# Notable reflection phases from plate boundary observed in seismic waveforms in central Japan

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It is of great importance to investigate temporal change of crustal structure when we monitor continuously seismic and/or volcanic activity. We suggested methodology for active monitoring of temporal variation of crustal structure with Accurately Controlled Routinely Operated Signal System (ACROSS). We must also clarify which part of crust changed when we detect temporal change during the active monitoring. That process requires understanding of detailed crustal structure. Although many studies on estimation of seismic velocity structure have utilized travel times of direct waves, the estimated structure should also satisfy the travel times of later phases (e.g. PmP, PxP etc) and their amplitudes.

In central Japan, active seismic experiment revealed fine velocity structure along the profile (Iidaka et al. 2003). Tsuruga et al (2005) re-analyzed the data by using the travel times of later phases and their amplitudes, and found notable reflection layer deeper than 20 km in the central part of the profile, west of Mt. Ontake. Around Mt. Ontake, such reflection layer has been found by Mizoue and Ishiketa (1988) and Inamori et al (1992). Inamori et al (1992) reported that the reflection layer became deeper in the western part of the mountain. Recent observation of natural earthquakes indicates existence of notable later phases which may be attributed to reflection layer at other part of central Japan.

Although it is difficult to know location and origin time of natural earthquakes, they usually have larger magnitude than artificial explosions, providing good signal-to-noise ratio waveforms to broader area. By using appropriate pairs of events and stations, we can further polish up the velocity model initially obtained from artificial explosions. In this study we utilize natural earthquake data collected by routine observation to examine the location of reflection layers in central Japan.

To date, we identified several event-station pairs with notable later phases. For example, events to the northeast of lake Hamana at a depth of ˜30km cause such phases about 1-2 seconds before the S arrival at stations within 50 km of the epicenter. In the presentation, we will utilize more data with later phases and estimate reflective layers which satisfy them.