

The high-frequency waveform inversion – an adequate tool for estimating the focal mechanism of the weak crustal earthquakes of Vrancea region (Romania)

Luminita Angela Ardeleanu

National Institute for Earth Physics, Seismological Laboratory, Bucharest - Magurele, Romania (ardel@infp.ro)

The crustal seismicity of Vrancea region (Romania) is moderate-sized – not exceeding magnitude 5.6 – and occurs over a rather broad region in the Southeastern Carpathian foreland. Due to the low occurrence rate of moderate-size events, and to the very poor seismic instrumentation before 1980, the number of reliable seismic source mechanisms in the area, determined from P-wave polarities, is still modest.

An inversion scheme for high-frequency waveform data, which requires only few good quality local records, has previously been applied to a set of shallow depth earthquakes with local magnitudes less than 4, which occurred in the study region. The approach resulted in satisfactorily constrained fault plane solutions for most of the investigated events.

Here we follow the same approach and improve the structural models used for the computation of the Green's functions by considering optimized local models of the quality factor of the medium Q . To determine the optimal attenuation models we propose a procedure resembling a non-linear waveform inversion: the normalized amplitude spectra of the high-frequency local records of the low-magnitude earthquakes are fitted to the synthetic spectra generated for point sources with the same location and mechanism as the observed events.

The results show a noticeable reduction of the estimated uncertainty of the retrieved fault plane solutions, and open perspectives for a detailed exploration of the crustal deformation field in front of the Carpathian bend.