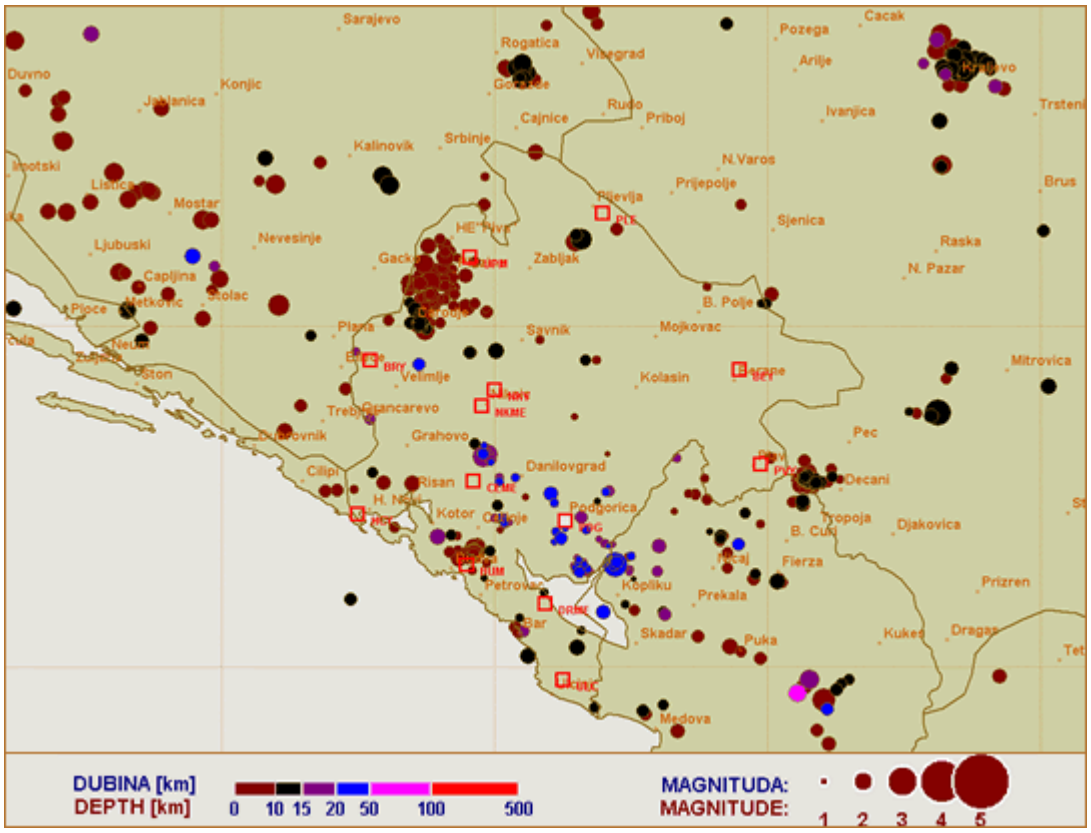
Seismic activity of Montenegro and its surroundings for year 2010

