CME assignment two, ANSWERS

For the CMEs listed below, follow the CME analysis procedure described in the lesson and also submit answers to the following questions for each CME.

HW#2 CMEs starting at
1) 2013-03-15T06:54Z
2) 2013-04-11T07:36Z
3) 2012-09-28T00:12Z
4) 2012-09-28T10:54Z
5) 2013-01-21T08:00Z
(two CMEs)

Resources & iSWA layouts

* *StereoCAT:* 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/cgi-bin/make_where_gif
* http://cdaw.gsfc.nasa.gov/movie/
* *Solar Images with grid overlays* http://www.solarmonitor.org/

Part 1: a) What is the source location for this CME? (list the location e.g. N15E20, instrument/wavelength, and time of the observation).

b) Describe the EUV lower coronal signature for this CME (e.g. flare, post eruption arcade/loops, rising loops, dimming, filament eruption).

c) Is the CME a halo in any of the coronagraphs? If so, is it moving away from or towards the observer?

d) Which coronagraph instrument first observed the CME at the start time?

e) What are your final CME parameters (radial speed, half width, longitude, latitude, and time at 21.5 Rs (solar radii)).

f) Compare your EUV source location obtained in (a) with the parameters obtained in (e). Discuss why they might be different.

g) Submit your "Save URL" of your measurements.

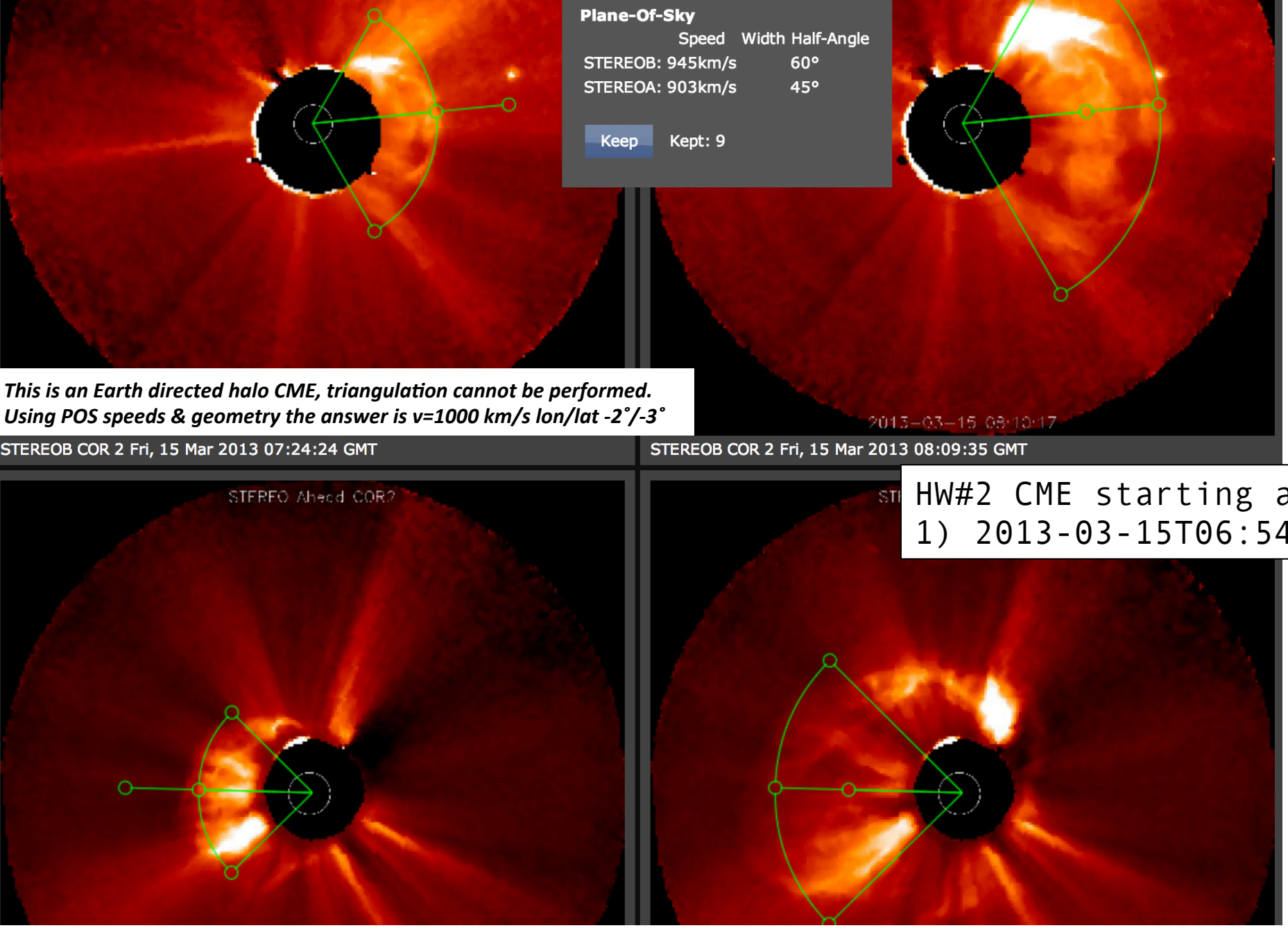
Part 2: Reanalyze the CMEs above using single spacecraft mode and the CME Projection Graph:

