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Preparing for joint operation of numerical modelling and observational data in IMPEx

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The FP7-SPACE project IMPEx (http://impex-fp7.oeaw.ac.at) was established as a result of scientific collaboration between research teams from Austria, Finland, France, and Russia, working on the integration of a set of interactive data mining, analysis and modeling tools in the field of space plasma and planetary physics. The primary goal of the project is, to bridge the gap between spacecraft measurements and modern computational models of the planetary near-by space environments, enabling their joint operation for better understanding of related physical phenomena.

The major challenge of IMPEx development consists in the need to connect different types of data sources, in particular numerical simulation results and observational data. To do so, every IMPEx tool must be able to handle both kinds of data in a consistent way. Thus, a considerable part of effort is dedicated to the development of standardized (web service-) interfaces and protocols for communication between the components, as well as a common approach to share user credentials. One of the systems' cornerstones is the specification of a standard for describing and storing the different data products involved that is able to include simulation outputs as well as observational data within a common standard, i.e. Data Model (DM). The IMPEx DM is an extension of the widely used SPASE DM and constitutes the first attempt in the field of space plasma physics worldwide, to create a unified data model that is able to store simulation outputs as well as observational data products in a shared data structure.

To meet the requirement of extendibility, i.e. to have a possibility to include new computational models as well as analysis and visualization tools, the IMPEx DM as well as communication protocols have been designed to be as compact as possible and yet general and powerful enough to integrate a wide range of data sets and to allow for simple procedures when attaching new components to the system.

A draft version of the IMPEx DM that is being developed as this abstract is written, was presented on several international scientific conferences and recognized by professionals in the field as an important contribution and a sound starting point for the development of a unified approach to work with experimental and computationally modelled scientific data.