

Active structure beneath the Yufutsu coastal lowland, Hokkaido, Japan

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1. Introduction

Sato et al.(1998) and Kato et al.(2004) have shown that a fold (an anticline) is concealed beneath the Yufutsu coastal lowland, Hokkaido, which deforms the overlying Cenozoic strata. However there is no information on the fold activity in the late Quaternary. We try to evaluate the activity in the late Quaternary by using a seismic reflection survey and two shallow borings, conducted under the AIST project "Investigations on Geology and Active Faults in the Coastal Zone of Japan".

2. Seismic Reflection Profiling

We conducted a 19.7km-long P-wave seismic reflection survey, targeting depths as great as 1000m, along the coast of the Yufutsu lowland, from the Tomakomai West Port, via the Tomakomai East Port, to Mukawa town. In the western part of the survey line crossing the fold, we located shot points densely along the survey line using a MiniVib source with higher sweep frequency to obtain a precise structure and, if possible, to tie following two shallow borings. The processed section provides the following conclusions. Clear reflectors are seen as deep as 1500m. The concealed fold is cumulatively active in the late Cenozoic era. There are two prominent angular unconformities around 80m and 230m in depth above the axis of the anticline. Another broad anticline is concealed around 1000m deep to the west of the above mentioned anticline, suggesting that the front of the thrust fault associated with this fold system may be almost reach to the west end of the seismic section.

3. Boring Survey

We conducted two 80m-long all-core boring surveys named BT1 and YF1 which are located at the axis and at the end of west wing of the anticline respectively. The BT1 core shows Toya tephra (110-120ka) at 19m, and marine sand to mud layers at 26-35m, 50-66m, and 71-80m depth intervals. Particularly marine layer at 52-66m interval is characterized by abundant Fagus pollens. The YF1 core shows Holocene sediments at 0-45m, and marine layers at 45-48m and 57-80m intervals. There is no Fagus-dominant zone in the YF1 core. A pollen zone boundary in a marine layer (subtidal zone) around 28m depth in the BT1 core is correlated to that around 58m depth in the YF1 core. As the boundary is interpreted to correspond to the contemporaneous surface of MIS 7, the anticlinal structure may have vertical displacement rate of 0.1-0.15m/ky in the late Quaternary.

References:

Sato et al.(1998) Jour. Japan. Assoc. Petrol. Tech., 63, 323-324.

Kato et al.(2004) Tectonophysics, 388, 75-84.

Keywords: active structure, Yufutsu, boring, seismic reflection survey