

## P and S wave tomography of the NE Japan forearc region using S-net data

\*豊国 源知<sup>1</sup>、趙 大鵬<sup>1</sup>、内田 直希<sup>1</sup>、中山 貴史<sup>1</sup>

\*Genti Toyokuni<sup>1</sup>, Dapeng Zhao<sup>1</sup>, Naoki Uchida<sup>1</sup>, Takashi Nakayama<sup>1</sup>

1. 東北大学・理・予知セ

1. RCPEVE, Tohoku University

The great 2011 Tohoku-oki earthquake (Mw 9.0) occurred off the Pacific coast of Northeast Japan, where the Pacific plate is subducting beneath the Okhotsk plate. The S-net (the Seafloor observation network for earthquakes and tsunamis along the Japan Trench) that initiated in 2016 is a large-scale, permanent, ocean-floor seismograph network with cabled 150 stations, which covers a wide oceanic region off Northeast Japan (Kanazawa, 2013). In this work, we study the 3-D seismic velocity structure beneath the NE Japan forearc region covered by the S-net.

We have newly collected two sets of arrival-time data. The first set contains arrivals picked by our technical staff, which include 36,002 P and 13,326 S arrivals of 241 local earthquakes recorded at the S-net and other inland Hi-net stations. The second data set contains arrivals picked by the first author (G.T.), which include 3,754 P-wave arrivals of 63 local earthquakes recorded by the S-net. Then the newly picked data are integrated with the existing arrival-time data from 747 teleseismic events for P-wave and 643 teleseismic events for S-wave, as well as 2,528 local earthquakes recorded at 1,852 Hi-net stations on the Japanese land areas (Liu & Zhao, 2016). These combined data are inverted to obtain new 3-D P- and S-wave velocity models ( $V_p$ ,  $V_s$ ) beneath the entire NE Japan arc by using the tomographic method of Zhao et al. (2012).

In this work we focus on the obtained 3-D images at depths < 80 km below the region covered by the S-net. The major results are summarized as follows.

- (1) The spatial resolution of the  $V_p$  and  $V_s$  images at depths of 5~60 km beneath the S-net is greatly improved.
- (2) Prominent low- $V_p$  and low- $V_s$  anomalies are revealed in the off-Iwate and off-Fukushima areas. These features are consistent with those revealed by previous works (e.g., Zhao et al., 2011; Huang & Zhao, 2013; Liu and Zhao, 2018), suggesting that our hand-picked arrival-time data are quite accurate and robust.
- (3) A significant high- $V_p$  anomaly is revealed along the Japan Trench especially beneath the off-Miyagi region where the rupture of the 2011 Tohoku-oki earthquake (Mw 9.0) initiated, which may reflect that the sedimentary layer is very thin there above the subducting Pacific plate.

### References

- Huang, Z., D. Zhao (2013) JAES, 70–71, 160–168.  
Kanazawa, T. (2013) Underwater Technology Symposium (UT), 2013 IEEE International.  
Liu, X., D. Zhao (2018) Science Advances 4, eaat4396.  
Zhao, D. et al. (2011) GRL 38, L17308.  
Zhao, D. et al. (2012) GJI 190, 816–828.

Keywords: Seismic tomography, Offshore Northeast Japan, S-net, 3-D velocity structure

