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Autonomous low-power magnetometer platform to enable remote high latitude array deployment

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A major driver in the advancement of geophysical sciences is improvement in the quality and resolution of data for use in scientific analysis, and discovery, or for assimilation into or validation of, empirical and physical models. The need for more and better measurements together with improvements in technical capabilities are driving the ambition to deploy arrays of autonomous geophysical instrument platforms in remote regions. This is particularly true in the southern polar region where measurements are presently sparse due to the remoteness, lack of infrastructure and harshness of the environment. The need for the acquisition of continuous long-term data from remote polar locations exists across geophysical disciplines and is a generic infrastructure problem. The infrastructure, however, to support autonomous instrument platforms in polar environments is still in the early stages of development. We report here the development of an autonomous low-power magnetic variation data collection system. Following two years of field test at South Pole station, the system is being reproduced to establish a dense chain of stations on the Antarctic Plateau along the 40° magnetic meridian (conjugate to the magnetic stations along the west coast of Greenland). The first two stations have been deployed and are operating. The system is desaigned to operate for at least five years unattended and to provide data access via satellite communication. The system will store 1-second measurements of the magnetic field variation ($< 0.2nT$ resolution) in three vector components plus a variety of engineering status and environment parameters. We believe that the data collection platform can be utilized by a variety of low-power instruments designed for low-temperature operation. The design, technical characteristics and operation results are presented here.