h) Single Spacecraft mode: for both spacecraft chosen in Part 1 use your longitude derived in (e) to determine the "angle from plane of the sky" for each measurement. Use this in single spacecraft mode to get the 3D speed.

i) Now use the CME projection graph with your width and your 3D longitude from (e) to derive two estimates of the 3D speed for each spacecraft viewpoint.

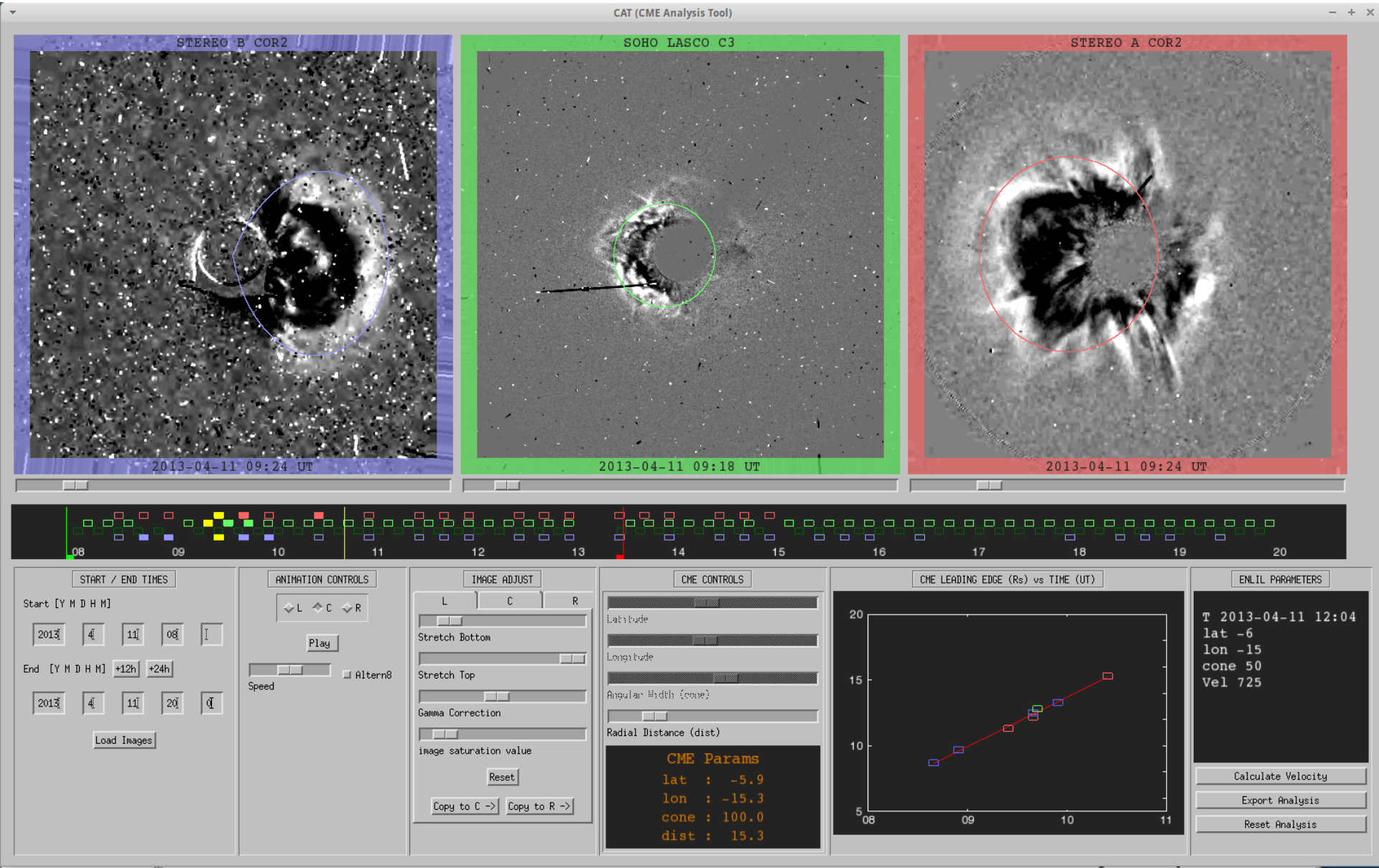
j) Now do the same (j), only using the source longitude from (a) instead of the longitude from (e).