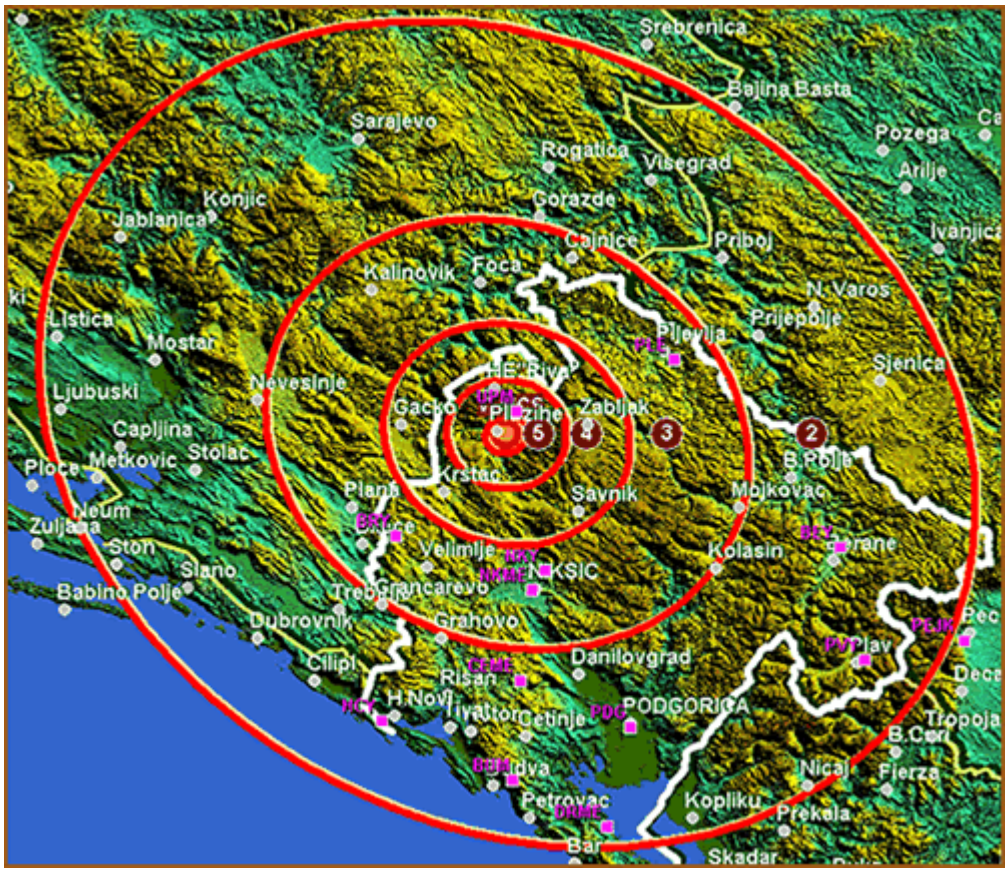
During the year 2010, Montenegro Seismological Observatory, using seismic network containing 13 stations, recorded moderate seismicity and at the end of year increased seismic activity on the Montenegro territory. At that period, 435 earthquakes, under 1.2 magnitude are recorded totally. During the daytime 240 of total number of earthquakes occurred and 195 at the night. An average number of earthquakes per month were 36 and the maximum – 304 (70 % of all occurred earthquakes) was registered during December as a result of increased seismicity at Pluzine and Brajici regions.



Picture 1. The epicenters of recorded earthquakes at the Montenegro territory and its surroundings (2010).

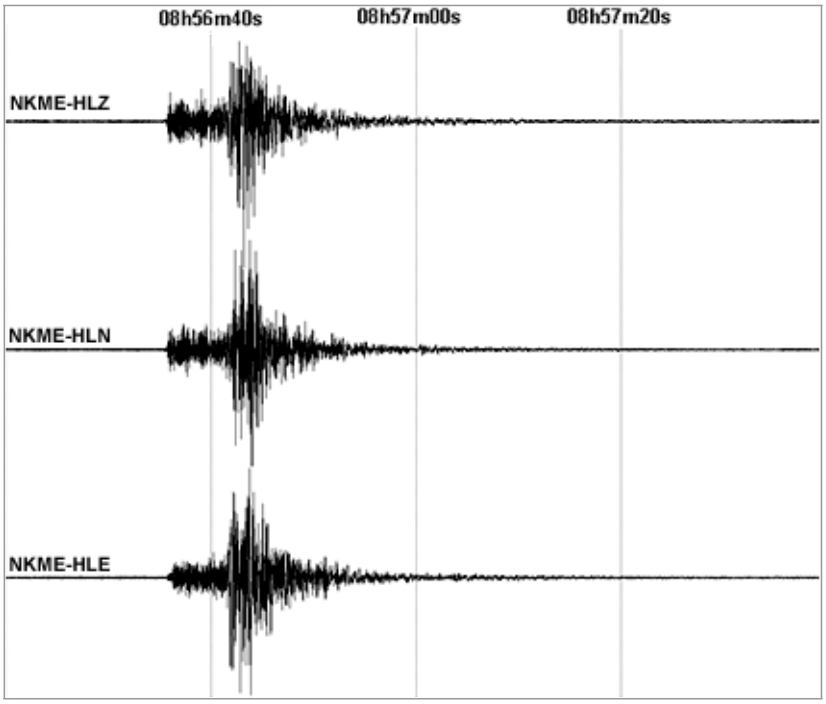
Last year was characterized by increased seismicity on the northwestern part of Montenegro, in a wider zone of the accumulation lake for the Piva Hydroelectric Plant. Starting from 2nd of December until end of the year, Montenegro Seismological Observatory recorded 193 earthquakes, under 1.4 magnitude in this area. Occurred sequence of earthquakes is a typical manifestation of induced seismicity, caused by the effect of water mass of artificial Lake Piva, on surroundings rocks. Accumulation was in its maximum for a longer time period, so releasing of seismic energy through smaller tectonic activity and consequent earthquakes is driven by strong hydrostatic pressure on surroundings rocks.

