[EE] Eveningポスター発表 | セッション記号 S (固体地球科学) | S-IT 地球内部科学・地球惑星テクトニクス

[S-IT28]The lithosphere and the asthenosphere

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The lithosphere-asthenosphere boundary (LAB) separates Earth's rigid tectonic plates from the underlying convecting mantle. The LAB is fundamental to our understanding of plate tectonics and mantle dynamics, although its depth and defining mechanism are highly debated. How it varies among tectonic environments and its relationship to the Moho, MLD, and anisotropy are also poorly understood. Ocean bottom seismic data is particularly important for constraining the young plate with relatively simple history, although this data is difficult to attain and rare. We will focus on the lithosphere, the asthenosphere, and the lithosphere-asthenosphere system in a variety of settings including but not limited to continents, oceans, margins, rifts, ridges, hotspots, plumes, and subduction zones. We welcome research contributions from diverse fields, including but not limited to seismology, magnetotellurics, petrology/mineralogy, dynamical modelling, and mineral physics.

[SIT28-P05]Phase speed and arrival angle measurements of multi-mode surface waves with array-based analysis

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Recent high-density broadband seismic networks allow us to improve the lateral resolution of surface wave tomography. For further enhancement of vertical resolution of surface wave models, the use of higher-modes is inevitable. Measuring the multi-mode phase speeds of surface waves is, however, not a straightforward issue since wave trains of several mode-branches overlap each other in an observed seismogram, which makes the modal separation intrinsically difficult.

To overcome this issues in higher-mode measurements, we have recently developed a series of array-based methods for (1) the multi-mode phase speed measurements based on a classical f-k analysis using a linear array, and (2) the modal waveform decomposition for the centroid location of the array using the linear Radon transform (LRT, e.g., Luo et al., 2015). In this study, we apply these techniques to observed waveforms in USArray.

At first, we extract a multi-mode dispersion spectrogram in a *c-T* (phase speed - period) domain, which reflects relative spectral powers of each mode, using a long linear array (2000-4000 km). Then, the LRT method is applied to decompose observed waveforms into mode-branch waveforms at the centroid location of the linear array, based on a single-mode dispersion spectra extracted from the *c-T* spectrogram. This process is repeated for many sets of linear arrays, producing a large data sets of mode-branch seismograms at the centroid location (regarded as an imaginary station) of the array. Local phase speeds as well as arrival-angles for each mode can be estimated from the inter-station waveform fitting (Hamada &Yoshizawa, 2015) and the classical beamforming analysis using a small 2-D array.

By applying a set of decomposed mode-branch waveforms to the inter-station dispersion measurements, we can obtain reliable local phase speeds for higher modes as well as the fundamental mode Love waves, which tend to be contaminated by overtone interference. We also performed a preliminary beamforming analysis with a 2-D array using the mode-branch waveforms. This analysis provides us with stable estimates of local phase speeds and arrival-angles for each mode, implying that the fundamental and the first higher-mode Love waves are likely to arrive at the array from different directions departing from

the great-circle.