k) You now have determined the 3D speed with several different methods. How much do they match? Why are there differences?

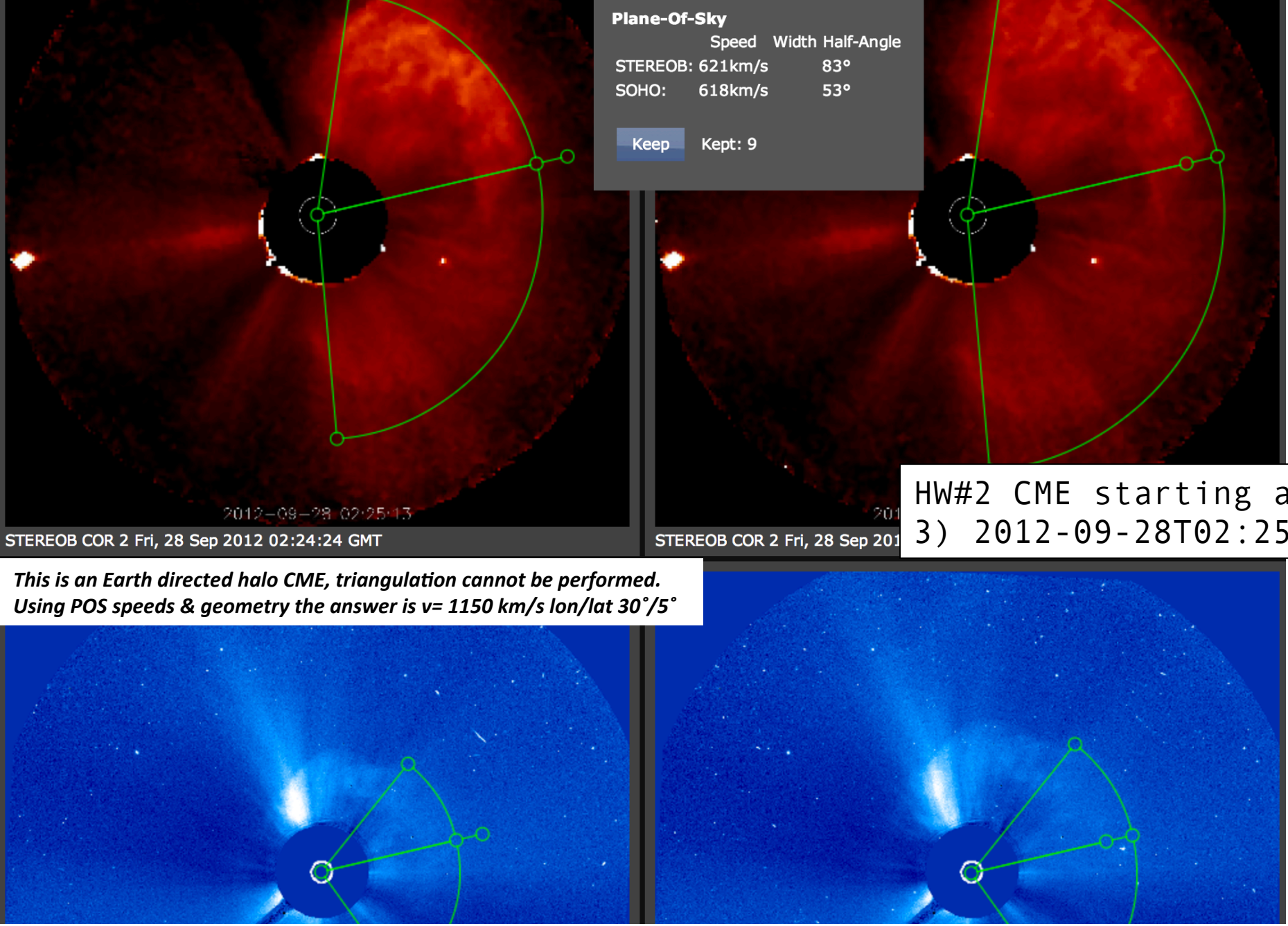


EUV Signatures: AIA: Flare brightening, eruption, post-eruption arcade from AR north of disk center, dimming below AR. EUVI: Rising loops from behind NW limb in B.

