INTEGRATED MEDIUM FOR PLANETARY EXPLORATION (IMPEX): an infrastructure to bridge the gap between space missions data and computational models in planetary science. M.L. Khodachenko, E.J. Kallio, V.N. Génot, T. Al-Ubaidi, F. Topf, W. Schmidt, I.I. Alexeev, R. Modolo, N. André, M. Gangloff, and E.S. Belenkaya. 1Austrian Academy of Sciences, Space Research Institute, Graz, Austria, 2Finnish Meteorological Institute, Helsinki, Finland, 3IRAP, CNRS & UPS, Toulouse Cedex 4, France, 4Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University, Moscow, Russian Federation, 5LATMOS, CNRS & UVSQ, Guyancourt, France

The FP7-SPACE project Integrated Medium for Planetary Exploration (IMPEX) has been officially started in June 2011. The aim of the project is the creation of an integrated IT framework where data sets from space missions are connected to numerical models, providing a possibility to:

- simulate planetary phenomena and interpret spacecraft data;
- test and improve models versus experimental data as well as alternative models;
- fill gaps in measurements by appropriate modeling runs;
- solve technological tasks of mission operation and preparation.

Data analysis and visualization within IMPEX will be based on advanced computational models of planetary environments. Specifically, the initial modeling sector of IMPEX is based on four well established numerical codes and their respective infrastructures:

- 3D hybrid modeling platform HYB for the study of planetary plasma environments, hosted at FMI;
- an alternative 3D hybrid modeling platform, hosted at LATMOS;
- MHD modeling platform GUMICS for 3D terrestrial magnetosphere, hosted at FMI;
- the global 3D Paraboloid Magnetospheric Model for simulation of magnetospheres of different Solar System objects, hosted at SINP.

Modeling results will be linked to the corresponding experimental data from space and planetary missions via several online tools. Initially the following tools will be integrated:

- AMDA (Automated Multi-Dataset Analysis) which provides cross-linked visualization and operation of experimental and numerical modeling data
- 3DView which will offer 3D visualization of spacecraft trajectories in simulated and observed environments
- CLWeb which enables computation of various micro-scale physical products (spectra, distribution functions, etc.).

In practical terms, IMPEX is going to provide its user community with straightforward access to an extended set of space and planetary missions’ data and powerful, world leading computing models, complemented by advanced visualization and data analysis tools. By building a comprehensive software infrastructure, IMPEX will merge spacecraft databases and scientific modeling tools, providing their joint operation for the better understanding of related space and planetary physics phenomena.

Another goal of the envisioned software architecture is to provide straight forward procedures for future extensions of the system by carefully designing interfaces, protocols as well as data models that are used by the various components to store information and to communicate with other data sources and tools. Here existing standards and recommendations as those defined by IVOA play a pivotal role. In theory the scope of scientific applications is not constrained to planetary magnetospheric and heliospheric physics. Future developments of the IMPEX infrastructure could focus on generalizing the approaches taken a step further and - building on the experiences gained - provide a versatile environment in which a wide range of measurements and modeling data sets can be superimposed, analyzed and processed in a variety of ways.