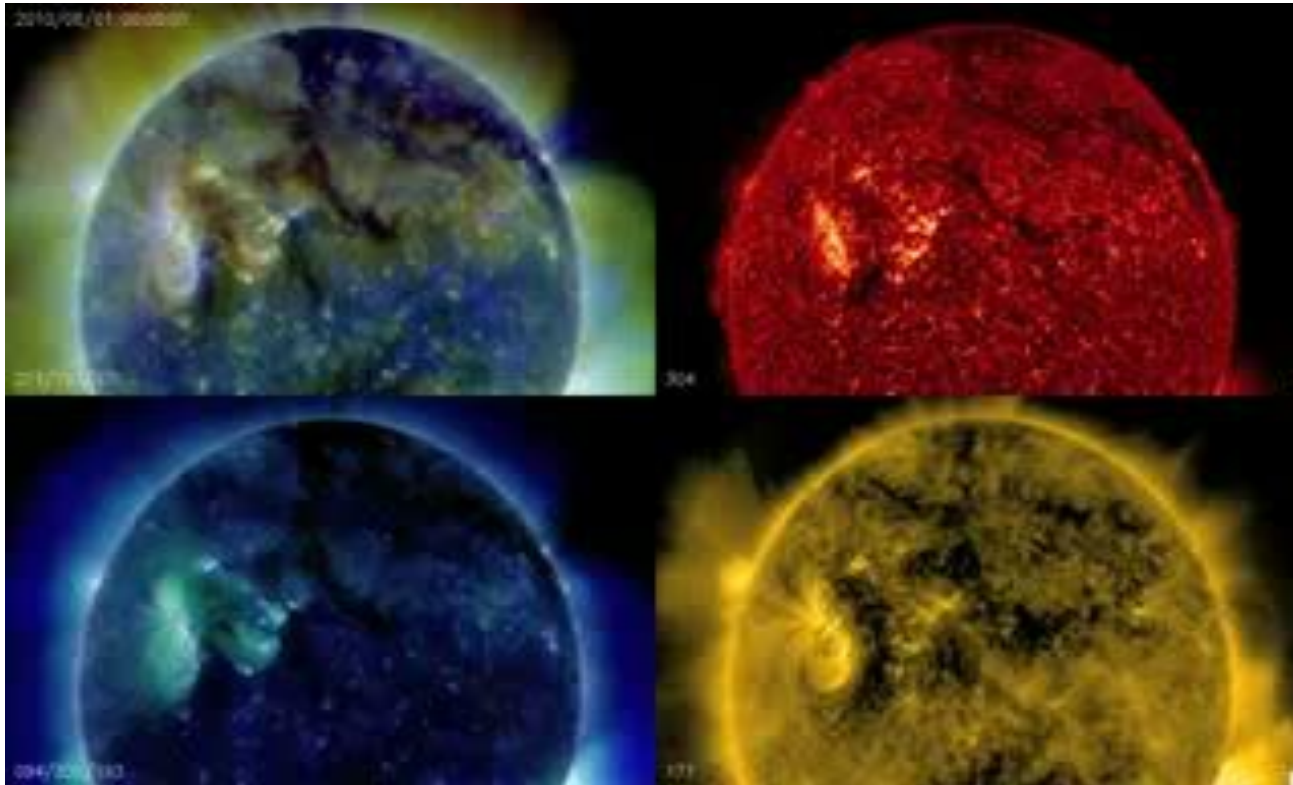


Exercises

Become a forecaster in less than 3 hours



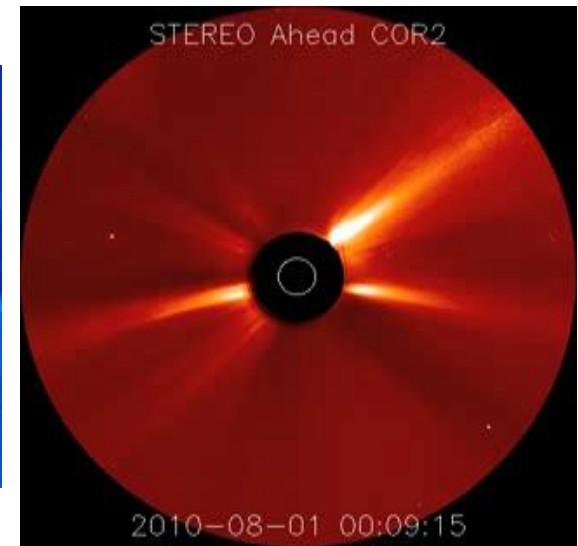
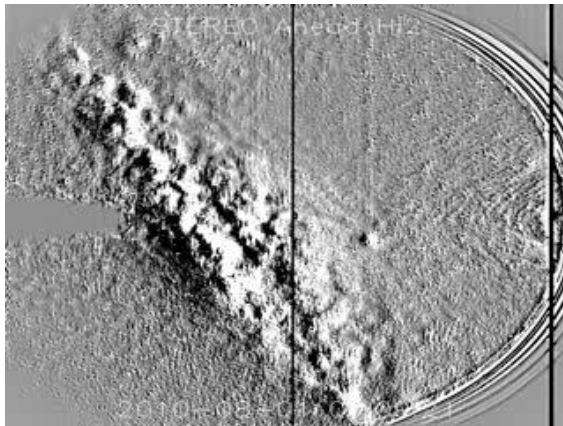
A solar event: Aug 1



▶ August 1 event

An energetic trip from the Sun to the Earth

- ▶ Lasco was not available, STEREO A/B were
- ▶ Real time calculation based on coronagraphic images
- ▶ Post-check: Cactus



-
- ▶ August 1 event

Real time calculation – STEREO A

- ▶ Solar diameter = x' pix
- ▶ 08:24:00 UT $\rightarrow y'$ pix
