# Wieso können wir Sonnenstürme nicht vorhersagen?


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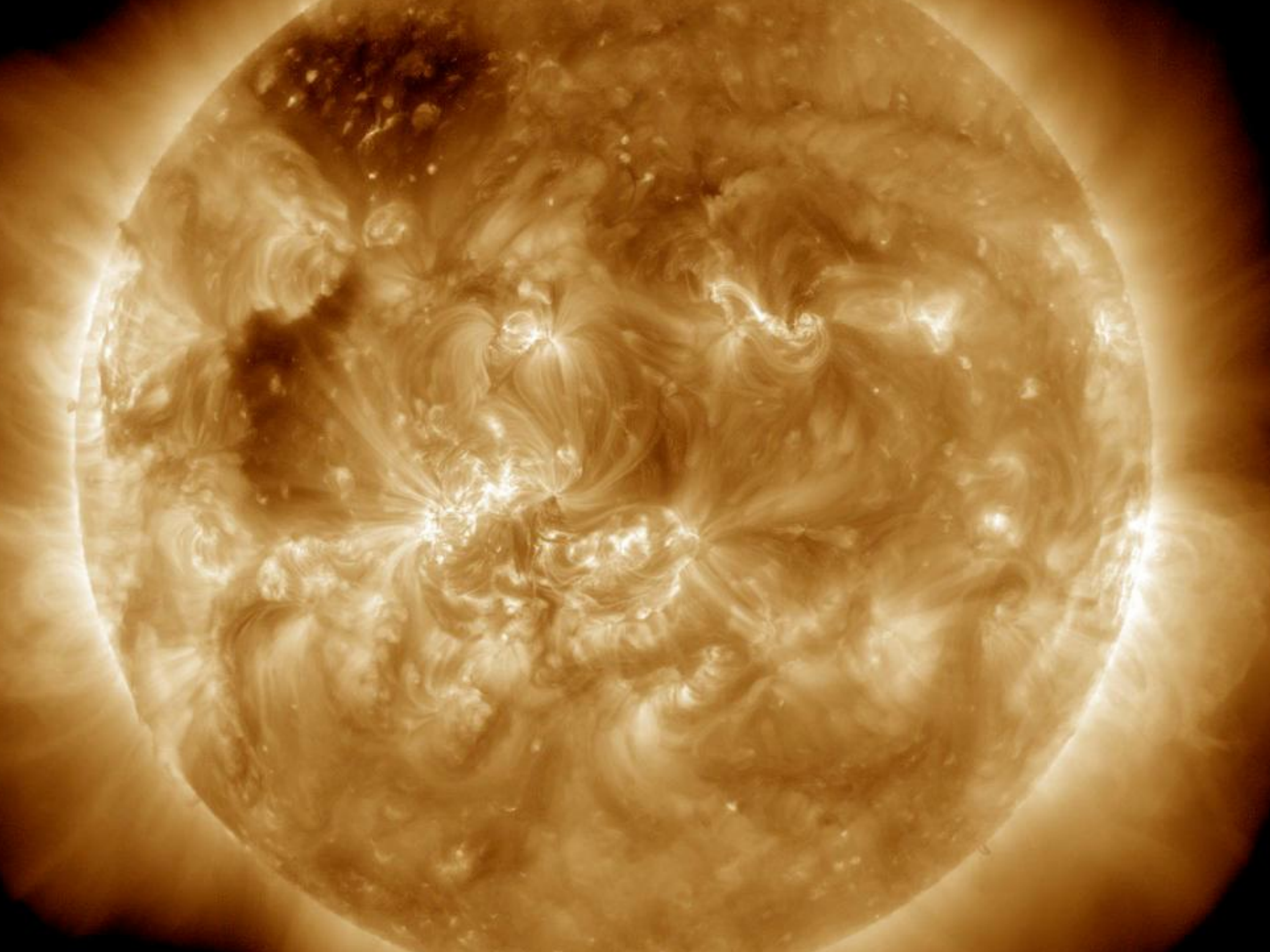
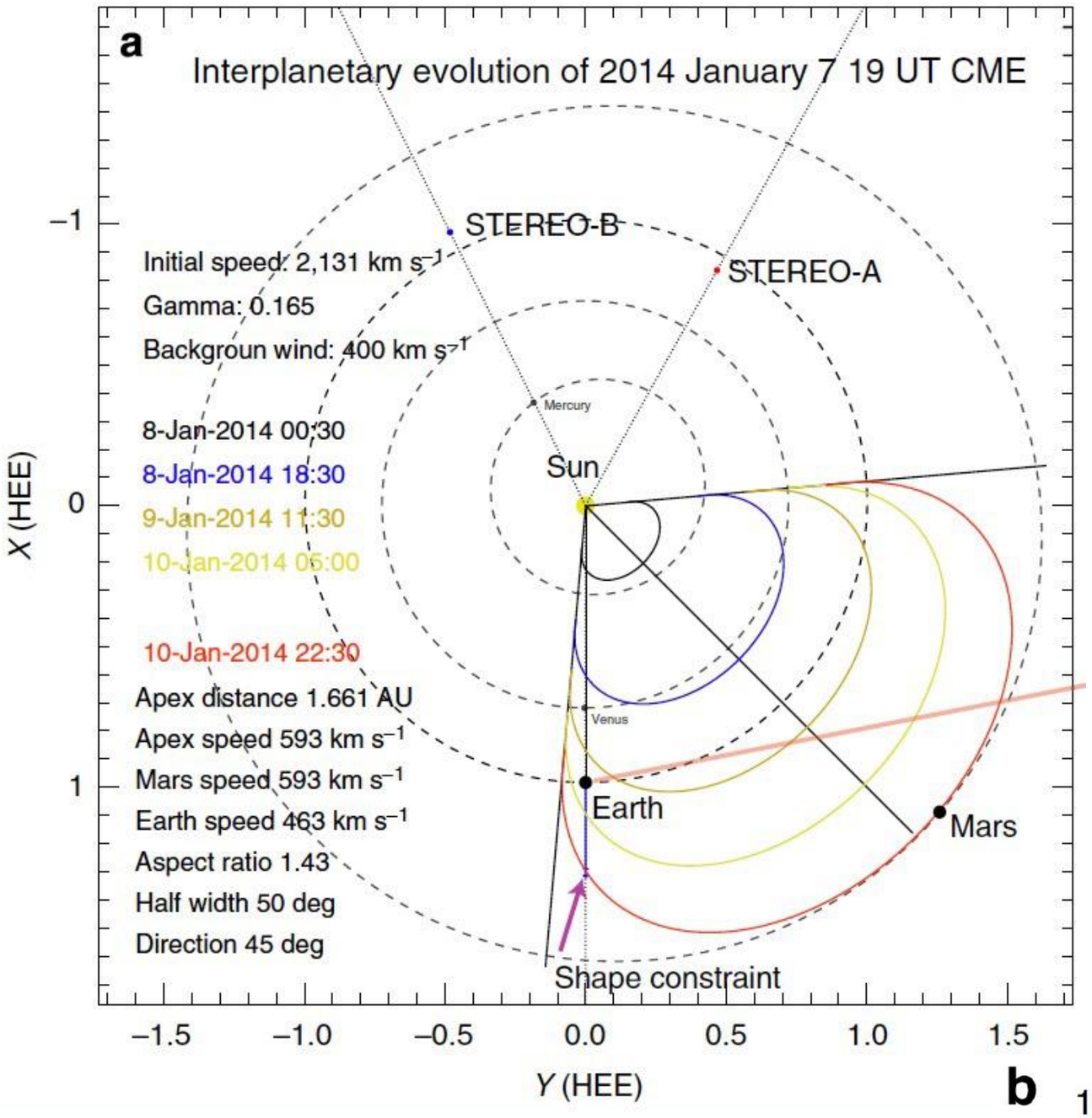
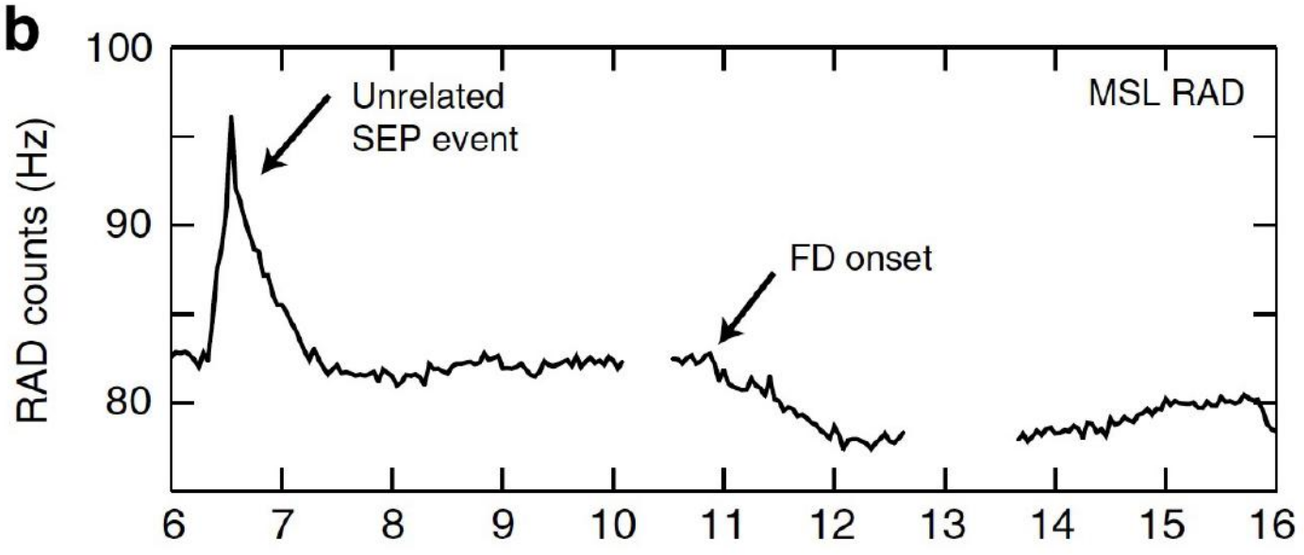
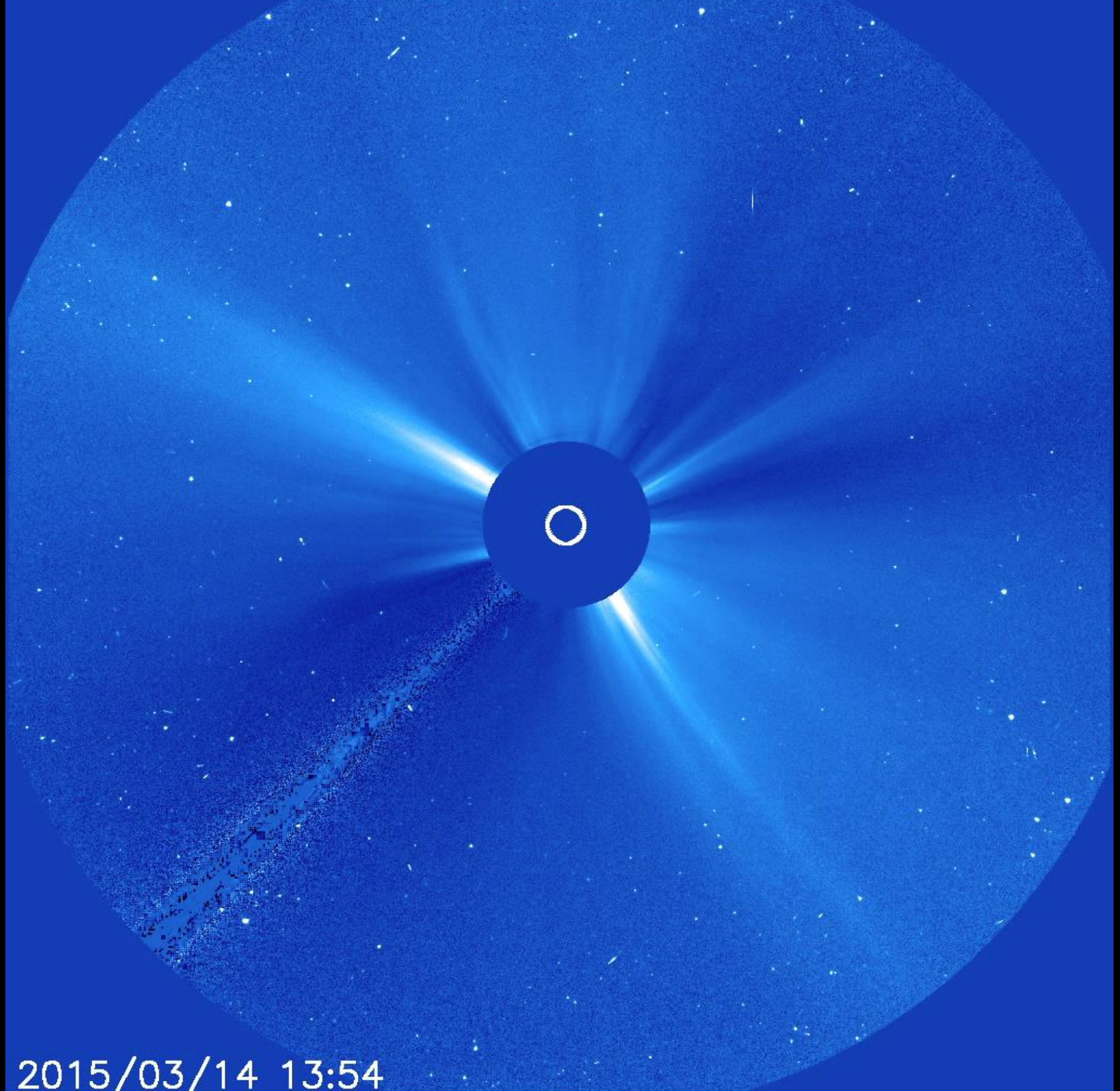





