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Swarm satellites EM monitoring for pre-earthquake anomaly detection?

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In the frame of SAFE (“Swarm for Earthquake study”) project, funded by ESA within the initiative "STSE Swarm+Innovation”, we analyse Swarm three-satellite magnetic and electron density data for 3.5 years since the satellites launch to look for possible earthquake related anomalies. We define the potential pre-earthquake anomalies statistically and in the frequency content. We applied the search of satellite anomalies in the whole space-time interval of interest, avoiding high magnetic latitudes (1 Jan 2014 - 31 Aug. 2017, |geomagnetic latitude|$\leq 50°$) and then we correlated them with earthquakes by means of a superimposed epoch approach. Final diagrams are compared also with analogous random simulations in order to assess the robustness of the results obtained from observations. In general, our results point to a slightly better statistical correlation of the magnetic field signal with respect to the electron density, although both are superior with respect to random anomaly distributions by more than 3σ, confirming a lithosphere-atmosphere-ionosphere coupling in the preparation phase of earthquakes.