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Seismic Anisotropy in the upper mantle around the Northern Apennines: results of RETREAT's project.

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Inside the multidisciplinary project RETREAT (REtreating-Trench, Extension and AccretionTectonics, www.geology.yale.edu/RETREAT/index.htm),focused on the development of a 3D self-consistent dynamic model of the syn-convergent extension in the Northern Apennines, we present here the results of seismic anisotropy analysis using core-refracted shear waves. For this study we used the data recorded by the RETREAT seismic station array, consisting of 35 temporary broadband stations, many of which are deployed along a NE-SW transect across the Apennine chain. The study of SKS splitting is applied on 15 teleseismic earthquakes occured between November 2003 and August 2005, with magnitude greater than 7.0 and epicentral distance ranging from 85 to 120. For every earthquake we calculate the anisotropic parameters (delay time and fast polarization direction) by minimizing the energy in the transverse component of the selected phase and testing the parameters for stability to noise. The results suggest the existence of some "domains" with different splitting characteristics. In the southern part of the study area, the fast polarizations of the shear waves are parallel to the strike of the Apennines orogen for stations within the orogen. Fast polarizations rotate to an E-W direction as the observation points move toward the Tyrrhenian Sea. For our northern stations, fast polarizations measured in the Apennines and in the Po Plain show a NE-SW trend, i.e. perpendicular to the orogen. In the western portion of the RETREAT deployment we measure splitting "nulls", within the Tuscan extensional region and the Alps-Apennines transition zone. Moreover, our measurements show a strong back-azimuth dependence. The birefringence estimates confirm the likely complexity of anisotropy beneath the Northern Apennines. To im-

prove our understanding, the most significant seismic events are used to recover the anisotropic parameters for a complex structure, taking into account the possibility of 3D structures beneath our study region.