**Möstl et al. 2015**
**Nature Communications**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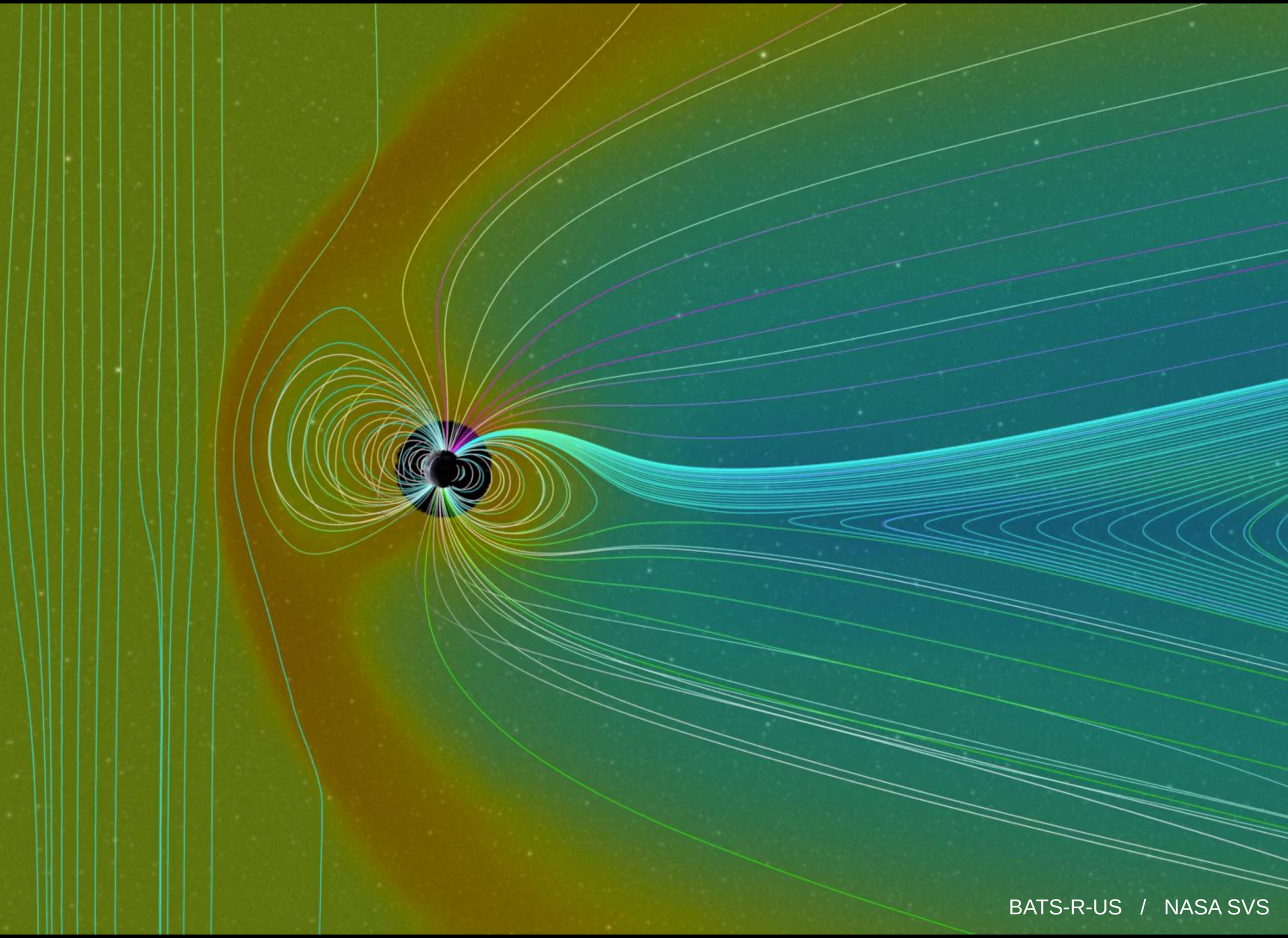
Terry Wirts @AstroTerry
@TamithaSkov
@halocme
@chrisoutofspace

