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Possible correlation beteen the pre-seismic geomagnetic signal and the M6.4 earthquake generated in the coastal zone of Albania, on November 26, 2019

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A catastrophic earthquake of magnitude Mw6.4 generated at 10km depth hit coastal zone of Albania on November 26-th 2019, at 2h54min UTC. The earthquake was intensively felt at about 34km far, in Tirana City, where a lot of damages have occurred. Consequently, in order to identify the anomalous geomagnetic signature before the onset of this earthquake, we retrospectively analyzed the data collected on the interval October 15–November 30, 2019 at the two geomagnetic observatories: Panagjurishte (PAG)-Bulgaria and Surlari (SUA)-Romania, the last one taken as reference. The pre-seismic geomagnetic anomalous signal is postulated to be due to the electrical conductivity changes, most probably associated with the earthquake-induced tectonic stress, followed by rupture and electrochemical processes deployed along the Adria plate subduction zone. To identify a pre-seismic geomagnetic signal related to this earthquake we used: (i) polarization parameter BPOL which should be time invariant in non-seismic condition and it becomes unstable before the onset a seismic event; (ii) Strain effect-related to the anomalous geomagnetic signals identification. Thus, the daily mean distributions of the BPOL and its standard deviations (SD) are performed for the both observation site (PAG and SUA) by using the FFT band-pass filter analysis in the ULF range (0.001Hz - 0.0083Hz). Further on, a statistical analysis based on a standardized random variable equation was applied for the two particular cases: a) the assessment of the singularity for anomalous signal, related to the Mw6.4earthquake, observed on the daily mean distributions of the BPOL*(PAG) and BPOL*(SUA); b) the differentiation of the transient local anomalies associated with Mw6.4earthquake from the internal and external parts of the geomagnetic field, taking Geomagnetic Observatory (SUA) as reference, and the result is presented as daily mean distribution of the BPOL*(PAG-SUA). Finally, on the BPOL*(PAG-SUA) time series, carried out on the interval 1-30 November 2019, a very clear anomaly of maximum greater than 2.5 SD was detected on November 22, what means a lead time of 4 days before the onset of Mw6.4earthquake. In consequence, all mentioned results could offer opportunities to develop new tools for early detection of geomagnetic anomalies related to major seismic events.