HELCATS

UGOE contribution to WP 3.2

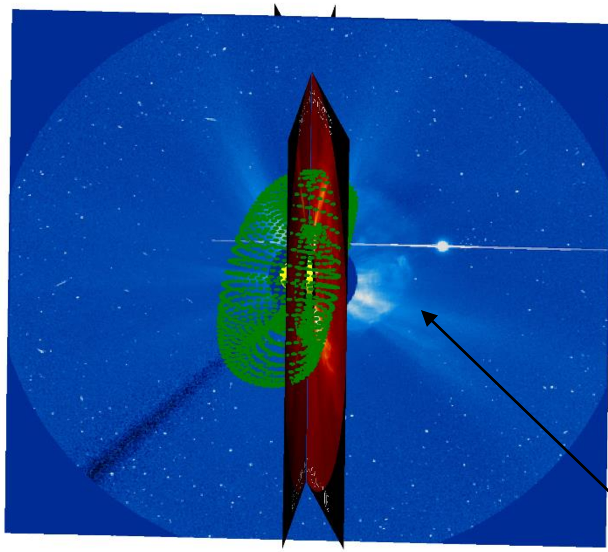
GCS Modelling and CME Kinematics

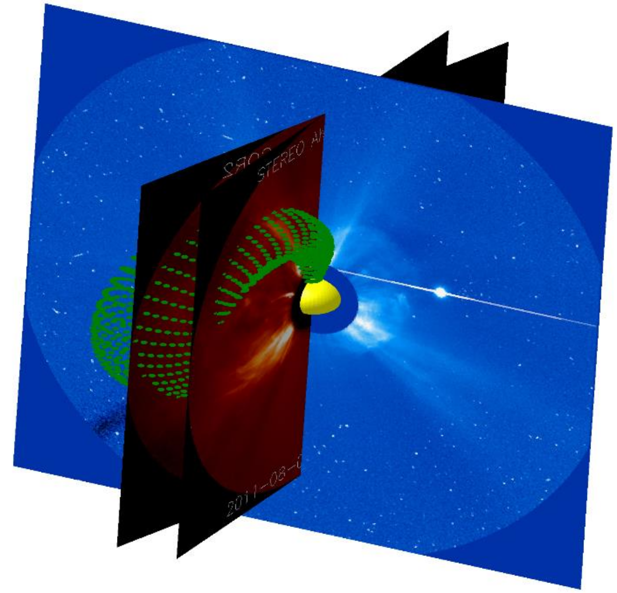
Adam Pluta & Niclas Mrotzek

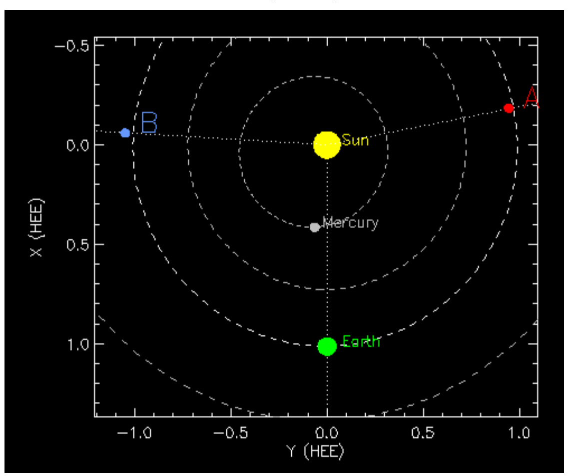
HELCATS BiAM, 3-4 Nov 2015, Helsinki, Finland