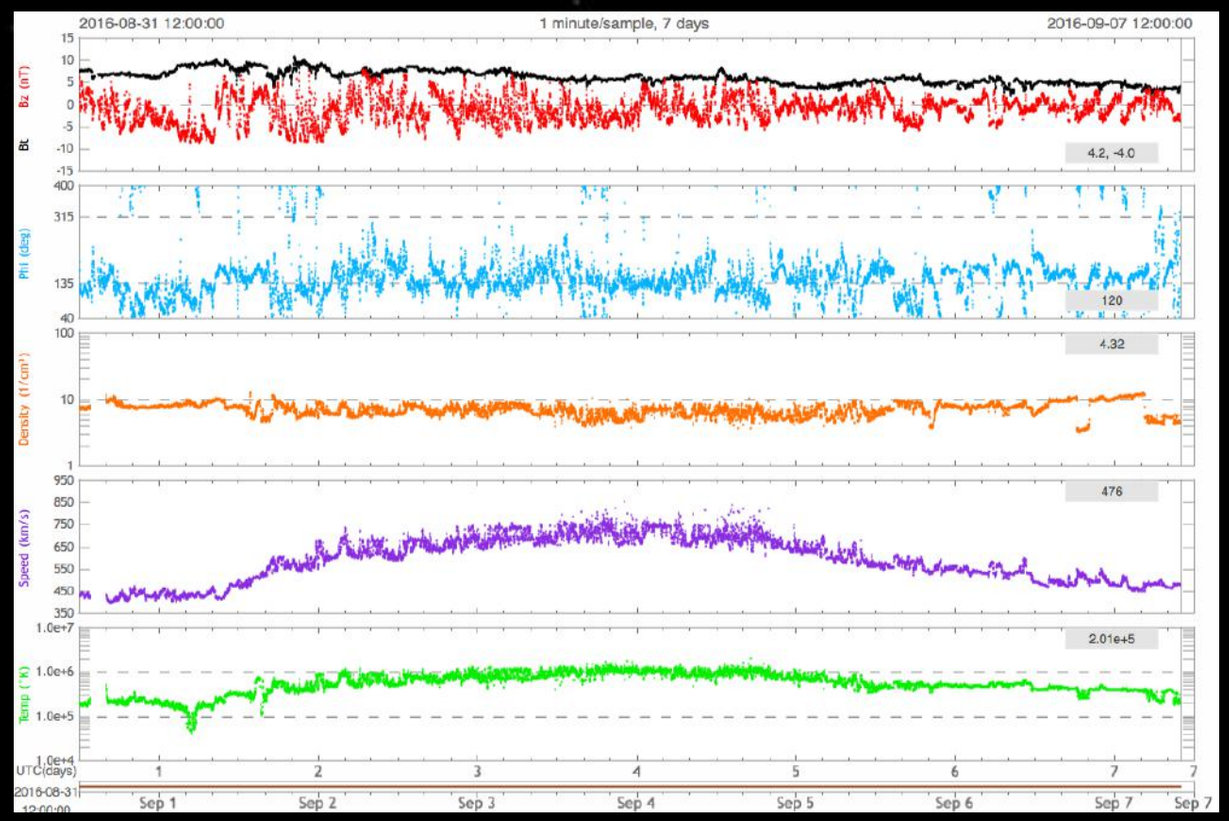
Herfried Eisler

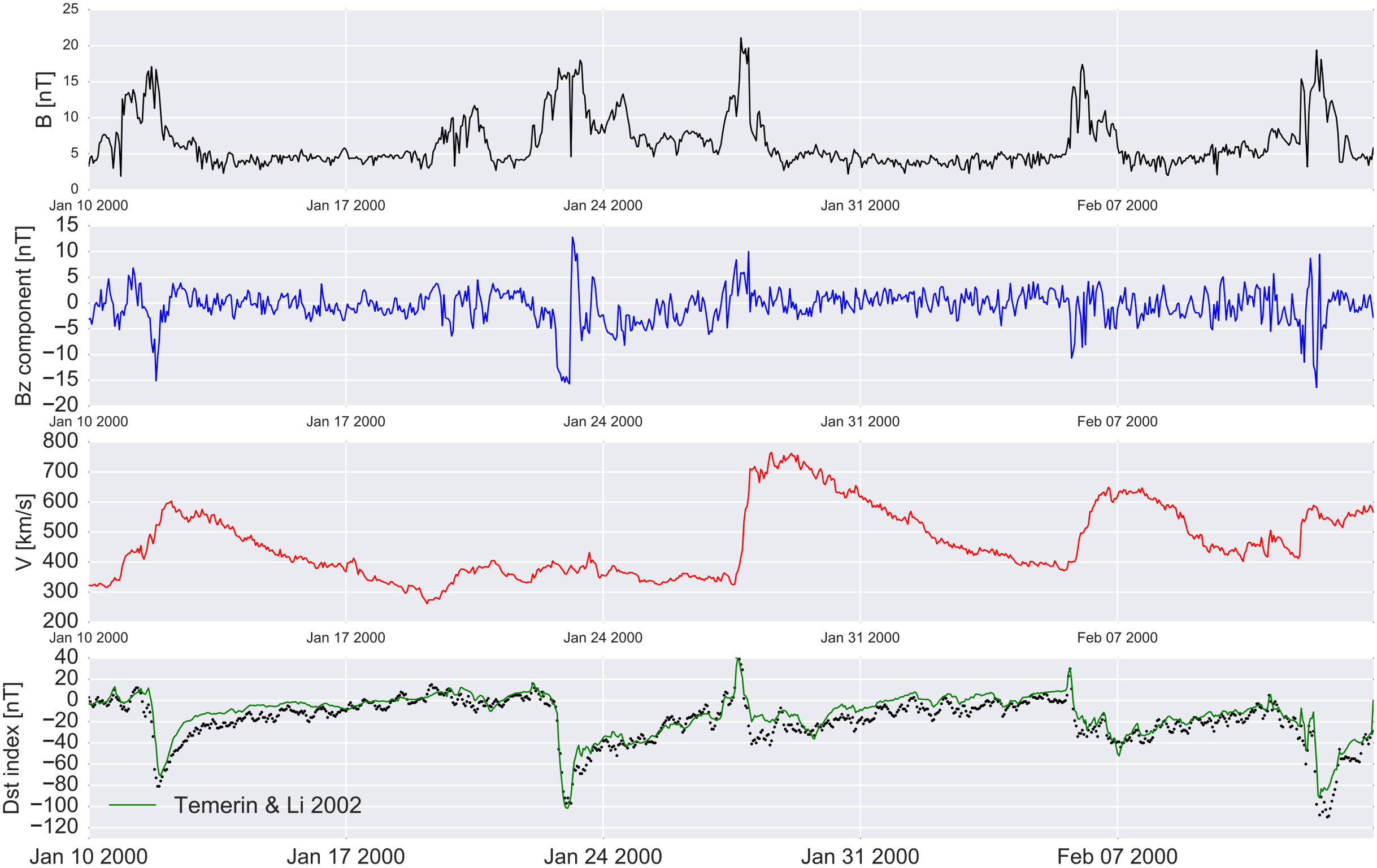

BATS-R-US / NASA SVS

# State of the Art

NASA's Eyes

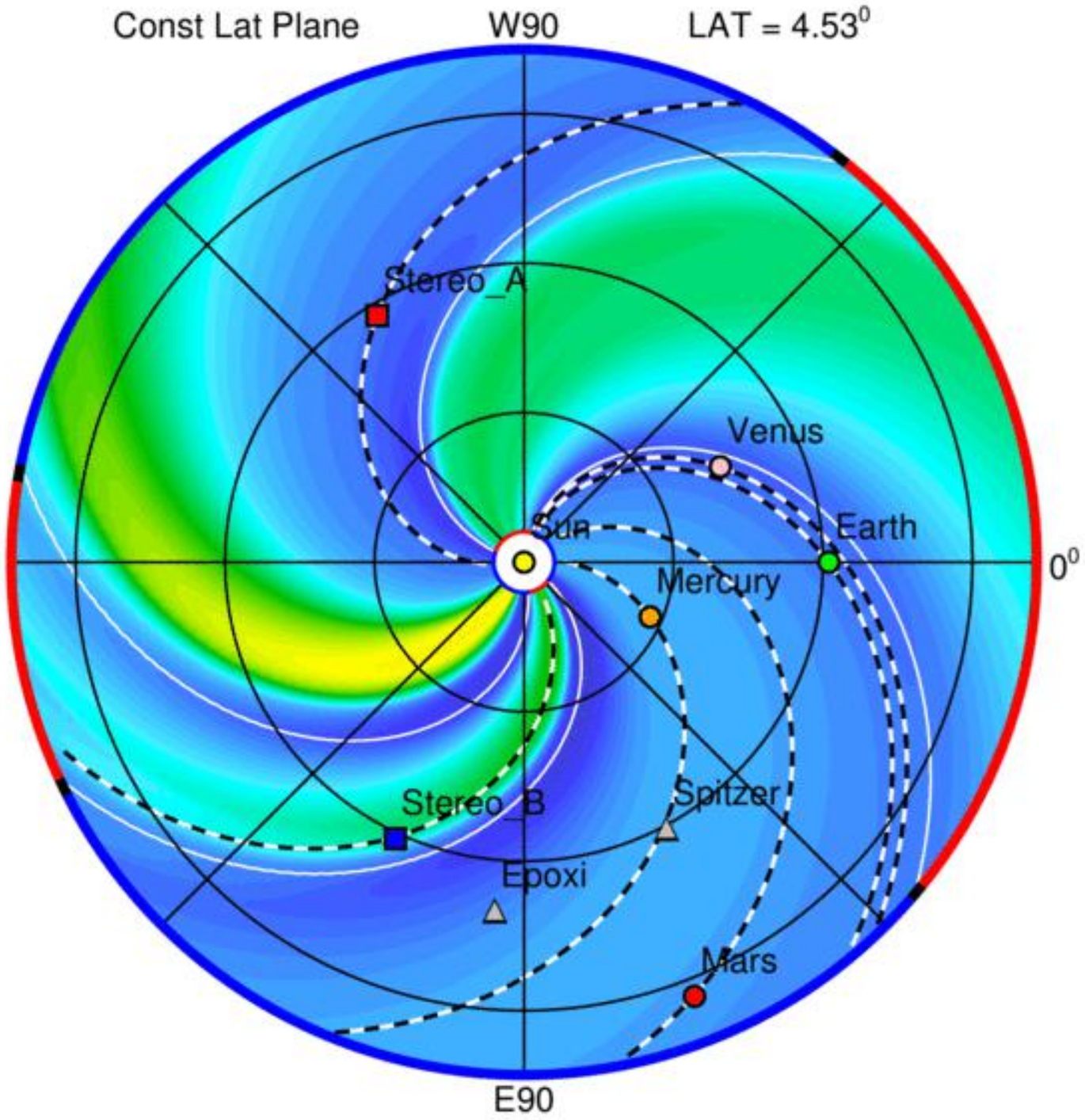
# DSCOVR




$$\text{Dst} \sim \text{solar wind speed}^{2} \quad -\text{Bz}^{1} \quad \text{density}^{0.5}$$

2012-07-17T00:00

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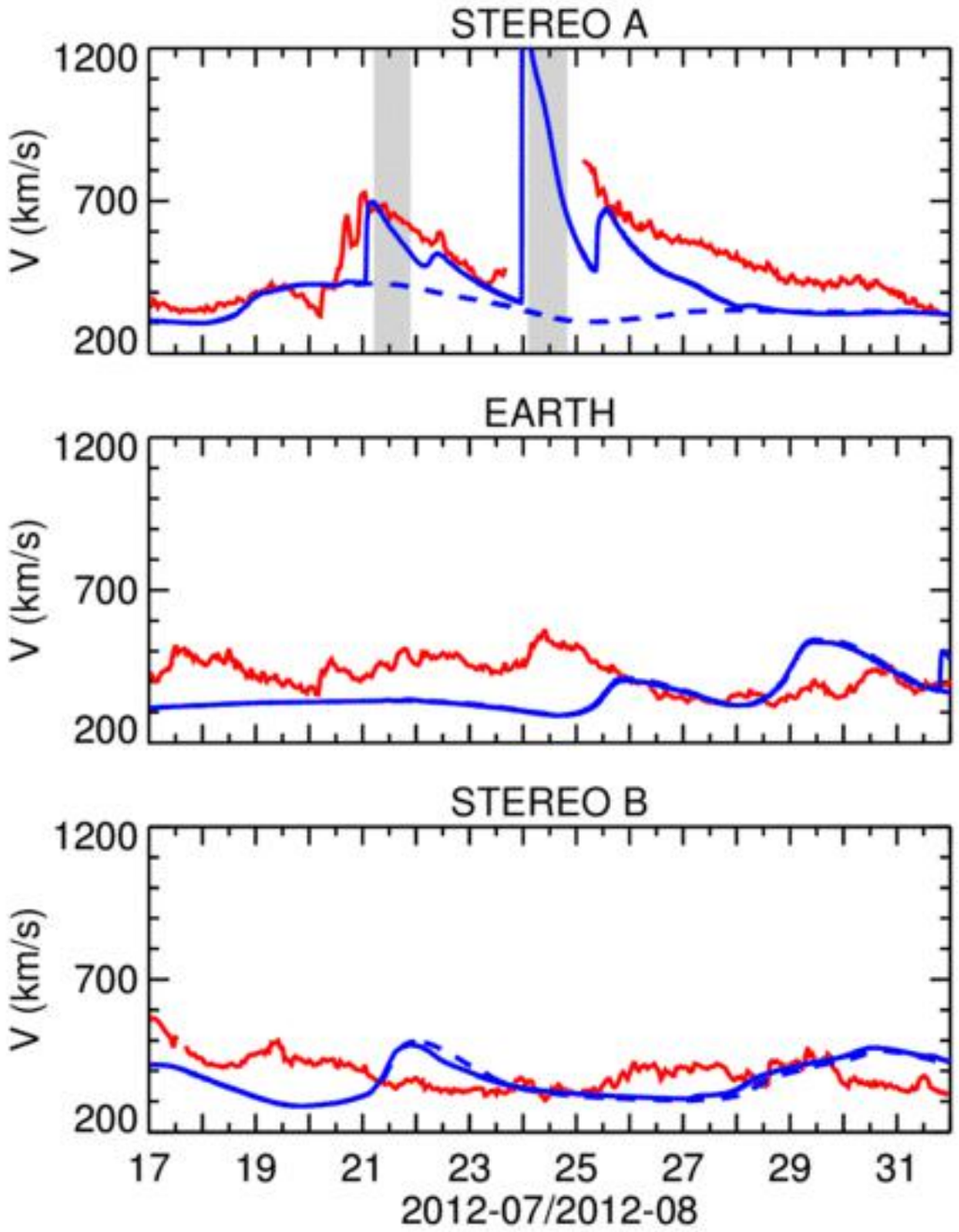
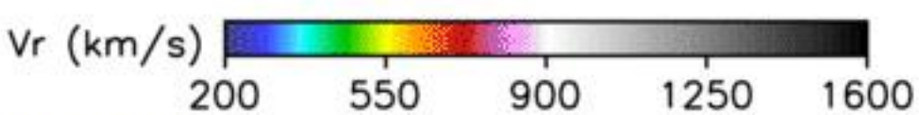
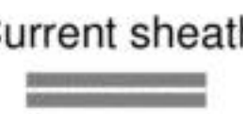






