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# JRA3 / WP 24: European Modelling and Data Analysis Facility (EMDAF) – development of a distributed computational modelling and data analysis service for the European planetary science

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## Abstract

Observational data analysis and modeling are two major aspects of the modern scientific research. Both appear nowadays under extensive development and application. Many of the scientific goals of planetary space missions require robust models of planetary objects and environments as well as efficient data analysis algorithms, to predict conditions for mission planning and to interpret the experimental data. Europe has great strength in these areas, but it is insufficiently coordinated; individual groups, models, techniques and algorithms need to be coupled and integrated. Existing level of scientific cooperation and the technical capabilities for operative communication, allow considerable progress in the development of a distributed international Research Infrastructure (RI) which is based on the existing in Europe computational modelling and data analysis centers, providing the scientific community with dedicated services in the fields of their computational and data analysis expertise. These services will appear as a product of the collaborative communication and joint research efforts of the numerical and data analysis experts together with planetary scientists. The major goal of the JRA3 / EMDAF is to make computational models and data analysis algorithms associated with particular national RIs and teams, as well as their outputs, more readily available to their potential user community and more tailored to scientific user requirements, without compromising front-line specialized research on model and data analysis algorithms development and software implementation. This objective will be met through four keys subdivisions/tasks of EMAF: 1) an Interactive Catalogue of Planetary Models; 2) a Distributed Planetary Modelling Laboratory; 3) a Distributed Data Analysis Laboratory, and 4) enabling Models and Routines for High Performance Computing Grids. Using the advantages of the coordinated operation and efficient communication between the involved computational modelling, research and data analysis expert teams and their related research infrastructures, EMDAF will provide a 1) flexible, 2) scientific user oriented, 3) continuously developing and fast upgrading computational and data analysis service to support and intensify the European planetary scientific research. At the beginning EMDAF will create a set of demonstrators and operational tests of this service in key areas of European planetary science. This work will aim at the following objectives: (a) Development and implementation of tools for distant interactive communication between the planetary scientists and computing experts (including related RIs); (b) Development of standard routine packages, and user-friendly interfaces for operation of the existing numerical codes and data analysis algorithms by the specialized planetary scientists; (c) Development of a prototype of numerical modelling services “on demand” for space missions and planetary researchers; (d) Development of a prototype of data analysis services “on demand” for space missions and planetary researchers; (e) Development of a prototype of coordinated interconnected simulations of planetary phenomena and objects (global multi-model simulators); (f) Providing the demonstrators of a coordinated use of high performance computing facilities (super-computer networks), done in cooperation with European HPC Grid DEISA.