The strongest earthquake generated from this seismogenic source occurred on 21st of December at 09:56 local time, with Richter magnitude of 4.0, on 3 kilometers east from Pluzine. Earthquake felt with intensity of VI degrees on the Mercalli Scale in the area of the accumulation within 10 kilometers distance, and with intensity of V degrees in Zabljak and area inside 20 kilometers distance.

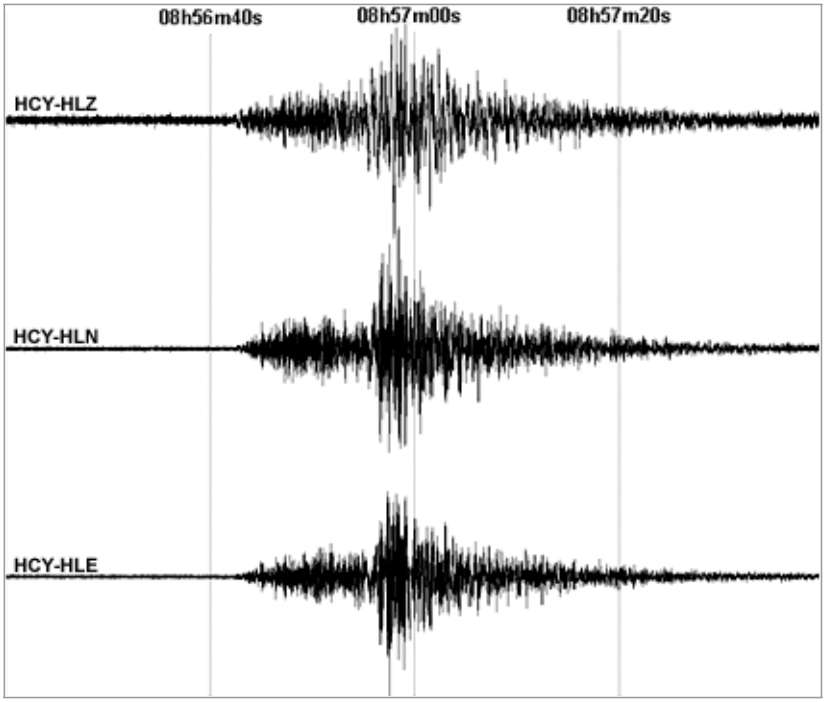


Picture 2. The position of earthquake epicenter recorded on 21st of December (at 09:56) with Richter magnitude 4.0 in Pluzine with isoseismal line distribution.