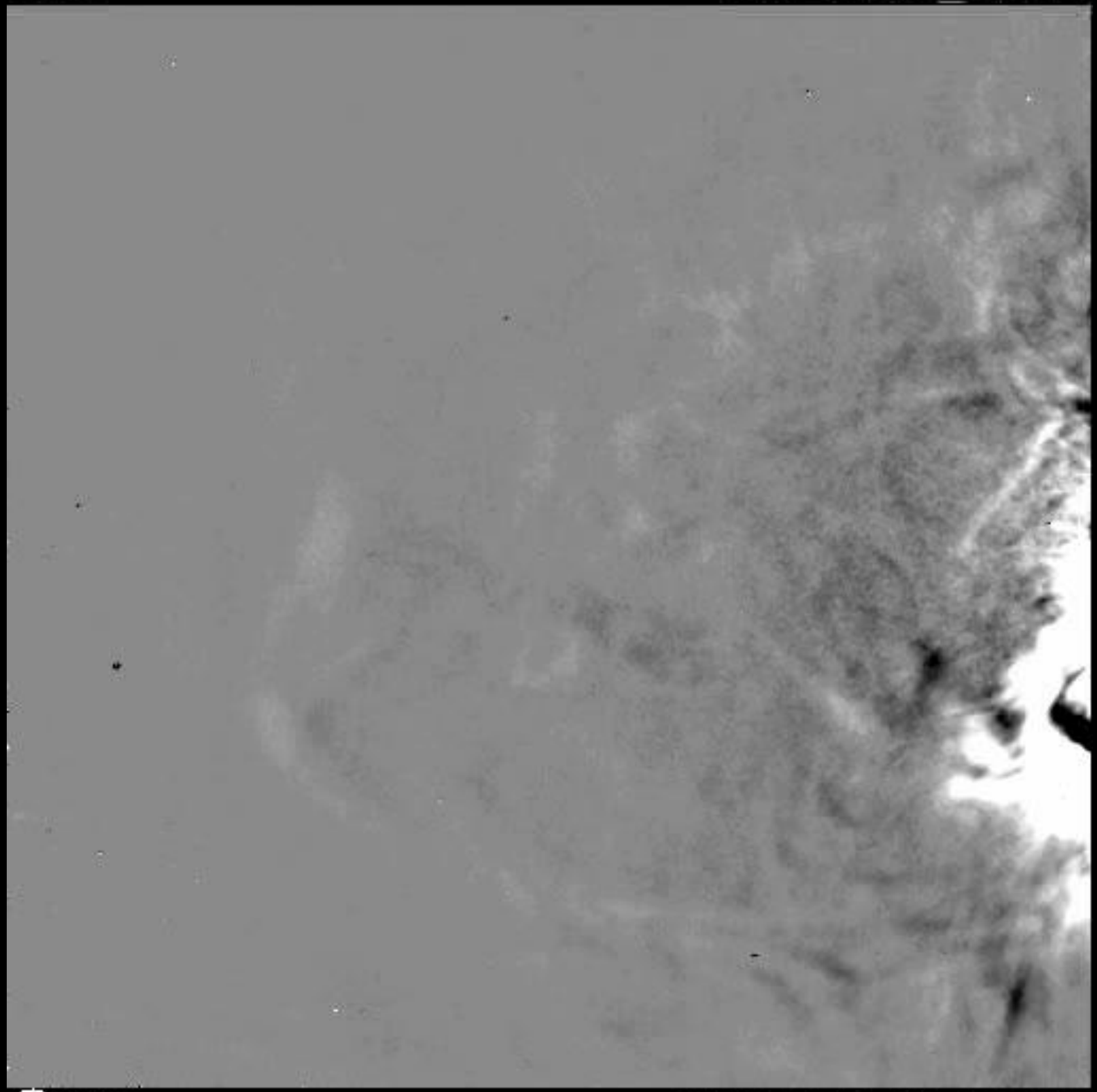



ENLIL-WSA-CONE

HELIO WEATHER

RAL

STEREO_A HI1



SECCHI

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