Submarine landslides and the trigger on the Kumano Basin

Submarine landslides and the trigger on the Kumano Basin

*川村 喜一郎[1]、グレゴリー ムーア[2]、浅田 美穂[3]
*Kiichiro Kawamura[1], Gregory F. Moore[2], Miho Asada[3]

1.山口大学・JAMSTEC、2.University of Hawaii、3.JAMSTEC
1.Yamaguchi University/JAMSTEC, 2.University of Hawaii, 3.JAMSTEC

Submarine landslides are indirectly visible, but they directly affect our society. Tsunamis might be excited mostly by an active fault movement on a seafloor, but some of the tsunamis could be excited by large submarine landslides in coastal areas in the 1952 Alaska Earthquake[1)] and the 2010 Haiti Earthquake[2)]. Some of the large tsunamis at convergent margins have been suspected as a result of submarine sliding[3)].
Underwater cables are cut suddenly by submarine landslides and related bottom currents. Such a cable cut accident damages economics[4)]. We have various observation data in the events, but we can not critically understand its trigger mechanism yet.
The trigger mechanism of submarine landsliding is thought to be earthquake shaking, pore pressure increment, slope steepening and so on[5)]. It is possible that uplift due to mud diapir could be responsible for slope steepening. The gas-related high-pressure could induce fluid escaping from deeper sub-seafloor toward seafloor and causes mud volcanism. We observed a gas-related submarine landslide example at off-Hachinohe[6)]. Some of the researchers challenged to understand the formation mechanisms using various soil mechanics experiments[7)]. However, we need more descriptive and also experimental studies to understand the formation mechanism. These attempts are the first step for a prediction of the submarine landslides.
In this June, Dr. Asada (chief scientist for the cruise), Prof. Moore and others challenged to survey what at the outer ridge of the Kumano Basin using *AUV Urashima* during the cruise YK15-10. This challenge was a series of difficulty caused by the Kuroshio Current, but finally the *Urashima* recovered dataset of topographic textures, sub-bottom profiling images, side scan sonar images, and bathymetric images in a submarine landslide area, as shown by Moore and Strasser[8)]. Based on these survey results, we conclude that
1) The submarine landslide might be critical state by a slope gradient of several degrees.
2) This slide was formed by one big slide (~1.0 x 1.0 x 0.03 km) and many small slope failures resulting turbidite layers covering on the wasted-mass.
3) This might not need any triggers for sliding (e.g. large earthquake).
4) In the wasted mass, we observed transparent dome-shaped bodies of ~several tens meters in the subbottom profiling images. These might result from fluid escaping and/or small mud volcanoes.
We further analyze in detail the Urashima's data to decipher the trigger mechanism and also formation process of the submarine landslides on the Kumano Basin.

References
1) Plafker and Mayo, 1964, USGS OF-Rep., 2) Hornbach et al., 2010, Nat. Geosci., 3) Kawamura et al., 2014, Mar. Geol., 4) Hsu et al., 2008, TAO, 5) Locat and Lee, 2002, Can. Geotech. J., 6) Morita et al., 2012, Springer, 7) Sultan et al., 2004, Mar. Geol.), 8) Moore and Strasser, 2016, Springer

キーワード：海底地すべり、南海トラフ、泥火山

Keywords: Submarine slide, Nankai trough, Mud volcano

