

Blind active fault beneath Shonai plain, NE Japan

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The sedimentary basins along the Sea of Japan coast of northern Honshu, such as Akita-Yamagata, Niigata basins, suggest large amount of subsidence since late Pliocene. Such basin scale subsidence makes it difficult to identify active tectonic movements by tectonic geomorphological method. The Shonai basin has thick Quaternary sediments and the active tectonic feature beneath the plain is poorly understood, including the source fault of the 1894 Shonai earthquake (M7.0). We present the geologic interpretation of seismic sections and suggest an active blind thrust beneath the Shonai plain.

We interpreted the 15-km-long seismic section perpendicular to the Aosawa fault and the eastern boundary fault of the Shonai plain along the River Arase-gawa. CMP seismic reflection data were collected using four vibroseis trucks at 25-m shot and recorder interval. The seismic section was interpreted based on surface geology and drill hole data. The interpreted seismic section was examined using balanced cross sectional method.

The seismic section portrays the fault-related fold system developed by sequential thrust frontal migration from the Aosawa fault, which bounds the western margin of the Dewa Hills, The detachment is developed at the horizon of the Kusanagi and Kitamata formation, which consist of mudstone. The thrust front is located at the eastern flank of the Shonai ridge. The sediments on the western flank of the Shonai ridge suggest growth strata including Quaternary sediments. The structure was produced by thrusting at the western flank of the Shonai ridge. The source fault of the Shonai earthquake is estimated to be the eastern boundary fault of the Shonai plain. However, strongly damaged houses were located just the center of the basin, suggesting that 1894 Shonai earthquake probably produced by the blind active fault beneath the Shonai plain.

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