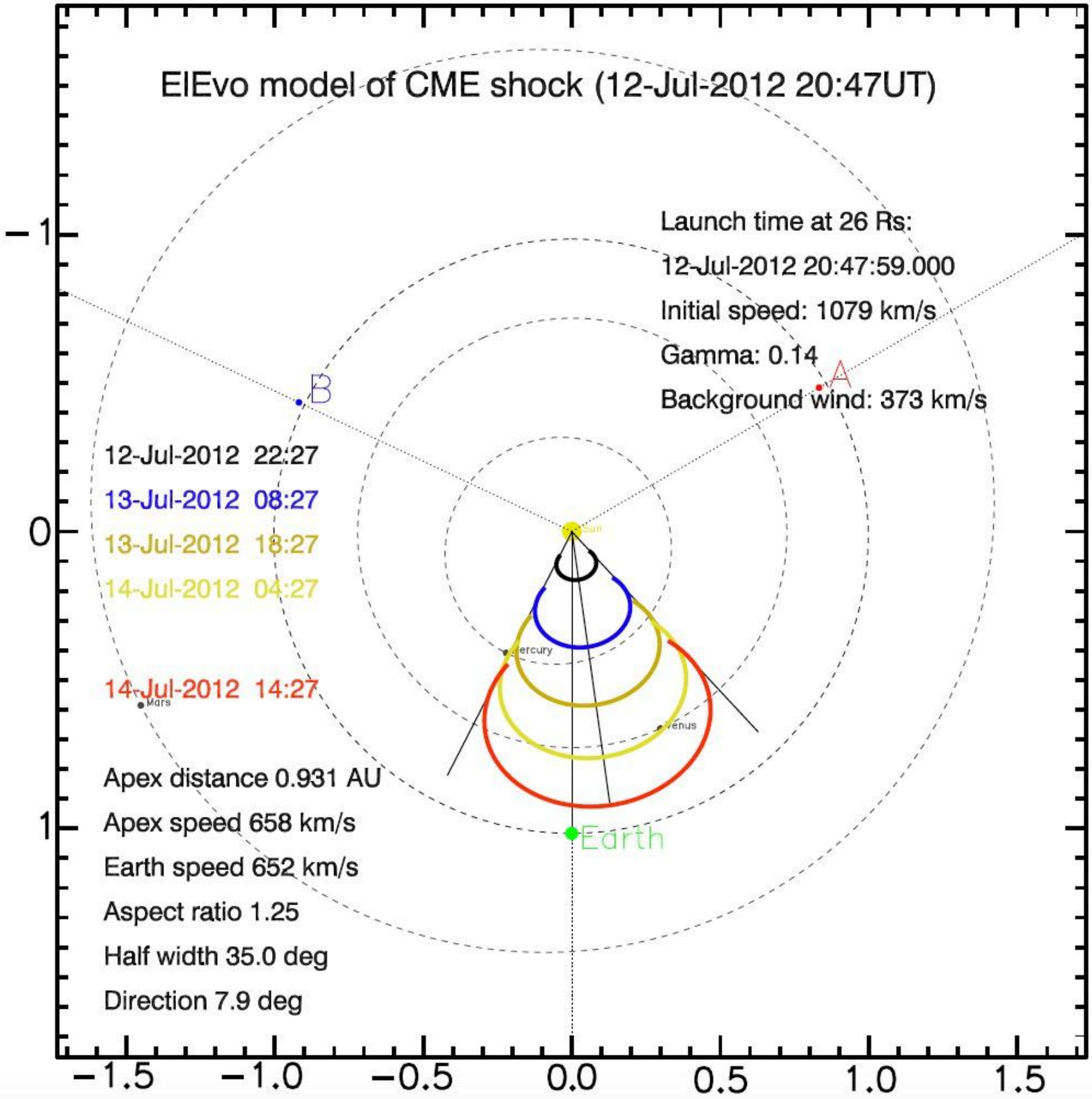
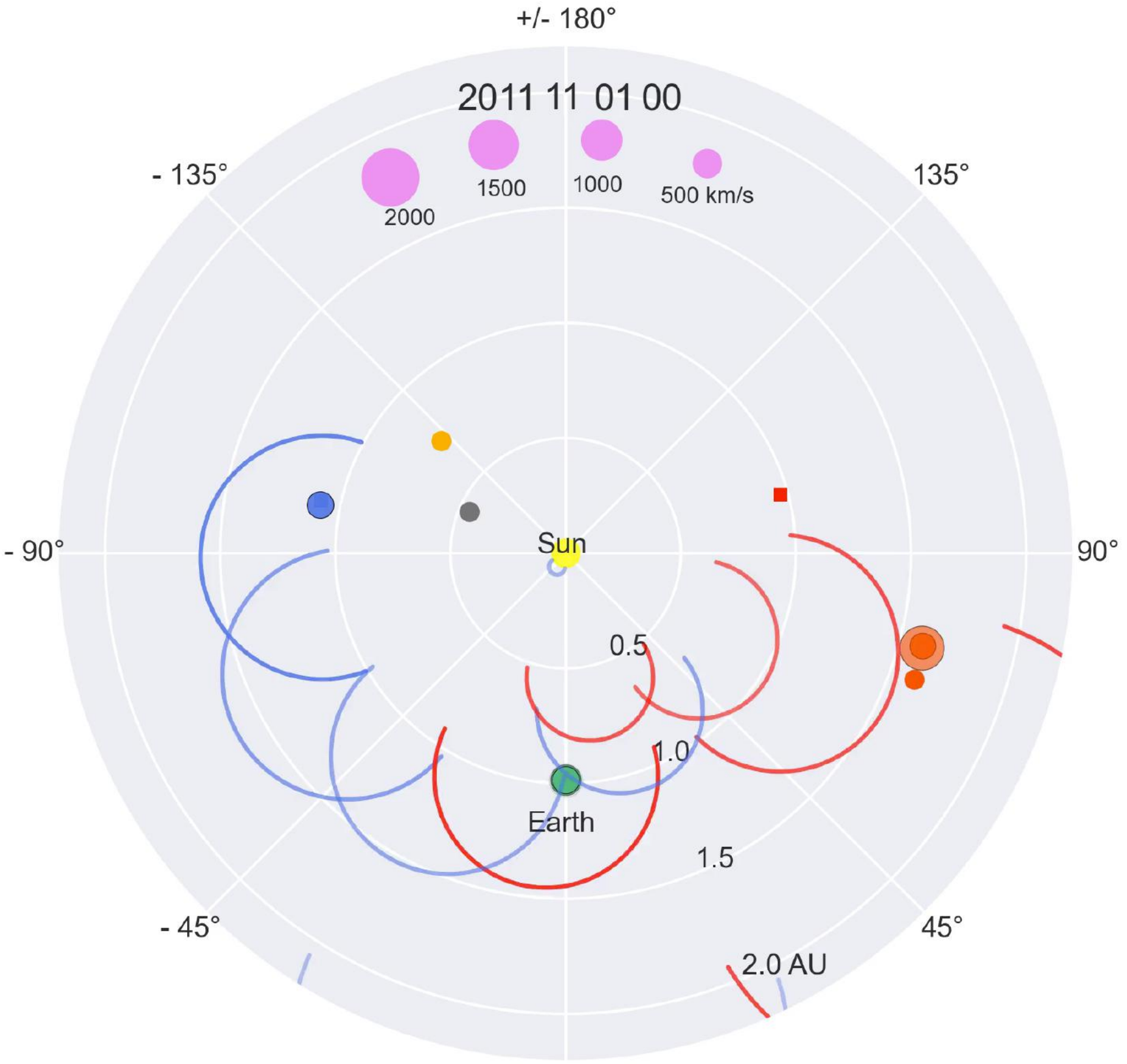
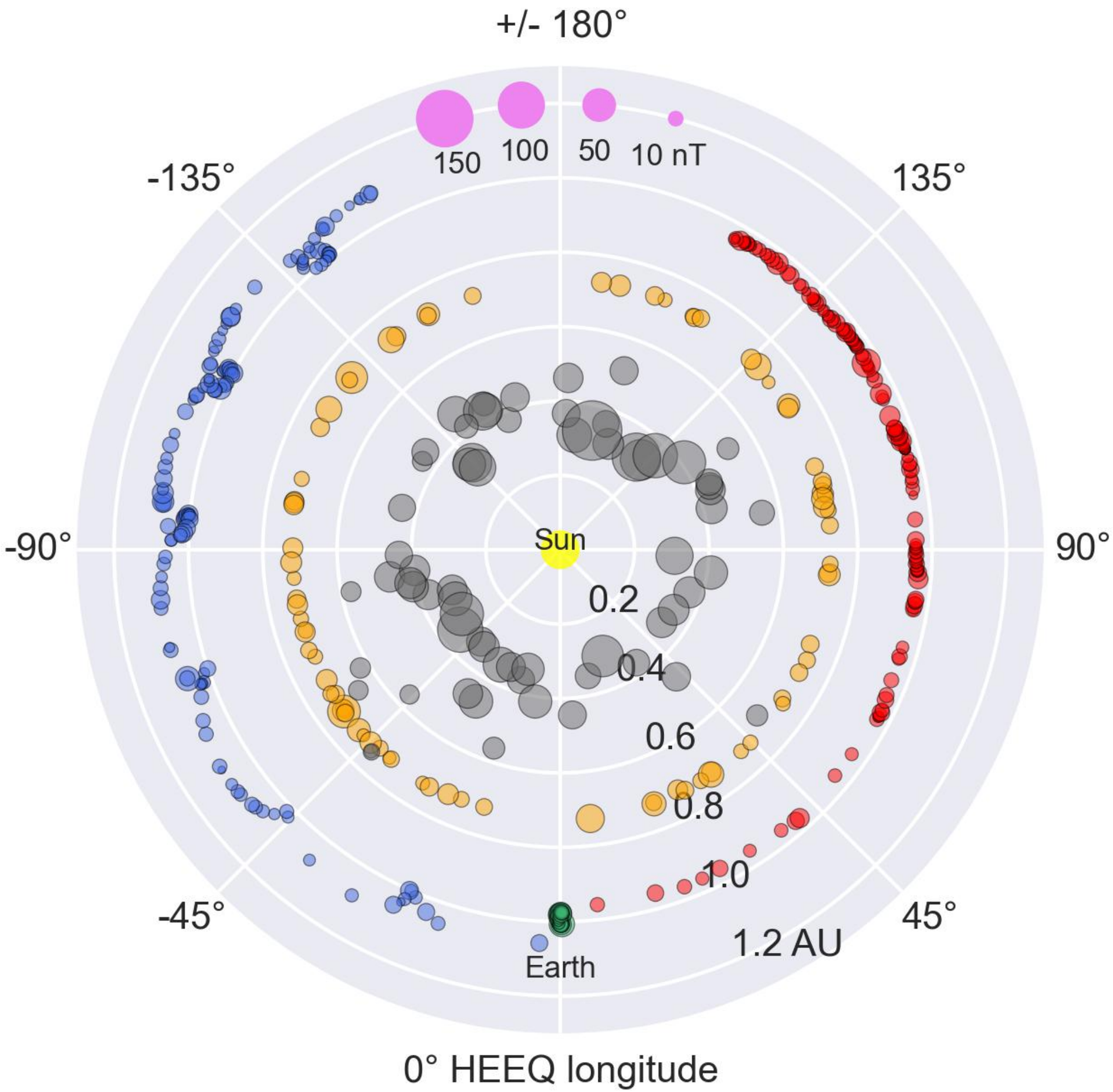