2) 2013-04-11T07:36Z



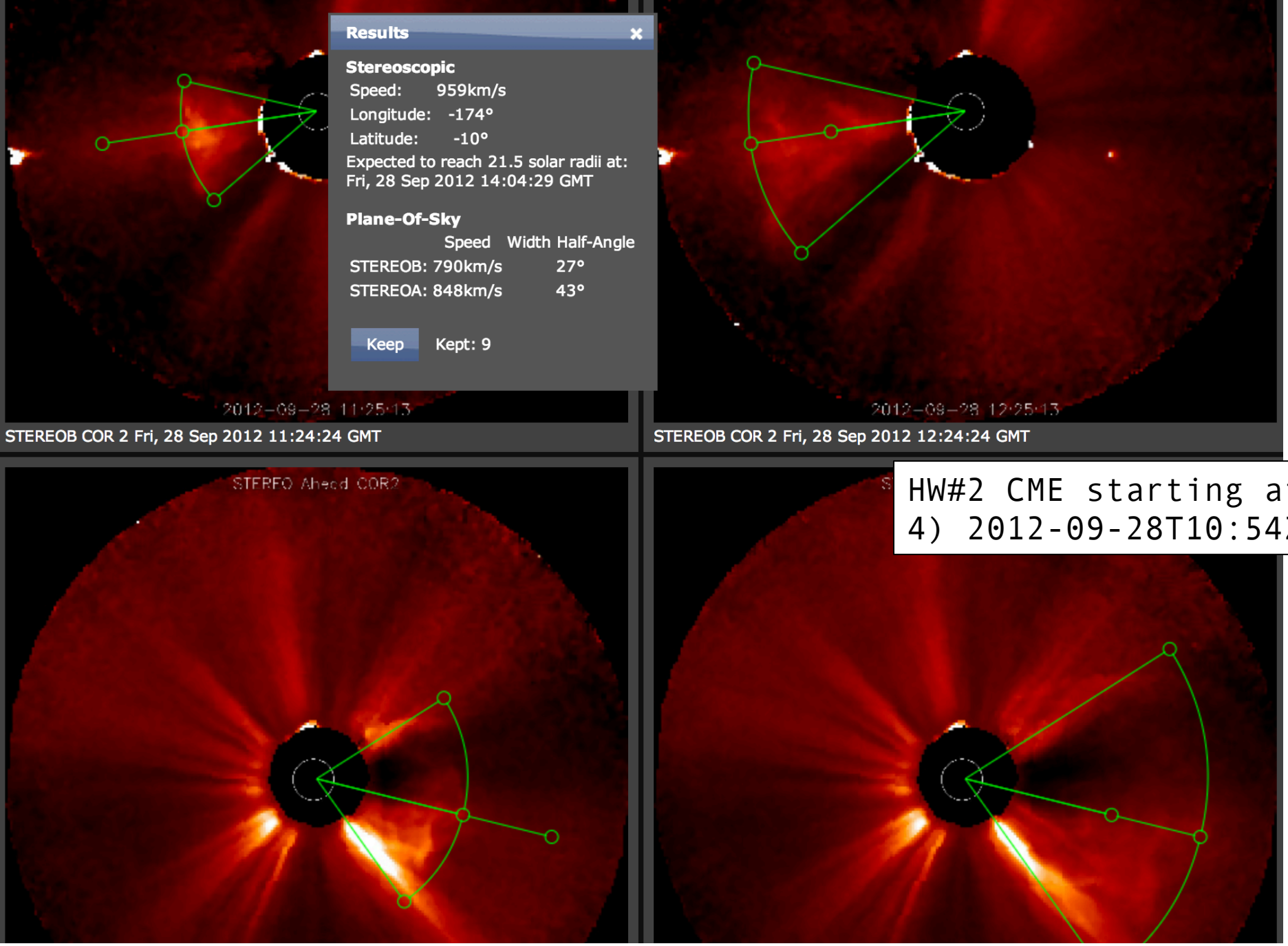
yielding a triangulated speed of 850 ± 200 km s^{-1}, $-5° \pm 5°$ latitude, $-15° \pm 10°$ longitude, $50° \pm 5°$ half width



