**CME analysis Procedure**

\* Identify the CME and the start time.  (The CME start time is the time it is first observed by any of the four coronagraphs)

\* Observe all available coronagraph images in motion.  Look for the same CME leading edge feature in various spacecraft.

\* Look at EUV images in motion near the CME start time and identify the source location and any lower coronal signatures (post eruption arcade, dimming, rising loops, filament eruption).

Go to the CME analysis tool: <http://ccmc.gsfc.nasa.gov/analysis/stereo/>

\* Select two overlapping times for each spacecraft pair available. Times should be around 45-75 minutes apart, and try to choose times just before the CME leading edge has left the field of view.  It is useful to refer back to the CME movies while selecting images.

\* Perform plane of sky measurements CME leading edge and obtain triangulation results if appropriate.  Determine final CME parameters (radial speed, half width, longitude, latitude, and time at 21.5 Rs (solar radii)).

**CME analysis tips/notes**

\* Make sure you are measuring the same feature in each spacecraft.

\* If you cannot see the leading edge of the CME in image (halo), then it is not appropriate to use the triangulation method.  In this case, estimate the plane of sky speed.  It may be cautiously used for an asymmetric halo.

\* Don’t forget to determine the source location and signatures.  Use these to assess the accuracy of your results (which spacecraft pairs will give the best results), or to derive the radial velocity from the plane of sky speed.

\* Measure each CME about 10 times with various time and spacecraft pairs to get a feel for the parameters and the measurement error.

\* The two selected times should be around 45-75 minutes apart for each spacecraft.

\* The time between each spacecraft pair should be less than 10 minutes.

\* Try to choose times just before the CME leading edge has left the field of view.

\* Bear in mind that plane of sky speeds are always lower than the derived radial velocity.

**CME Analysis Resources & iSWA layouts**

\* CME analysis tool: <http://ccmc.gsfc.nasa.gov/analysis/stereo/>

\* 40 Frame coronagraph and EUV movies <http://go.nasa.gov/16bTvzK>

\* Where is STEREO? <http://stereo-ssc.nascom.nasa.gov/where.shtml>

and <http://stereo-ssc.nascom.nasa.gov/cgi-bin/make_where_gif>

\* Solar Images with grid overlays <http://www.solarmonitor.org/>

**Slide Link Summary**

SW REDI website

<http://ccmc.gsfc.nasa.gov/support/SWREDI/swredi.php>

iSWA [http://iswa.gsfc.nasa.gov](http://iswa.gsfc.nasa.gov/)

iSWA Cygnet Glossary  <http://iswa3.ccmc.gsfc.nasa.gov/wiki/index.php/Full_iSWA_Cygnet_List>

iSWA Space Weather Glossary <http://iswa3.ccmc.gsfc.nasa.gov/wiki/index.php/Glossary>

Example CME movie

<http://cdaw.gsfc.nasa.gov/movie/make_javamovie.php?img1=stb_cor2&img2=sta_cor2&stime=20120712_1500&etime=20120712_2000>

<http://helioviewer.org/?movieId=zZv95> <http://helioviewer.org/?movieId=tZv95>

Helioviewer solar visualization tool <http://www.helioviewer.org/>

SOHO LASCO CME Catalog  <http://cdaw.gsfc.nasa.gov/CME_list/>

SWRC SCORE CME scale <http://swrc.gsfc.nasa.gov/main/score>

STEREO orbit movie <http://www.nasa.gov/multimedia/videogallery/index.html?media_id=59559661>

Sun Primer: Why NASA Scientists Observe the Sun in Different Wavelengths

<http://www.nasa.gov/mission_pages/sunearth/news/light-wavelengths.html>

*EUV lower coronal signatures of CMEs movies*

post eruption arcade<http://cdaw.gsfc.nasa.gov/movie/make_javamovie.php?img1=sta_e195&img2=sta_cor2&stime=20130526_1500&etime=20130527_0000>

prominence eruptions   <http://go.nasa.gov/19Dni3v>

<http://cdaw.gsfc.nasa.gov/movie/make_javamovie.php?img1=lasc2rdf&img2=sdo_a304&stime=20130430_2200&etime=20130501_0800>

filament eruptions      <http://go.nasa.gov/12qcWDO>

[http://www.lmsal.com/hek/gallery/podimages/2013/06/01/pod\_malanushenko\_anna\_2013-06-01T02:24:03.851/anny\_AIA-304\_20130531T113203-20130531T185203\_120s\_made\_20130601T022253\_720p.mpg](http://www.lmsal.com/hek/gallery/podimages/2013/06/01/pod_malanushenko_anna_2013-06-01T02%3A24%3A03.851/anny_AIA-304_20130531T113203-20130531T185203_120s_made_20130601T022253_720p.mpg)

coronal dimmings[http://www.lmsal.com/hek/gallery/podimages/2013/06/01/pod\_malanushenko\_anna\_2013-06-01T00:52:07.870/anny\_AIA-211\_20130531T094003-20130531T145203\_120s\_made\_20130601T005102\_720p.mpg](http://www.lmsal.com/hek/gallery/podimages/2013/06/01/pod_malanushenko_anna_2013-06-01T00%3A52%3A07.870/anny_AIA-211_20130531T094003-20130531T145203_120s_made_20130601T005102_720p.mpg)

<http://cdaw.gsfc.nasa.gov/movie/make_javamovie.php?img1=stb_cor2&img2=stb_e195&stime=20120527_0300&etime=20120527_1600>