- ▶ 09:39:00 UT $\rightarrow z'$ pix
- ▶ 75 min = 4500 sec $\rightarrow z'-y'$ pix
- ▶ $(z'-y') * 1392000 / (4500*x')$ km/sec



SECCHI CME list

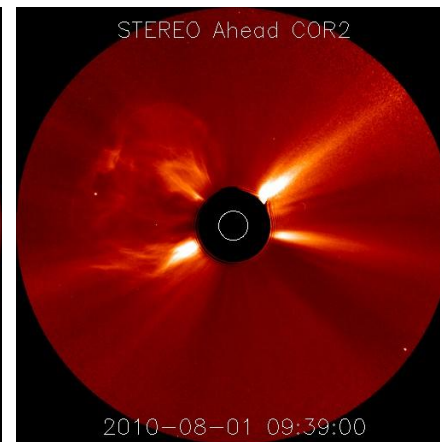
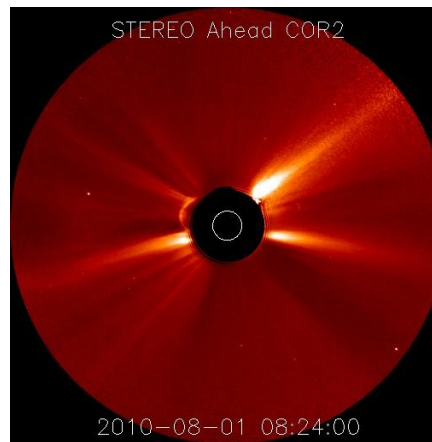
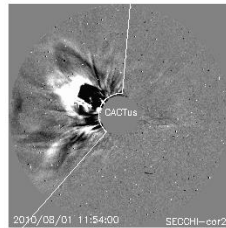
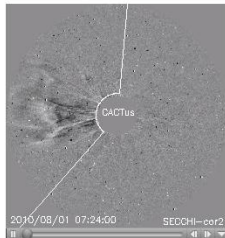
Automatically generated by CACTus using COR2 observations

Details and graphs for CME0003

```
# CME | t0 | dt0 | pa | da | v | dv | minv | maxv | halo?
0003|2010-08-01 08:24| 11 | 067| 144| 0694| 0398| 0378| 1562| II
```

