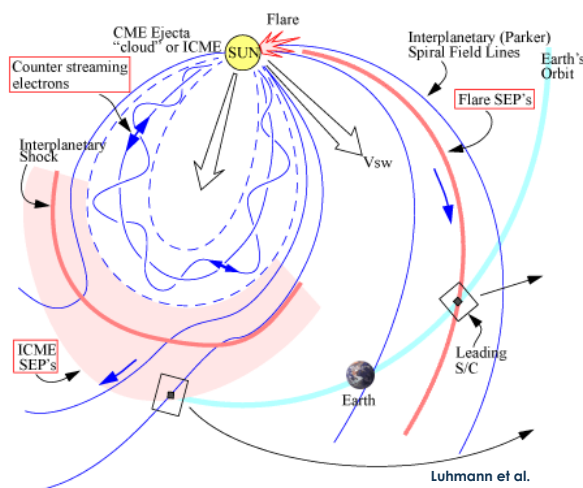


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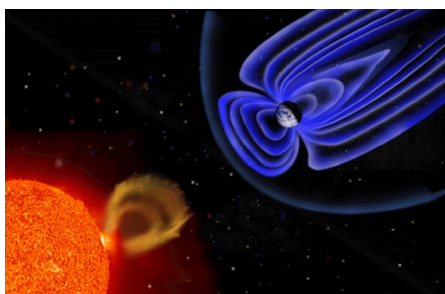
Coordination Action for the integration of
Solar System Infrastructures and Science

10th Concertation Meeting

Science of Heliophysics



- **Heliophysics, an event-driven science**
 - Something is observed and desire is to trace origins or subsequent effects
- **Nature of effect depends on causal phenomenon, type of emission, and the location of the observer**
 - Most effects have origins in emissions from solar activity
 - Immediate and delayed effects result from the different types of emission
 - Location of observer in relation to the source and with respect to a planet determines what is observed



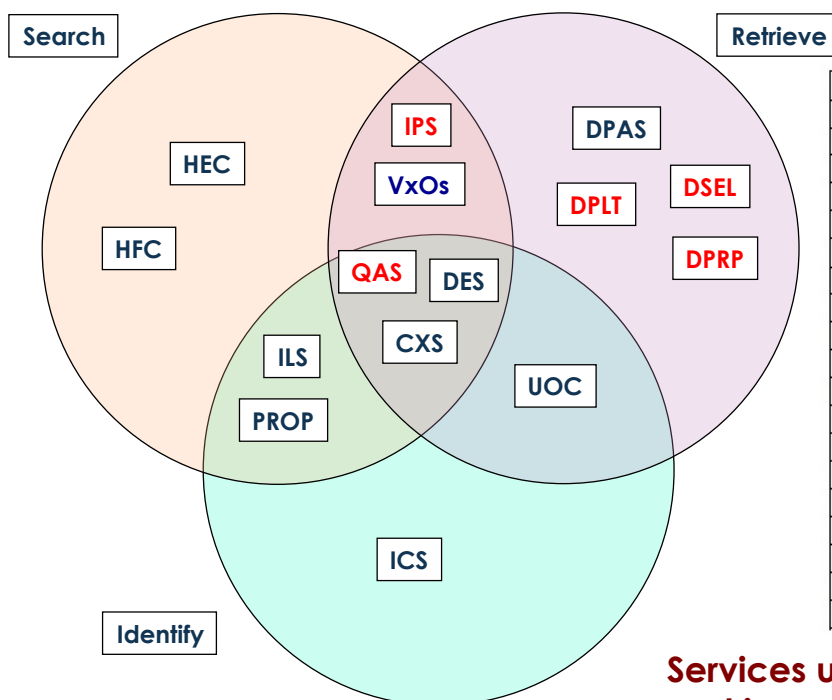
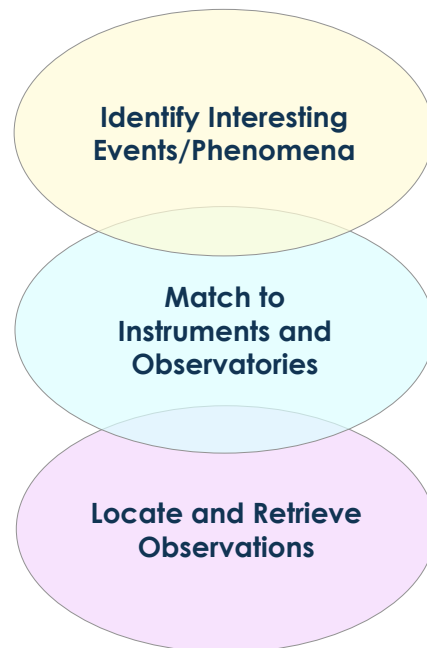
- **Presence of magnetic field and/or atmosphere influences effect on planetary environment**
- **Study requires an understanding of how phenomena evolve in space and time – how they propagate, interact...**

HELIO is an **research infrastructure** implemented with a **service-oriented architecture (SOA)**

Tasks split into a set of components or **services** that are used independently or as part of a workflow

System provides access to observations from **many different communities** – solar, heliospheric, geosciences, planetary sciences...

Communities have different ways of describing & handling data. Developing ways of providing the required **interoperability** a major issue



CTS	Coordinate Transformation
CXS	Context Service
DES	Data Evaluation Service
DPAS	Data Provider Access
DPLT	Data Plotter
DPRP	Pipeline Processing
DSEL	Data Selector
HEC	Heliophysics Event Catalog
HFC	Heliophysics Feature Catalog
HPS	Processing Service
HRS	Registry Service
HSS	Storage Service
IAS	Index Access Service
ICS	Instrument Capabilities
ILS	Instrument Location
PROP	Propagation Modelling
QAS	Quick-look Access
SMS	Semantic Mapping
UOC	Unified Observing Catalog
VxO	HSD Virtual Observatory

Services used in any order and in more than one way

- The capabilities that HELIO is developing should be thought of a building block in a larger capability – parts of a tool kit...
- **Service-oriented architecture has advantages**
 - Services can be used individually or as part of a workflow
 - Method of implementation is hidden from the user
 - New capability can be implemented as a new service
 - Services can be developed and maintained independently
- **Services interfaces need to be compliant with a set of standards in order to ensure interoperability**
- **HELIO has defined Web Service interfaces for its services based on IVOA specifications (with extensions)**
 - If adopted by other infrastructures and capabilities, these also could become part of the tool kit
 - *May need some iteration to satisfy needs of all*

- **HELIO Query Interface (HQI) used on most services**
 - Input based on the Parameter Query Language (PQL) and Table Access Protocol (TAP)
 - Output uses *annotated* VOTable
 - Both synchronous and asynchronous requests – latter known as “long running query”
- **Services that involve processing follow the Universal Worker Service (UWS) pattern**
 - Input usually via an XML file (more flexible)
 - Output could be data file (VOTable or otherwise), or an image
 - Wait for completion flag from service
 - Services include Context Service and Coordinate Transformation
- **Services usually have both SOAP and REST interfaces**
 - REST interface used to implement Test GUI for service