



Evidence of submarine landslide triggered by the 2009 Suruga Bay, Japan earthquake

Hiroyuki Matsumoto, Toshitaka Baba, and Yoshiyuki Kaneda

Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Yokosuka, Japan (hmatsumoto@jamstec.go.jp, +81 46 8699315)

On 11 August, 2009, at 05:07 JST, a moderate-to-large earthquake (M6.5) took place in the Suruga Bay of central Japan. It struck two deep ocean water pipes, which reach 397 m and 687 m deep in the near source area. The temperature and the turbidity of deep ocean water became higher and larger, respectively than usual immediately after the earthquake. The temperature of 397 m deep ocean water have been recovered in one week later, however, the relatively high temperature of 687 m deep water has been continued. This implies that something to be damaged have happened on the 687 m water pipe due to the earthquake. In the meantime, three in-situ surveys to reveal damages of the 687 m water pipe and its cause could be carried out by using a research vessel and two vehicles of Japan Agency for Marine-Earth Science and Technology (JAMSTEC). The first survey was done by using ROV "Hyper-Dolphin", which performed the visual surveys. As a result, the 687 m water pipe has been moved at least 2 kilometers downstream from the original laid position. Sediments and debris have been deposited somewhat in one side along the 687 m water pipe. And the 687 m water pipe has been buried into the sediment at water depth of 782 m. Thus the direct evidence of submarine landslide trace could be discovered during the first survey by ROV "Hyper-Dolphin". The second survey by R/V "Natsushima" was to reproduce the bathymetry map in the source area after the earthquake. Comparing with the bathymetry map obtained before the earthquake by the same equipment on R/V "Natsushima", a retrieved contour pattern, i.e. an erosion pattern could be found near the original 687 m water pipe location, whereas a sediment pattern has been reproduced in the downstream where the current 687 m water pipe disappears, which is possibly a submarine landslide trace caused by the earthquake. The last survey was done by AUV "Urashima" in order to obtain a high-resolution bathymetry map near the submarine landslide trace. AUV "Urashima" can dive close to the seafloor and obtain bathymetry map at a high resolution. A high-resolution 3D image of the seafloor clearly depicted a slump scarp of 450 meters wide and 10 to 15 meters deep near the original 687 m water pipe location. Dune structures, which seem to be generated by turbidity current, were found widely in the submarine slide area. Each dune has a wavelength of 20 to 30 meters and a height of about 1 meter. This submarine landslide might contribute to trigger the tsunami excitation, which still cannot be interpreted by the seismic faulting alone.