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Low frequency anomalous pre-seismic behavior of the electromagnetic normalized functions related to the sub-crustal earthquakes (Vrancea-Romania)

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To confirm the relationship between anomalous behaviour of the normalized electromagnetic functions (ENF) and impending earthquakes of magnitude higher than 4,an EM data–collection system, placed on the high conductivity path (Carpathian electrical conductivity anomaly) connected with seismic active Vrancea zone, has been used. The daily mean distributions of the ENF (Bzn=Bz/Bper and Ron=Ropar/Roz, where Ropar is resistivity parallel to strike and Roz is vertical resistivity) and their standard deviation are performed in the frequency range less than 1.666E-2 Hz, where the existence condition of a 2D geoelectrical structure is fulfilled. The concept of this analysis is based on the idea that the ENF signals of the solar-terrestrial origin are constant, while the lithospheric origin signal generated by the underground current flowing along the high conductivity path is considered to have a vertical component. In these circumstances, in pre-seismic conditions the ENF distributions have an anomalous behavior marked by a significant enhancement compared to their normal trend established in non geodynamic condition, as a result of the electrical conductivity changes that may be associated with the dehydration-induced faulting processes and fluid migration through the faulting system developed inside the seismogenic volume and its neighboring areas. To assess the robustness of this analysis, the ENF distributions acquired in a span of about two years (2010-2011) are shown in correlation with the Vrancea (Romania) sub-crustal earthquakes with magnitude (Mw) higher than 4.0 (Richter scale).