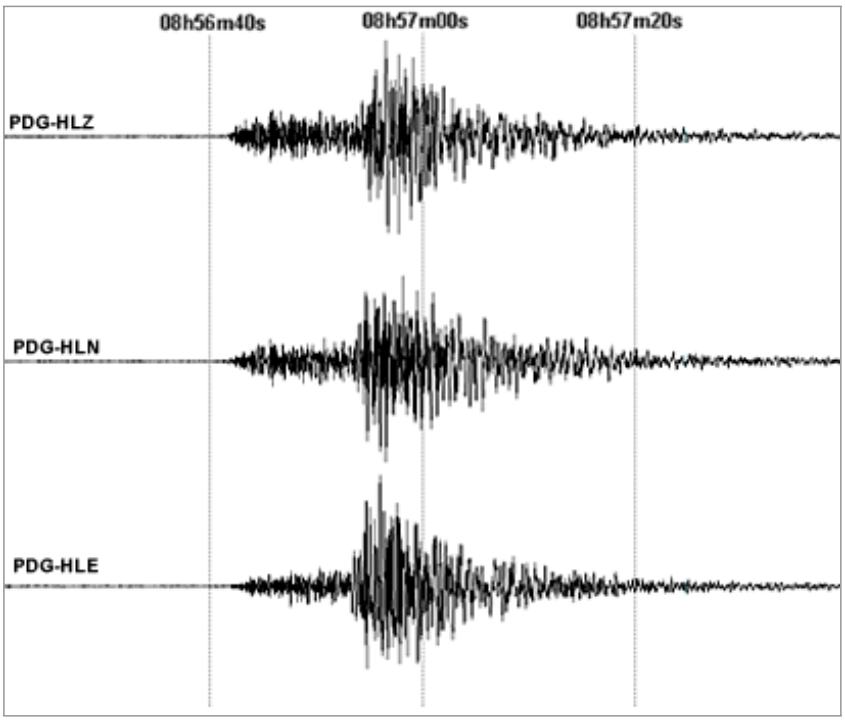
Accerometric stations in Niksic (NKME), Herceg Novi (HCY), Podgorica (PDG) and Dracevica (DRME) registered this earthquake and time history are given on the next pictures.



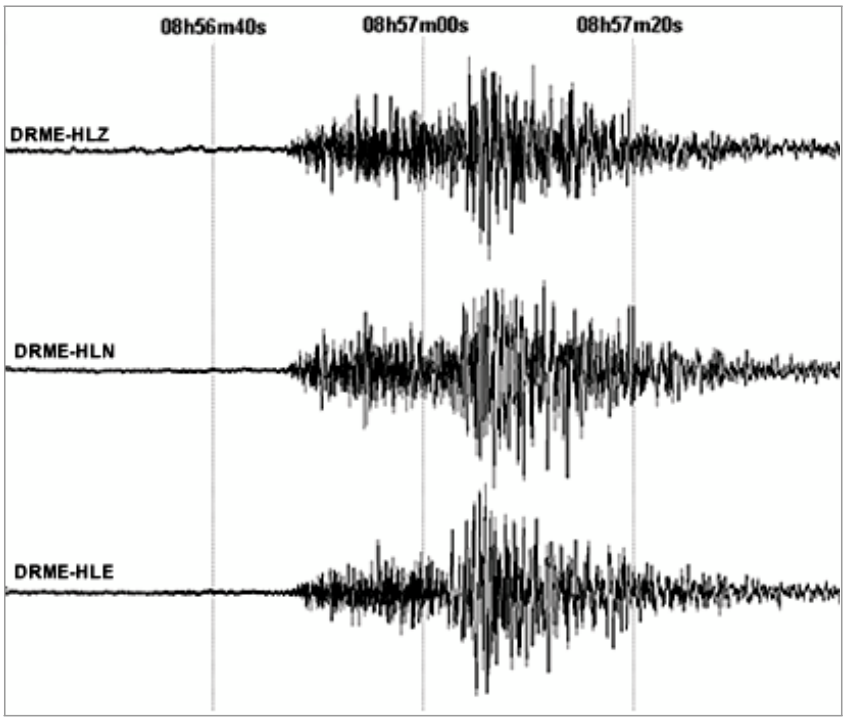
Picture 3. Accelerogram of earthquake occurred on 21st of December at 09:56, registered on the Niksic accelerograph, on 43 kilometers distance from epicenter.