Adding SOHO C3 after fitting with only COR 2 A & B

Event 2011-08-04

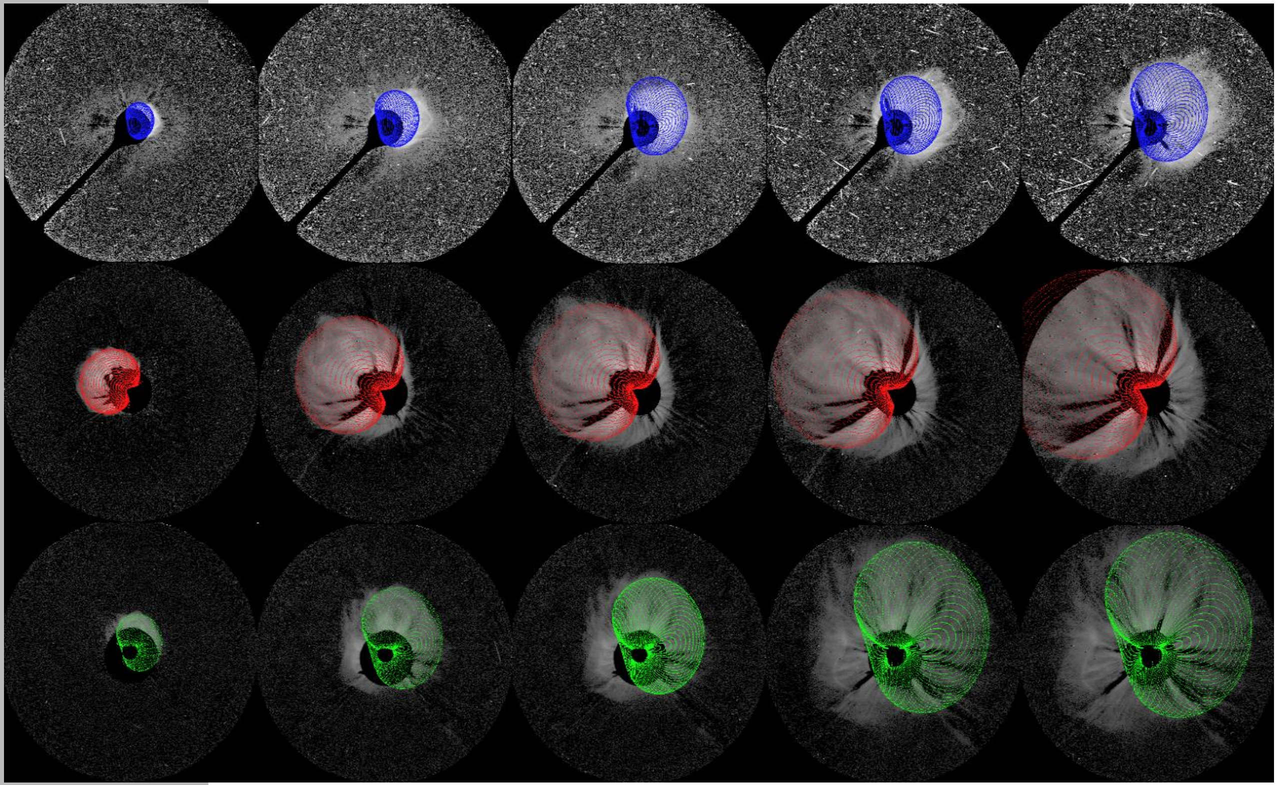






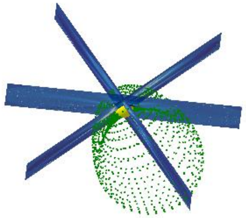
Bad modelling of GCS tilt parameter

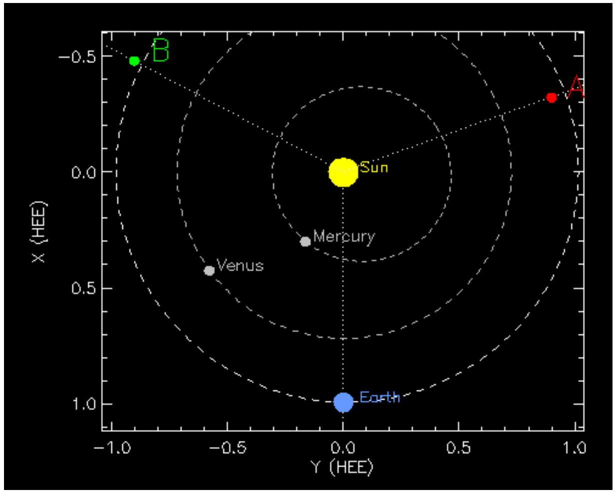
GCS Modelling with SOHO/LASCO C3 and STEREO COR 2 A & COR 2 B



Event: 2012-03-13

Illustration of Prespectives

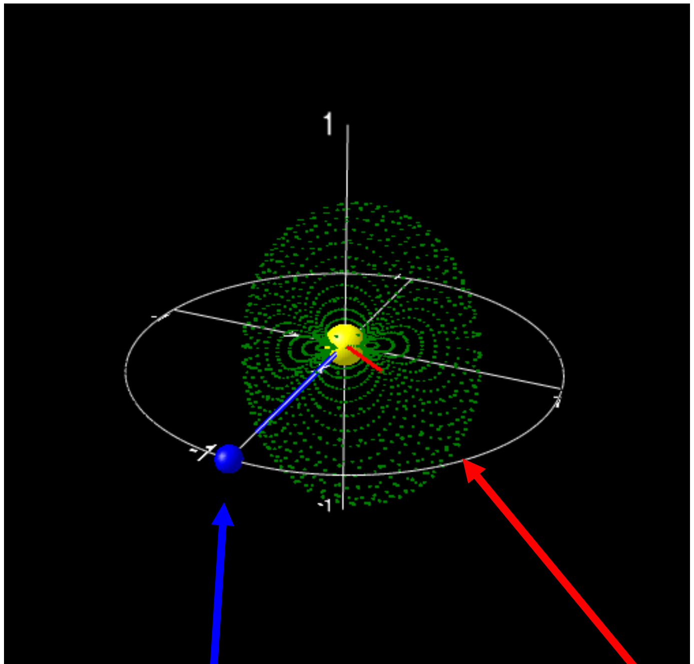


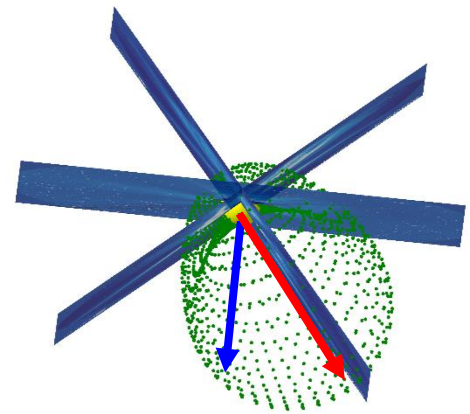


Stereo Orbital Tool

Reconstruction of Earth directed velocity

DoomsDay Calculater (unreleased software by UGOE)





