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Earthquake induced deposits during the 2004 off Kii Peninsula earthquakes at a terminal basin

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Submarine paleoseismology has been advanced mainly by investigation of distribution and age of seismogenic turbidite deposits. However, we have to pay attention to the following issues for the usage of this method. 1) Turbidity currents are also triggered by flood, wave, rapid sedimentation and so on. 2) It is hard to determine a seismic source region by investigation of turbidites originated from more than one sediment-provenance. 3) Tuibidity current does not provide sedimentary record or remove the former sequence in some cases. In order to avoid these problems, a terminal basin with a limited small provenance area and without direct river input is an appropriate target. The term ”a terminal basin” is a sedimentary depression surrounded by topographic heights that capture all sediments supplied from outside.

The sedimentary basin located between the Kumano forarc basin and the outerarc high corresponds to a terminal basin 250 meter deeper than the surroundings. The core sample collected by R/V Shinsei-maru KS-14-08 from this basin includes thin very fine-grained sand at 17 cm below seafloor and mud with silty clay laminae above it. The surface 17 cm thick mud layer is interpreted to be younger than 1950 because Cesium-137 measurements show constant high value above 17 cm and lower value than detection limit below it. Moreover, excess Pb-210 values show constant high above 17 cm and rapid decrease downward below it. This indicates a sedimentation event for a short period of time. Because the sampling site is isolated from river flood sedimentation area, earthquake shaking is the most plausible trigger of sediment gravity flow. The 2004 off the Kii peninsula earthquakes is a potential candidate within the historical earthquakes in this area after 1950.

Sidescan sonar WADATSUMI survey was conducted in this area in December 2004 just after the Kii peninsula earthquakes. The sidescan sonar image at the terminal basin shows extremely low backscattering intensity suggesting surface veneer of very high water content mud derived from earthquake triggered turbidity flow.

Keywords: turbidite, turbidity current, sedimentary basin, accretionary prism, submarine landslide