# SEMINAR REPORT
# FOSI-IAS-SEPM REGIONAL SEMINAR: PAST AND PRESENT SEDIMENTATION IN TROPICAL REGION

***Report by: Barry Majeed Hartono, Ahmad Najili***

Tropical sedimentations are unique. The "unique" term that given for tropical sedimentation is because that this sedimentation is affected by climates, vegetation, and high rate of weathering. The understanding of recent and modern tropical sedimentation can be used to study the sedimentation happened in the past. So studies about tropical sedimentation hopefully could help and improve the understanding of oil and gas exploration or coal exploration.

FOSI 3rd Regional Seminar was held first September in Grha Sabha Pramana (UGM Conference Centre) Yogyakarta, Indonesia. Indonesian Sedimentologist Forum (FOSI) together with International Sedimentologist Association (IAS) and Society of Sedimentary Geology (SEPM) organized the joint Seminar. This Seminar was held also as a follow up from lecture (FOSI special meeting) in 2016 that was given by Prof. Poppe de Boer (Utrecht University) and Ir. Herman Darman (FOSI) in Gadjah Mada University (UGM).

This joint Seminar was intended to be a media for geoscientist and researchers to share their experience, research, and knowledge in order to improve the understanding of the tropical sedimentation, especially in SE Asia. The Seminar initial activity of the Seminar on September 5th was oral presentations followed by coffee break and poster presentations over the next day. 17 posters were presented and 12 talks giving a total of 29 contributions. In this Seminar, there were also 9 keynote addresses.

The first keynote address was given by Dr. Eko Yulianto from Indonesian Institute of Sciences (LIPI) and titled "Interdisciplinary Study of The South Java Giant Tsunami". Dr. Yulianto use historical records from Babad Tanah Jawa (The Book of Java Land) and many possible documents to relate The South Java Giant Earthquakes and Tsunamis. From the historical records, the possible year that tsunami happened in historical records are in ~1600 AD. Combined with tectonic studies, the possibilities tsunami




***Figure 1.*** *Keynote speakers in the first day of the Seminar; From above: 1) Dr. J.T. Van Gorsel (above left); 2) Dr. Eko Yulianto (above right); 3) Dr. Charlie Wu (left below); and 4) Dr. Moyra Wilson (right below) (Geoweek Documentation, 2018).*

occurred are in the southern of Java. The problem is discovering the tsunami traps. Satellite image was used to determining the tsunamis traps. After the tsunamis traps have been determined, the evidence of the tsunamis must to be found. Dr. Yulianto use plant fragments and imbricated conglomerate as the evidence of paleotsunami. Samples were taken from paleotsunami layer to be examined for its foraminifera assemblage. Dr. Yulianto use the juvenile foraminifera found in the foraminifera assemblage as paleotsunami indicator. The reason he use the juvenile foraminifera because it is found abundance and undamaged.

The second keynote address was given by Dr. J.T van Gorsel from Geoscience Research and titled "Depositional Environments of the Indonesian Region: When is the Present not the Key to the Past?". Dr. van Gorsel addressed the difference between present and past sedimentation in Indonesia. The difference is known from the present day environment and past Indonesia environment. The climates are the main factor that differs present-days and past sedimentation. From Dr. van Gorsel explanation, at least there are 3 conclusions that can be considered. First, Modern depositional environment are not always a good analogues for deposits from cooler or warmer climate periods. Sedimentary record in Indonesia probably formed in a different condition with the present-days sedimentation. Second, modern reefs are probably good analogues for the widespread coral-rich Late Oligocene-Early Miocene reefal buildups of Indonesia. Finally, modern deltas are probably good analogues for shelfal deltaic deposits in the transgresive parts of Cenozoic rift-basins.