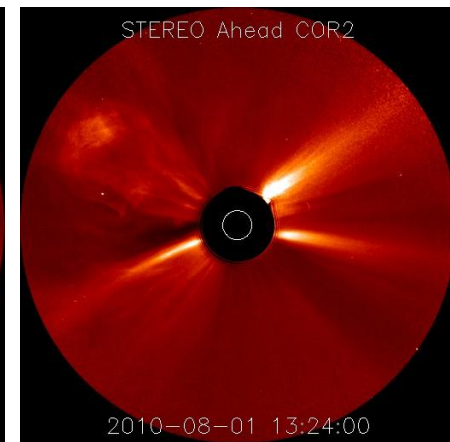
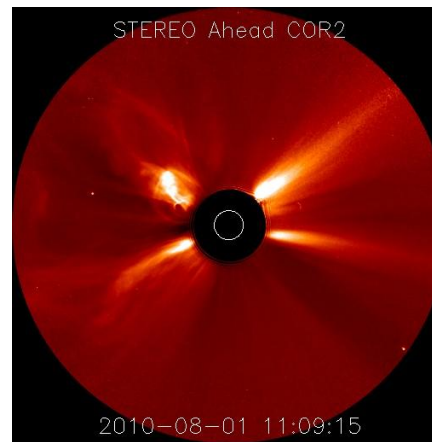
CME Movie :: [Download](#) ::

