Three linear seismic arrays consisting of a total of 100 broadband sensors were deployed in southern Peru to study the transition from shallow to normal subduction (30 degree dip angle). Information obtained from this study is intended to help explain the causes of the subduction in Peru and has implications for the timing of uplift of the Altiplano plateau. There is a positive impedance mid-crustal feature that may indicate underthrusting by the Brazilian Shield. There is also a negative-impedance feature at 20 km depth that could be a magma body similar to that reported in Chile. We also use S-wave receiver functions to study the lithosphere/asthenosphere boundary (LAB). In addition to structural information, receiver functions were stacked to obtain the Vp/Vs ratio to investigate hydration of the asthenosphere or lower continental lithosphere. Additional information about variations in S-wave velocity can be obtained from an inversion of receiver function amplitudes.

**ABSTRACT**

- **Line 1**: Mollendo (coast) to Nazca (inland near Lake Titicaca), was installed in 2008, and is located in the steeper subduction region.
- **Line 2**: Juliaca to Cusco, started collecting data in Dec 2009, covers the transition from normal subduction to flat subduction regimes.
- **Line 3**: Cusco to Nazca, recently installed in 2010, consists of half of the stations from line 1, and runs through the flat subduction region.

**Discussion**

A possible interpretation of the observations of a positive impedance mid-crustal structure beneath the Altiplano in Southern Peru is that we are observing underplating by the Brazilian Shield. A model for the slab location based on slab contours.

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**Line 1**

- **Nazca Ridge**
- **Comparison of Lines 1 and 2 images**

**Line 2**

- **Upper left**: Possible model for Line 1 depicting slab, moho, mid-crustal structure, and magma body.
- **Upper right**: Elevation, Moho, and Vp/Vs ratios from stacking of receiver functions.
- **Lower right**: S-wave receiver function image showing possible LAB (lithosphere/asthenosphere boundary).

**Line 3**

- **Upper right**: Moho, and Vp/Vs ratios from stacking of receiver functions.
- **Lower right**: S-wave receiver function image showing possible LAB (lithosphere/asthenosphere boundary).

**Earthquake locations from NEIC, magnitudes greater than 5.0 from Peru.**

**Lines 2 and 3**

- **Comparison of Lines 1-3**
- **More detail of the structure beneath Southern Peru which can be provided by receiver functions and other methods.**