Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

SSS34-P10 Room:Convention Hall Time:May 21 13:45-15:15

Velocity profile along the Boso peninsula: result of Boso 2002

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Due to the buoyant subduction at the Izu collision zone, the shallow subduction of the Philippine Sea plate (PHS) occurs in the sourthern part of Kanto area (Sato et al., 2005). At the Boso peninsula, fore-arc structure (accretionary prism, trench slope break, fore-arc basin), which is commonly found in the sea bottom, is exposed on land area (Saito, 1992: Kawakami and Shishikura, 2006) and it produces exceptional opportunity to investigate the geological process near the subduction zone on land.

In 2002, seismic reflection and refraction survey was conducted in Boso peninsula as part of special project for earthquake disaster mitigation in urban areas (Boso 2002). Boso 2002 was laid out 150km-long seismic line in NNE-SSW direction. This seismic line extends from southern edge of Boso to Kashima city in Ibaraki prefecture through central region of Boso. On this line 12 shots with dynamite (maximum weight 300 kg) were recorded at 2473 stations. In addition 11 shots with air-gun and with vibroseis and 496 shots with vibroseis were conducted in the southern part of this line. The receiver interval is 50- m in southern part and 100-m in northern part.

Based on near vertical seismic section, Sato et al. (2005) revealed the geometry of PHS, and main features of reflection image. However, detailed seismic velocity structure is not well understood. In particular, In order to understand the tectonic evolution of accretionary prism, constructing seismic velocity structure is very important. Therefore, we performed velocity analysis of this section using ray tracing method (Iwasaki 1988) and refraction tomography analysis to construct P-wave velocity model. By ray tracing method, the following results were obtained.

(1)P-wave velocity of Neogene sedimentary layers are from 1.7km/s to 3.2km/s.

(2)The maximum thickness of the Neogene fore-arc sediments is about 4 km in North of the Mineoka belt, central part of seismic line.

(3)The Neogene basement shallows toward north (1 km<). P-wave velocity of upper part of basement is from 4.8km/s to 5.4km/s . Northern Mineoka zone shows low P-wave velocity.

(4)The depth of Neogene basement is consistent with existing seismic reflection profiles and borehole data.

(5) The Mineoka zone, is marked by thick moderate velocity zone (Vp=4km/s, 5 km in depth), suggesting the thick development of accreationary complex.

Keywords: Boso peninsula, fore arc structure, seismic velocity structure, seismic refraction method, Kanto Plain, Philippine sea plate