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S-Wave Velocity Structure beneath Stromboli Volcano (Italy) from Receiver Function Inversion

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Low-resolution information about the crustal structure beneath Stromboli volcano come from a few coarse-scale 3D seismic velocity models, and little effort has been done so far to carry out detailed seismological studies on this area. A better understanding of its eruptive behaviour and its plumbing system can be achieved from accurate knowledge of crustal structure beneath the volcano. In this study shear wave velocity-depth structures are determined by applying the non-linear neighbourhood algorithm (NA) for the inversion of the receiver functions (RF) calculated from P-coda teleseismic data. This algorithm includes a search method in a multidimensional parameter space based on the Voronoi cells to derive a set of velocity models which best satisfy the objective function. This technique has been applied to 87 teleseismic earthquakes (Mw greater than 6.0), recorded between 2004 and 2007 at 13 broadband seismic stations deployed by the INGV. Radial RFs with amplitude larger than transverse RFs amplitude were selected in order to assure the approximation of 1-D and isotropic medium. Subsets of radial RF data (strictly limited in ray parameter, backazimuth and epicentral distance) have been stacked and then used as input data in the non-linear inversion. Synthetic RF were performed by a total of 10020 1-D models, and the data misfits were calculated with the L2-norm. The velocity models obtained for different backazimuths show a low-velocity layer in the lower-crustal; it can explain the negative pulse with a delay time of 5.5 s observed in the calculated RF. The Moho-discontinuity inferred from these models was approximately observed at a depth of 19 km. A low-velocity layer is also found in the shallower crust; this can

be associated with the negative pulse at approximately 1.2 s.