

Combining observations to study heliospheric phenomena

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Abstract

There is currently a more diverse range of observatories scattered around the solar system than at any time in the past. As a consequence, heliophysics - the study of the effect of the Sun on the Solar System – has entered a boom period.

The Heliophysics Integrated Observatory, HELIO, has established a collaborative environment where scientists can discover, understand and model the connection between solar phenomena, interplanetary disturbances and their effects on the planets. The project is designed around a service-oriented architecture with needed capabilities that support metadata curation and search, data location and retrieval, and data processing and storage being established as independent services.

HELIO provides integrated access to the data and metadata from the domains that constitute heliophysics - solar, heliospheric, geophysics and planetary. More than 50 event catalogues can be used in the search, together with 10 feature catalogues; data from more than 150 instruments from nearly 50 observatories can be accessed. A comprehensive user interface is available and the services can also be accessed through IDL; a workflow tool provides the ability to combine services together and it is possible to execute programmes on demand including propagation models.

We will show how HELIO can be used to explore how phenomena evolve as they propagate through the Solar System. Effects related to structures in the solar wind, coronal mass ejections and particle events are reported using observations from multiple platforms, including occasions where the same phenomenon interacts with multiple planetary environments.

The HELIO Consortium includes thirteen groups from the UK, France, Ireland, Italy, Switzerland, Spain and the US; the project started in June 2009 and has a duration of 42 months.