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TOOLS, DATA, AND MODELS FOR 3D SEISMOTECTONICS: THE ITALIAN OVER TIME LABORATORY

Unveiling the characteristics of the eastern Southern Alps boundary thrust and the "Collalto Stoccaggio" gas storage with multi-scale attenuation tomography

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Seismic attenuation tomography, mainly used in volcanic contexts, is also proving to be a valuable geophysical method for tectonic assessment, from fault scale to the regional extent.

This study deals with the first multiscale seismic attenuation tomography in the eastern Southern Alps (Northern Italy), focusing on the Montello hill and a segment of the Alpine boundary thrust (~100 km long, from Vicenza to Pordenone). The study area, characterized by medium-high seismic hazard, hosts the Collalto Underground Gas Storage (UGS) monitored by a local seismic network.

We use the data from this seismic network and the Murat code to perform a robust attenuation tomography in scattering, absorption and total attenuation. The results are interpreted by integrating geological-structural data, seismic profiles, and travel-time tomography available in the literature.

At the regional scale, our model confirms the connection of the Montello thrust and the Bassano-Valdobbiadene thrust at a common detachment surface. We also identify two important discontinuities: a sub vertical one that act as a barrier to fault propagation in the Cansiglio area, and the Montello backthrust that limits fluid propagation to shallower depths.

At the local scale, the absorption model identifies the UGS volume and some attenuative patches on the Montello thrust unaffected by seismic activity. This suggests the presence of fluids that could facilitate the aseismic deformation of the structure.

These findings could pave the way for further research and improve the development of comprehensive seismotectonic models that combine seismogenic aspects with rock properties and deformation patterns at the regional scale.