Long period magnetotelluric at the Antarctica: The role of asthenospheric mantle anisotropy in Glacial Isostatic Adjustment.

González-Castillo L.[1], Madarieta-Txurruca A.[1], Hill G.[2], Castro C. [3], Galindo-Zaldívar J. [1,4] and Junge A. [3]

1 Dpto. de Geodinámica, Universidad de Granada, Granada, Spain. lgcastillo@ugr.es

1 Dpto. de Geodinámica, Universidad de Granada, Granada, Spain. amadatxu@ugr.es

2 Institute of Geophysics, Czech Academy of Science, Prague, Czech Republic. gjhill@ig.cas.cz

3 Institut für Geowissenschaften, Goethe Universität Frankfurt, Frankfurt am Main, Germany. castro@geophysik.uni-frankfurt.de

4 Instituto Andaluz de Ciencias de la Tierra CSIC-Universidad de Granada, Granada, Spain. jgalindo@ugr.es

3 Institut für Geowissenschaften, Goethe Universität Frankfurt, Frankfurt am Main, Germany. junge@geophysik.uni-frankfurt.de

SUMMARY

Understanding the behavior and geodynamic evolution of Antarctica is essential to determine the processes controlling future climatic warming and sea level rise. The Antarctic continent was isolated since 30-40 Ma ago by the tectonic opening of the Drake-Scotia and Tasman gateways creating the Antarctic Circumpolar Current. This change in oceanic circulation doubtlessly affected the global climate and Antarctic ice sheet evolution with consequent sea level change. Mantle rheology influences the motion of lithospheric plates and the Glacial Isostatic Adjustments (GIA) processes which imprint the mantle structure including anisotropic features. Mantle electrical anisotropy may be identified by means of long period magnetotelluric (LMT) measurements. In the first stage of our research, LMT data were collected at seven sites distributed on the Antarctic Peninsula and South Shetland Islands, from January to March 2022. Here we present preliminary data analysis that suggests possible presence of electrical anisotropy in the asthenospheric mantle of this portion of the Antarctic Peninsula and South Shetland Islands. Accounting for the tectonic evolution of Antarctica, is essential to identify the source of potential mantle anisotropy i.e. is it a result of geodynamic and /or GIA processes. These results will contribute to the improvement of GIA models currently developed in view of an isotropic mantle. GIA models allow for reconstructions of ice mass changes which help the understanding and prediction of sea-level changes.

Keywords: Antarctica, mantle anisotropy, Long Period Magnetotelluric, GIA.