



## **Estimation of an optimum 1D model in the Peloritani Mountains – assessment of the variance of model parameters and variability of earthquake locations**

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The distribution of small earthquakes is frequently exploited to trace tectonic patterns. In both standard as well as the earthquake relative location techniques the velocity parameters are kept fixed to a priori values - that are assumed to be correct - and the observed travel time residuals are minimised by adjusting the hypocentral parameters. Neglecting the coupling between hypocentral and velocity parameters during the location process, however, can introduce systematic errors in the hypocentre location, which strongly depend on the assumed a priori velocity structure (Kissling et al., 1995; Michelini and Lomax, 2004). Precise hypocenter locations and error estimate, therefore, demand the simultaneous solution of both velocity and hypocentral parameters. In the present study, we invert for an optimum 1D model and examine earthquake location for recent events and their relationship to tectonic features in northeastern Sicily and southern Calabria, which represent an area of high seismic activity. As a principal goal of this study we focus on the stability of the inverted parameters. For this purpose we carry out a series of tests concerning the initial guesses of the velocity structure and locations used in the inversion. Besides this, we assess the uncertainties which originate from the finiteness of the available data sets carrying out resampling experiments. We compare the locations obtained with the various velocity models. In doing so we assess the errors which originate from the uncertainties of the velocity model parameters as well as from the finiteness of the available data set.