

Seismicity, structure and tectonics in the Arctic region

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The 'Arctic' region, where the North Pole occupies the center of the Arctic Ocean, has been affecting the environmental variation of the Earth from geological time to the present. However, the seismic activities in the area is not adequately monitored. Therefore, by conducting long term monitoring of seismic phenomenon as sustainable parameters, our understanding of both the tectonic evolution of the Earth and the dynamic interaction between the cryosphere and geosphere in surface layers of the Earth will increase. In this presentation, an overview of the structure and tectonics of the Arctic is demonstrated by incorporating recently deployed seismic approaches and detailed seismicity of the region. In particular, the Eurasian continent is largely focused in wide areas of Siberian Arctic, Baikal Rift Zone and the Far East. Though the majority areas of the Arctic are occupied by relatively stable continents, the tectonic history reveals distinct variations during the formation of the present landscapes and crustal structure. A variety of tectonic settings are present in the Arctic such as the collision zones at the Plate boundary, deformed areas inside the continents, mantle plumes, rift systems, and so on. On the other hand, in particular for Greenland, a drastic change in the overlying cryosphere has been identified in terms of global warming which has currently resulted in an increase of glacial earthquake activities. In addition, micro-seismic and volcanic monitoring has now been carried out including at the bottom of the Arctic Ocean. A continuous accumulation of the Arctic data from global networks could definitely contribute to the development of high space resolution analysis, the understanding of the deformation and uplift mechanism involving seismicity, the formation processes of the super-continents, and the bedrock topography and geological structure underneath the ice-sheet, in many parts of the polar region. A complete view of global tectonics could be achieved by advancing inter-disciplinary research in the Arctic, in particular at the Eurasian continent and Greenland. The Arctic is, without doubt, one of the frontiers that remain at present to human beings, and also the place which has a crucial role to clarify the tectonic history and current variations on the Earth's surface. It is expected by using fully developed seismological approaches the whole understanding of multi-sphere systems in the Arctic will be enhanced.

Keywords: Arctic region, seismicity, crustal structure, tectonics, glacial earthquakes