

Crustal structure in the northern part of Fossa Magna region, central Japan, from refraction/wide-angle reflection data

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The Fossa Magna is a back-arc rift basin formed in the opening of the Sea of Japan in the Miocene, which is filled with the Tertiary thick sediment. The western margin is bounded by the Itoigawa-Shizuoka Tectonic Line (ISTL), which is one of the most active inland fault system in Japan arc. In the northern Fossa Magna region, the Central Uplift Belt (CUB) is oriented northeast and southwest. The Tertiary sediment between ISTL and CUB is strongly folded. The Western Nagano Basin Fault system (WNBF) is running in parallel with CUB and has caused large inland earthquakes as well as ISTL. The seismic activities reflect tectonics of the northern Fossa Magna. To understand the tectonic history and the inland earthquake process, it is important to obtain a detailed crustal structure in the northern Fossa Magna.

A detailed stereoscopic crustal structure model is constructed from five sets of refraction/ wide-angle reflection data collected in this region in 1967-2002. It clearly indicates that ISTL is an east dipping reverse fault and beneath which the Tertiary sediment between ISTL and the pre-Tertiary rocks is descending to 5km depth. A wedge of CUB basement rocks cuts northwestward into the Tertiary sediment. WNBF is mapped as a conjugate fault with ISTL and a west dipping reverse fault extending downward to a boundary between CUB and the Tertiary sediment.

It would indicate as follows. CUB wedge is pushed northwestward under NW-SE compressive stress, which is responsible for the uplift of a triangular sediment prism and reactivation of ISTL as a reverse fault. Simultaneously WNBF is also activated. Geological information indicates that WNBF is more active and releases more stress at present than the northern part of ISTL.