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Seismic structure of the Eastern Alps – TRANSALP revisited

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Previous controlled source images from the high-resolution TRANSALP reflection data were produced by CMP-stacking and post-stack migration. This method is well suited for the layered basin structures of the forelands, but the geometry of dipping events – abundant in the central part of the orogen – is distorted, and it precludes the imaging of steeply dipping reflectors, such as the Periadriatic Fault (PF) system, which separates the Southern Alps over a length of 700 km from the European plate.
We reprocessed the Vibroseis reflection-data with methods appropriate for steep-dip imaging. We used a Kirchhoff-prestack-depth-migration algorithm and the tomographic p-wave velocity model of Bleibinhaus and Gebrande (2006) for imaging the upper and middle crustal structure between the Tauern Window and the Valsugana Thrust Belt. The resulting images show the PF dipping almost vertically in the upper 3 km, with a minor branch offset 2 km to the South. At greater depth the PF increasingly bends towards the South from vertical to 75° at 8 km to 60° at 16 km depth. Reflection amplitudes gradually fade out near 20 km depth, where the PF appears to cut the reflectors that have been related to the Valsugana thrust. This structure contradicts several published models. It is probably a result of the detachment and partial exhumation of the Penninic nappes.
We are currently in the process of including more data to extend these images to the forelands and to greater depth. Key questions are the continuity of the “Sub-Tauern Ramp” and its possible merging with the Inn Valley fault, and the structure of the “Sub-Dolomite Ramp”. We will present first results of these attempts, and we plan to modify existing tectonic models to take these results into account.