

Megathrust Structure beneath North Island, New Zealand - Japan-New Zealand Joint Geophysical/Geological Research Project

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Understanding of megathrust developed along subducting plate is inevitably important for predicting disasters associated with a great interplate earthquake. Japan-New Zealand joint geophysical/geophysical research project started from 2009. This is a three-year project involving seismic expedition using active and passive sources and geomorphological study. The southernmost North Island is under tectonic conditions similar to those in Kanto area, Japan. It is also noted that capitals are located in both the regions, where subducted plates are situated at a shallow depth (less than 25 km).

Seismic expeditions in Japan were dramatically improved in later half of 1990's (Iwasaki and Sato, 2009; Ito et al., 2009). A series of seismic expeditions in Kanto district from 2002 to 2006 succeeded in imaging subducted Philippine Sea Plate. This region is very unique because the shallower part of the subducting plate is observable in onshore area because of the collision of the Izu-Bonin arc to Honshu. Recent seismological studies delineate that the non-reflective part of the plate boundary well corresponds to asperity of the megathrust. The location of such asperity is essentially important to estimate strong motion associated with the megathrust event. So, the distribution reflective and non-reflective parts on the plate boundary is a key issue.

Similar tectonic situation is only found in North Island, New Zealand, where the Pacific plate is subducted from the Tonga Kermadec Trench. In the northern tip of South Island, the Pacific plate with Hikurangi Plateau is colliding to the Australian plate, forming an eastward dipping plate boundary (the Alpine fault) along the eastern margin of South Island. These tectonic situations are responsible factors for a shallow subduction zone along the southernmost North Island.

Our research project is composed of three phases as described below.

Phase I (March 2010-May 2010)

Offshore seismic expeditions in forarc and bacarc sides of North Island.

Phase II (April 2011-May 2011)

Onshore seismic expedition crossing the southernmost North Island.

Earthquake observation in the southernmost North Island.

Phase III (October 2011-November 2011)

Earthquake observation in the southernmost North Island.

The active source experiments in Phase I and II are aimed to collect information on reflectivity of the plate boundary. By combining these data to those from the earthquake observation, routine earthquake and GPS observation, we will clarify mechanical properties on the plate boundary.

Keywords: subduction zone, plate, megathrust, earthquake, fault, crustal structure