Height in Earth direction

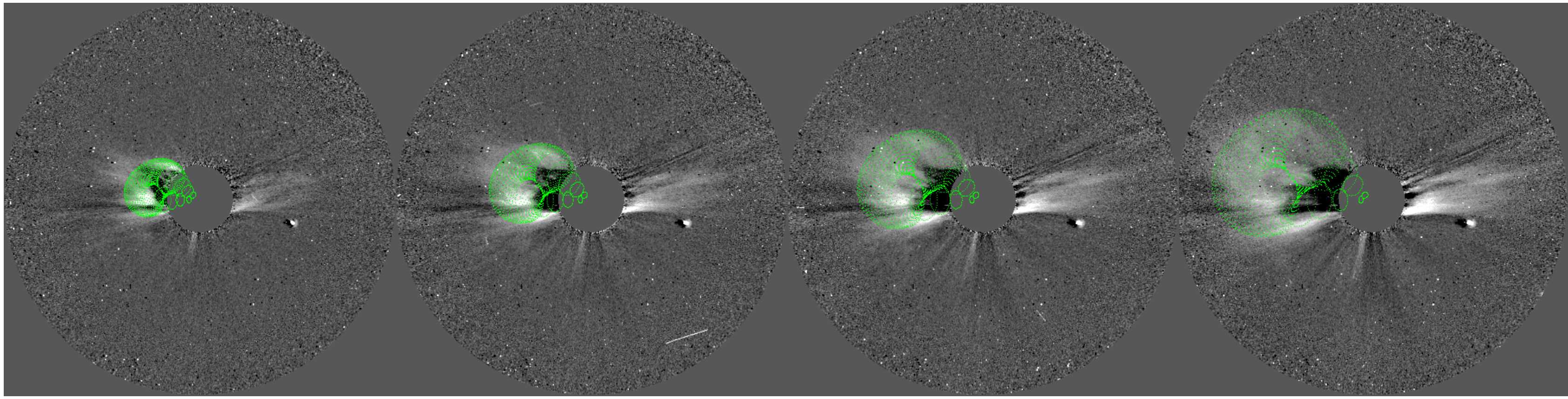
APEX
height

h_earth/h_apex=v_eart/v_apex=0.82

GCS modelling – COR2

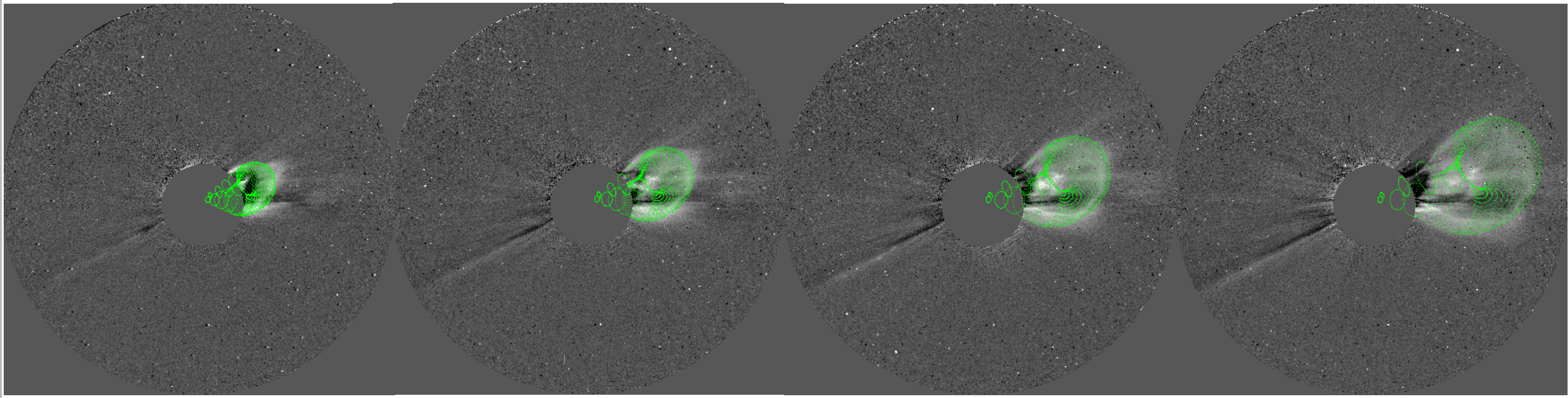
2008-12-12

COR2 A:



