Why and where submarine mud volcanoes existing? A case study of the Kumano Basin, Naikai Trough subduction zone

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Mud Volcano (MV) is one of topographic feature which derives sediments and fluid from depth to surface of the Earth, which observed over the world (Kopf et al., 2002). They are mainly reported from oilfields, areas of high sedimentation rate, and convergent plate margins. Such loci of MVs suggest that MVism needs stable compressional tectonic setting and/or enough amount of source making MV. MV emits sediment and fluid (gas, water, oil, dissolved salt) (Milkov, 2005). The reason why buried materials intrude upward is that they have buoyancy because of heating (relates to magmatic activity) and difference in density (degassing, dehydration, hydrolysis reaction of mantle wedge, etc.) at the buried depth. Faults maybe help for making upwelling of materials, at some occasions. Because the “MV” is just a topographic feature made by ejecta from depth, background geology of the MVism is too complicate to overview the activity. In order to understand MV itself and desterilize information which MV brings, at least around Japan Island, it is now required that we focus on MV activities around our country and similar geological settings.

MV on and around Japan Island is reported on land (Niigata and Hokkaido area, and hot mud pools) and also at submarine environments (off-Tanegashima and Kumano Basin). There are at least 14 of MVs in the Kumano Basin, the forearc basin at off Kii peninsula (Kuramoto et al., 1998, 2000; Morita et al., 2004; Pape et al., 2015, Asada et al., submitted). Kumano Basin is forearc basin overlying an older accretionary prism along the Nankai Trough, where Philippine Sea Plate subducts under the Eurasia Plate (Moore et al., 2009; Boston et al., 2016). A megasplay fault from the base of the accretionary prism cuts to the seafloor (Moore et al., 2009; Kimura et al., 2011). A fluid sampled from a MV in the Kumano Basin indicate that it comes from deeper than 15 km below seafloor, possibly meaning along plate boundary (Nishio et al., 2015). Results from seismic survey over the Kumano Basin partly show diapiric structure below MVs in the northern Kumano Basin (Morita et al., 2004; Moore et al., in this session). A recently confirmed MV along the Kumano Basin Edge Fault Zone (Asada et al., submitted; Walter et al., in this session) also is considered existing with larger mud diapir nearby, and maybe activated by faults cutting surface of the diapir (Asada et al., submitted). Trying overview the MVism in the Kumano Basin, to pick up characteristic feature of this area, a possible scenario is: (1) ejecta from MV maybe derived from accreted part, (2) environment below a lower sediment layer may decide presence of mud diapir and rough distribution of connecting MV, and (3) tectonic deformation near seafloor controls activity of each MV. Comparative discussion with other submarine MVs are efficient for further understanding of MV in the Kumano Basin. An original depth, history, degree of volcanism, differences between each MV, to know unknown MVs around Japan, and relationship with earthquake remains as unsolved problems.

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