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## Artefacts in Earthquake Location - a Case Study on Microearthquakes in Northeastern Sicily and Southern Calabria

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We examine earthquake location for recent events and their relationship to tectonic features in northeastern Sicily and southern Calabria, which represent a seismically highly active area. The resolution of standard location may be insufficient and introduce artificial patterns giving rise to misleading seismotectonic interpretations. We evidence biases affecting hypocenter distributions carrying out a grid search location and mapping the distribution of theoretical RMS-residuals. The problem can be partly fixed employing relative location techniques based on travel time differences rather than absolute arrival times. Further problems may arise from inappropriate crustal models for which artificial streaks in the distribution of foci may derive. Using data from northern Sicily and southern Calabria we re-analyse seismicity patterns originally inferred from standard location with respect to possible biases introduced by unfavourable boundary conditions for earthquake location. We show how the scatter of distinct hypocenter clusters reduces during the application of relative location, both using catalogue arrival times and high precision travel time differences. Nonetheless even the results of relative location are sensitive to small disturbances such as the use damped least square methods instead of singular value decomposition. The accuracy of earthquake locations is also determined by the velocity model used. We address to the problem of the velocity model and station corrections comparing results obtained using the standard model to those for an ad-hoc derived minimum 1D model.