Three-component receiver function study of seismic array data from the Tibetan plateau

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(0) Why another RF study?

INDEPTH-III array (Red Crosses) recorded excellent waveform data. Those data had been used for many studies such as surface wave dispersion, shear wave splitting, Q value inversion and Pn tomography. R. Kind et. al [2002] analyzed the radial component receiver function and yielded very important results. In this study, we intend to use stacked source time function to study the receiver functions from three components. Especially we expect to extract the crust P velocity structure by vertical-component receiver functions.

(1) Technique: Three Component Receiver Functions

(2) Results

(2.1) Results: (a) STF make differences (b) Azimuthal variations (c) North-South variations.

(2.2) Results: RFs of stations along the array.

Issues addressed:

(0) Introductions: why another RF studies?
(1) Technique: Three component RFs.
(2) Results & Results.

Conclusions:

(1) Stacked source time functions make differences:
   A.) Stronger signals B.) Constraints on P velocity in crust
(2) Strong mid-upper crust reverberations observed across the array. Azimuthal variations imply strong heterogeneity.
(3) North-South structure variations are prominent. Especially the strength of the Ps phases.

Collecting RFS associated with one earthquake.

RFS of ST05 associated with different earthquakes.

Consistent Negative Pulses

(1) Strong negative pulses present on both components, which may imply strong near surface velocity structure, possibly low velocity layer.
(2) Ps phases at about 8-9 seconds are much stronger in north end of the array than those in south end. This is consistent with other observations with a secondary discontinuity at lower crust beneath southern Tibetan plateau.
(3) The vertical receiver function provides constraints on the P wave velocity structure. Efforts will be put to study how the layer model or 3D P structure will produce those kind of RFS.