Picture 4. Accelerogram of earthquake occured on 21st of December at 09:56, registered on the Herceg-Novi accelerograph, on 84 kilometers distance from epicenter

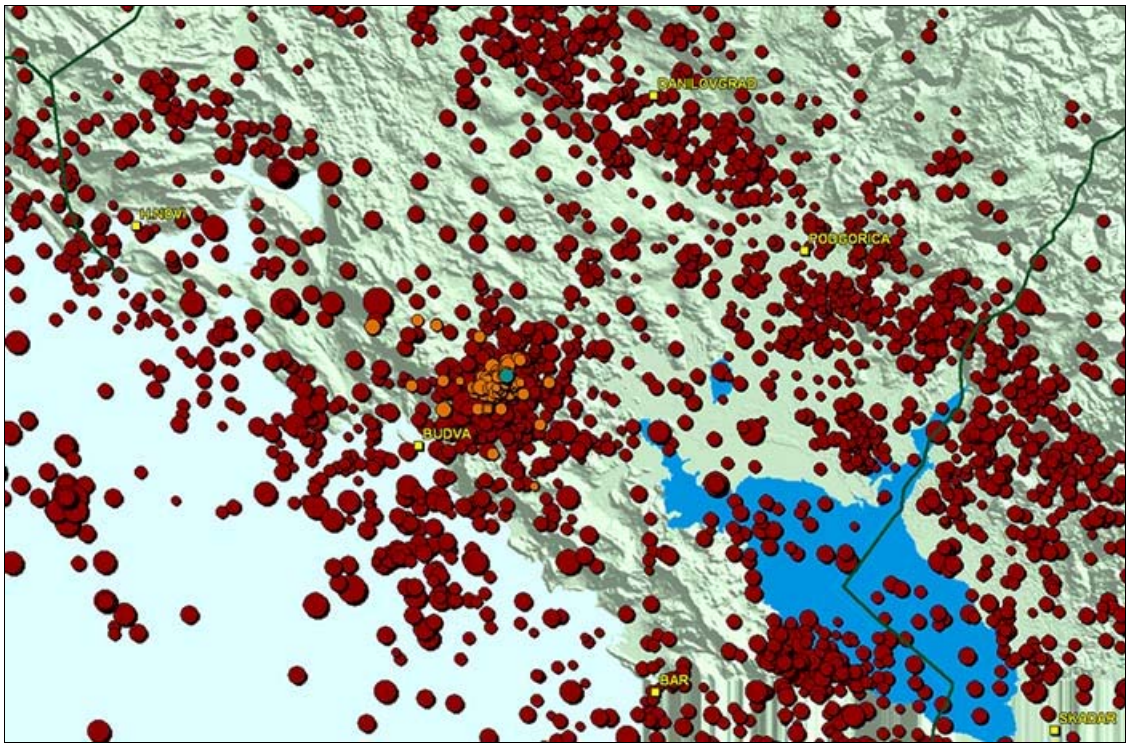


Picture 5. Accelerogram of earthquake occurred on 21st of December at 09:56, registered on the Podgorica accelerograph, on 86 kilometers distance from epicenter.



Picture 6. Accelerogram of earthquake occurred on 21st of December at 09:56, registered on the Dracevica accelerograph, on 110 kilometers distance from epicenter.

At the beginning of December, seismogenic zone of Braici near Budva was activated. In time period starting from 2nd to 26th of December, Montenegro Seismological Observatory registered at this area series of 97 earthquakes above 1.3 Richter magnitude. In the serie, the strongest earthquake occurred on 10th of December at 02:36 local time, with Richter magnitude of 3.1, which corresponds (for hypocenter depth of 8 kilometers) to epicentral intensity of IV-V degrees on Mercali scale. Seismogenic zone of Braici was active last time in year 1985, generating serie of earthquakes in which the strongest one was 5.0 on the Richter scale.



Picture 7. Epicentral map of earthquakes occurred during last years in the broader region of seismogenic zone Brajici (read cycles). Epicenters of earthquakes happened from 2nd to 26th of December are presented with orange cycles, and the position of the strongest earthquake in the series is shown with the symbol of green cycle.

