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POSTER PRESENTATION

Petroleum Seepage Analysis in Java-Sumatra Forearc Basins

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Subsurface fluid flow in sedimentary basins has been intensively studied in recent decades due to its significances in the petroleum industry such as identifying petroleum plays in frontier basins and shallow geo-hazard potency, and beyond the petroleum industry in such areas as climate change and marine ecosystems. Recent advancement in seismic imaging has aided the identification of fluid flow phenomena through a magnificent visualisation of fluid flow elements in subsurface such as seepage's termination, seal bypass systems, and potential fluid sources. Nonetheless, lack of access to high resolution seismic data and seismic interpretation calibration, due to paucity or confidentiality of data, has left gaps in the study of subsurface fluid flow phenomena around the world. In this study, a high resolution seismic dataset from the Java-Sumatra forearc basins has been analysed through state-of-the-art seismic imaging techniques to define the fluid plumbing system in the study area and distinguish petroleum seepages.

Bottom simulating reflectors (BSR), which indicate the base of gas hydrate stability and require methane to form, were widely identified in these basins. BSRs may also indicate a potential shallow geo-hazard due to the risk of gas hydrate or free gas blow out during drilling activities. A coincidence of many BSR occurrences above potential oily fluid conduits such as strike slip faults indicates a prospect of oil leakage from a deep source. Through tectonostratigraphic analysis from previous studies, Eocene source rock / reservoir at the deepest sedimentary succession in the forearc basins was inferred as a source of oily hydrocarbons, which could contribute to the presence of shallow DHIs including the BSRs. A possibility of biogenic hydrocarbon contribution in the BSR formation has also been considered but requires further geochemical analysis to be confirmed. Thus, migration of oily hydrocarbons was interpreted through seismic imaging in the Java-Sumatra forearc basins. Through this result, it can be inferred that a prospective source rock may lie on the deepest part of the Java-Sumatra forearc basins and a potential shallow geo-hazard may exist as indicated by the BSR appearance in relation to structures. Additional work will be done to calibrate the seismic anomalies by sea surface seepage slick analysis from satellite imagery in order to further probe the potential for active oil-migration in the study area. The results of this analysis should be available in time for the conference.