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e-POP Magnetic Field Instrument (MGF) - Instrumentation and Early Results

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The scientific objective of the Enhanced Polar Outflow Probe (e-POP) is to study plasma outflows, neutral atmospheric escape, and associated effects of auroral currents and plasma microstructures on radio propagation at an unprecedented level of detail. Field-aligned currents are an important coupling process between the Earth's magnetosphere and the polar ionosphere. Field-aligned currents may be detected via measurements of magnetic gradients along the track of a polar orbiting spacecraft. The detection of gradients does not require observatory class measurements of the geomagnetic field. The Magnetic Field Instrument (MGF) uses two fluxgate magnetometers to measure the DC and low frequency magnetic field and detect and remove the stray field from the spacecraft. The fluxgate sensors are based on the MAGSAT design and are mounted on a modest 80 cm carbon-fiber boom. They are double wound for reduced mass and cross-field dependence. The MGF measures the magnetic field at 160 samples per second to a resolution of 0.0625 nT. Data output is 1952 bytes per second including temperature measurements. Power consumption is 2.2 watts. Noise levels of 7 pT per root Hz at 1 Hz were obtained using sensors built with Infinetics cores. The MGF has been successfully commissioned and is available for science observations. This presentation will review the capability of the instrument, describe the routinely generated science data products and present some early results from the instrument.

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