The third was presented by Dr. Charlie Wu from University of Indonesia. In this talk, Dr. Wu discuss about geostatistics. He gave us knowledge about big data issues, geostatistical reservoir modelling steps, issues in the geostatistical methods, and another options aside from traditional geostatistical methods. The most important thing from the discussion is geostatistical methods only tool to provide models of equal probability. We must back to our basics and use our geological concept when using geostatistics methods, especially when the data is limited.

The last keynote address in the first day of the Seminar was given by Dr. Moyra Wilson from University of Western Australia and titled with "Tropical Carbonate Systems and Reservoir of SE Asia". Dr. Wilson mainly discuss about carbonates sedimentation in Paleogene and Neogene in SE Asia. The discussion is very interesting and very important to understand because almost half of SE Asia's hydrocarbon reserves are contained in carbonates. Dr. Wilson compared Paleogene carbonates with Neogene carbonates from its depositional and its diagenetic conditions. Paleogene carbonates in SE Asia characterized by foraminifera domination, subsiding environment, and unaffected by meteoric leaching. Neogene cabonates are characterized by coral domination, reefal buildups forming isolated platform and repeated subaerial exposure caused by SE Asia active Neogene compression. . This condition resulting secondary porosities all occurred in Neogene carbonates. The conclusion that can be take from the discussion is the evaluation of variability in SE Asia carbonate reservoirs provides much needed data as the hydrocarbon industry focuses on improving recovery from existing fields and exploring for new reserves.

On the second day of the Seminar, there were five keynotes addresses, and four paper and eight posters to be presented. The first keynote address in the second day was given by Dr. Kim-Kiat Liaw from University of Technology, Petronas and titled "Coaly Petroleum Source Rock in Malaysia". Dr. Liaw discuss about Type III coaly source rock that predominantly gas prone as the source rock of three Malaysia's petroleum provinces. This Type III gas prone source rock could not explain the distribution of large oil accumulation. For example in the Malay Basin, the oil is sourced from coaly shale. In Sabah and Sarawak Basin, oil has already correlated geochemically to coaly source rocks. Therefore, understanding the environmental factors that control hydrogen index (HI) in the peat forming process is crucial to establish the distribution of oil prone coaly source rock. Dr. Liaw explained that peat usually started off as floating mires. The early immature stage of peat development is the precursor to Type III coal development. By the time the peat reach the mature stage by evolving into dome-shape raised bog. Domed peat bogs are the origin of Type III gas prone which tend to be thick more localized. The understanding of the relationships between immature peat and mature in peat forming process and the petroleum generating potential of the resultant coal, reaffirms the notion that "The Present is indeed the Key to the Past".

The second keynote address in the second day was given by Dr. Meor Hakif Amir Hassan from University of Malaya and titled "Miocene Mangrove-tidal Flat Deposits From The Nyalau Formation of Sarawak, Malaysia". Dr. Hassan

mainly talking about the sedimentology of ancient mangrove deposits in Early Miocene Nyalau Formation, Sarawak.

The third keynote addresses in the second day was presented by Dr. John Warren from Chulalongkorn University and titled "*Globigerinoid* Reservoir in Mundu Formation".

Dr. Warren discusses about two well sites in Southern Madura. Dr. Warrren compared this three well sites in two different Hareas, area A and area B. The area A are characterized by well-sorted sand, abundance of *Ophiomorpha* trace fossils and internalites deposits while area B are characterized by finer grained, poor sorted sand, and more cementation process. By comparing well 1, well2, and well 3, minimal diagenetic occurred in well 1 and well 2. One thing that we can take from the statement above is cementation degrade quality, so well 3 have a poor quality as a reservoir. Dr. Warren explained that this Globigerinoid is intenalites deposits that deposited by internal waves that produced from Lombok Straits.




