

LOW COST FLUXGATE MAGNETOMETER DEVELOPMENT USING PROGRAMABLE LOGIC CONTROLLER FOR SAMA MONITORING IN SOUTH OF BRAZIL

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The South Atlantic Magnetic Anomaly (SAMA) region is extensive over a very large South America area, where is observed the smallest intensity of the Earth's Geomagnetic Field on the Global surface. To monitor and study the geomagnetic phenomena in the SAMA's region with a magnetometer network in a reliable and autonomy way, it has been developed concepts to construct low cost three axis fluxgate magnetometers with programmable logic controller. The concepts are been developed at the Southern Regional Space Research Center – CRS/INPE-MCT in collaboration with the Federal University of Santa Maria – UFSM, Santa Maria, RS, in South of Brazil, through a undergraduate Capacity Building Integrated Program (CBIP). The operation of fluxgate magnetometer is based on the magnetic properties of the high permeability core sensor. Varying the sensor core magnetic permeability through superposing a high frequency excitation signal, it is possible to obtain a change in the core hysteresis loop ($B \times H$). The sensor pickup coil detects the external field magnetic density variation, in this case the Earth's Geomagnetic Field. Therefore, it is possible to determinate the external field intensity. The use of programmable logic controllers may reduce the size of usual analog circuits used in magnetometers manufacturing. It also may reduce the power consumption and provides a direct connection to a data record system without the necessity of a PC and an external AD converter to save the detected geomagnetic data. This paper has the intention to show, as a result of the INPE-UFSM's CBIP, the development of a low cost magnetometer circuit, sensor concepts and its implementation. It also aims to present the preliminary results and conclusions of the Earth's Geomagnetic Field data acquisition at the Southern Space Observatory – SSO/CRS/INPE-MCT, (29.4°S, 53.8°W, 480 m a.s.l.), in the SAMA's region, South of Brazil.

Capacity Building, Low cost fluxgate magnetometer development, SAMA region

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