# Arctic tsunamis revisited

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In 2006 I presented a joint paper on the "tsunami Hazards in the Arctic Regions of North America, Greenland and the Norwegian Sea" with Tad Murty to the third Tsunami Symposium of the Tsunami Society. Dr. Murty and I had very few known Arctic events that we could cite and were reduced to listing possible hazard areas and waving our arms most wisely. In the past decade and a half at least three new events have been identified and the concern about possible tsunamis related to deglaciation should now be seriously considered. The phenomenon of glacial-calving earthquakes is now demonstrated and the seismic signals from landslides can now be recognised. This paper will use a definition of an Arctic geohazard as one found in areas of deglaciation and generally in the north of North America, Europe and Asia beyond a nominal tree line. Thus the paper includes post-glacial events along the Alaska Panhandle. The tsunamis that may be generated are not just a hazard to local Arctic communities and to temporary coastal accommodations and facilities used for resource extraction projects. The far field effects of an Alaskan subduction earthquake on 1 April, 1946 killed 159 persons in Hilo, Hawaii and triggered the establishment of the Pacific tsunami warning network. A tsunami generated by a post-glacial fault (pgf) off the coast of SE Greenland could affect coastlines from Portugal north to Great Britain and Norway; a pgf off the SW coast of Greenland could affect the Baffin-Labrador coasts south to Newfoundland and by refraction the coasts of Nova Scotia and New England.

Only one large $M_w = 7.3$ earthquake is known in NW Baffin Bay on 30 November, 1933 – an area that remains seismically active. While no tsunami was seen in 1933 such an event could well trigger an underwater landslide and a tsunami. Felt earthquakes are associated with the mid-ocean Labrador Ridge and these may trigger tsunamis. If post-glacial rebound is rapid it may be non-elastic and coastsubparallel pgfs are well-documented in northern Norway and Sweden over lengths approaching 400 km with throws of as much as 25 m. If, from a single event, the earthquake would be of a magnitude >8. The huge Storegga landslide of ~8000 years ago may possibly have been triggered by a pgf. Canada now has at least three known pgfs (Lac Turquoise in Quebec, the Holy Grail fault in Manitoba and Dr. King's recently identified submarine feature at the mouth of McLure Strait). The author's historic seismicity research has identified a modest tsunami of 24 September, 1848, seen from St. John's to Fishing Ships Harbour, southern Labrador; is this a record of a pgf off SW Greenland? We have known rockfall events in West Greenland on 21 November, 2000, at Paatuut, a recent Karrat Fjord event on 17 June, 2017 with four deaths and at Taan Fjord, Icy Bay, Alaska a rapidly retreating glacier left a lateral moraine unsupported and a large rockfall into the sea on 17 October, 2015 created an initial tsunami wave ~150 m high. No one saw it, or heard it, and Columbia University seismologists identified the landslide remotely in Palisades, New Jersey.

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