Using the Virtual Observatory Concept - data, models and educational materials

Goal - find the right balance of data/model holdings, portals and client software that a researchers can use without effort or interference as if all the materials were available on his/her local computer.

The prototype Virtual Solar-Terrestrial Observatory (VSTO) is proposed to be a distributed, scalable education and research environment for searching, integrating, and analyzing observational, experimental and model databases in the fields of solar, solar-terrestrial and space physics (SSTSP). VSTO would connect a system which provides virtual access to specific SSTSP data, model and material archives containing items from a variety of space- and ground-based instruments and experiments, as well as individual and community modeling and software efforts bringing research and educational use. The prototype would be a fully functional system addressing a substantial need within the SSTSP community, allowing science projects to advance more rapidly. E.g. in solar coronal physics there is a need to coherently assemble multi-wavelength images of the dynamic solar upper atmosphere. Space weather model inter-comparisons, and Asimilative Mapping of Ionospheric Electrodynamics results need to be distributed to their communities.

In discussions with data providers and users, the needs are clear:
- "Fast access to 'portable' data, in a way that works with the tools we have; information must be easy to access, retrieve and work with."

Too many users (and data providers) have to deal with the organizational structure of the data sets which varies significantly -- data may be stored at one site in a small number of large files while similar data may be stored at another site in a large number of relatively smaller files. There is an equally large problem with the range of metadata descriptions for the data. Users often only want subsets of the data and struggle with getting it efficiently. One user expresses it as:
- "(Please) solve the interface problem."

Datasets alone are not sufficient to build a virtual observatory. The VSTO must address the interface problem to bring data to the users' tools, and to the tools within the VSTO, effectively and scalably. VSTO will leverage the development of schemata (e.g. VSO, Earth System Grid, VO). That adequately describe the syntax (name of a variable, its type, dimensions, etc., or the procedure name and argument list, etc.) and semantics (what the variable physically is, its units, etc., or what the procedure does and returns, etc.) of the datasets and tools.

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Preliminary VSTO database components have been developed and are available at:
- http://vsto.hao.ucar.edu/
- http://www.virtualsolar.org/
- http://www.ivoa.net/