

Use of foreshore deposit to evaluate activity of blind fault in the Ishinomaki Plain, north-eastern Japan

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Analyzing the height distribution and ages of foreshore deposit, it is inferred that the blind thrust fault beneath the Holocene coastal lowland of the Ishinomaki Plain was activated during 1000-3000 cal yBP. Beneath the western part of the Ishinomaki Plain, the source fault of the 2003 Miyagiken-Hokubu Earthquake (M6.2) that is west dipped thrust striking NNE-SSW is inferred from seismic data. No surface rupture was detected, but up to 15 cm of broad flexural uplift in the western part of the plain was observed from releveling of bench marks conducted by Geographical Survey Institute. Micro topography on the plane also indicates no distinct fault scarp displaced during late Holocene. It is difficult to evaluate the activity of such blind fault by using ordinary method such as trench excavation survey. We thus focused on foreshore deposit to apply to indicator of broad flexural displacement. A line of emerged beach ridge composed of foreshore deposit is an indicator of shoreline position of specific age. If the height distribution of foreshore deposit is displaced locally, it might be deformed by faulting in intraplate. Based on this hypothesis, we conducted coring survey on 3 lines with 30 sites using Handy Geo-Slicer of width 10 cm and length 200 cm. Foreshore deposit can be identified easily from obtained cores, because the lithofacies is characterized by well-developed parallel lamination. The following results were obtained: Along the emerged beach ridge formed at around 3000 cal yBP, the height distribution of the upper limit of foreshore deposit is that western part reached to 2-3 m in altitude is 1-2 m higher than the eastern part (0.5-1 m in altitude). In contrast, the foreshore deposit dated to be around 1000 cal yBP is distributed almost same level of 0.5-1 m in altitude in any sites, though the western part was slightly uplifted due to the 2003 event. Therefore only the western part of 3000 cal yBP foreshore deposit is evidently higher. This suggest that the western part of the Ishinomaki Plain was 1-2 m uplifted during 1000-3000 cal yBP due to faulting of blind fault. This displacement seems to be caused by almost single event that is larger than the 2003 event.