

Continued Permafrost Warming on the Arctic Slope of Alaska, 2014 Update

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USGS maintains a permafrost monitoring network on federal lands in northern Alaska as part of the Global Terrestrial Network for Permafrost (GTN-P). This network consists of two arrays: 1) An array of 16 automated meteorological/active-layer stations, and 2) an array of 19 deep boreholes, the majority of which are located on the Arctic Coastal Plain (a few are located in the northern foothills of the Brooks Range). Both arrays are sensitive to conditions in the nearby Beaufort and Chukchi Seas. Temperature measurements are made in the deep borehole array once every 5 years to monitor the thermal state of permafrost from the surface down to 125+ meters.

During the summer of 2012, permafrost temperatures were again obtained across the deep borehole array as part of an international effort to monitor the thermal state of permafrost. Previous measurements made in the USGS/GTN-P borehole array had shown little trend in permafrost temperatures during the 1980s, followed by a significant warming beginning ~1990. The 2012 measurements demonstrate that shallow permafrost temperatures are continuing to warm in this region; temperatures 20 m below the surface are now 2-3 K warmer than they were during the 1980s. Data from the co-located USGS/GTN-P meteorological array show that air temperatures have been warming significantly during the summer and autumn seasons (~ 1 K/decade mean-annual warming rate), 1-m ground temperatures have been warming during all seasons (~ 1 K/decade mean-annual warming rate), and that the winter freezeback of the active layer is occurring about 1 month later than it did a decade ago.

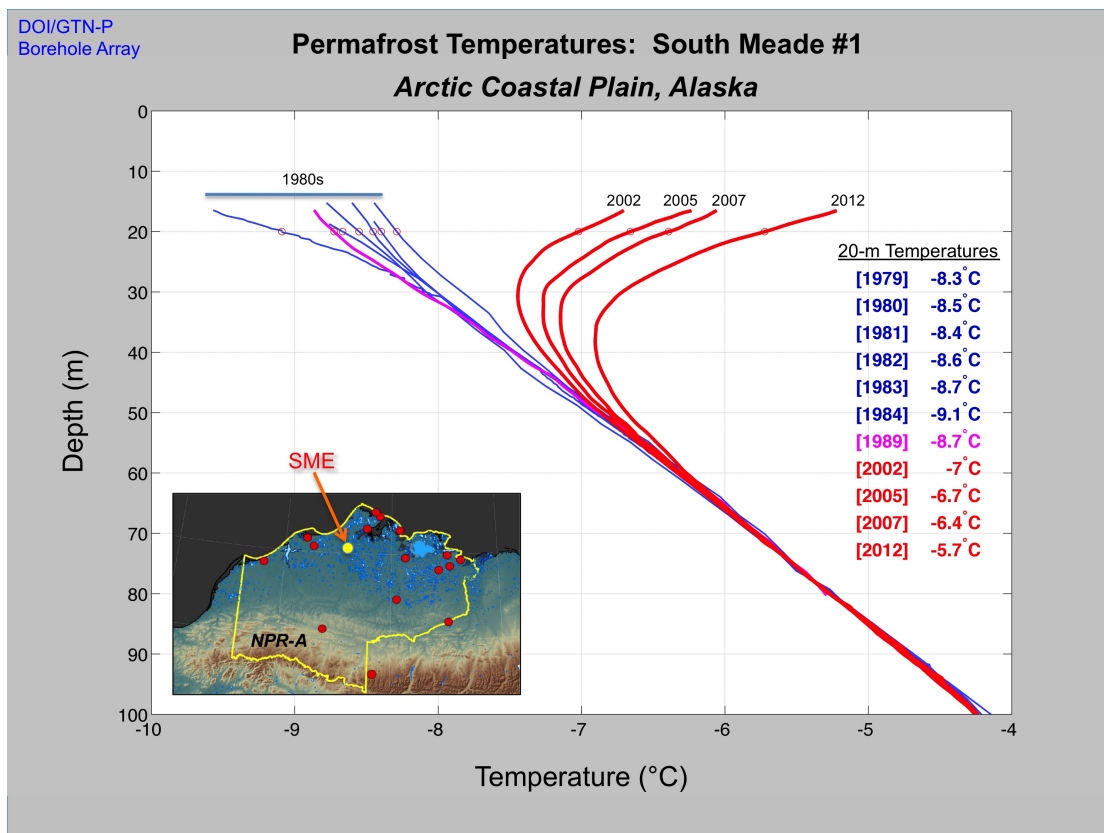


Figure 1. Permafrost temperatures measured in the South Meade #1 borehole on the Arctic Coastal Plain of Alaska since 1979. Temperatures 20 m below the surface have warmed about 2.8 K at this site since the early 1980s. South Meade is one of 19 deep boreholes currently monitored by the U.S. Geological Survey in Arctic Alaska.