Geophysical Research Abstracts
Vol. 13, EGU2011-6881, 2011
EGU General Assembly 2011

Fluid migration in continental subduction: new insights on Northern Apennines (Italy) from Receiver Function

Irene Bianchi, Nicola Piana Agostinetti, Alessandro Amato, and Claudio Chiarabba
INGV, Rome, Italy (irene.bianchi@ingv.it)

Subduction zones are the place in the world where fluids are transported from the foredeep to the mantle and back-to-the-surface in the back-arc. The subduction of an oceanic plate implies the transportation of the oceanic crust to depth and its methamorphization. Oceanic sediments release water in the (relatively) shallower part of the subduction zone, while dehydration of the subducted basaltic crust allow fluid circulation at larger depths. While the water budget in oceanic subduction has been deeply investigated, less attention has been given to the fluids implied in the subduction of a continental margin (i.e. in continental subduction). In this study, we use teleseismic Receiver Function (RF) analysis to image the process of water migration at depth, from the subducting plate to the mantle wedge, under the Northern Apennines (Italy). Harmonic decomposition of the RF data-set is used to constrain both isotropic and anisotropic structures. Isotropic structures highlight the subduction of the Adriatic lower crust under the NAP orogens, from 35−40 km to 65 km depth, as a dipping low S-velocity layer. Anisotropic structures indicate the presence of a broad anisotropic zone (anisotropy as high as 7%). This zone develops in the subducted Adriatic lower crust and mantle wedge, between 45 and 65 km depth, directly beneath the orogens and the more recent back-arc extensional basin. The anisotropy is related to the metamorphism of the Adriatic lower crust (gabbro to blueschists) and its consequent eclogitization (blueschists to eclogite). The second metamorphic phase release water directly in the mantle wedge, hydrating the back-arc upper mantle. The fluid migration process imaged in this study below the northern Apennines could be a proxy for understanding other regions of ongoing continental subduction.