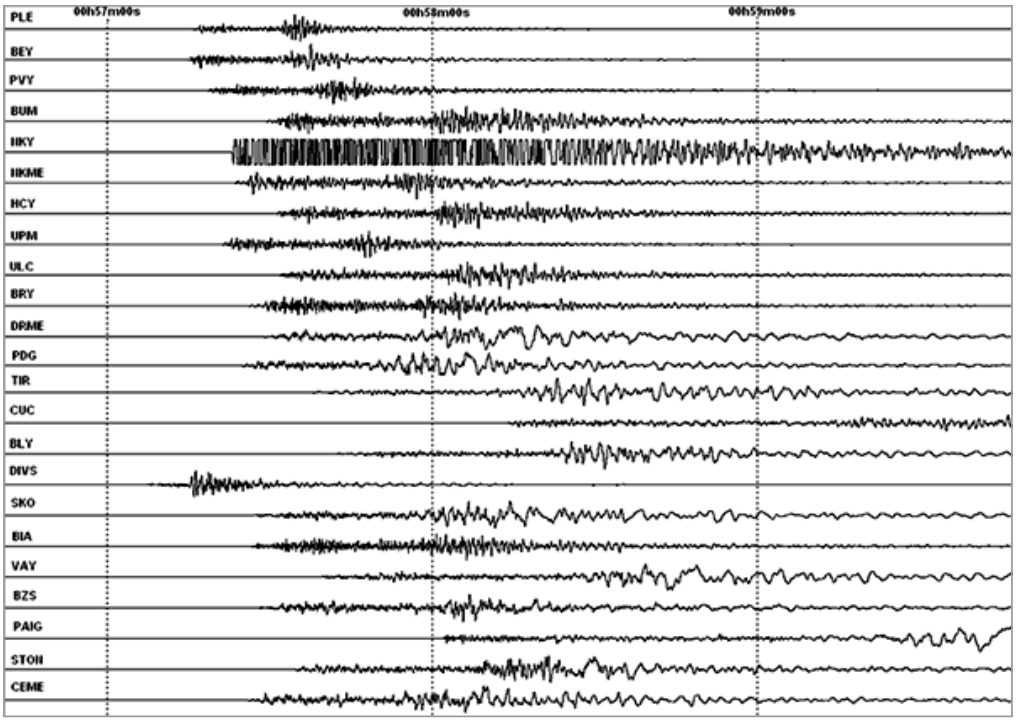
Short-lasting seismic activity was observed on the north-west from Danilovgrad, where 6 earthquakes were recorded on16th of January, in the time period of tree hours. First earthquake in the sequence was registered on 06:43 local time, with Richter magnitude of 3.7, and one more occurred 90 minute later with magnitude 3.9 and hypocenter depth of 15 kilometers. This earthquake was the strongest in this serie, and felt it on the Danilovgrad, Niksic, Cetinje and Podgorica area with intensity of III-IV degrees on Mercali scale. Following four earthquakes had magnitude ranging from 1.4 to 2.1.

Earthquake with 3.9 Richter magnitude occurred on 9th of February at 17:16 local time, on 5 kilometers south from Pljevlja. The highest intensity in the epicentral zone was VI degrees and on territory of Zabljak and Pljevlja earthquake felt with V degrees on Mercali scale. On this area, last occurred 3.9 or above earthquake happened before more than 50 years.

