

Seismic Observation Network and Seismicity of Mongolia

Mr. Baasanbat TSAGAAN and Mr. Ganzorig DAVAASUREN

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Research Center of Astronomy and Geophysics, Mongolian Academy of Sciences

1. Seismic Observation Network

Research Center for Astronomy and Geophysics (RCAG) was founded in International Geophysical Year, 1957 and the very first seismological station was built in 1957, in Ulaanbaatar city. After that, a great earthquake of Gobi-Altay took place at 1957-12-04, 03:37 UTC with magnitude 8.1. Since then, the seismic observation network of Mongolia (figure 1) has been developing progressive year by year, its successfully installed 10 analogue seismic stations until year 1990's.

The installation of first digital seismic network in Mongolia started in 1994. According to the principle of uniform distribution of seismic stations and at the same time ensuring intensive observation in some key areas, the observation system was designed to consist of national and regional networks. The National Seismic Network, which is under the responsibility of RCAG, has 70 seismographs placed in 14 areas, among which 6 consist seismic array with 4 - 10 elements. All of the seismic stations perform 24-bit data acquisition and the waveform data are synchronously transmitted to RCAG via a satellite and VPN line.

Since 2005, unusual high seismic activity has been observed near the capital city Mongolia. Last 3 years study of this region shows the location of those seismic activities are corresponding to 6 seismic active faults dated in last rupture of 1000 – 10000 years before. Supported by the Mongolian government funding, RCAG began to establish “Comprehensive seismological and geophysical Monitoring of Ulaanbaatar area” in 2011. The system was completed and began operation at the beginning of 2013. The Network has 16 seismic stations equipped with a BB-broadband seismometers, 7 permanent GPS, 6 tiltmeter, 7 radons and 3 geomagnetic stations. Most of them are designed and operated as a continuous data transmission to the Mongolian National Data Center (MNDC).

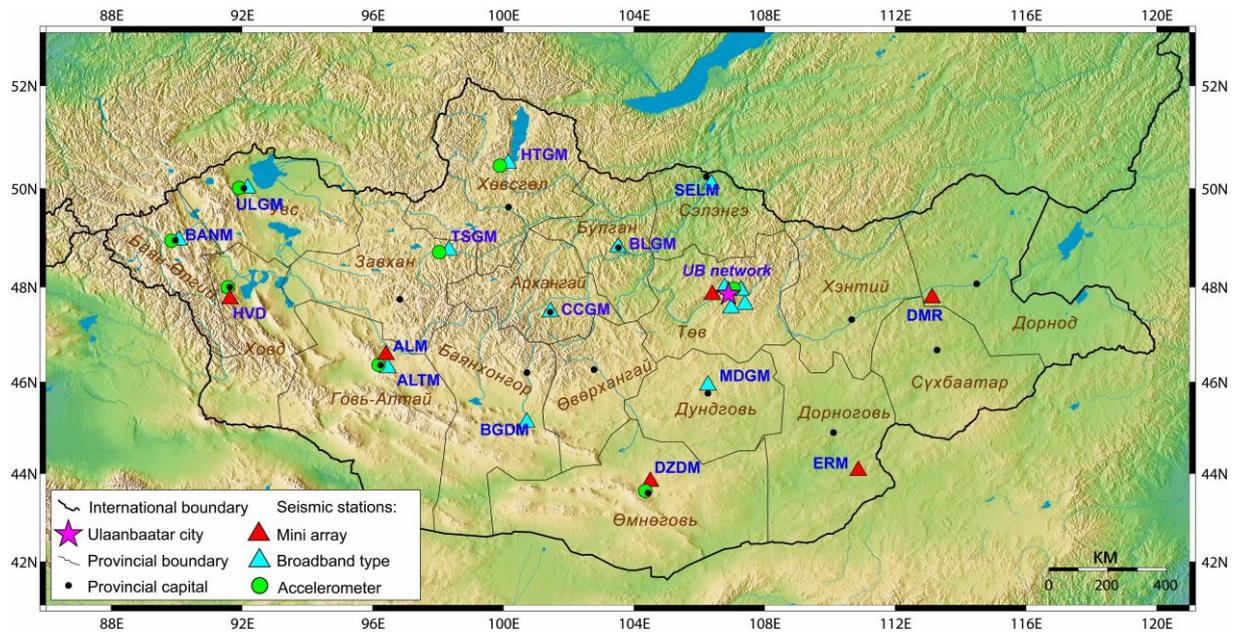


Figure 1. Seismic observation network of Mongolia. Seismic stations and accelerometers are denoted by triangles and green solid circles, respectively. Red and cyan colored triangles represent mini arrays and broadband type stations, respectively.