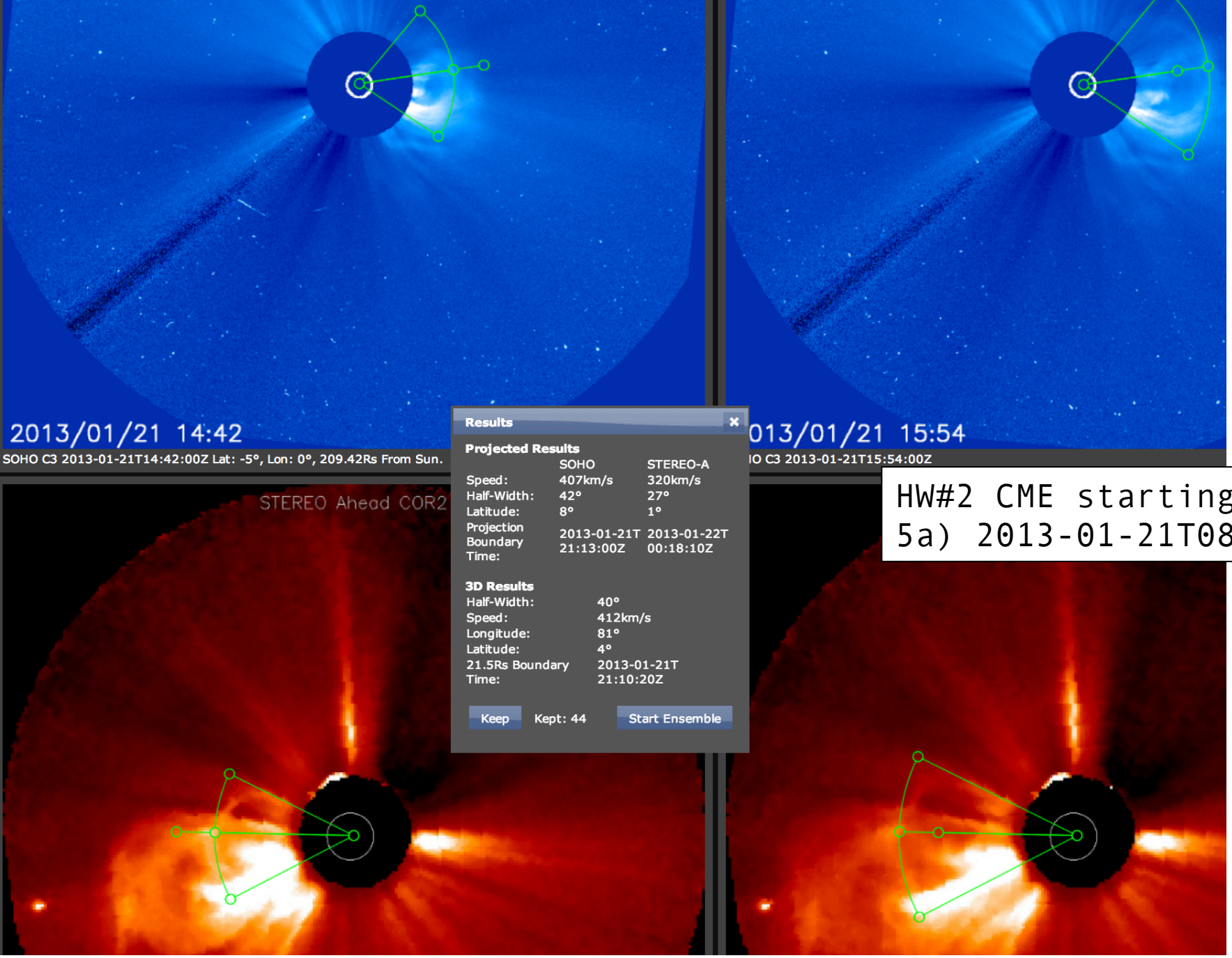
HW#2 CME starting at 3) 2012-09-28T02:25Z

This is an Earth directed halo CME, triangulation cannot be performed. Using POS speeds & geometry the answer is v= 1150 km/s lon/lat 30˚/5˚

EUV Signatures: AIA: Filament eruption near AR west of disk center. Post-eruption arcade. EUVI: Filament eruption just beyond E limb in A (304Å), rising loops.

