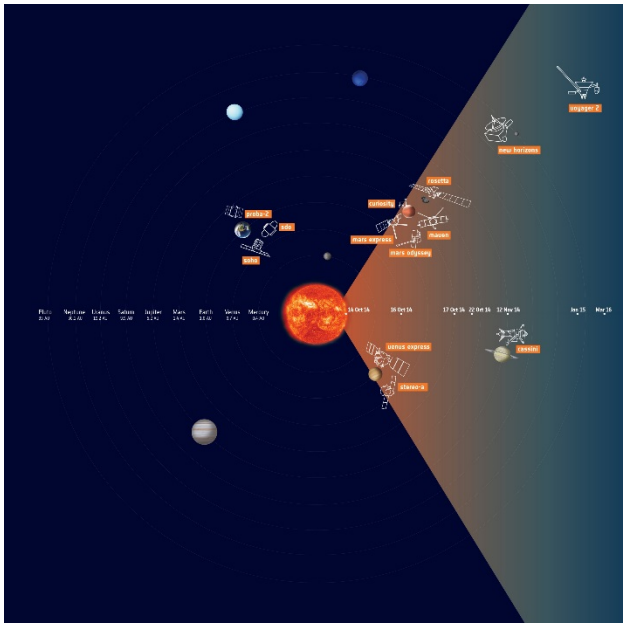
Up to Ten NASA and ESA Spacecraft Track CME Propagation

What is the science question?

How do Coronal Mass Ejections (CMEs) move through the solar system?

What were the findings?

- Only one CME to originate from largest sunspot group observed in the last 24 years with speed ~850 km/s
- Interest began when CME interfered with observations of the interaction between Comet Siding Spring and the Martian atmosphere.
- Experimental forecasting and ENLIL modeling at CCMC made it possible to track the CME throughout the solar system.

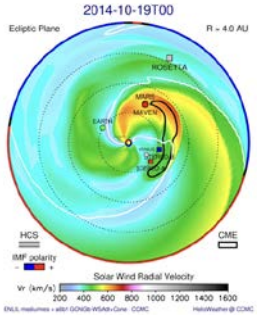


What was the impact?

Unprecedented portrait of how these solar storms move through space.

Why does it matter to non-scientists?

- Observations add key information to the models needed to track how CMEs move and evolve throughout space in the solar system.
- This information enables better space weather forecasts to protect space assets and our technological infrastructure.



Computer model of the CME traveling through the solar system.

Date	Detected By	Location in Space	Distance from the Sun
Oct. 14, 2014	--	Sun – CME Launches	--
Oct. 16, 2014	Venus Express *(indirect data)*	Venus	0.72 AU
Oct. 16, 2014	STEREO-A	The Far Side of the Sun	0.96 AU
Oct. 17, 2014	Curiosity	Mars	1.41 AU
	MAVEN		
	Mars Express		
	Mars Odyssey		
Oct. 22, 2014	Rosetta	Comet 67P	3.13 AU
Nov. 12, 2014	Cassini	Saturn	9.94 AU
Jan. 18 – Feb. 14, 2015	New Horizons *(possible detection)*	En Route to Pluto	31.49 AU
Late March 2016	Voyager 2 *(possible detection)*	The Heliosheath	111.06 AU

O. Witasse (ESA ESTEC), B. Sánchez-Cano (University of Leicester), M. L. Mays (674), I. G. Richardson (UMD/672), [and 48 others], **Interplanetary coronal mass ejection observed at STEREO-A, Mars, comet 67P/Churyumov-Gerasimenko, Saturn, and New Horizons en-route to Pluto. Comparison of its Forbush decreases at 1.4, 3.1 and 9.9 AU** (2017), *J. Geophys. Res. Space Physics*, 122, 8.