



# HELIO Use Case 2: The 100 CME Challenge

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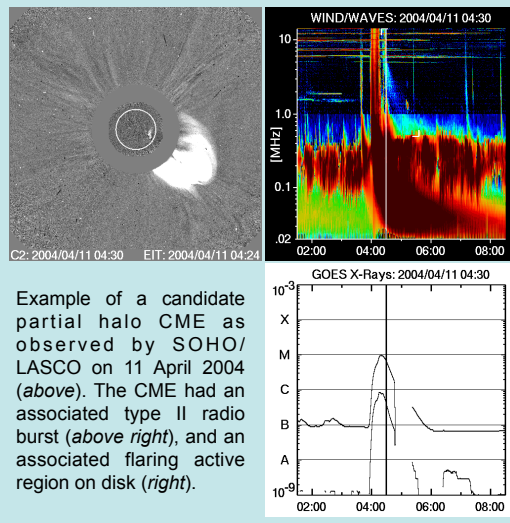
## The Challenge:

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.

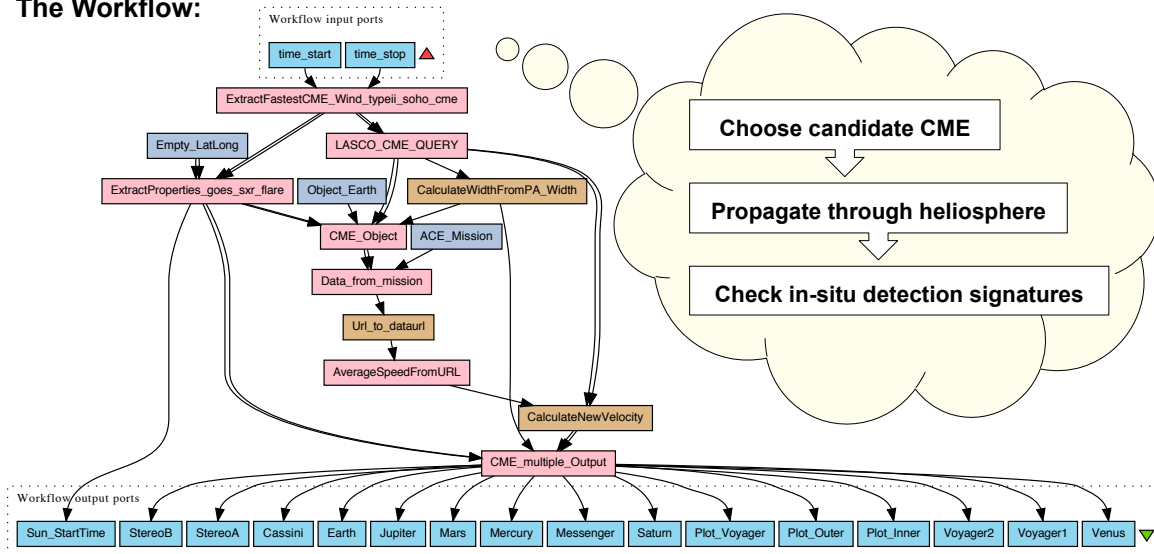
## Which CMEs to choose?

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>

