Geophysical Research Abstracts
Vol. 21, EGU2019-18581, 2019
EGU General Assembly 2019

Moho depth and crustal velocity structure in the north of Algeria by teleseismic receiver function analysis

Billel Melouk (1,2), Abedelkrim Yelles-chaouche (1), Juan José Galiana-Merino (2), Chafik Aidi (1), and Fethi Semmane (1)

(1) Centre de Recherche en Astronomie Astrophysique et Geophysique (CRAAG) Algiers, Algeria, (2) University Institute of Physics Applied to Sciences and Technologies,University of Alicante, Alicante Spain

The Mohorovicic discontinuity (Moho), which separates Earth's crust from the underlying mantle, represents a major change in seismic velocities, chemical compositions, and rheology. The depth of Moho is an important parameter to characterize the overall structure of the crust; it can often be related to geology and tectonic evolution of the region. In northern Algeria, recent studies were conducted in the offshore Algerian margin (SPIRAL) particularly to estimate the Moho depth using different geophysical methods as for example the wide-angle seismic reflection. The results show that the continental Moho discontinuity is ranging, for example for the central part of Algeria, between 20-25 km depth. In order to better constrain the Moho depth, we use, in this work, the teleseismic Receiver Function (RF) technique to estimate the crustal thickness and Vp/Vs ratios beneath the Algerian broadband seismic network. Indeed for this purpose, 17 broadband and very broadband stations, BBVS-60 and STS-2 sensors respectively, installed throughout the northern part of the country from east to west, are used. This provides a unique opportunity to map out the lateral variation of Moho depth using the RF method. For now, we selected 35 earthquake data (Mw$\geq$6.0) that occurred between January 2016 and June 2017 and recorded at an epicentral distance of 30°-90° by few stations. All the selected 3C seismograms show a good signal-to-noise ratio (SNR). We calculated the P-wave RFs by deconvolving the radial component of the seismogram by the vertical component to obtain the PS converted waves. We used the RF stacking algorithm (H-K staking method) to transform the time domain waveforms into the depth domain, which usually gives the best estimations for both the crustal thickness and Vp/Vs ratios. In addition, we used the inversion of all the receiver functions to get the crustal structure and the velocity model beneath each broadband station starting from the continental AK135 model for teleseisms. As preliminary results, we obtained the Moho depth and the 1D velocity model beneath each broadband station. Our obtained first results are in agreement with the recent results obtained during the SPIRAL project using a tomographic inversion of travel times along a wide-angle seismic profile. In the next step of this study, we apply the common-conversion-point stacking technique (ccp stacking) for all available stations to increase our resolution, what allow us to generate a 2D map of the Moho depth variation in northern Algeria.