**Rollett et al. 2016 ApJ**

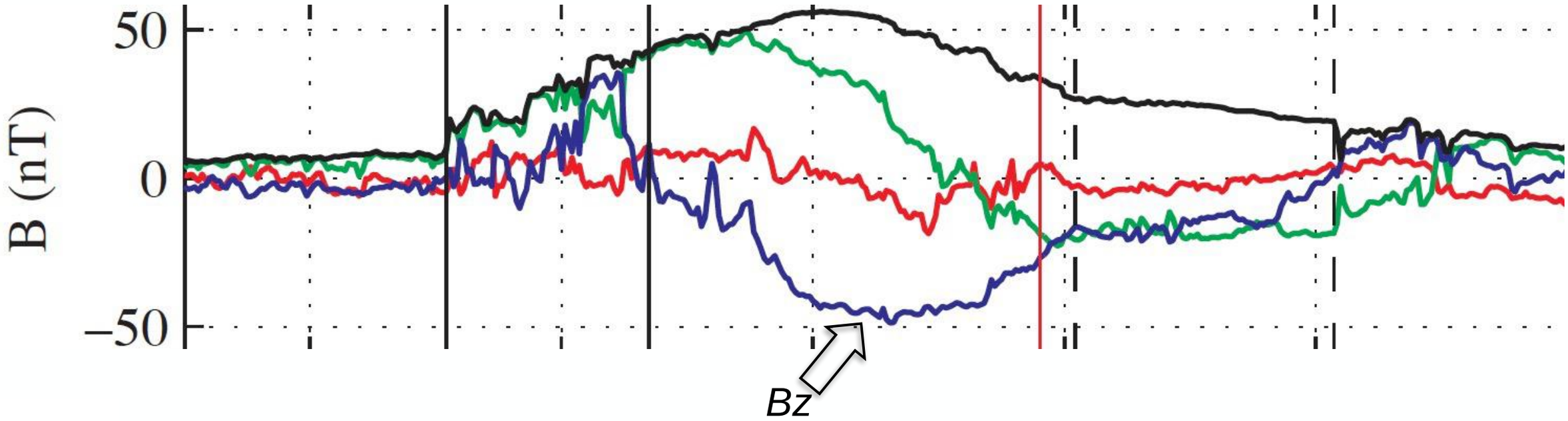


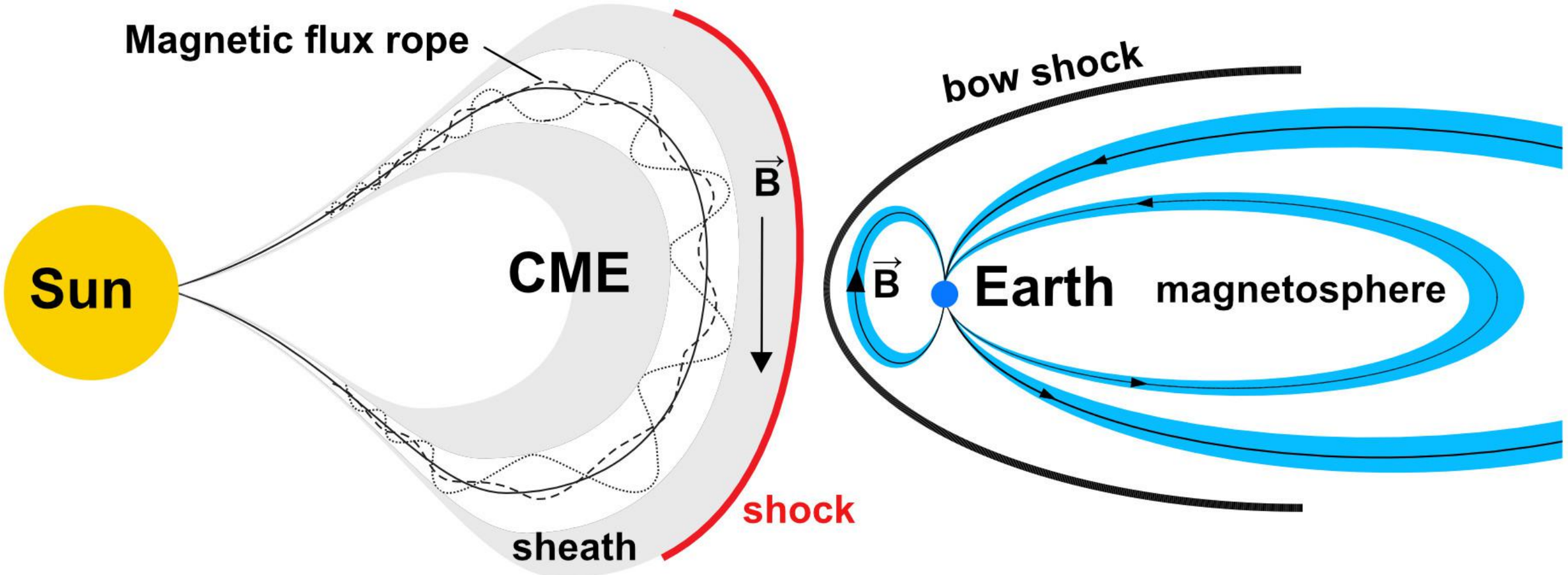


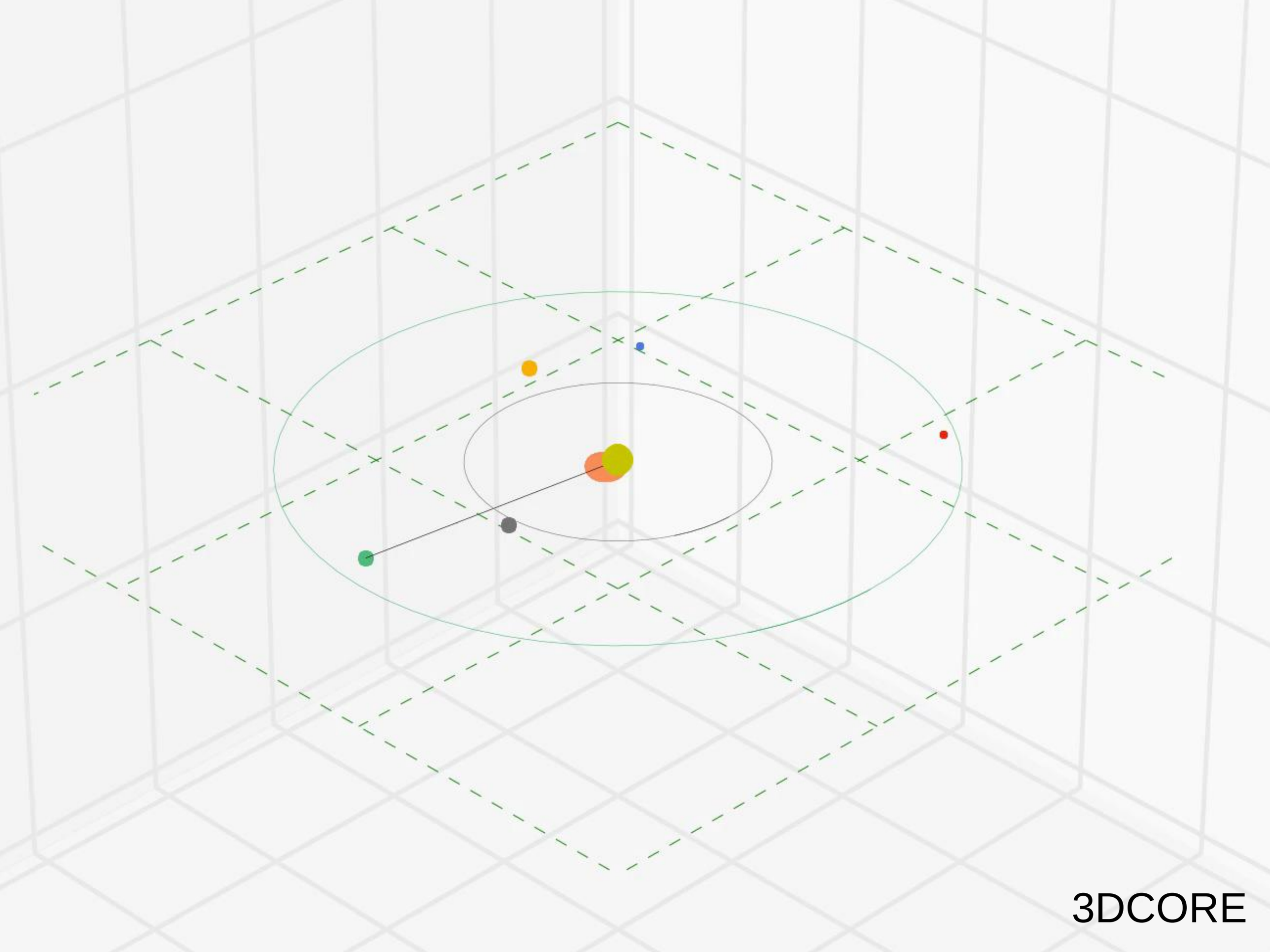

Mercury MESSENGER Venus STEREO-A STEREO-B Earth Mars MSL Maven Rosetta

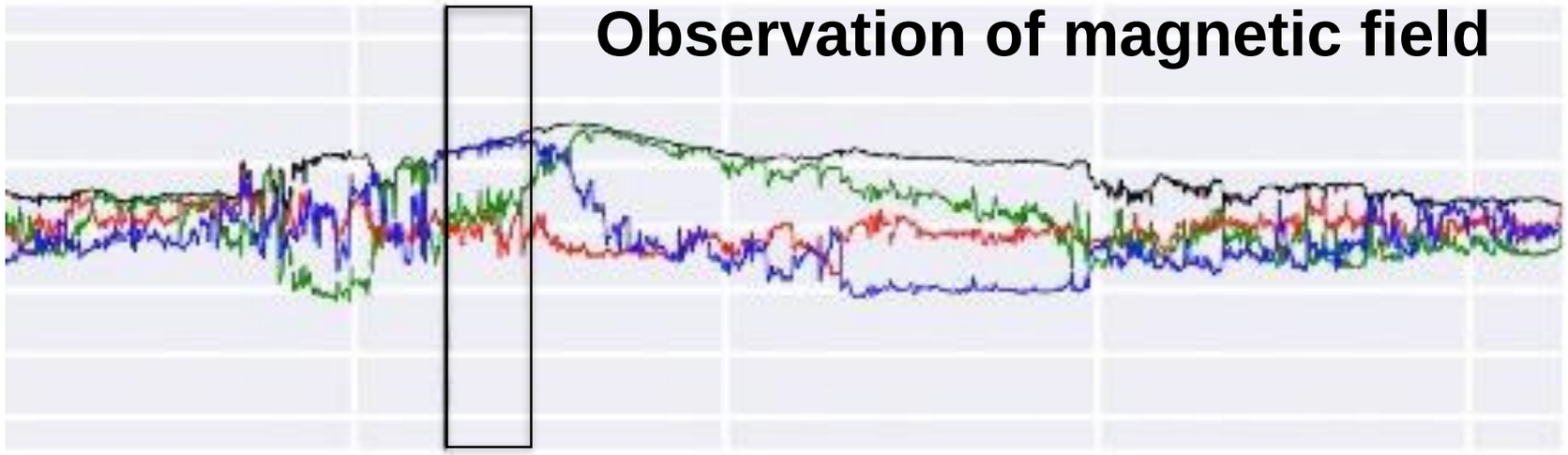

+/- 180°
-135°
135°
-90°
90°
-45°
45°
150
100
50
10 nT
Sun
0.2
0.4
0.6
0.8
1.0
1.2 AU
Earth
0° HEEQ longitude