Time

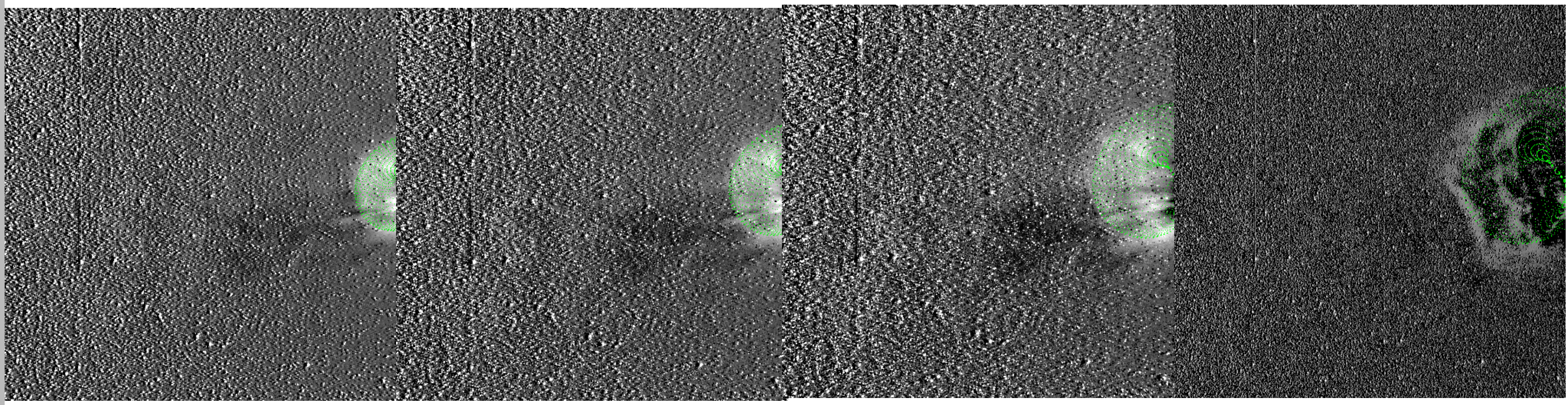
COR2 B:



GCS modelling – HI

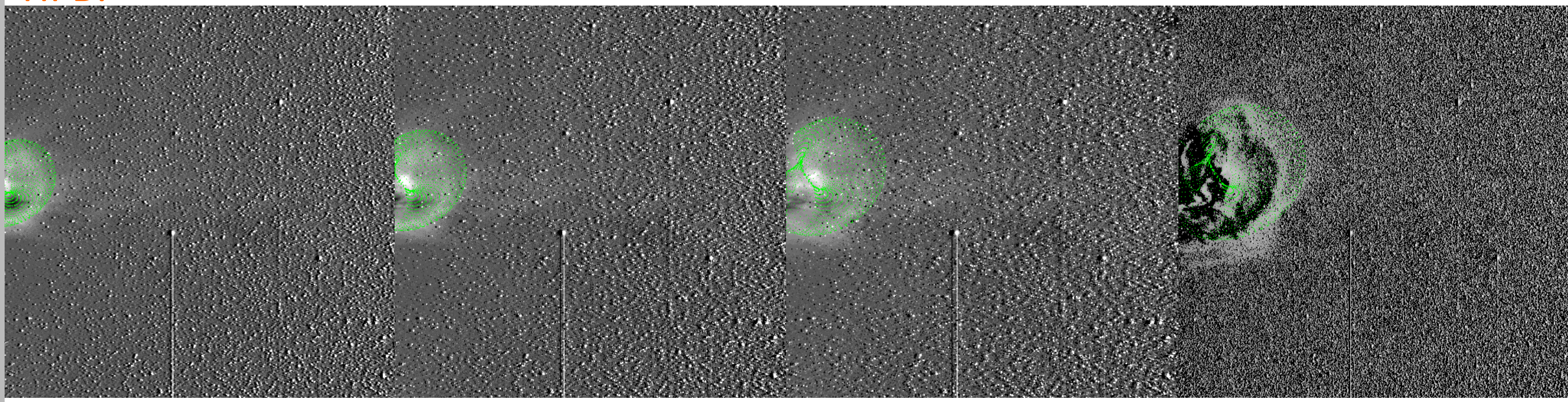
2008-12-12

HI A:



