



HELIO Use Case 2: The 100 CME Challenge

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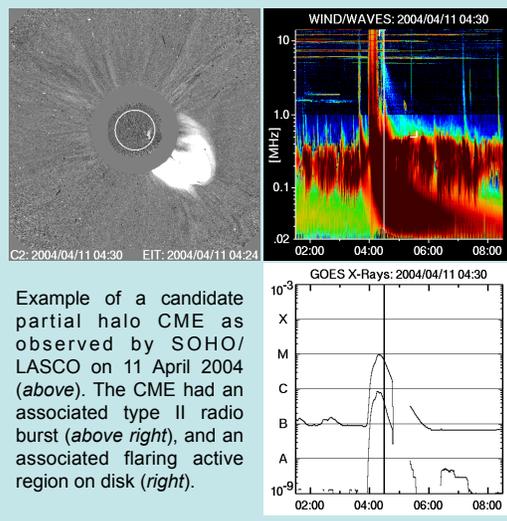
The Challenge:

To use HELIO to study the origin, propagation, and in-situ properties of a large number of coronal mass ejections (CMEs) as they were observed at various locations throughout the heliosphere.

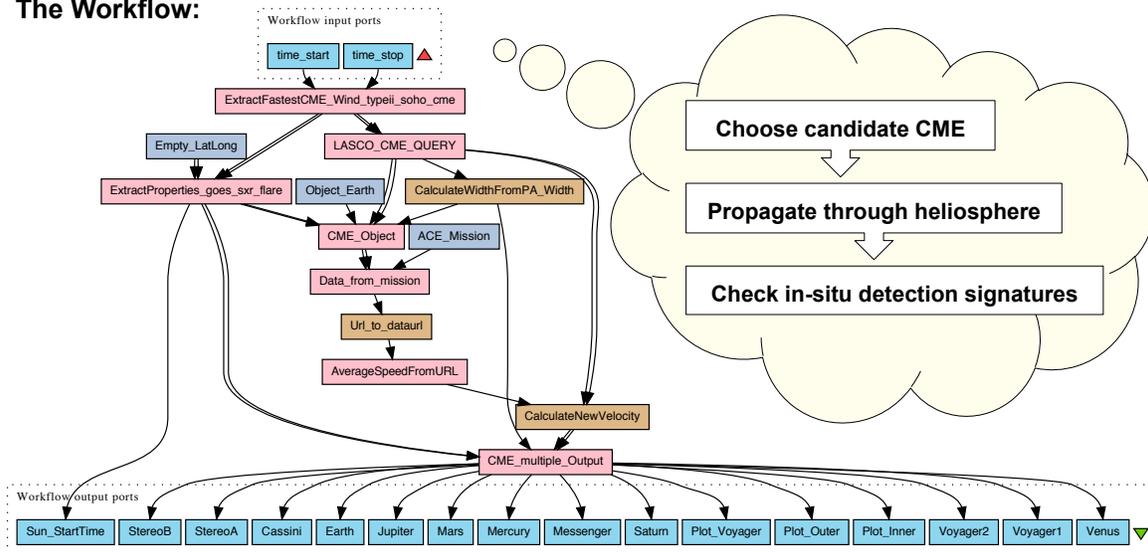
Which CMEs to choose?

In order to study those events most relevant to space weather near Earth, the CMEs had to meet the following criteria:

1. The CME is classified as a halo event.
2. The CME has an associated type II radio burst.
3. The 100 fastest CMEs were chosen.



The Workflow:



Choose candidate CME

Propagate through heliosphere

Check in-situ detection signatures

HELIO provides CME catalogue information:
CME speed? Halo event? Source region?
Associated flare? Type II radio burst?

SHEBA (HELIO's propagation model) provides:
CME arrival times at spacecrafts & planets, and other locations in the heliosphere.

Caveat: CME catalogues provide *plane of sky speeds* that are usually smaller than their true speeds.

Solution: The above workflow is run twice: first with the plane-of-sky speed provided by the catalogue, to determine the average solar wind speed during the expected CME arrival at 1AU. Then the workflow is run again with a compensation factor to account for CME drag in the solar wind.



Taverna – a workflow tool

Taverna is very useful for the automation of workflows, providing a powerful interface for designing the order of the workflow, inputting/outputting parameters, and repeating steps as necessary.

my experiment

Once the workflow is finished, it can be shared through MyExperiment, allowing other users to edit and remix it. This workflow can be found at

<http://tinyurl.com/HELIO-100CMEChallenge>