Sample Image

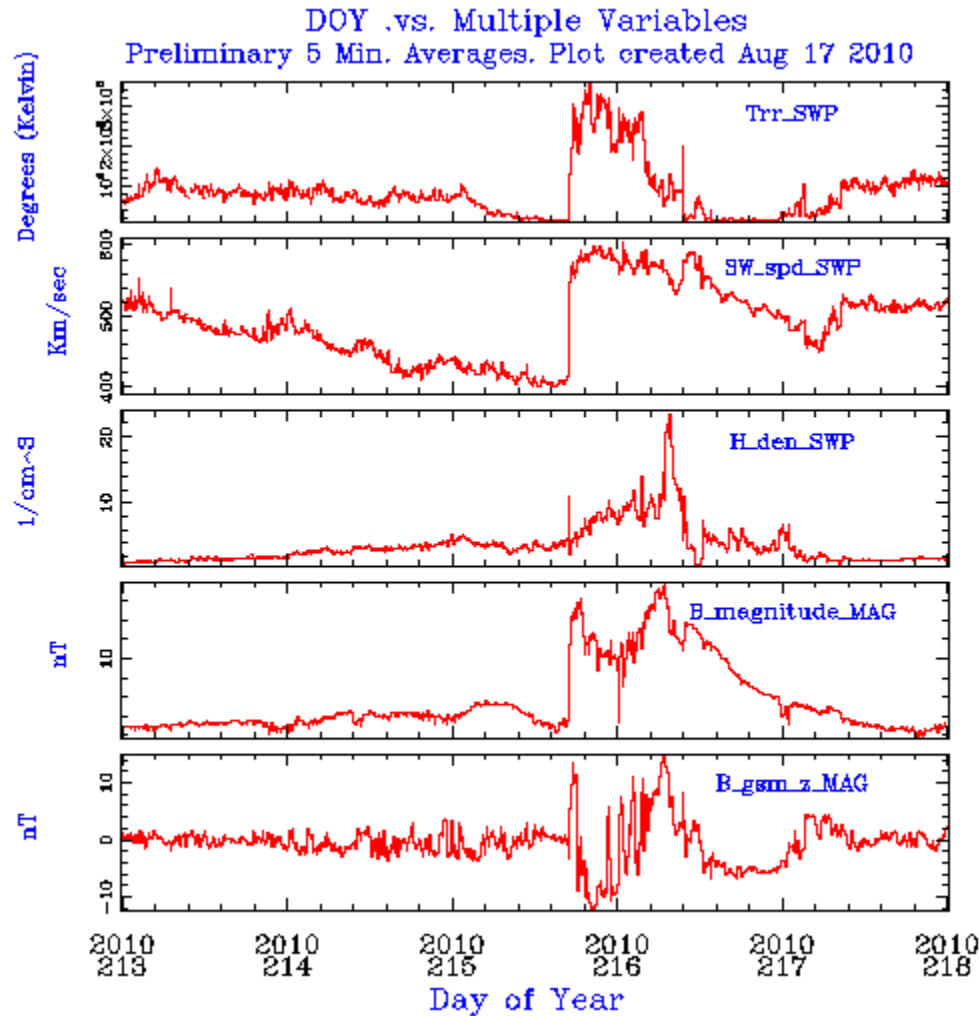


Real time calculation – STEREO A

- ▶ Solar diameter = x' pix
- ▶ 11:09:15 UT $\rightarrow y'$ pix
- ▶ 13:24:00 UT $\rightarrow z'$ pix
- ▶ sec $\rightarrow z'-y'$ pix
- ▶ $(z'-y') * 1392000 / (.....*x')$ km/sec

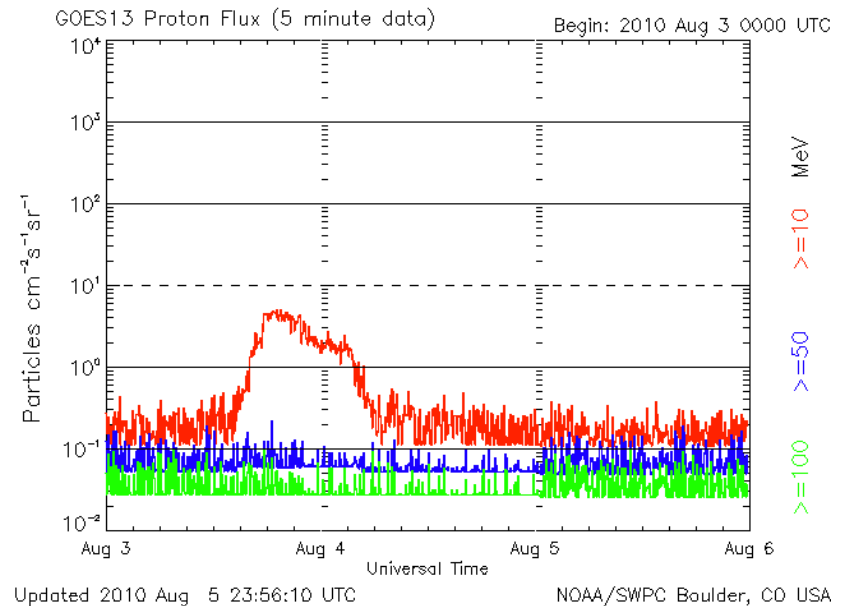
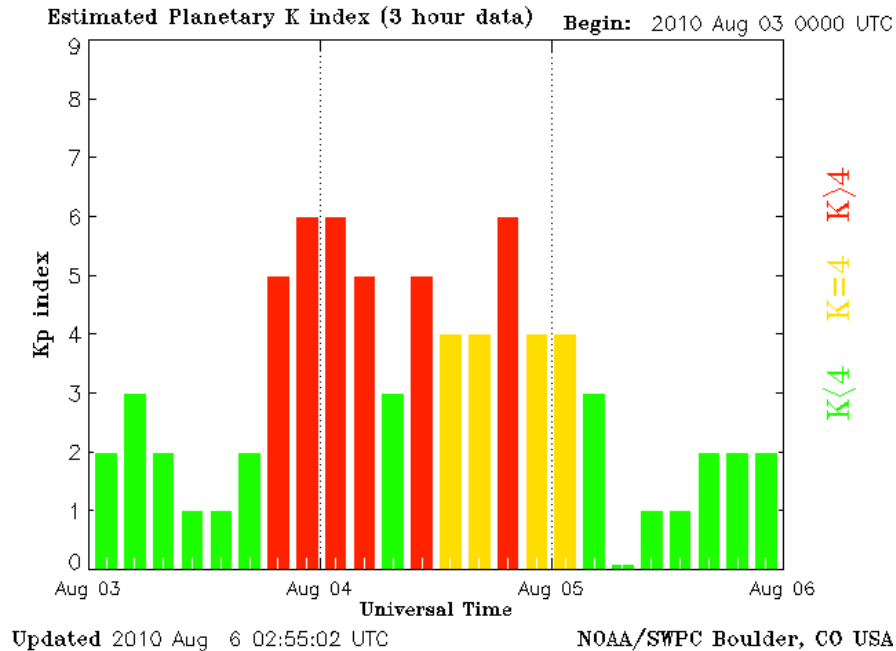


