

## **Experimental studies with a fluxgate magnetometer of toroidal core at south of Brazil**

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The geomagnetic field undergoes regular transient changes and also long period secular variations. The study of geomagnetic variations provides understanding of electric currents in the ionosphere and magnetosphere of the Earth. Monitoring of geomagnetic variations is a part of the space weather studies. The objective of this work is to report the results and the construction a cheap ring core three component fluxgate magnetometer to record geomagnetic variations in the central region of the South Atlantic Magnetic Anomaly (SAMA) at the Southern Space Observatory - SSO/CRS/CIE/INPE – MCT, (29S, 53W), São Martinho da Serra, RS, south of Brazil. The magnetometer described here is constituted by three orthogonal sensors (H, D, and Z components) with a toroidal nucleus. The functioning of this sensor is based on properties of high permeability material of the ring core. Each sensor is composed for two bobbins in each axis, one for excitement and another bobbin for the second harmonic signal detection which is proportional to the surrounding magnetic field. After the comparison of the signals is made follows the stage of an integrator which provides smoothed variations proportional to the surrounding geomagnetic field. This type of a magnetometer is a versatile equipment for the detection of geomagnetic field ranging from 0,1nT to 1mT. The experimental studies for the construction of a cheap equipment but with good sensitivity level may open the possibility to increase the number of sensors installed in the region of the South Atlantic Magnetic Anomaly – SAMA – in south of Brazil and other countries of South America.

**Keywords:** geomagnetic field, fluxgate magnetometer, solar-terrestrial interactions

## Multiscale Magnetospheric Processes: Theory, Simulations and Multipoint Observations

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### 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-spacecraft measurements. Alexei Kropotkin: Properties of super-thin current sheets. H. Laakso: DC electric fields in the plasmopause 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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