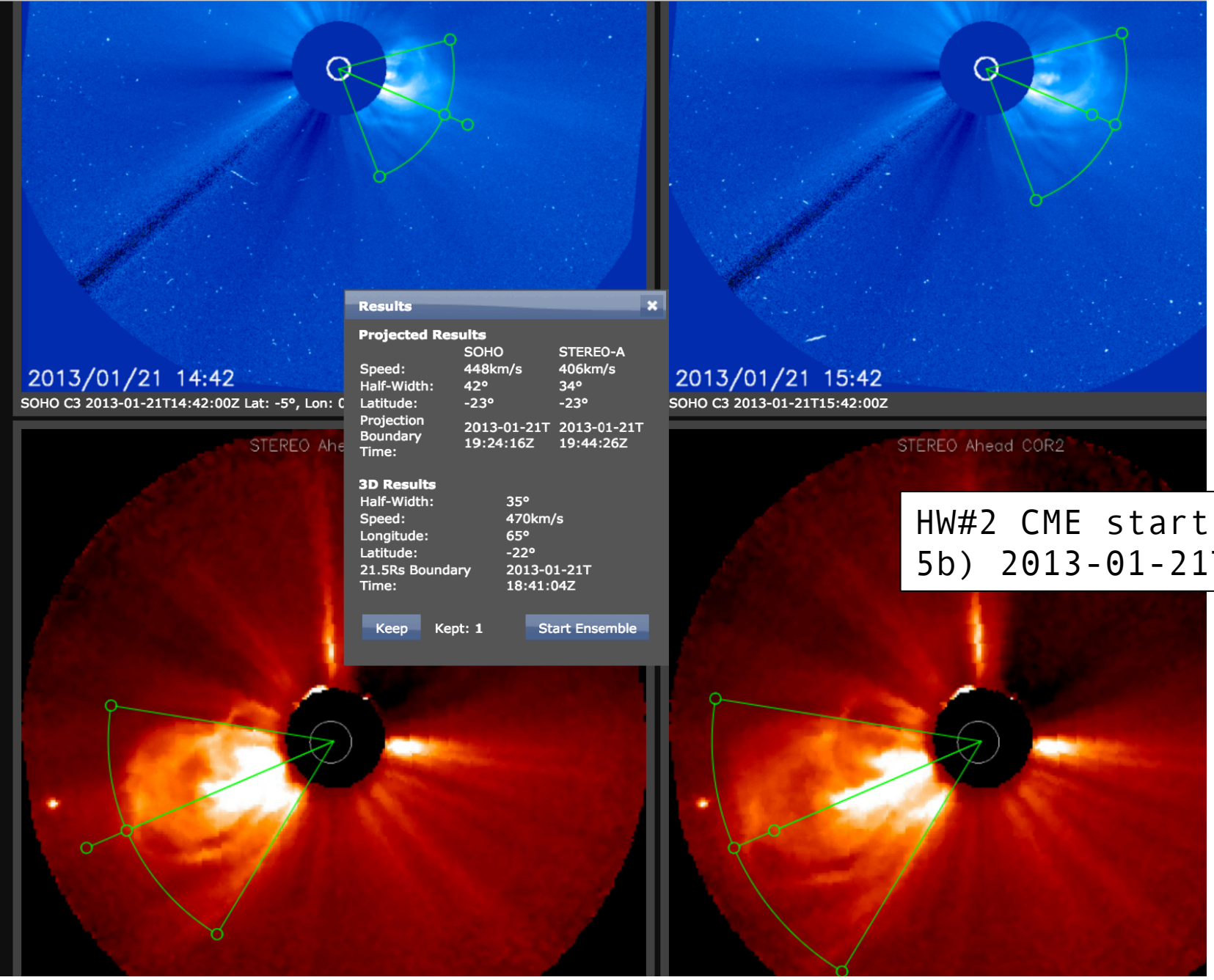


EUV Signatures: EUVI: Flare and eruption from nearby AR in SW of A, SW of B.



HW#2 CME starting at 5a) 2013-01-21T08:00Z

EUV Signatures: EUVIA: some activity in AR in the NE (near limb), AIA SDO: some activity in the AR at the NW limb



HW#2 CME starting at
5b) 2013-01-21T08:24Z

EUV Signatures: EUVIA: rising loops off SE limb, hard to see in AIA SDO, but some activity in the SW.