THREE AXES FLUXGATE MAGNETOMETER WITH RING-CORE DEVELOPMENT FOR STUDIES AND MONITORING THE SOUTH ATLANTIC MAGNETIC ANOMALY

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The Earth Magnetic Field variations are studied in different time scales classified as secular to diurnal variations and also micropulsations that have period smaller than 1000 seconds. The data acquisition for investigation of this phenomena can provide important information about the Magnetosphere, the Earth/Sun interaction, as well as events occurring in the Ionosphere which can, for instance, generate disturbances in telecommunications, small satellites or even in the space weather. In the area where there is observed the smallest intensity of the Earth's magnetic field on the Global' surface, the South Atlantic Magnetic Anomaly – SAMA, there frequently occur charged particle precipitations during magnetic storms. We have developed a three axis ring core fluxgate magnetometer at the Southern Regional Space Research Center – CRS/CIE/INPE–MCT in the south of Brazil to study the behavior and the geomagnetic process in the SAMA`s proximities. The fluxgate magnetometer has its operation based on the iron magnetic properties of the high permeability ring-core. Varying the magnetic permeability of the nucleus through a high frequency excitation signal it is possible to obtain a response changing the magnetic saturation around the nucleus as in the (BxH) Hystereses curve. The sensor coil detects a signal with high harmonic content that has linear relation with the Earth's Magnetic Field variations in the observed local. This paper has the intention to show the way used to implement the sensor, the electric circuit and specially the preliminary data and conclusions about experiments performed at the Southern Space Observatory SSO/CRS/INPE – MCT which is located near the center of the SAMA in Brazil. This project also has the objective to develop this kind of low cost fluxgate magnetometers to install it at different points along the SAMA edge.

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Session Description:

The magnetosphere is a complex nonlinear dynamical system. Large regions of the magnetosphere are connected by fundamental processes operating on vastly different scales. It is necessary to understand how small-scale processes control large-scale phenomena, and how thin boundary layers are formed and sustained in spite of the presence of plasma turbulence in these regions. There is a need to clarify the role of coherent solitary electrostatic structures, chaos, stochastic processes and self organized criticality at the bow shock and magnetopause but also in plasma sheet dynamics, substorm onset and the magnetosphere-ionosphere coupling via field-aligned currents. Several ISTP spacecraft have provided valuable data on waves and particle on various crucial region of the magnetosphere. The Cluster and Double Star missions have provided an unprecedented coverage of the magnetosphere on a wide range of spatial and temporal scales. This session will provide the opportunity to report on the latest results from theory, simulation and data analysis dealing with the nonlinear processes occurring in the various plasma boundaries in the magnetosphere, e.g., magnetic reconnection, parallel electric fields, heating and acceleration of plasma, solitary structures, etc. In particular, contribution from the application of theory, simulation and data analyses which employ multipoint measurements from Cluster, Double Star, Themis and other spacecraft and ground based observatories measurements are encouraged. A partial list of invited speakers and tentative titles of their talks: G. Facsko:Study of hot flow anomalies using Cluster multi-spacraft measurements. Alexei Kropotkin:Properties of super-thin current sheets. H. Laakso:DC electric fields in the plasmapause and ring current regions. Ramon Lopez: Bow shock influence on MI coupling. Tony Lui:

Breakdown of frozen-in conditions in the tail. R. Pottelette: Connection between Auroral acceleration and magnetotail-reconnection. J.A. Sauvaud: Multi point measurements of substorms events --new advances from Cluster and Double Star missions. David Sibeck : Results from Themis. N. Singh: simulation of thin reconnecting current sheets. B. T. Tsurutani:Nonlinear wave-particle interactions with chorus emissions.

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