



Electric, Magnetic and Ionospheric Survey of Seismically Active Regions with SWARM

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We present a project devoted to the scientific exploitation of SWARM multi-point measurements of the magnetic and electric field, of the electron temperature and density in the ionosphere. These data provide unique opportunities to study in-situ and remotely the electromagnetic and plasma variability due to ionospheric forcing from above and below. The project “Electric, Magnetic and Ionospheric Survey of Seismically Active Regions with SWARM (EMISSARS)” focus on coordinated studies between SWARM and ground based observatories to survey electromagnetic and ionospheric variability at medium latitudes and look for possible correlations with the seismic activity in central Europe. The project is coordinated by the Institute for Space Sciences (INFLPR-ISS) and the National Institute for Earth Physics (INFP) in Bucharest, Romania. In addition to SWARM data the project benefits from support of dedicated ground based measurements provided by the MEMFIS network coordinated by INFP, the MM100 network of magnetic observatories coordinated by the Geological and Geophysical Institute of Hungary (MFGI) in Budapest. Seismic data are provided by INFP and the European Mediterranean Seismological Center.

The mission of the project is to monitor from space and from ground the ionospheric and electromagnetic variability during time intervals prior, during and after seismic activity in (i) the seismic active regions of the central Europe and (ii) in regions unaffected by the seismic activity. The latter will provide reference measurements, free from possible seismogenic signals. The scientific objectives of the project are: (1) Observation of electric, magnetic and ionospheric (electron temperature, density) variability in the ionosphere above or in the close vicinity of seismic active regions, in conjunction with ground based observations from dedicated networks; (2) Investigation of the coupling between the lithosphere - atmosphere - ionosphere, during Earthquakes; (3) Quantitative nonlinear analysis of anomalous magnetic events detected on ground and in space before, during and after Earthquakes. The methodology includes methods of analysis like : (i) the Power Spectral Density (PSD) of electric, magnetic, lithospheric signal, (ii) the Probability Distribution Functions (PDFs) at various scales from multi-spacecraft statistical ensembles, (iii) the auto and cross-correlation analysis of magnetic field and ionospheric variables for search of coherent structures, (iv) numerical modelling of the lithosphere-atmosphere-ionosphere coupling based on the current continuity.