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Pre-seismic geomagnetic anomalous signature related to the Mw7.0 earthquake generated in the northern coastal zone of Samos island – Greece, on October 30, 2020

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A strong earthquake of magnitude Mw7.0 struck the northern coastal zone of Samos Island, Aegean Sea, Greece, on October 30, 2020, at 11:51 UTC. This earthquake was felt at a wide area including Athens (at 270km) and city of Heraklion, Crete (at 320km), causing over 120 deaths and a lot of damages on houses, buildings and infrastructures mainly in Samos Island and Izmir (Turkey). With the aim to identify an anomalous geomagnetic signature before the onset of this earthquake, we have retrospectively analyzed the data collected, on the interval September 16 - October 31, 2020, at the two geomagnetic observatories, Pedeli (PEG)-Greece and Panagjurishte (PAG)-Bulgaria, by using the polarization parameter (BPOL) and the strain effect-related to geomagnetic signal identification. Thus, for the both observation sites (PEG and PAG), the daily mean distribution of the BPOL and its standard deviation (SD) are carried out using a FFT band-pass filtering in the ULF range (0.001-0.0083Hz). Further on, a statistical analysis based on a standardized random variable equation was applied for the following two particular cases: a) to assess on the both time series $BPOL^*(PEG)$ and $BPOL^*(PAG)$ the anomalous signature related to Mw7.0 earthquake; b) to differentiate transient local anomalies associated with Mw7.0 earthquake from the internal and external parts of the geomagnetic field, taking the PAG Observatory as reference. Finally, on the $BPOL^*(PEG-PAG)$ time series, carried out on the interval 1-31 October, 2020, a very clear anomaly of maximum, greater than $1.2SD$, was detected on October 27, with 3days before the onset of Mw7.0 earthquake.