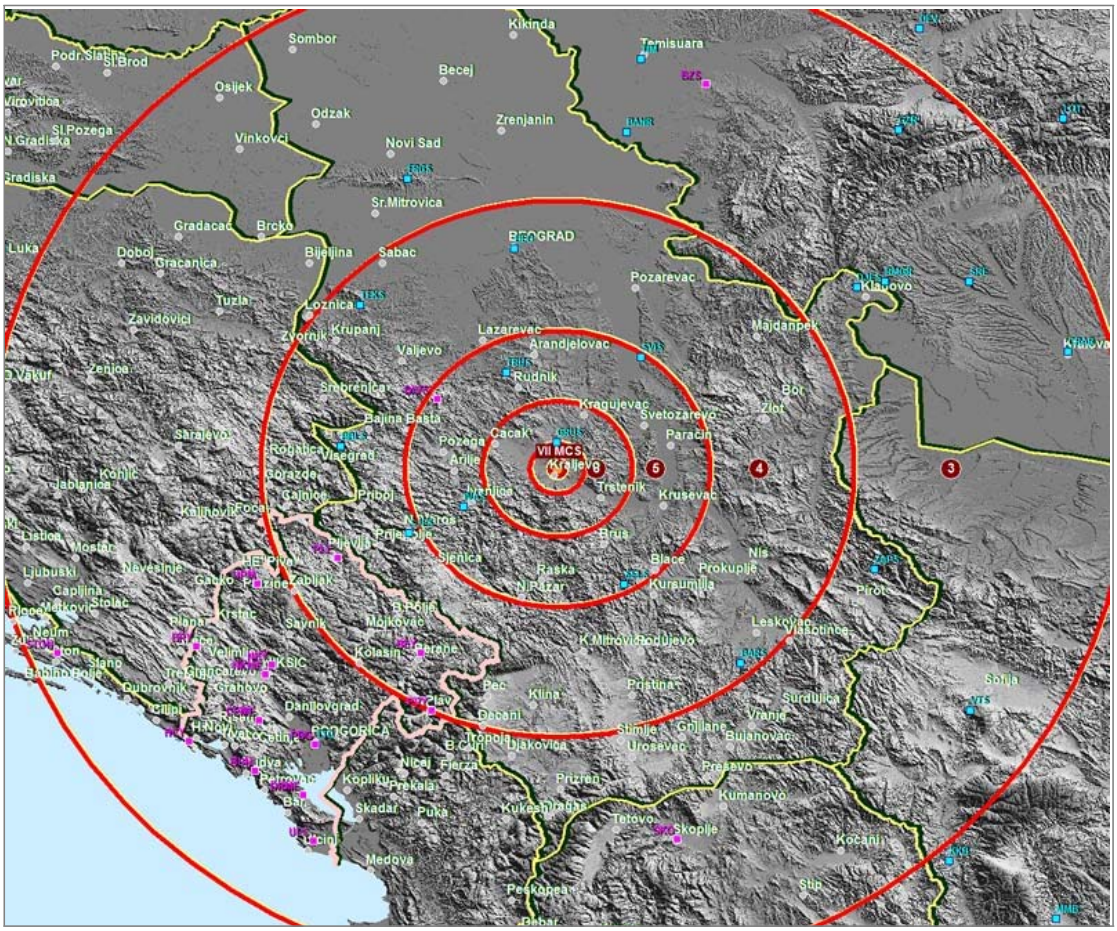
In last year, Skadar Lake surrounding (part that belongs to Montenegro) was characterized by moderate seismicity. In the time period starting from 29th to 31st of January 15 earthquakes occurred with magnitude ranging from 1.4 to 2.0. Also, at the north-west of Skadar Lake (part that belong to Albania), on February 11 tree earthquakes were registered, and first that occurred on 03:25 local time had the biggest magnitude of 4.5 and hypocenter depth of 19 kilometers. Intensity of this earthquake on territory of Podgorica, Bar and Danilovgrad was III-IV degrees on Mercali scale.

Weak seismic activity was observed in the vicinity of Podgorica, Cetinje and Bar. On the territory of capital city 33 earthquakes were registered with magnitude ranging from 1.2 to 2.5.

Seismic activity in the Region was denoted by strong earthquake in the Kraljevo vicinity (Serbia), occurred on 3rd of November, at 01:56 local time The earthquake magnitude was 5.4, and the highest intensity in the epicentral zone was VII degrees on Mercali scale. This earthquake felt on the whole territory of Montenegro with intensity of III-IV degrees on Mercali scale.



Picture 8. Seismic signals on 23 seimological stations that recorded earthquake near Kraljevo on 3rd of November at 01:56.



Picture 9. The position of the earthquake epicenter with isoseismal line distribution, for the earthquake occurred of 3rd of November at 01:56, with a Richter magnitude of 5.4, near Kraljevo.

Observatory recorded more than 50 earthquakes in the zone Montenegro, Albania and Kosovo borders, mostly during July. The strongest earthquake on this territory occurred on 30th of September at 13:17 local time, on 8 kilometers from Plav with Richter magnitude of 3.5

In the time period from 7th to 11th of October, eight earthquakes were recorded in the surroundings of Gnjilane, and last one happened at 02:34 local time with 4.2 Richter magnitude. Earthquake occurred on 26 km west of Kosovska Mitrovica (Kosovo), on 10th of Mach at 14:38 with Richter magnitude of 4.6, felt on the territory of east Montenegro with intensity III -IV degrees on Mercali scale.

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