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Relocation of Early Instrumental Earthquakes in the Arctic

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The source parameters of earthquakes in the Arctic during the entire instrumental period were calculated using a small number of stations, which in addition were remote from each other. Furthermore, during the 20th century, the source parameters of Arctic earthquakes were most often calculated from bulletin data from only part of the seismic stations operating at that time, using outdated velocity models and localization algorithms. The present article describes an approach that has already been successfully used by the authors to recalculate the source parameters of early instrumental earthquakes in the Arctic. The approach uses all currently available archives of bulletins and seismograms from the seismic stations that operated in the early 20th century; it also employs the modern ak135 velocity model, new method of the probabilistic location of early instrumental earthquakes based on macroseismic and instrumental data [1] and an improved localization algorithm implemented in the NAS program [2].

We have relocated the epicenters of earthquakes recorded within the Arctic in the early 20th century and compiled an updated catalog of relocated seismic events. The new coordinates of some earthquakes appeared to significantly differ from the previously determined ones. As a result, this may significantly affect the ultimate seismic hazard assessment of such areas as Severnaya Zemlya and Franz Josef Land, which are characterized by weak seismicity. Most of the relocated earthquake epicenters are confined to the main seismically active zones of the Arctic, namely, mid-ocean ridges, the Svalbard archipelago, and the Laptev Sea shelf.

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