***Figure 2.*** *Five keynote speakers in the second day of the Seminar; From above: 1) Dr. Kim-Kiat Liaw (above left); 2) Dr. Meor Hakif Amir Hassan (above middle); 3) Dr. John Warren (above left); 4) Dr. Sandip Roy (left below); and 5) Dr. Ludvig van Lowemark (right below) (Geoweek Documentation, 2018).*

The next keynote address was given by Dr. Sandip Kumar Roy from Directorate General of Hydrocarbon, India and titled "Impact of latitudinal Variations in Tropical Sedimentation: Case Study from Andaman Basin. Dr. Roy explained that the depositional environment in fluvial, shallow marine, and deep marine setting in sedimentary basin of tropical latitude are influenced by weathering, river discharge, monsoonal climate, cyclones, earthquake, Tsunamis, and climatic variances. Dr. Roy choose Andaman Basin, a convergent margin basin in the tropics, as the case study because this basin has been influenced by the above factors, especially cyclones, earthquake and Tsunamis that left their imprint in the sedimentation history. In the present day tropical cyclones often hit Andaman island. Located near the plate boundary of Indian and Eurasian Plate frequent earthquake occurred in Andaman Basin. This major earthquake and Tsunamis have left significant imprints in the basin sedimentary record. The imprints represented by soft sedimentary structure that have been found in Paleogene and Neogene rock record. For example, in 2004 the earthquake occurred near Banda Aceh lead to Tsunamis, which damaged shoreline in the form of corals and other rocks being washed into the beach as well as back wash fans, and creation of new beaches and upliftment of some islands.

The last keynote address in the last day of the Seminar was given by Dr. Ludvig Lowemark from National Taiwan University and titled "Zoophycos: an Amazing Trace Fossil with Some Serious Implications to Quarternary Paleoclimatology". Dr. Lowemark explained the general characteristic of Zoophycos. He explained that Zoophycos has been found in sediment since Phanerozoic Eon. Zoophycos evolved towards a more complex morphology and adaption to new environments corresponds to general shifts and changes in the ocean's biogeochemical cycles and the evolution of new groups of organisms over the Phanerozoic Eon. From Dr. Lowemark explanations it can be concluded that the Zoophycos trace fossil represents an adaption to an environment where food arrives to the sea floor in pulses as a response to seasonal changes in currents and wind patterns.

All of the keynotes speakers have already give their presentations in the Seminar day. Actually, between the keynotes session there are coffee breaks for half an hour. In the coffee break, the participants can discuss about the presentations that have already given by the keynotes speakers or the participants can visit the poster display. There also seven papers that must to be presented oral between the keynotes session in the first day and four papers in the second day of the Seminars. These papers generally discuss about comparison between recent sedimentation and ancient sedimentation in SE Asia, especially in Indonesia. Studies varied from stratigraphy analysis to 2D flume experiment. Papers about fossils and ichnofossils also presented in the Seminar. Not to be forgot, there were poster presentations in the first day and second day of the Seminar. This session have duration for 25 minutes with nine posters presented in the first day and eight papers in the second day. These posters are also relevance with modern and ancient sedimentation in SE Asia.



***Figure 3.*** *Keynote speakers, and paper and poster presenters (above). Discussion among the participant during poster session (Geoweek documentation, 2018).*

The Seminar was interesting because the Seminar focus on transdiciplinarity and sedimentology studies by specialist from other areas. Another interesting aspect of the Seminar is this Seminar is attended by 57 peoples from Indonesia and its surrounding countries. From 57 participants, Thirty-four participants from academic institution, 14 participants from the industries, include 3 participants from P.T. Geoservices (main sponsors), and 9 participants from civil services. This Seminar allowed all participants from different background, different experience, and different area to share their

nowledge. Two research topics were proposed for next FOSI Seminar and to the network of professionals. These topics are:

1. Stratigraphy and reservoir sedimentology for enhanced oil recovery (EOR).
2. Sedimentology for development of unconventional energy.

The outcome of the FOSI-IAS-SEPM Regional Seminar is the edition of a special issue of the Berita Sedimentologi featuring keynote papers presented during two days of the Seminar.




***Figure 4.*** *All participant of the seminar*