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Initial Results of the Magnetic Field Measurements on the C/NOFS Satellite

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The Vector Electric Field Instrument (VEFI) suite onboard the C/NOFS spacecraft includes a sensitive fluxgate magnetometer to measure DC and ULF magnetic fields in the low latitude ionosphere. The instrument includes a DC vector measurement at 1 sample/sec with a range of $\pm$ 45,000 nT whose primary objective is to enable a V x B measurement that is more accurate than that provided by using a magnetic field model. These data will also be used to provide signatures of large-scale ionospheric current systems, which, when analyzed in conjunction with the C/NOFS DC electric field measurements, promise to advance our understanding of equatorial electrodynamics. The instrument also includes an AC-coupled vector measurement in the 0.05 – 8 Hz frequency range at 16 samples/sec with an output range of $\pm$ 900 nT in order to measure small-scale current filaments and possible Alfven waves associated with plasma irregularities. We compare the Earth's magnetic field models such as the most recently updated IGRF (the International Geomagnetic Reference Field) model and the POMME (the POtsdam Magnetic Model of the Earth) model with the measurements in order to provide an in-flight "calibration" of the data as well as compute magnetic field differences to reveal large scale ionospheric currents. Our initial results show that the C/NOFS VEFI magnetometer returns high quality magnetic field data in the low-latitude ionosphere. The POMME model is a much better representation of the magnetic field measurements by C/NOFS magnetometer than the IGRF model. A statistical comparison of the data and the model shows that magnetic field residuals in low-latitude ionosphere are dominated the geographic effects because the model is more accurate in some regions than others. After removing the geographic effects, the magnetic field signatures of ring current and magnetopause current can be readily identified in the data.