

A challenge to detect mud volcano activities in an ocean area using DONET1 in the Kumano Basin, central Japan

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Mud volcano (MV) is geological feature that are observed all over the world, especially along plate convergent margins. MVs bring fluid and sediment to the surface from depth. The reason why subsurface sediment come up to the surface is they gain buoyancy at depth. The buoyancy is originated from heating (thermal field), generation and input of fluid (oil, water, and gas, at both volcanic and sedimentary area), and metamorphism of rock and sediment. Add to this, fluidized sediment may come up along a certain fault plane. MVs along Japan Islands are mostly found on ocean floor, at forearc basins along southwest Japan. At least 14 MVs are reported from both the Kumano Basin and off-Tanegashima area. MVs in an ocean area, small and easily eroded feature on seafloor, are hard to observe by a usual wide-ranging observation technique and thus still explored enough. A difficulty of revisit and repetitive observation also prevent us from understanding of mud volcano activities in an ocean area.

DONET (Dense Oceanfloor Network system for Earthquakes and Tsunamis) is a submarine cabled real-time seafloor observation infrastructure which is designed for precise monitoring of earthquakes and tsunamis in the Nankai area. The system is constructed by 2 loops of observatories, developed in the western Kumano Basin (DONET1) and off-Shikoku area (DONET2). MVs in the Kumano Basin locate within areas of observatories connected to node A and D of the DONET1. We just start challenge to detect signals of MV's activity into the DONET data.

Seismic signals related to MVism are considered as a result of subseafloor intrusion and emission of gas bubbles into water. We searched suspected-MV-related signals in data from differential pressure gauge, DONET, using an information provided by Prof. Obara, ERI, Univ. of Tokyo. Prof. Obara's data show a seismic event occurred at seafloor in Sagami Bay in December 2001 detected by on-land seismometers. The characteristics we are seeking for into DONET data is as follows:

- Data having a peak at 5~6 Hz
- Duration of data is at least 10~20 minutes
- Data having strongest signals at around A and D nodes of DONET1 where closely exists to the known MVs
- Data having a square shape, meaning steady strength during its duration (data do not show spindle-shape)

There are many events detecting Earthquakes within the data from DONET, but there are less number of events which show features mentioned above. For examples, such feature has detected only 2 times during January 2017. As for a timing of ~1 week before and after the large Earthquake occurred at SE off-Kii peninsula (M6.1) in 2016 April 1st, we cannot find notable features. It may be because the MV activity behind of high-level of seismic signals, and/or no MV activities relate to the event. Further inspection and discussion beyond research fields is absolutely needed.

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