2. Seismicity of Mongolia

Mongolia is a seismically active region and main seismicity is caused by active continental deformation in the India-Asia collision zone. Last century, several strong continental seismic events took place in Mongolia. Two of them are well known in the world and these earthquakes occurred in 1905 and 1957, respectively. Due to these strong seismic events, Bulnay and Bogd faults were formed. Moreover, there are several inactive and active faults in Mongolia.

Mongolia has large territory and less population. Half of the population lives in Ulaanbaatar city. Although Mongolian urban areas seem to be out of danger from strong earthquakes thanks to less population, several rural places were affected by stronger events that took place closer these places. For example, in 20 July 2005, a moderate size earthquake with $M_l=5.1$ took place in territory Khatanbulag sum, Dornogobi province, which is considered as historically seismic and tectonically quiescent place. This seismic event caused damage of some buildings, especially a school building just after renovation; however, there was no loss of life fortunately.

Seismicity of Mongolia is divided into two parts, a historical part before 1963 years and an instrumental part after 1963 years. From Figure 2, one can say that west mountainous area has more

seismic activity. However, nowadays we are observing seismicity in the eastern part of Mongolia, because later years, modern digital seismic stations were installed in central and eastern part of Mongolia.

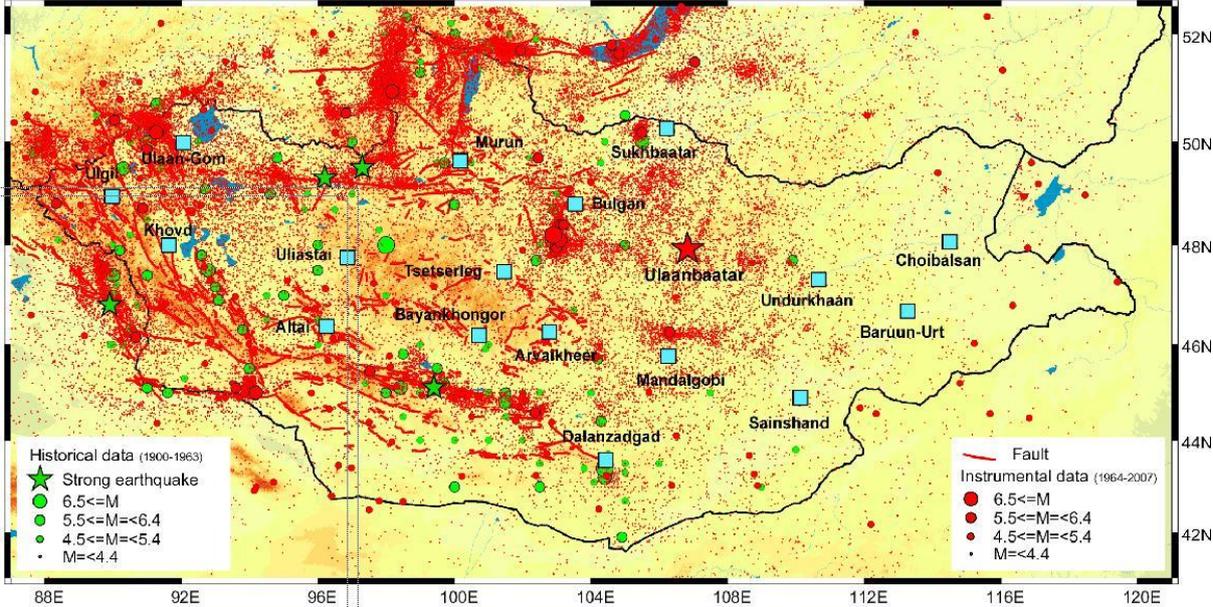


Figure 2. General seismicity map of Mongolia. Seismicity is parted into two groups, namely historical (1900-1963) and instrumental (1964-2007) data. Green and red solid circles represent historical and instrumental events.