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ESPAS, the near-Earth space data infrastructure for e-Science: design and development phase

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Space physics models with good predictive capabilities may be used to forecast accurately the state of the near-Earth space environment and to enable end user communities to mitigate the effects of adverse space weather on humans and technological systems. The results obtained from model runs, and also the validation of their performance accuracy, depend to a large extent on the availability of data from as many as possible regions of the near-Earth geospace. Despite the abundance and variety of related observational data, their exploitation is still challenging as they come from different sensors, in different formats and time resolution, and are provided from various organizations worldwide with different distribution procedures and policies.

The primary objective of ESPAS is to provide the e-Infrastructure necessary to support the access to observations, extending from the Earth's atmosphere up to the outer radiation belts, including ionosondes, incoherent scatter radars, magnetometers, GNSS receivers and a large number of space sensors and radars. The development of the ESPAS common interface will allow users to uniformly find, access, and use resources of near-Earth space environment observations from ground-based and space-borne instruments and data from distributed data repositories, based on semantically web services (www.espas-fp7.eu). The first phase that will lead to the release of a first prototype includes the design and development of the data model that will support location of all available data from ground based experiments and satellite missions, available at certain spatial coordinates and time interval. For the first release only the basic data sources will be registered (i.e. Cluster, IMAGE/RPI, DEMETER, DIAS, EISCAT ISRs and SWACI). In a second phase, when all databases and enhanced databases will be registered, the ESPAS infrastructure must be extensively tested through the application of several use cases, designed to serve the needs of the wide interdisciplinary users and producers communities, such as the ionospheric, thermospheric, magnetospheric, space weather and space climate communities, the geophysics community, the space communications engineering, HF users, satellite operators, navigation and surveillance systems, and space agencies.