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High-turbidity layer and its settling in the Nankai accretionary prism off Kumano

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Earthquake shaking is one of the major triggers for redistribution of slope sediments. Some seafloor observations suggests disturbances during large earthquakes. Core sample analyses also provide information about histories of gravity flows in sedimentary basins. A series of earthquakes of magnitude about 7 occurred southeast off the Kii peninsula in September 2004. We had a chance to obtain undersea video images just after and six years after earthquakes. The seafloor observation was conducted along the prism slope ranging from near the epicenter to 80 km southwest of it by ROV "NSS" during the KY04-11 cruise. The NSS consists of a pilot vehicle, tether cable, and a removable winch system. The pilot vehicle has four thrusters, two underwater TV cameras and hook for a heavy payload. TV observation indicated changes of turbidity with depth: cloudiness increased with depth and was relatively high within the bottom 200m irrespective of the distance from the epicenters. Such turbidity was found in the whole prism slope and was not recognized in the forearc basin. Moreover, extreme high-turbidity layer was observed at the bottom of the slope basin. Complete sinking of the weight of the heat flow probe within this layer suggested thickness of more than 2 meters. NSS revisited this site 6 years after the earthquakes during KH-10-3 cruise and confirmed the seafloor to be normal condition. The seafloor depth 2.4 m deeper than that measured just after the earthquakes using a depth meter (pressure) and an altimeter (acoustic) of the pilot vehicle suggests that the altimeter acoustically recognized the top of the extreme high-turbidity layer as a seafloor in 2004. Our seafloor observation revealed pervasive distributions of turbidity layers probably caused by slumping or sliding in the prism slope and accumulating process in the slope basin.

Keywords: gravity flow, Earthquake shaking, turbidity layer, NSS