Geophysical Research Abstracts
Vol. 14, EGU2012-837, 2012
EGU General Assembly 2012

Teleseismic receiver function analysis in Tierra del Fuego Island: an estimation of crustal thickness and Vp/Vs velocity ratio

C. Buffoni (1,2), N. C. Sabbione (1), M. Schimmel (3), and M. L. Rosa (1)

(1) Department of Seismology. Faculty of Astronomical and Geophysical Sciences. National University of La Plata, Argentina , (2) CONICET, Argentina, (3) Institute of Earth Sciences Jaume Almera, CSIC, Barcelona, Spain

Tierra del Fuego Island (TdF) is situated in the southern part of South America, where the transform tectonic boundary between the Scotia and South America plates divides the island into two continental blocks. This boundary is represented by a mainly strike-slip lineament known as Magallanes-Fagnano fault system that runs from the western part of the north Scotia ridge to the Chile trench south of 50º S. This fault system is composed of many splays and diverse subparallel faults that overprint the fold-and-thrust belt and are the responsible for the complex tectonic setting that has TdF.
Only a few studies have been carried out to constrain the crustal structure and Moho depth in TdF. We present the preliminary estimations on Moho depth and Vp/Vs velocity ratio in TdF Argentinian Island, from teleseismic receiver function analysis with data recorded at five permanent seismic stations.
We analyzed data and selected among 40 and 120 events for each seismic station, according to data availability and quality. Earthquakes with magnitudes greater than 5.5 mb and epicentral distances between 30º and 90º were selected. We used Seismic Analysis Code software to pre-process the seismograms. After removing the mean and trend, the data were band-pass filtered using different ranges of frequencies: 0.5-2Hz, 0.08-2Hz and 0.02-1Hz. We applied an iterative deconvolution technique in order to isolate the P-to-S converted waves and obtain the Receiver Functions (RFs). A Gaussian factor of a= 2.5 ($\sim$1Hz) was selected to reduce the noise and improve the signal coherence in the RFs. Crustal thickness and Vp/Vs ratio were estimated using the H-K stacking method. Since our RFs were not as clear as those typically obtained for simple tectonic settings, we performed different resample techniques to asses the robustness of our results.
RFs from clustered events were stacked to increase the signal-to-noise ratio. For this purpose we divided the events into three clusters according event distribution which roughly fall into the quadrants: North, East and Southwest. Stacks were performed assuming a constant average crustal velocity and a Vp/Vs ratio based on a reference model. Ps conversions were observed between 3 and 4.5 s depending on the seismic station and backazimuth, indicating a Moho that varies in depth from about 25 to 34 km. H-k stacks showed an increase in cortical thickness at seismic stations located in the south of the island compare with northern stations. Regarding the Poisson ratio, a wide range of values were obtained for each seismic station. This may be due to the complex tectonic setting and the different geological features that are present in this region.