Time

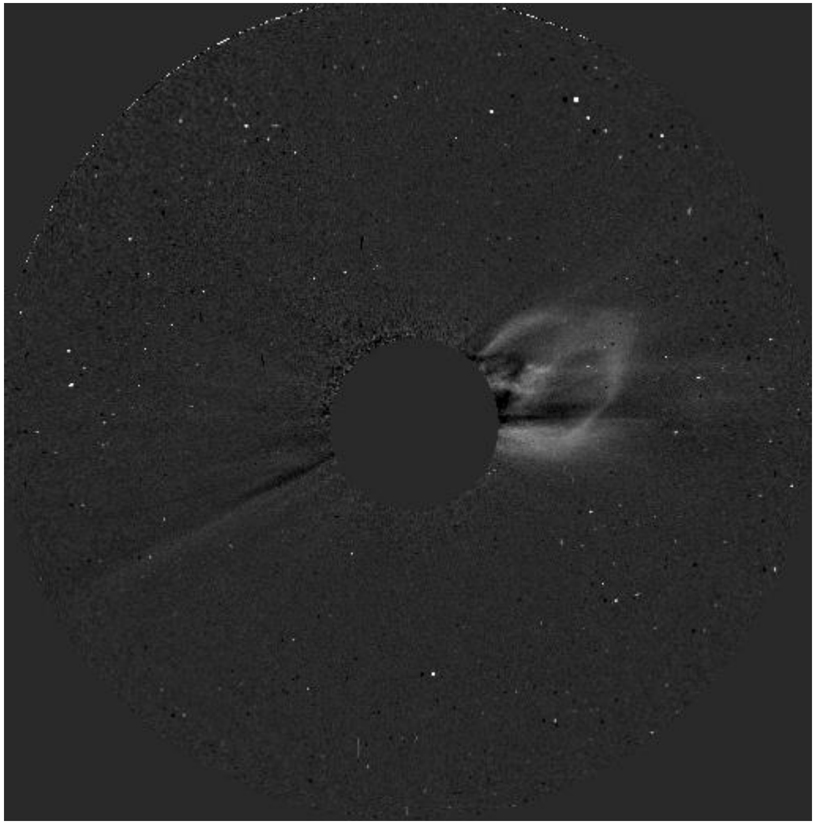
HI B:



