

**Abstract:** A geodatabase of earthquakes that occurred on the Balkan Peninsula and the adjacent area has been created. The database includes information on historical earthquakes with a magnitude greater than 6.0 and earthquakes from the instrumental period to the present day with a magnitude greater than 4. Maps of the spatial distribution of earthquakes, along with their magnitudes, have been elaborated. On those maps, existing and confirmed crustal faults are depicted together with the boundaries of the seismic zones. Using GIS functionality, it is possible to filter the data on the map to reduce the results and reach the necessary selected information as needed by the end user. The creation of a register (database) of earthquakes in the Balkans and neighbouring territories with a magnitude above 5.0 on the Richter scale for the period after 2015 and their visualization by location is the first and main step in the implementation project "Study of co-seismic deformations of the earth's crust for the territory of the Balkan Peninsula based on satellite data" launched in December 2023. The purpose of the project is to provide details on the deformations on the Earth's surface caused by the earthquake events using innovative methods.

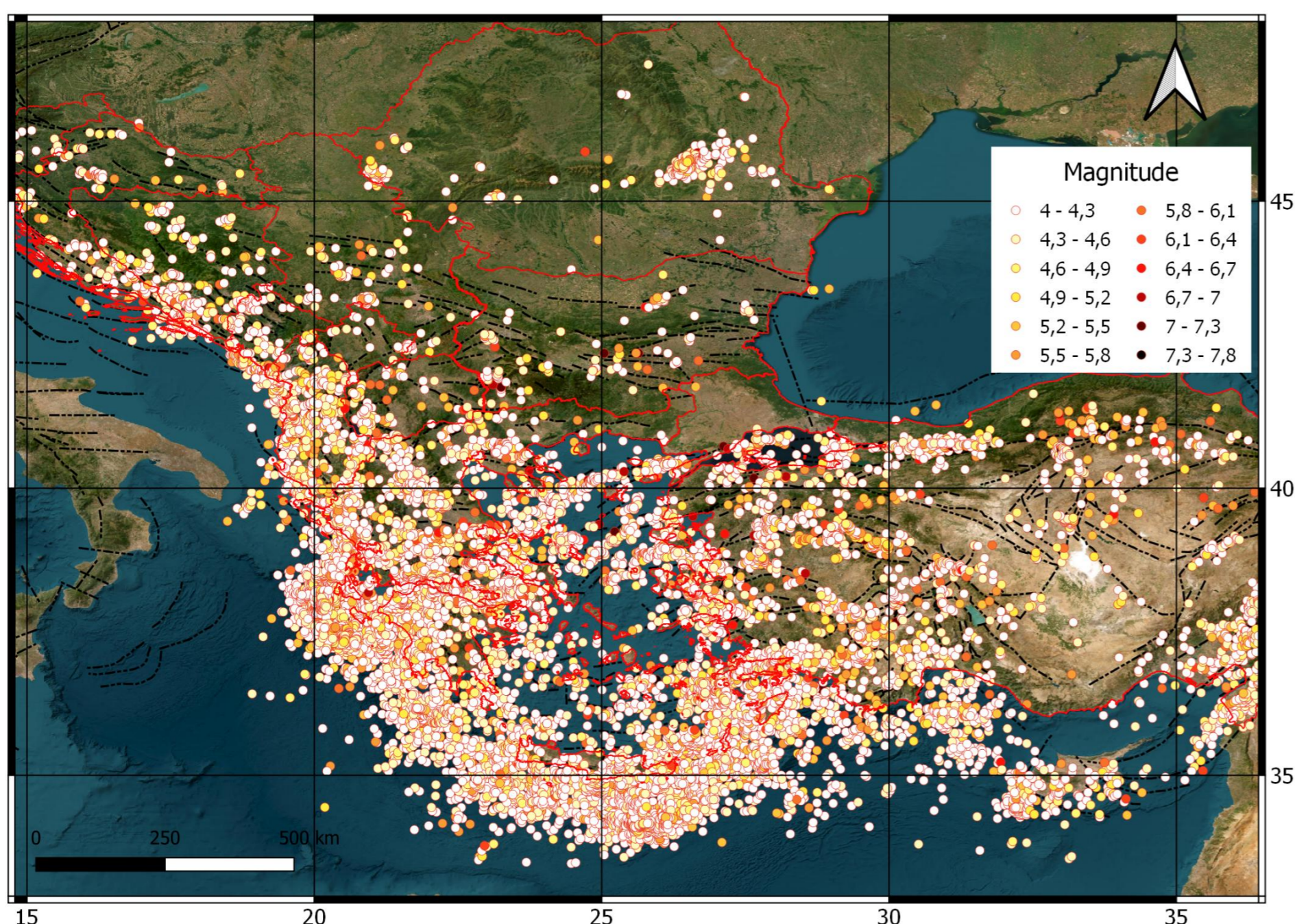


Figure 1 Location map of the earthquake with magnitude above 4.0 Mw after 1904

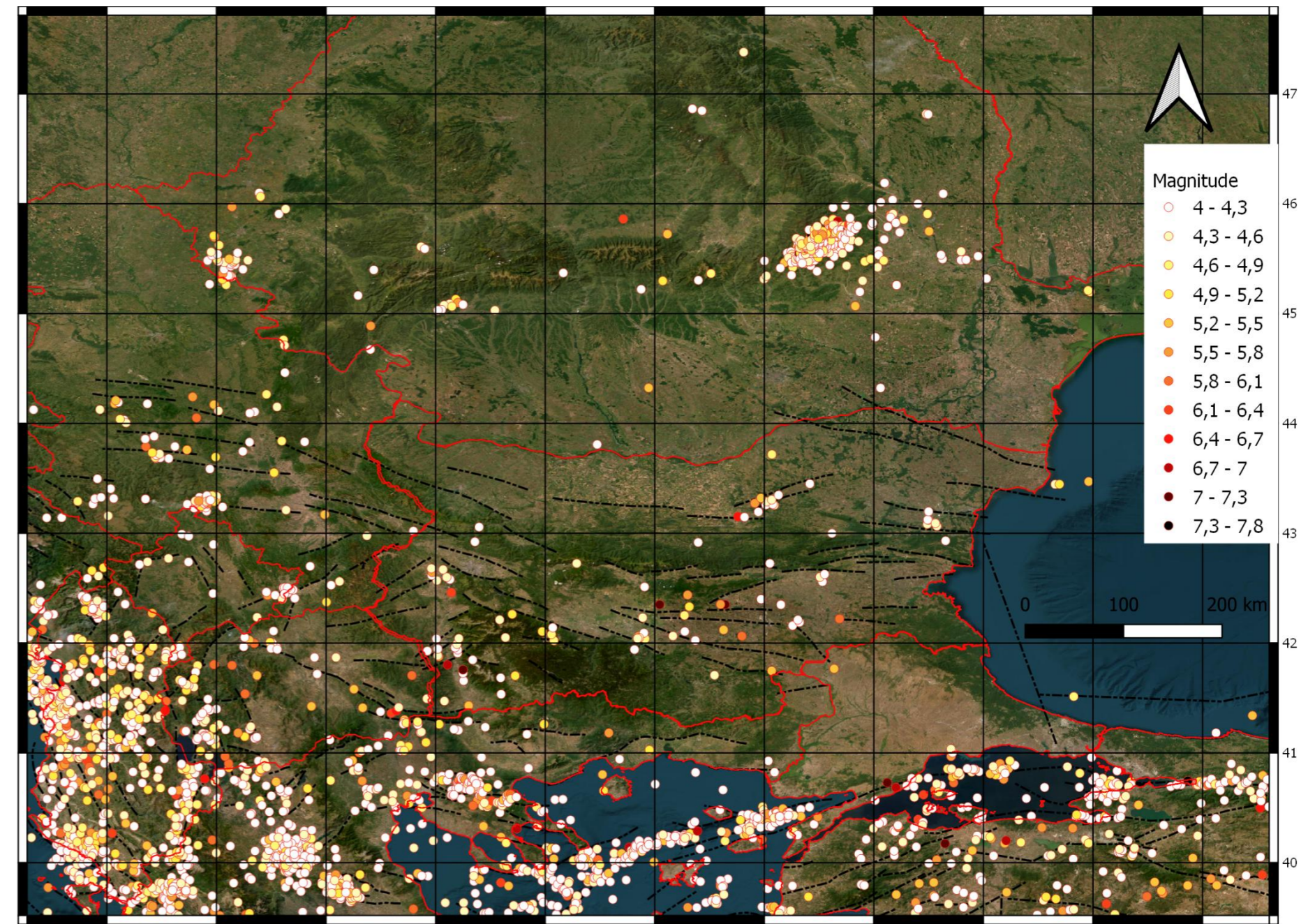


Figure 2 Location map of the earthquakes with magnitude above 4.0 Mw after 1904 (USGS) for territory of Bulgaria.

