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Local seismicity pattern and 1-D velocity model in the Southern and Eastern Alps using the temporary SWATH-D network data

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The Alps as the result of the convergence of the African and European plates represent extremely complex structures and kinematics. The Southern and Eastern Alps as part of this continental collision are the target area of the current study. In this region, the Priadriatic Fault is sinistrally offset by the Guidicarie Fault and a switch in the subduction polarity had been proposed. In order to better understand the crustal and upper-mantle structure and how it is related to faults seen at the surface, we aim to assess the precise distribution of local earthquakes (potentially indicating active faults) and the seismic velocity structure in the subsurface. In our investigation, we use the data of a very dense seismic network deployed in the Southern and Eastern Alps (SWATH-D network - DFG funded priority Programme 4D-MB) to provide seismicity pattern and velocity structure of the crust and possibly the upper mantle. This temporary network consists of 150 stations with an average inter-station spacing of 15 km complementing the larger scale AlpArray Seismic Network (AASN). The objectives are, accordingly, to implement a reliable and fully automated algorithm to detect the events and pick the phase onset times of local earthquakes, provide precise hypocentral locations and calculate a velocity model for the target area. Here we focus on the first results of the earthquake analysis procedure and present a 1-D velocity model for the Southern and Eastern Alps. Later, this data will be used for a 3-D tomographic inversion. So far, we used 10 months of data from September 2017 to Jun 2018 and implemented an automated multi-stage processing chain to provide the first catalog. The catalog comprises 123 local earthquakes with 5261 P and 2651 S picks. The hypocentral locations were then calculated and a 1-D velocity model was also obtained using simultaneous inversion of hypocenters, velocity, and station corrections. The seismicity pattern is characterized by rather diffuse clusters in the Friuli, Lake Garda, Brenner and Trentino regions with low to medium magnitude (ML 0-4) events within the upper 25 km of the crust. The central part of the region, where the Preadriatice fault sinistrally offset by the Guidicarie Fault and its related fold-and-thrust belt, has obviously less activity. Our 1-D velocity model indicates upper crustal velocities that are higher than average for the whole Alpine region.