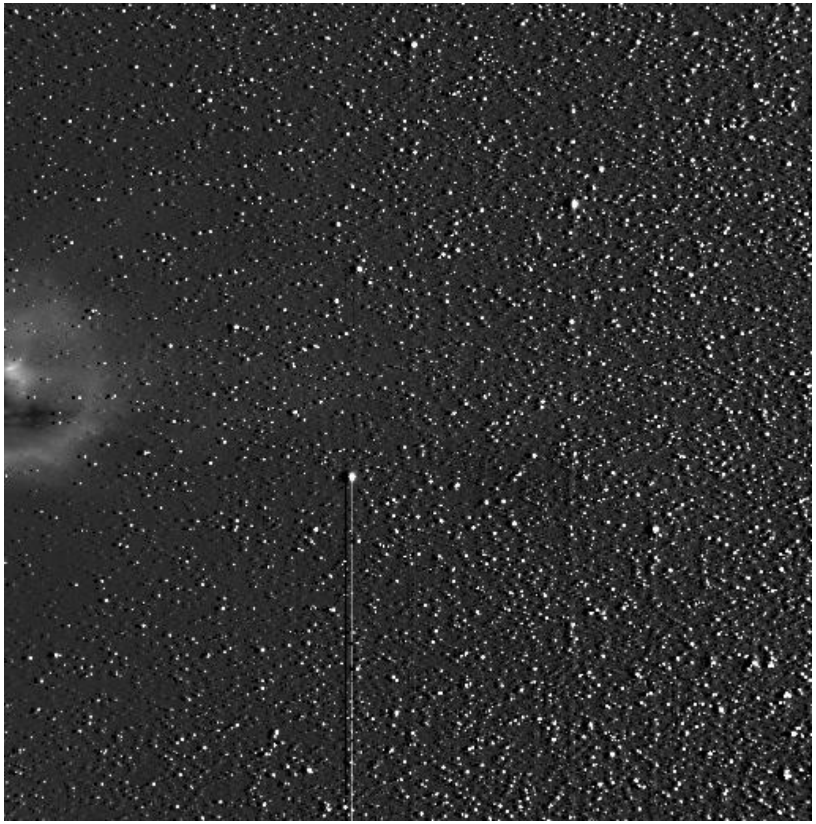
GCS modelling

2008-12-12

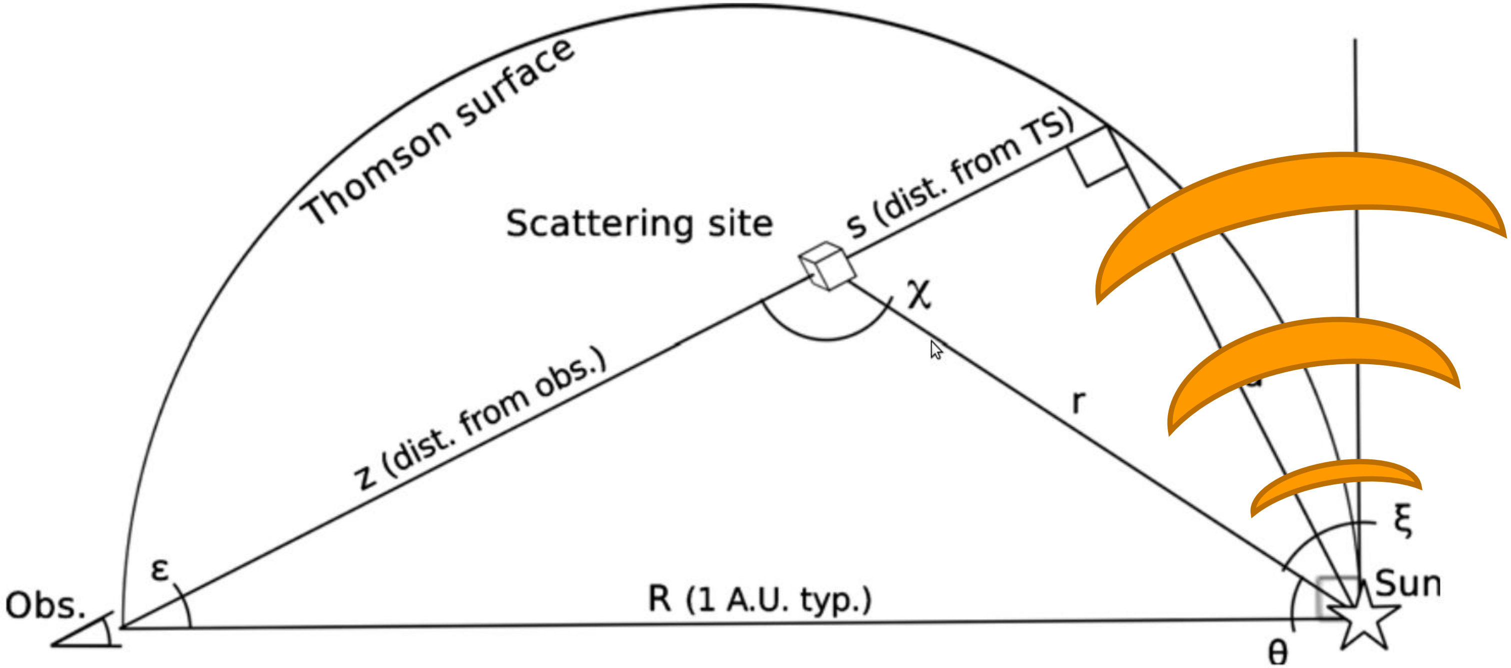
COR2 B:



HI B:

