In the last decades, the phenomena of Geomagnetic Induced Currents (GICs) have received special attention as one of the main hazards of Space Weather and has been widely investigated. In the high and mid-latitudes, these large GICs can flow in power systems and become problematic and even severe enough to cause a complete system shutdown. Two major factors determine GICs: (1) the strength and orientation of the electric field in the power system, which depends on the ionospheric and magnetospheric currents as well as on the crust and mantle conductivity; and (2) the electric power network characteristics. The Earth's conductivity can be obtained based on geophysical measurements that give the distribution of the conductivity in-depth and laterally. A realistic model of conductivity can be built based on the interpretation of Magnetotelluric (MT) soundings. The power of this geophysical method resides in the fact that it uses a natural source of energy, which allows estimating the conductivity distribution from a dozen of meters to some kilometres in depth.

We present a 3D resistivity model of the entire Portugal mainland based on more than 40 broadband MT soundings spaced 50x50km. The present study aims to contribute to a better understanding of Portugal's crust and its main geological structures. As a more practical application, knowledge of the presence of resistivity/conductivity bodies is important to obtain more precise GICs estimations.