



## **Interacting CMEs from the Sun to 1 AU: What can we learn from relating heliospheric images to in situ data?**

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Since the end of 2009 solar activity is on the rise, and the number of coronal mass ejections (CMEs) from the Sun increased accordingly. As a consequence, CMEs are more likely to interact with each other en route to Earth. In 2010, the two STEREO spacecraft were excellently positioned, with a mutual separation of 132 degrees in January to 175 degrees in December, to image Earth-directed CMEs continuously during their journey from the Sun to 1 AU. Indeed, some CME-CME interaction events were observed by STEREO, and we focus on the events on May 23-29 2010 and August 1-4 2010. We investigate whether techniques to forecast the direction and arrival time of a interplanetary CME observed at large elongations from the Sun, which have been successfully applied to single ICME events in the past, are still valid when discussing interacting ICMEs. To this end we use Jplots and movies provided by the Heliospheric Imager (HI) instrument onboard STEREO, part of SECCHI, in combination with in situ observations of their solar wind signatures, such as magnetic field and plasma parameters, by the Wind spacecraft near Earth as well as STEREO-A/B (IMPACT/PLASTIC) and Venus Express (MAG). The flux rope parts of the ICMEs are modeled with Grad-Shafranov and force-free-fitting techniques, and the information thus gained using the in situ data (arrival time, orientation, etc.) lets us confirm or reject the results of techniques used on HI images. This provides us with important clues on the interplanetary evolution and a possible deflection of interacting CMEs.

The results are of particular importance for future missions with both heliospheric imager and in situ instruments onboard, such as Solar Orbiter or Solar Probe Plus.