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Spatio-temporal correlation of crustal and intermediate depth seismicity in the Vrancea region (Romania)

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Seismicity in the Vrancea region is located in the SE Carpathians and their front both to the crustal and intermediate depth levels. Crustal seismicity did not exceed Mw5.2 while the undercrustal seismicity generated about 2-3 earthquakes with Mw>7.0 per century. Epicenters of the both types of events are overlapped in a NE-SW small area parallel to the Carpathians bend.
Crustal seismicity is mainly caused by a NE-SW fault system which borders the flanks of the Focsani basin, the deepest basin of Romania, with cca 18 km sediment thickness. Seismicity is mainly located in the first 20 km depth (80% out of events) but it was also observed down to 35-40 km or deeper to 50-60 km. Seismic events occurred either as swarms (more small events with comparable magnitudes) in the western part of basin and under Carpathian nappes or as sequences (a first shock with higher magnitude followed by a lot of weaker aftershocks) in the central and eastern part of basin. The focal mechanisms of crustal events point both normal and reverse faultings with strike-slip components on a prevalent NE-SW direction.
The intermediate depth seismicity occurs within the 60-180 km depth interval and it is confined to a relatively narrow and almost vertical slab of 40x70 km having a NE-SW direction parallel to the crustal faults of the Focsani basin. Focal mechanisms indicate a prevalent reverse faulting with an almost vertical T axis and a horizontal P axis for more than 90% out of events with Mw>6. The main fault plane has a NE-SW direction and a NV dip with the P axis orthogonal to the Carpathians.
The fact of the both seismicity domains (crustal and intermediate depths) show a common NE-SW direction of fault planes suggest some common or interdependent causes which generate both event types.
On the other hand a rough correlation of temporal distributions of the two seismic event types showed a enhancement of crustal seismicity in the aproach and after the large or moderate intermediate depth events like the ones from 1977, 1986, 1990 and 2004 years.
This study correlates both spatial and temporal distributions of the crustal and intermediate depths events with moderate to strong magnitudes and try to find a possible causality connection.