The Circumpolar Active Layer Monitoring Network-CALM: Long-Term Observations on the Climate-Active Layer-Permafrost System.

Funding Agency: U.S. National Science Foundation, Office of Polar Programs
Period of activity: 2004-2009.

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The CALM program involves more than 70 contributors from 15 countries.

Abstract. The Circumpolar Active Layer Monitoring (CALM) program, established in the early 1990s, is designed to observe temporal and spatial variability of the active layer, near-surface permafrost parameters, and their response to changes and variations in climatic conditions. The CALM network involves 15 participating countries and is comprised of 168 sites distributed throughout the Arctic, parts of Antarctica, and several mountain ranges of the mid-latitudes. Owing to historical circumstances and logistical constraints, the distribution of sites is not uniform within the permafrost regions. The majority of the sites are in Arctic and Subarctic lowlands. At 77 sites, direct active-layer measurements are conducted on standard rectangular grids ranging from 10 x 10 m to 1 x 1 km. The locations of grids were selected to represent generalized surface and subsurface conditions characteristic of broad regions. The size of each grid reflects the level of local geographic variability. At 91 sites, active-layer values are inferred using soil temperature measurements from boreholes of variable depth. Approximately 60 CALM sites have continuous active-layer records longer than five years and 30 have ten-year records or longer. Auxiliary information includes air temperature, soil moisture, soil temperature at different depth, snow cover, soil composition, and landscape characterization. Several sites have records of frost heave and thaw subsidence obtained by different methods. Metadata include detailed site descriptions and photographs for each site. Although the limited number of observational sites, their sparse distribution, and relatively short records preclude direct extrapolation of observations to entire circumpolar regions, several groups of sites have been used to create regional maps of active-layer thickness. CALM is the world's primary source of information about the active layer. Data obtained from the network have been used in validation procedures for permafrost, hydrological, ecological, and climatic models, at a variety of geographic scales. The research team maintains the network, preprocesses its data, serves as a first scientific data user, and disseminates them to scientific community.