Transient flows in the dayside magnetosheath: A search for THEMIS evidence made practical by the Virtual Magnetospheric Observatory

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MHD and hybrid models often predict transient features that are difficult to confirm because of the large amount of data available which in turn requires the researcher to download it, write custom code and search for intervals of interests. Fortunately, the Virtual Heliospheric Magnetospheric Observatory (VMO) is being developed to help researches by creating a single point of uniform discovery, access, and use of magnetospheric (VMO) data.
Available data can be searched based on various criteria as, for example, spatial location, time of observation, measurement type, parameter values, etc. The results can then be saved, downloaded or displayed as, for example, spatial-temporal plots that quickly reveal where and how often was the searched-for phenomenon observed.

We outline VMO features that enable practical and quick search for evidence of the sunward magnetosheath flows predicted by hybrid code simulations in response to IMF rotational discontinuities entering the foreshock during intervals of radial IMF orientation and creating foreshock bubbles.

We also search for magnetosheath flows towards the Sun-Earth line, predicted by the same simulations at locations and during intervals when there is a component of the electric field in the magnetosheath away from the bow shock.

Both MHD and hybrid code models predict that interaction with the bow shock can trigger reconnection along IMF tangential discontinuities. The resulting structures are embedded in the background magnetosheath flow, but exhibit narrow bands of plasmas jetting away from the subsolar point that we attempt to identify in the THEMIS data.