Detecting Faulting Event by Physical and Geochemical Analyses of Holocene Shallow Marine Sediments at the Kuwana Fault zone.

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Middle to late Holocene activity of the Kuwana Fault was successfully reconstructed based on stepwise changes in the depositional rates of shallow marine sediments controlled by 82 AMS 14C dates in four drilled cores (Naruhashi et.al., 2004, 2005). Six probable and one possible faulting events were detected during the last 7,000 years by the sudden change in the altitudinal difference between the paired depositional curves from both up- and down thrown side cores. This method is unfortunately inapplicable to the events older than 7 ka because of the lack of the shallow marine sediments on the upthrown side. To evaluate the repetition model of large earthquakes, however, we need to know many recurrence intervals. Thus, we try to find proxies indicating the faulting event horizons based on physical and geochemical analyses of core sediments such as grain size distribution, electric conductivity (EC), magnetic susceptibility (MS), Carbon/nitrogen ratios (C/N), coupling with biological records.

Across the Kuwana fault zone, Active Fault Research Center (AFRC) drilled many array cores, four of which are used for this study. That is No.200 (35 m of core length) and No.275 (31 m) on the downthrown side, and No.350 (18 m) and No.800 (5 m) on the upthrown side. Stratigraphy and ages of these cores were reported in Naruhashi et al. (2004). We measured EC, MS and grain size at intervals of 5 cm, while C/N ratio of 50 - 20 cm for each core. Around the five faulting event horizons of E3 - E7, we can find similar pattern of changes in EC, MS and sorting of the sediment.

Close to each event horizon (which were based on the change in altitudinal difference between the depositional curves of No.350 and No.275 cores), EC and MS show local maximum, while C/N and sorting local minimum. Above the horizons, we can find units with relatively larger depositional rates where EC gradually decrease upward, while C/N and sorting increase. These units may reflect the burying processes of the fault scarp. Sudden increase in EC may indicate sudden increase in water depth probably due to coseismic subsidence. Peaks in MS and sorting imply the occurrence of turbidity current triggered by large earthquakes.

Above-mentioned geologic signals obtained from the core analysis can explain co-seismic sudden environmental changes and post-seismic gradual burying processes in the footwall side of submarine reverse fault. Those results indicate the possibility of detecting two different kinds of event horizons; the 'true' one and the 'apparent' one showing the start of the post-seismic burying. Based on these interpretations, two other faulting event horizons can be recognized at the core depth of around 24 m and 29 m.