## Results

In the region of Europe, the strongest earthquakes are found around the Hellenic arc and occur more rarely in the interior of the Eurasian plate. This is the rationale to initiate the project "Investigation of co-seismic deformations of the Earth's crust for the territory of the Balkan Peninsula based on satellite data", which was launched in December 2023. The main task of this project is to demonstrate the operational readiness to determine the magnitude of deformations on the earth's surface, the size of the affected area and to prepare maps of the surface displacements that occurred after a seismic event. One of the first tasks in the course of its implementation was to create an extensive catalogue (database) of earthquakes in the Balkan Peninsula and neighbouring territories with a magnitude above 5.0 for the period after 2015. Data (in the compiled catalogue) are unified and standardized in accordance with requirements of the international seismological centres. The catalogue of earthquakes that occurred on the Balkan Peninsula and the adjacent area is processed, that duplicated events are removed and the foreshocks and aftershocks are identified. The geodatabase includes information of historical earthquakes with a magnitude greater than 6.0 and earthquakes from the instrumental period to the present day with a magnitude greater than 4. This database of the earthquakes and is complemented by information of faults are both combined in a project into geographic information system (GIS). The spatial distribution earthquakes in GIS format can be used in scientific and practical applications to estimate and thus to reduce the risk and consequences of possible strong earthquakes in future. These limitations for the time interval to be between 2015 – 2023 and the magnitude of the event are imposed because the main method for monitoring deformations of the Earth's crust used in the project is the InSAR technology. The data used to achieve the project goals are the SLC products from the mission Sentinel 1 A and B, which are available after 2015.

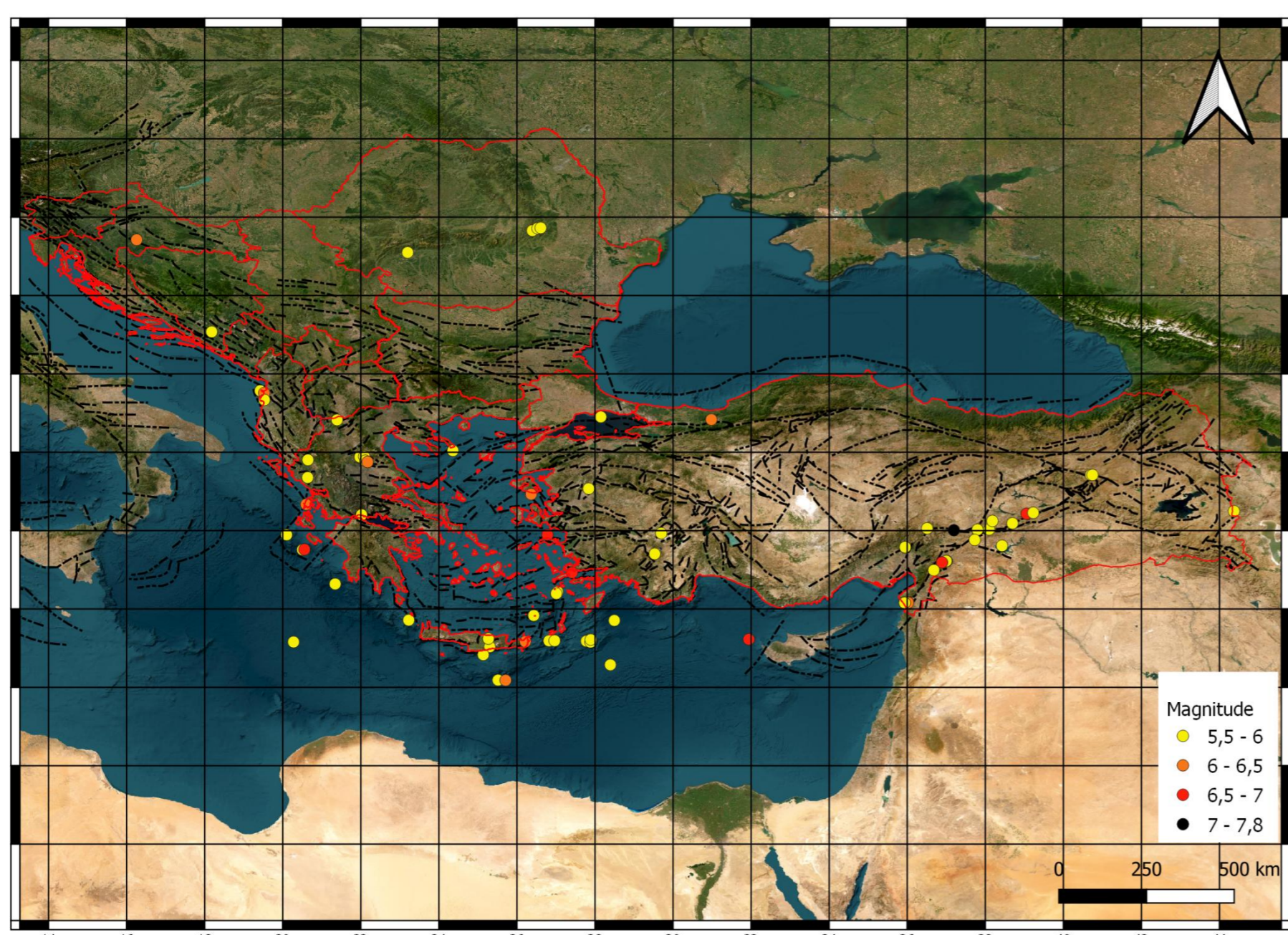


Figure 3 Location map of the strong earthquakes (Mw 5.5) after 2015 for Balkans and neighbouring territories

