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Seismo-electromagnetic phenomena in the western part of the Eurasia-Nubia plate boundary

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This paper presents a future research plan that aims to monitor Seismo-electromagnetic (SEM) phenomena in the western part of the Eurasia-Nubia plate boundary (WENP). This region has a significant tectonic activity [1] combined with relatively low electromagnetic noise levels and for that reason presents the possibility to perform high quality SEM measurements.

Further, it is known that low-frequency [ultra (ULF), very (VLF), and low-frequencies (LF)] electromagnetic (EM) waves produce more convincing earthquake precursors (compared to higher frequencies) because of less contamination, large skin depth, and low attenuation [2]. Thus, two SEM effects will be considered: ULF electromagnetic field emissions [3], and VLF/LF radio broadcastings [4].

With respect to the ULF measurements, as a start, three ULF sensors are planned to be installed in the South of Iberian Peninsula supported by the existing networks of seismic research stations. Subsequent development of this initial plan could result in the implementation of a lager ULF monitoring network not only in the Iberian Peninsula, but also in the rest of Europe. Possible integration in the SEGMA array is now under consideration. Another perspective is to use a portable station to track seismic events.

Regarding the VLF/LF radio broadcastings, a receiver is planned to be mounted in University of Évora. Radio signals from up to 10 transmitters (in these bands) of interest to study the seismic activity in the WENP region will be monitored. Actually, the radio path from the transmitter to the receiver should cross the epicentral area, therefore two possible transmitters are the ones installed in Monaco (France) and Sicily (Italy). Furthermore, the system will integrate the INFREP network and in this context it will not be restricted to WENP region.

With the development of these research plans we aim to collect novel SEM data emerging from the seismic activity in the WENP region. We expect to address the time variations of EM properties of the crust/plate in relation with the strain field, and in space in relation with composition and temperature and stress fields. Further, the interplay between atmospheric (and solar) perturbations with crust perturbations will be monitored, to observe geomagnetic perturbations at different locations. Our study will be focused in the analyses of low magnitude earthquakes with M =< 4, these events are frequent in the WENP region, but have been almost completely disregarded in literature [5,6].

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