ANALYSIS OF THE SOUTH ATLANTIC MAGNETIC ANOMALY DISPLACEMENT CONSIDERING ITS ASSOCIATED GEOLOGY IN THE PAST 100 YEARS

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ABSTRACT: The South Atlantic Magnetic Anomaly (SAMA) is recognized as the region where the earth's magnetic field has the least intensity compared to elsewhere in the world. The SAMA originates from an inverse magnetic flux at the core mantle boundary beneath South America and South Africa, whose existence is observed in the last 200 years (Gubbins et al., 2006). Although its center is currently located in the Paraguayan territory, its coverage reaches most of South America (continental and oceanic). The field of the crust is generated by the magnetic content of its rocks, which results in the magnetic field of the earth that can be measured by the secular variation, which we use in this work. This study describes the geology of a large strip, from the Atlantic coastal region of southern Brazil to the coastal region of the Pacific of Chile. In this analyzed region the geological formations have many differences between them, which has a different impact on the analysis of the SAMA. This paper relates the displacement of the SAMA from 1918 to 2018, associating it with the regional geologies of each country used in this study. We also attempt to analyze the Solar Quiet (Sq) variations of the geomagnetic components horizontal (H), declination (D) and vertical (Z) of different longitudes using quiet and disturbed days to observe its geological implications. The graphs showing the secular variation would be associated with the geology of the regions analyzed in this study, because there is a great difference in the thickness of the crust in the Brazil-Paraguay-Argentina-Chile strip. The results of this preliminary study confirm that the morphology of the curves obtained for H, D and Z can be related to the SAMA. For a possible understanding and correlation of the geological influence in the curves displaying of the diurnal variation, a statistical analysis should be done using a transformation from time to the frequency domain in the same components (H, D and Z) for comparison with the depth of the crust. Finally, a model should be made including all those influences. The data were obtained from the Brazilian and Argentine magnetic observatories, magnetic repeated stations and values taken from the International Geomagnetic Reference Field (IGRF).

KEYWORDS: GEOMAGNETIC SECULAR VARIATION, SAMA, REGIONAL GEOLOGY