RETREAT seismic data analysis: from records to 3D velocity model

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Introduction

The Apennines represent one of the most accessible convergent mountain belts with horizontal contraction and extension occurring simultaneously. The RETREAT project (Margheriti et al., 2006) was developed to study the tectonic processes acting in Northern Apennines and one of the tasks was a passive seismological experiment active from October 2003 until September 2006. About forty temporary broadband stations were deployed and their continuous recordings together with the recordings from several permanent seismic stations of Italian National Network were archived in the IRIS data centre.

This study presents the analysis of seismic records from the RETREAT project using a sequence of seismological methodologies to obtain shear-wave velocity models of the area in twenty-six contiguous cells, 0.5°x0.5° large. The used methodologies are: relocation of local events; frequency-time analysis to obtain group velocities; tree-station method to measure phase velocities; 2D surface-wave tomography; and optimised non-linear inversion. The study area is shown in Fig. 1a.