

Velocity Structure for hypocenter locating (4)

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1 Introduction

We have been studying a velocity structure for hypocenter locating. Hypocenter locations estimated with local networks in Japan often deviate from those estimated with global networks. High velocity in the plates and low velocity in the mantle wedge affect the ray paths and travel time of seismic rays. The distance of hypocenter locations between local networks and global networks could reach several tens kilometers beneath Ogasawara Islands region. We examined a regional velocity structure that could give smaller deviations of hypocenters from those estimated with global networks.

2. Method

We used arrival time data of the unified seismic catalog in Japan to estimate the seismic velocity structure with the tomographic method. We referred to ISC-EHB bulletin for the locations of deep events. The hypocenters in ISC-EHB bulletin were estimated with depth phases, and have high accuracy. We put weight on the locations given by ISC-EHB so that the hypocenter locations would not deviate from the initial locations. The velocity structure was estimated from shallower parts to deeper parts sequentially. Three-dimensional travel time tables (Katsumata, 2015) were calculated for hypocenter determination.

3. Result

Figure 1 and 2 show comparisons of located hypocenters between the unified seismic catalog in Japan and this study. Figure 1 shows that around the northern Japan. Figure 2 shows that around Izu-Bonin Islands region. The red symbols denote hypocenters of the ISC-EHB catalog. The black dots in the left panel are hypocenters of the unified seismic catalog in Japan, and those in the right panel are those of this study. The color map in the cross sections indicate velocity structure. Low velocity structures are recognized in the mantle wedge shallower than about 100 km. The hypocenter locations estimated with the inhomogeneous structure are closer to the those of ISC-EHB. The hypocenters estimated with the inhomogeneous structure still deviated from those of ISC-EHB in the northern area deeper than 400 km. The effect of location correction seems to be limited for those hypocenters. Scatter of hypocenters are greater for the inhomogeneous structure because the inhomogeneity would have created ray path instability.

