



Seismicity in Provadia region after modernization of LSM Provadia

Gergana Georgieva, Svetlana Nikolova, and Liliya Dimitrova

Geophysical institute - BAS, seismology, Sofia, Bulgaria (lidim@geophys.bas.bg)

The Provadia region is located in seismically quite part of Bulgaria. The exploitation of the Mirovo salt dome started in 1956 using leaching method that is extracting of saline brine to the surface. Since 1980 several moderate earthquakes with magnitude greater than 4.0 were occurred in this region and caused damages to the neighboring villages. To improve the monitoring of the seismicity in the region a local seismological network (LSN) was deployed in 1993. In the autumn of 2006 the modernization of LSN Provadia was completed. The four stations of the network are equipped with digital acquisition systems, 3 component geophones and modern radio connections. One more station is working as stand-alone point of observations, the data are collected monthly. In summer of 2009 in the LSN a small aperture array was installed. The installed equipment and increased number of points for observations permitted to screen out large number of quarry blast and increased the accuracy of the earthquake hypocenter location.

The detailed study of the seismic processes in the region for the period 10.2006 - 06.2008 made possible the localization of 73 earthquakes close to and in the salt dome. Now we could distinguish events clustered along known fault structures in the region and in the most in the western border of the salt stock in the depth. Some events are localized in the salt dome and may have technogenic origin. The main concentration of the epicenters is at one kilometer to the south-west from the salt dome. The recorded earthquakes in the area around the salt dome are at depths up to 5 km and most are within depth interval 1-2.5 km. In the northern part of the region, along south Moesian fault, deeper earthquakes were observed; computed depth of events reached about 20 km. The wave forms of these earthquakes have clear P and S onsets. They do not have coda waves what is typical for the deeper events.

We observed some changes in the number of the events during the period. This might be linked to the leaching process but this observation needs longer period of observations for statistics. Twice a sequence of four events was detected in the local zone. The first event is the strongest and is followed by weaker events that can be defined as normal aftershock activity for the micro earthquakes.

We performed second localization using HYPODD. Relocalization is done in two steps: first we had to cluster events; the second step was to minimize the travel time's differences for each station and event cluster. The second localization was made for 21 events. These earthquakes were very well grouped around the Mirovo salt dome. After application of relocalization procedure we observed a weak migration of the hypocenters to the north-east direction. A part of the earthquakes migrate closer to exploitation area and along the isoline 2000 m of the salt dome. The existence of the active tectonic structure in the region and the contrast boundary between the salt dome and the surrounding structures is a precondition for the higher seismic activity in the region.