ACE: at arrival



► The August 01 event

At Earth - Geomagnetic response



October 10, 2010

- ▶ What happened on the Sun?
- ▶ Could it be expected/predicted?
 - ▶ EUV movies - (In)stable filament
- ▶ Would there be an effect on Earth and when?
 - ▶ Find images from SOHO/LASCO – STEREO COR2/calculate the speed of the CME/direction
 - ▶ Check with CACTus
 - ▶ Arrival at LI can be checked in ACE-data:
http://www.srl.caltech.edu/ACE/ASC/browse/view_browse_data.html
use 'day of the year' (google)
- ▶ How big was the effect on Earth? - Kp



Speed calculation based on STEREO A/B

- ▶ Solar diameter = x pix
- ▶ 02:40:23 UT $\rightarrow y$ pix
- ▶ 06:55:23 UT $\rightarrow z$ pix
- ▶ 4h 15 min = 15300 sec $\rightarrow z-y$ pix
- ▶ $(z-y) * 1392000 / (15300*x)$ km/sec

- ▶ Solar diameter = x' pix
- ▶ 01:24:24 UT $\rightarrow y'$ pix
- ▶ 05:54:24 UT $\rightarrow z'$ pix
- ▶ 4h 30 min = 16200 sec $\rightarrow z'-y'$ pix
- ▶ $(z'-y') * 1392000 / (15300*x')$ km/sec



Report

- ▶ A filament located in the south east of the solar disk erupted late on Oct 10. In SOHO/LASCO images, the CME was seen as a partial CME. In STEREO Ahead/Behind COR2 it is seen from aside. The speed calculated from STEREO Ahead images by the CACTus software, is 297 km/s; from STEREO Behind images, 337 km/s.
- ▶ ACE data showed a rather sudden enhancement of the magnetic field carried in the solar wind on Oct 15. The speed jumped at 03UT from 280 km/s to 290 km/s. The density increased slightly. This was possibly the passage through the shock in front of the CME associated with the filament eruption of late Oct 10. The IMF stayed turbulent until Oct 17. Probably, ACE passed side away along the shock. This glancing blow lead to one period with active conditions on Oct 17.



October 06, 2010

- ▶ What happened on the Sun?

- ▶ X-ray flux
- ▶ SDO AIA 304/193 – SWAP

- ▶ Could it be expected/predicted?

- ▶ Would there be an effect on Earth and when? –Earth directed – arrival time

- ▶ STEREO - LASCO
- ▶ CACTus
- ▶ ACE-data:

http://www.srl.caltech.edu/ACE/ASC/browse/view_browse_data.html
use 'day of the year' (google)

- ▶ How big was the effect? - Kp



Report on this event

- ▶ Oct 06, a filament erupted. The shock and the CME arrived on Oct 11. The total interplanetary magnetic field (IMF) rose to values between 10 and 15 nT. ACE passed the shock heading the actual CME. We suspect that ACE passed along a leg of the plasma cloud measuring a negative B_z for a long period. The B_z was shifting slowly to zero. This negative B_z of the IMF is optimal for reconnection and lead to a short minor geomagnetic storm on Oct 11.



Oct 16, 2010

- ▶ **What happened on the Sun?**
 - ▶ EUV movies – SWAP – STEREO – SDO
 - ▶ X-ray data
- ▶ **Could it be expected/predicted?**
 - ▶ SDO – magnetogram
 - ▶ EUV movies – SDO - SWAP
- ▶ **Was there an associated CME?**
 - ▶ Coronal dimming – EUV wave
 - ▶ X-ray flux: Long duration event



Report

- ▶ Oct 16, AR 1112 was responsible for an M2.9 flare peaking at 19:12UT. The event lasted only for 8 minutes. In SWAP images, a small coronal dimming is visible. Although the large filament in the vicinity of this active region did not erupt. SOHO/LASCO and STEREO/SECCHI didn't show any evidence of an associated, strong CME.



Forecast

- ▶ http://sidc.be/previweb_demo