Keywords: velocity structure of the upper most mantle, hypocenter determination

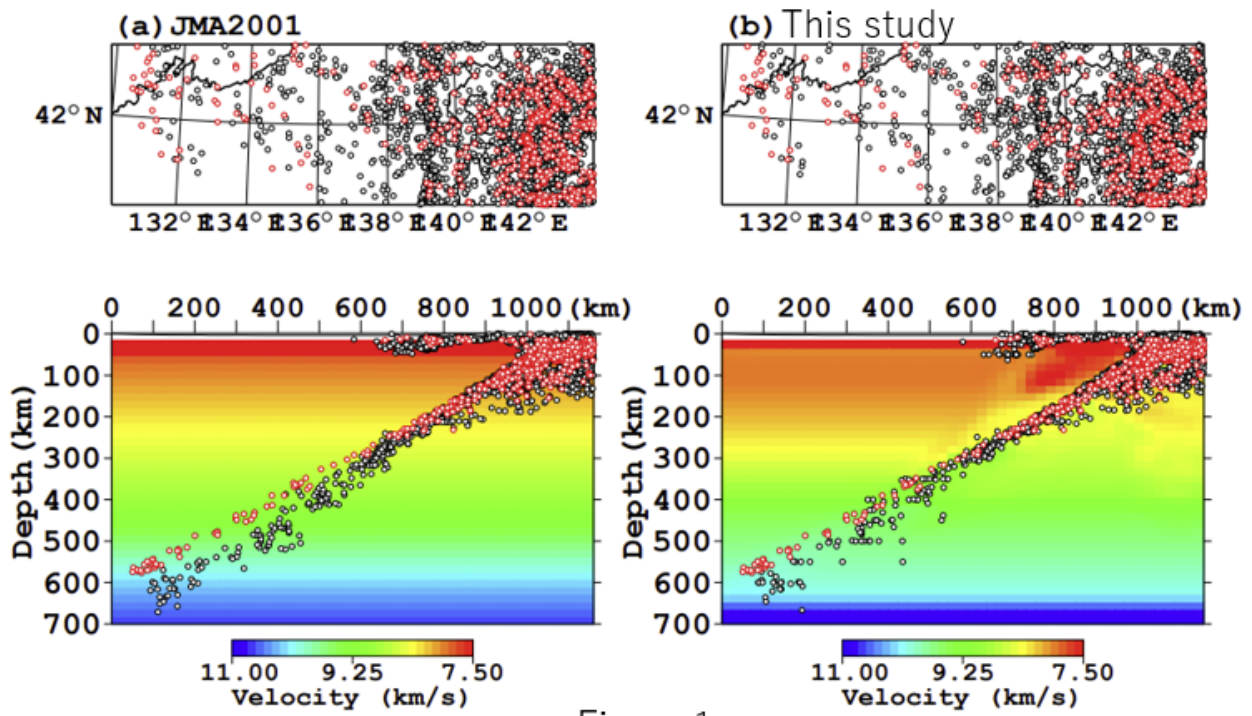


Figure 1

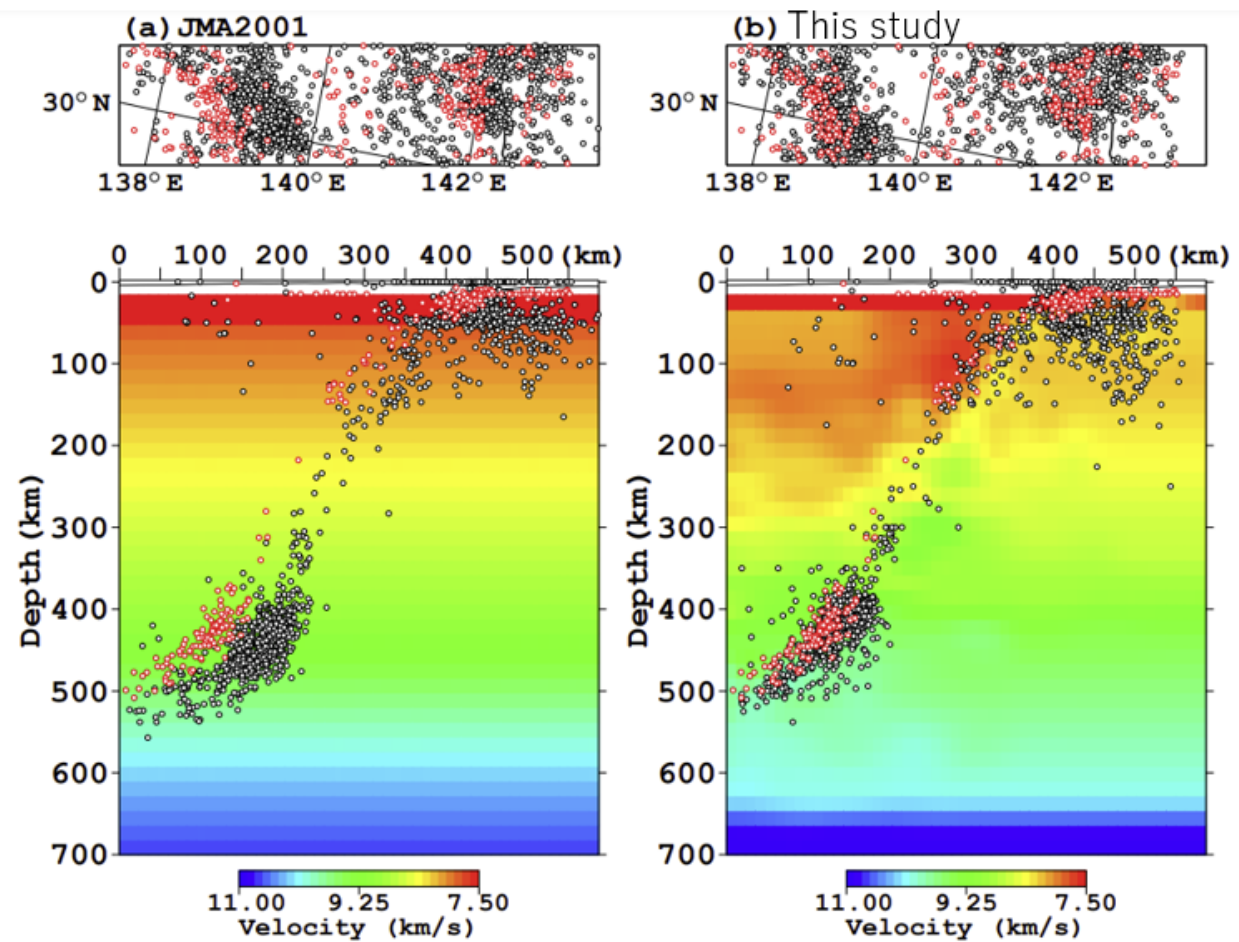


Figure 2