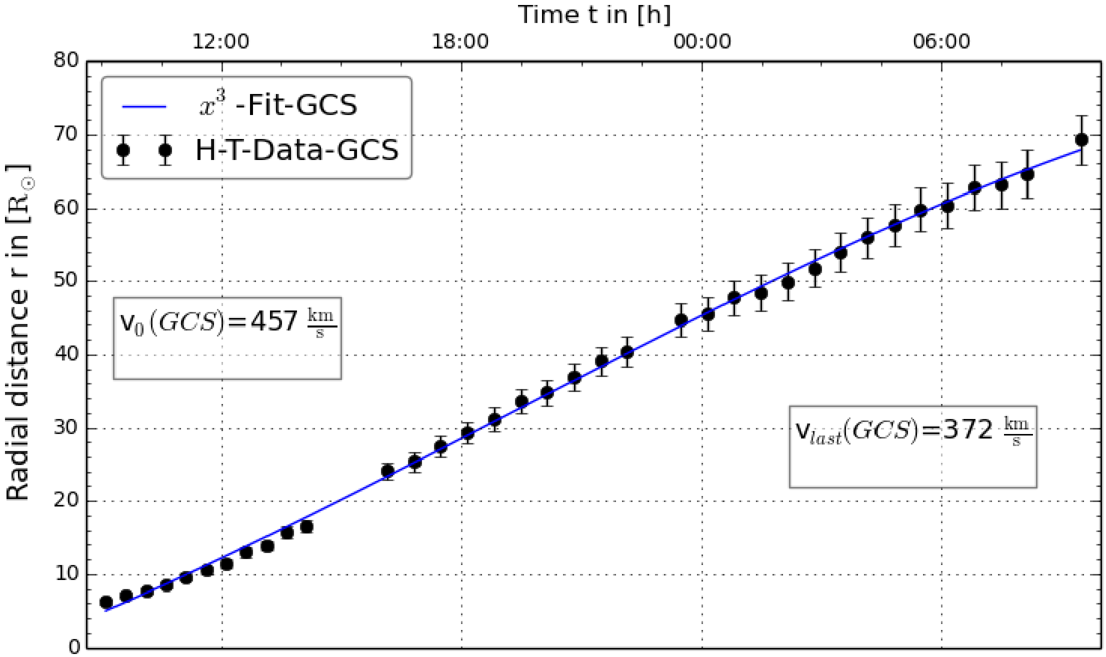


GCS modelling – Problems

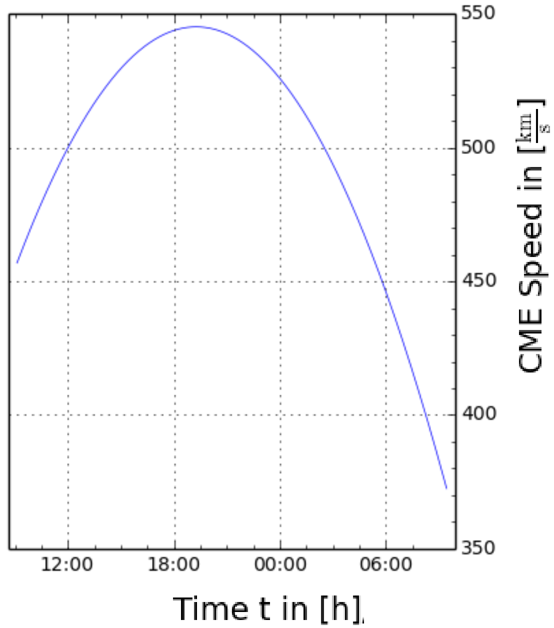


T.A. Howard, C.E. DeForest: The Thomson Surface. I. Reality and Myth, 2012, The Astrophysical Journal, 752: 130 (13pp)

