Houston, Texas. Further details are available at: http://superbasins.aapg.org/2018.

April 2-4, 2018: Regional Geoheritage Conference 2018, Khon Kaen, Thailand. Contact Mr. Suvapak Imsamut, email: suvapaki@hotmail.com, phone: (66) 08 1889 5064, 08 9227 9944 for details.

April 9-10, 2018: Conference on Lithium: From Exploration to End-User, London. Contact: georgina.worrall@geolsoc.org.uk for more details.

April 11-12, 2018: EAGE-HAGI First Asia Pacific Meeting on Near Surface Geoscience and Engineering, Yongyakarta, Indonesia. Details can be obtained at www.EAGE.org.

April 11-13, 2018: CIS Petrochemicals Conference 2018, Moscow, Russia. Further details at https://www.globuc.com/cispetrochemicals/.

April 12-14, 2018: Engineering Group Annual Conference, Cambridge. Contact Dave Giles, email address: dave.giles@port.ac.u for further details.

April 13-14, 2018: 1st International Conference on Geosciences 2018 (ICG2018), KualaLumpur, Malaysia. Visit website : http://estcon.utp.edu.my/icg to discover more details about the conference.

April18-19, 2018: Workshop: GTW Geothermal Cross Over Technologies, Utrecht, The Netherlands. Visit www.aapg.org/events for additional information about the workshop.

May 2-3, 2018: Global Analogues for the Atlantic Margin AAPG European Regional Conference, Lisbon, Portugal. Visit the event's website at http://erc.aapg.org for further details.

May 7-8, 2018: Petrochemical and Refining Congress Europe 2018, Berlin, Germany. Visit Congress website: goo.gl/dJtF38 for more information.

May 20-23, 2018: AAPG Annual Convention and Exhibition 2018, Salt Lake City, Utah, USA. Kindly visit website: http://ace.aapg.org/2018 for more information.

May 21-25, 2018: 5th International Course on Geotechnical and Structural Monitoring, Rome. Visit website: geotechnicalmonitoring.eu/ for further details.

June 6-7, 2018: Geosciences Technology Workshop on Pore Pressure and Geomechanics: From Exploration to Abandonment, Perth, Australia. For enquiries, contact: Programs Manager, AAPG Asia Pacific Region, tel. no.: +65 96536728 or visit www.aapg.org/career/training/inperson/workshops.

June 16-21, 2018: Resources for Future Generations Conference, Vancouver, British Columbia. Visit RFG2018.Org for other information about the event.

June 25-29, 2018: International Conference on Environmental Science and Technology, Houston, Texas, USA. Visit the conference website at: http://www.AASci.org/ conference/env/2018/index.html for more information or send email inquiries to env-conference@AASci.org.

June 25-29, 2018: World Gas Conference 2018, Washington DC, USA. Visit website at https://wgc2018.com/ for details.

June 26-28, 2018: European Mantle Workshop (EMAW2018), University of Pavia, Italy. For more information, visit http://emaw2018iggpavia.unipv.it.

July 2-5, 2018: Hedberg Conferences: Geology of Middle America – The Gulf of Mexico, Yucatan, Caribbean, Grenada and Tobago Basins and Their Margins, Sigüenza, Spain. Visit http://www.aapg.org/events/research/hedberg-conferences for more information.

July 3-4, 2018: SEGRM Symposium on Geo-engineering (SEGRM-GEO) in Tropical Region, Universiti Teknologi Malaysia, Kuala Lumpur. Contact Dr. Rini Asnida Abdullah, email add.: info@segrm.org for more details.

July 10-13, 2018: Granulites & Granulites 2018 Conference, by the Mineralogical Society of Great Britain and Ireland, Ullapool, NW Scotland. Additional details can be obtained at the link: http://www.minersoc. co.uk/2018-meeting-granulites-granulites.html. July 23-25, 2018: Unconventional Resources Technology Conference (URTeC 2018), Houstan, Texas. Visit: http://urtec.org/2018/ for further details.

August 13-14, 2018: 1st International Conference on Geosciences (ICG) 2018, Kuala Lumpur, Malaysia. More information about the conference is available at: http://estcon.utp.edu.my/icg.

August 13-17, 2018: "Mineral Evolution and Mineral Ecology: Changes in Species Diversity and Complexity in Space and Time" at XXII International Mineralogical Association meeting, Melbourne, Australia. More details can be obtained at https://www.ima2018.com/.

September 26-27, 2018: Back to the Future - the Past and Future of Oil and Gas Production in the Asia Pacific Region Conference, Bangkok, Thailand. Contact Programs Manager, AAPG Asia Pacific Region, Tel. No. +65 96536728 for information.

October 1-5, 2018: Short course on Application of Diffusion Studies to the Determination of Timescales in Geochemistry and Petrology, Ruhr-Universitaet Bochum, Germany. More details are provided at http://www.gmg.rub.de/petrologie/.

October 10-12, 2018: 9th International Conference on Asian Marine Geology (ICAMG-9), Shanghai. Visit https://icamg-9.tongji.edu.cn for further details.

October 13-21, 2018: 15th Regional Congress on Geology, Mineral and Energy Resources of Southeast Asia (GEOSEA 2018), Hanoi, Vietnam. Visit website: http:// geosea2018.dgmv.gov.vn for more information.

November 4-7, 2018: International Conference and Exhibition (ICE 2018), Cape Town, Africa. More information at: http://capetown2018.iceevent.org/.

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November 12-15, 2018: 1st Conference of the Arabian Journal of Geosciences (1st CAJG), Hammamet, Tunisia. Contact: contact@cajg.org for queries.





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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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