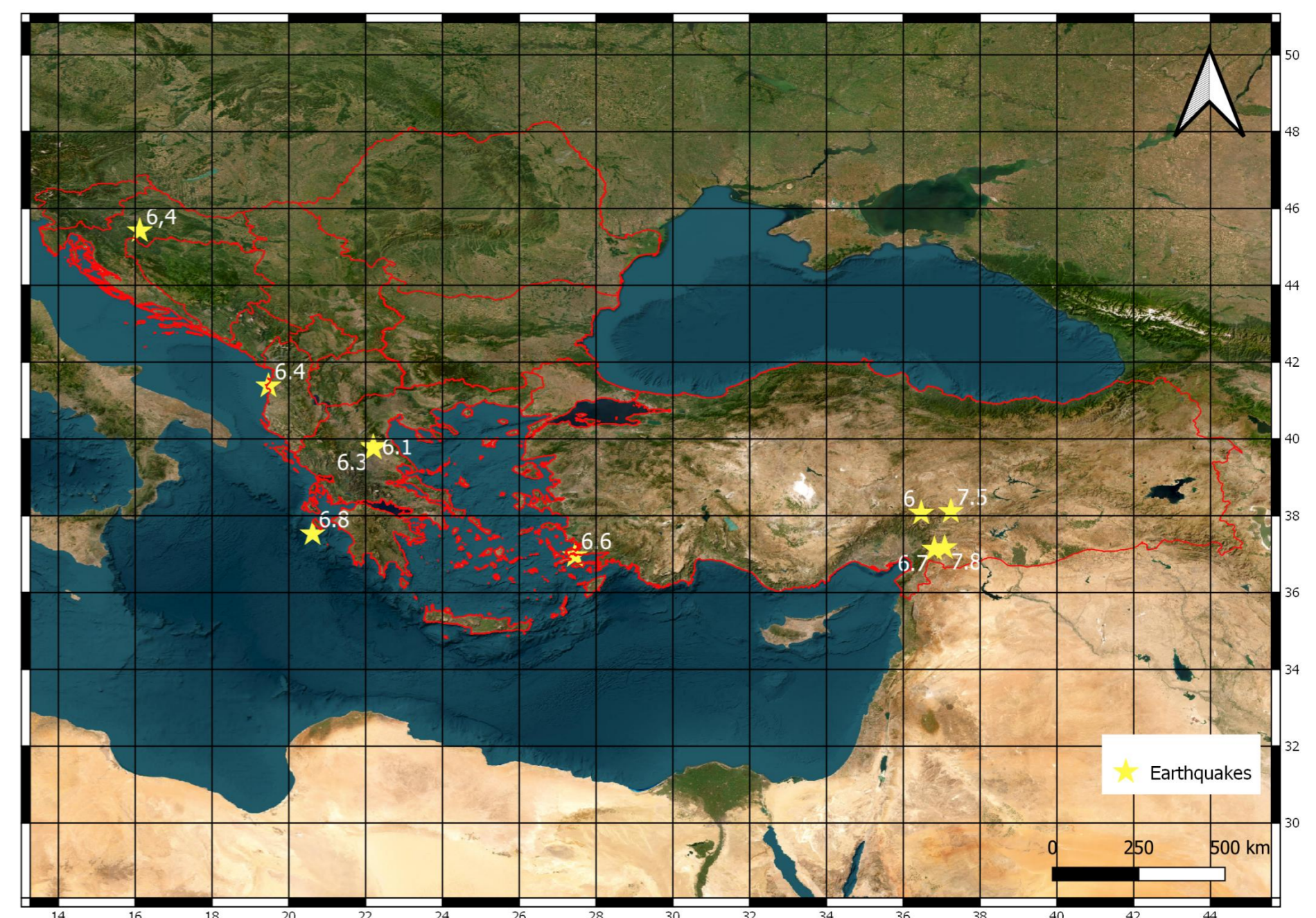


Figure 4 Location map of the researched earthquakes (MW=6.0) after 2015 for Balkans and neighbouring territories (InSAR)

**Conclusions:** The main task is to demonstrate possibility to determine the degree of deformation of the Earth's surface, and to prepare displacement maps that could be used by large number of experts. The applied processing methodology, employed by the authors, has successfully generated Interferometric Images that visually depict the displacements around the epicenters. The presented examples demonstrate the application of satellite Earth observation technologies such as InSAR for researching and monitoring the seismogenic zones in the Balkan peninsula, highlighting their importance and advantages in establishing patterns in the movements within these zones. The interpretation of space distribution and co-seismic deformations caused by major earthquakes also provide insights into the geodynamic and tectonic processes

### Acknowledgement:

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