

## Formation of backarc inner rifts and their shortening deformation in Honshu island, Japan

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The opening of the Sea of Japan has been developed with multi-rift axis. Deep seismic data across the rift system have been accumulated in northern to central Honshu, Japan. We present the structure of such rift basins, and discuss the formation and deformation of the failed rifts in northern Honshu.

The rift structure in the Niigata and Northern Fossamagna basin has been investigated by onshore-offshore deep seismic reflection/wide-angle reflection surveys. We got continuous onshore-offshore image using ocean bottom cable and collected offshore seismic reflection data using two ships to obtain large offset data in the difficult area for towing a long streamer cable. The velocity structure beneath the rift basin was deduced by refraction tomography in the upper crust and earthquake tomography in the deeper part. It demonstrates larger P-wave velocity in upper mantle and lower crust, suggesting a large amount of mafic intrusion and thinning of upper continental crust. The deeper seismicity in the lower crust beneath the rift basin accords well to the mafic intrusive rocks. The syn-rift mafic intrusion in the crust forms convex shape and the boundary between pre-rift crust and mafic intrusive shows outward dipping surface. Due to the post rift compression, the boundary of rock units reactivated as a reverse fault, commonly forming a large-scale wedge thrust and produced subsidence of rift basin under compressional stress regime. Such structural feature is revealed in the Niigata, northern Fossamagna and Toyama basins. The northern part of the Itoigawa-Shizuoka tectonic line (ISTL) is initially produced as trans current fault bound the southern rim of the Niigata rift basin and subsequence counter-clock-rotation of northern Honshu, it behaved as a normal fault. From the view point of Miocene tectonics, the southern extension of the northern ISTL is the Kanto tectonic line, trending WNW-ENE. Along this line thick syn-rift sediment as well as high P-wave velocity in the lower crust. The rift bounded faults dipping outward from the rift axis in this zone and shows same characters in the failed rift along the Sea of Japan coast.

Keywords: failed rift, backarc basins, the Sea of Japan, crustal structure, shortening deformation, fault-related fold