Title: Anisotropy of the upper mantle under the Northern Apennines based on data from the international experiment RETREAT (Italy)

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Abstract: In this master thesis, we process data recorded during the passive seismic experiment RETREAT (2003-2006) in the Northern Apennines with the aim to explore the upper mantle structure in the region. Active orogeny in the Northern Apennines relates to the collision of the Tyrrhenian and Adriatic (subducting westward) plates and is accompanied by an eastward retreat of the trench. Directional dependences of P-wave travel-time deviations together with variations of the fast split polarization azimuths of teleseismic SKS waves are derived from data recorded during experiment RETREAT. Both the fossil anisotropic structure in the mantle lithosphere and the anisotropy due to the present-day flow in the sub-lithospheric mantle are sources of the observed velocity-anisotropy patterns. Thick continental Adriatic plate can be divided into at least two sub-regions with their own fossil fabrics. We have also tried to evaluate effects of the well known trade-off between large-scale anisotropy derived from body-wave anisotropic parameters and a heterogeneity represented here by the high-velocity subducting Adriatic slab. Investigation of seismic anisotropy of the upper mantle requires precise measuring of teleseismic body-wave arrival times. A (semi-)automatic software (picker) for a fast and reliable processing of extensive datasets is a welcome alternative to a standard manual picking procedure. Therefore, we tested three semi-automatic pickers on subsets of the RETREAT data and selected the most precise and effective picker, the Autopick software, to measure the P-wave arrival times for the whole RETREAT dataset.

Keywords: velocity anisotropy; seismic body waves; upper mantle; Northern Apennines; semi-automatic picking software