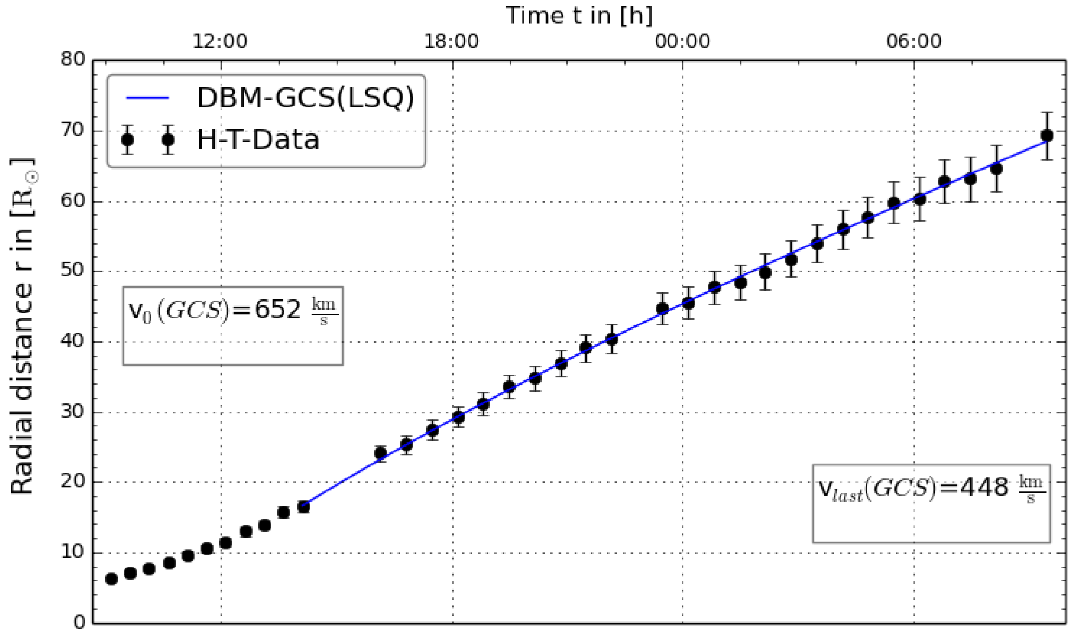
GCS modelling – H-T-profiles



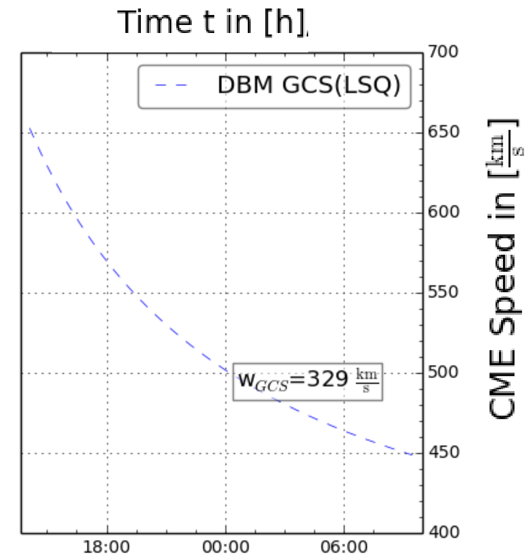
2008-12-12

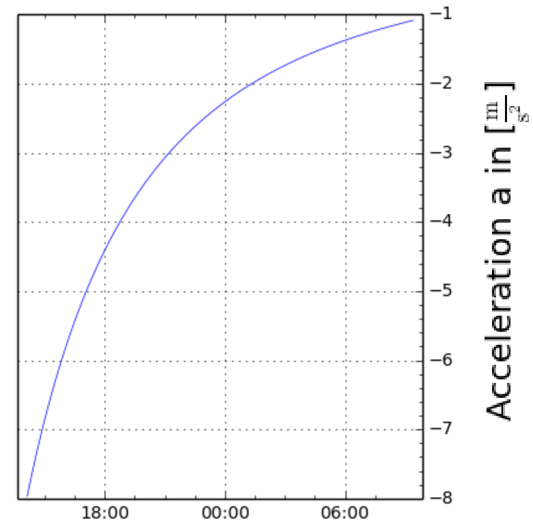


GCS modelling – H-T-profiles



2008-12-12





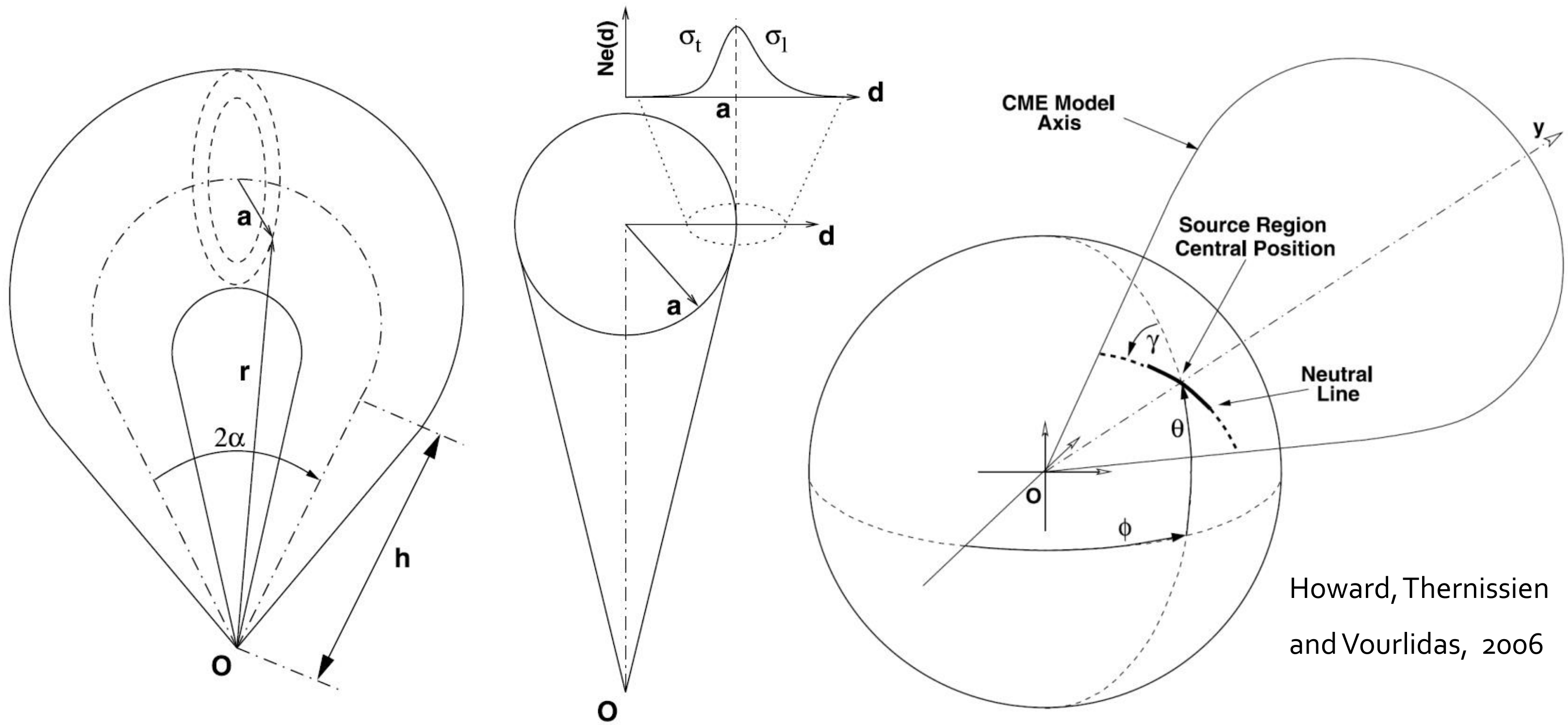
Drag takes over between 15 – 50 solar radii

(Sachdeva, CME Proppagation, 2015,
The Astrophysical Journal, 809: 158 (8pp))

<u>HI-Speeds:</u>

456 $^{km}/_{s}$ (FPF), 470 $^{km}/_{s}$ (SSEF), 481 $^{km}/_{s}$ (HMF)

Geometry of Graduated Cylindrical Shell (GCS) Model



Howard, Thernissien and Vourlidas, 2006

Parameter and electron density distribution

2α	angle between both legs		
h	height of the legs	Φ	longitude
h_{front}	distance between O (sun center) & leading edge	θ	latitude
a	radius of cross-section	γ	tilt angle
r	distance between sun center & boundary point of GCS		
$\kappa = a/r$	aspect ratio	σ_t	Gaussian width of density profile inside GCS
N_e	electron density	σ_l	Gaussian width of density profile outside GCS