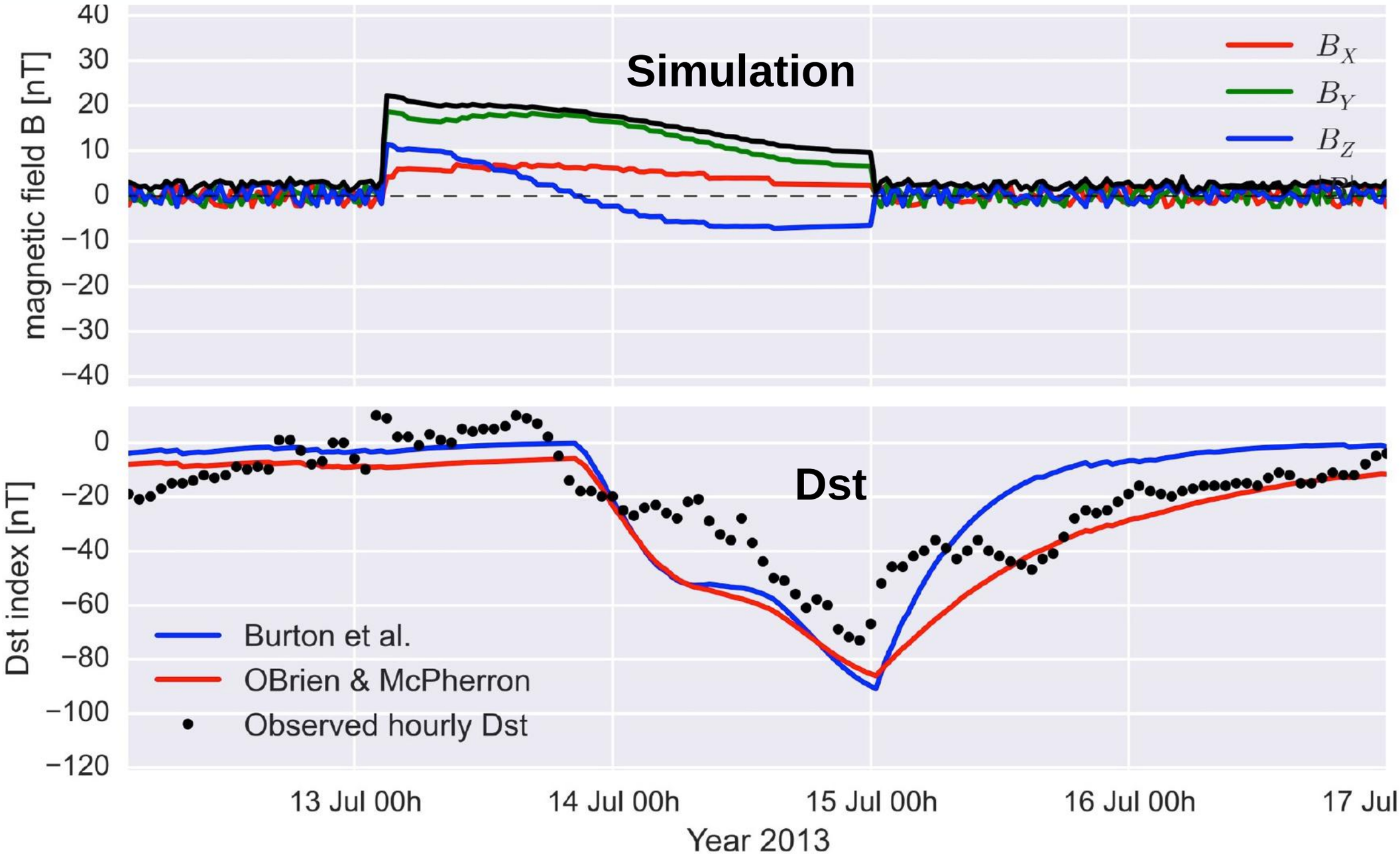
# Das *Bz* Problem

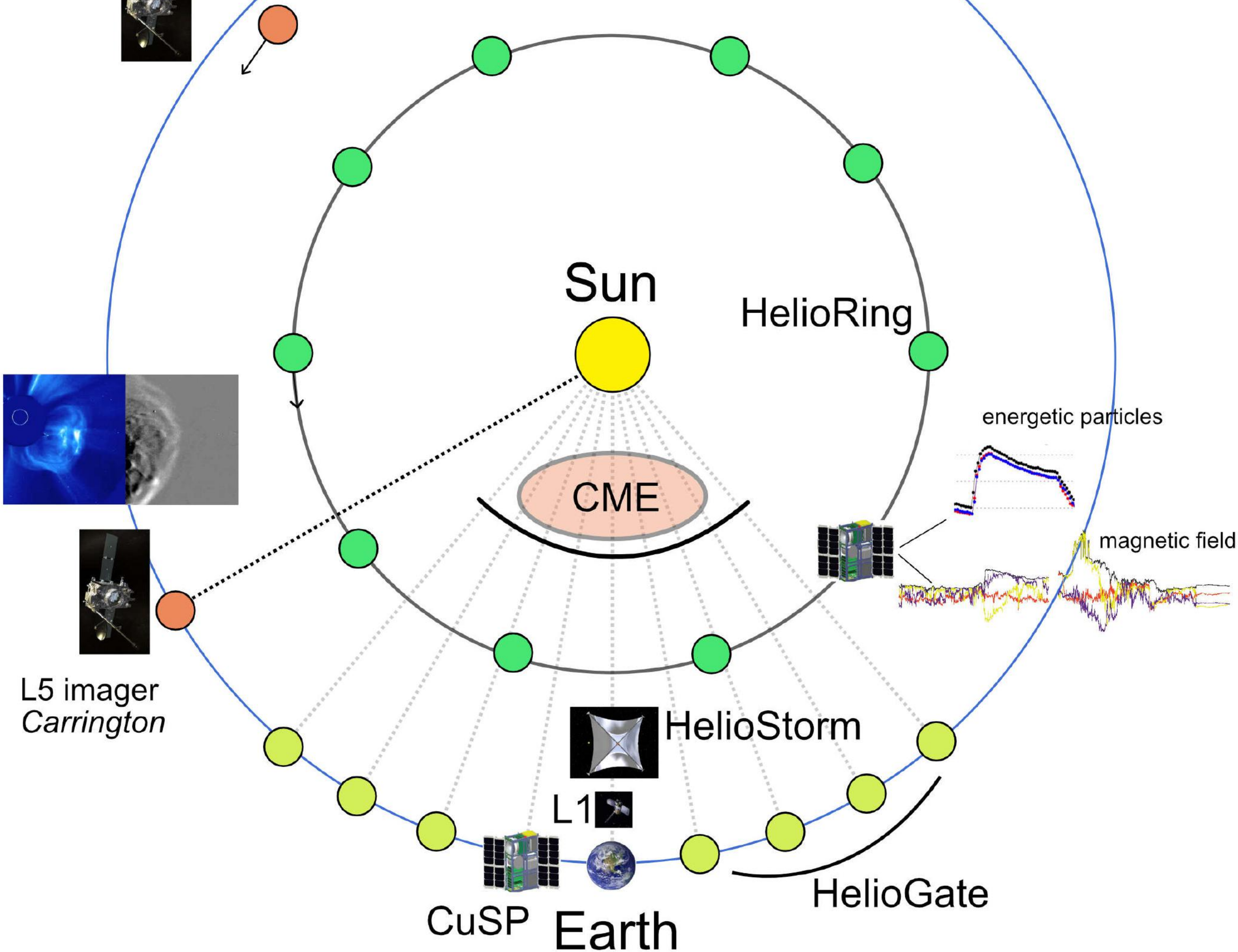

50
0
−50
B (nT)
Bz

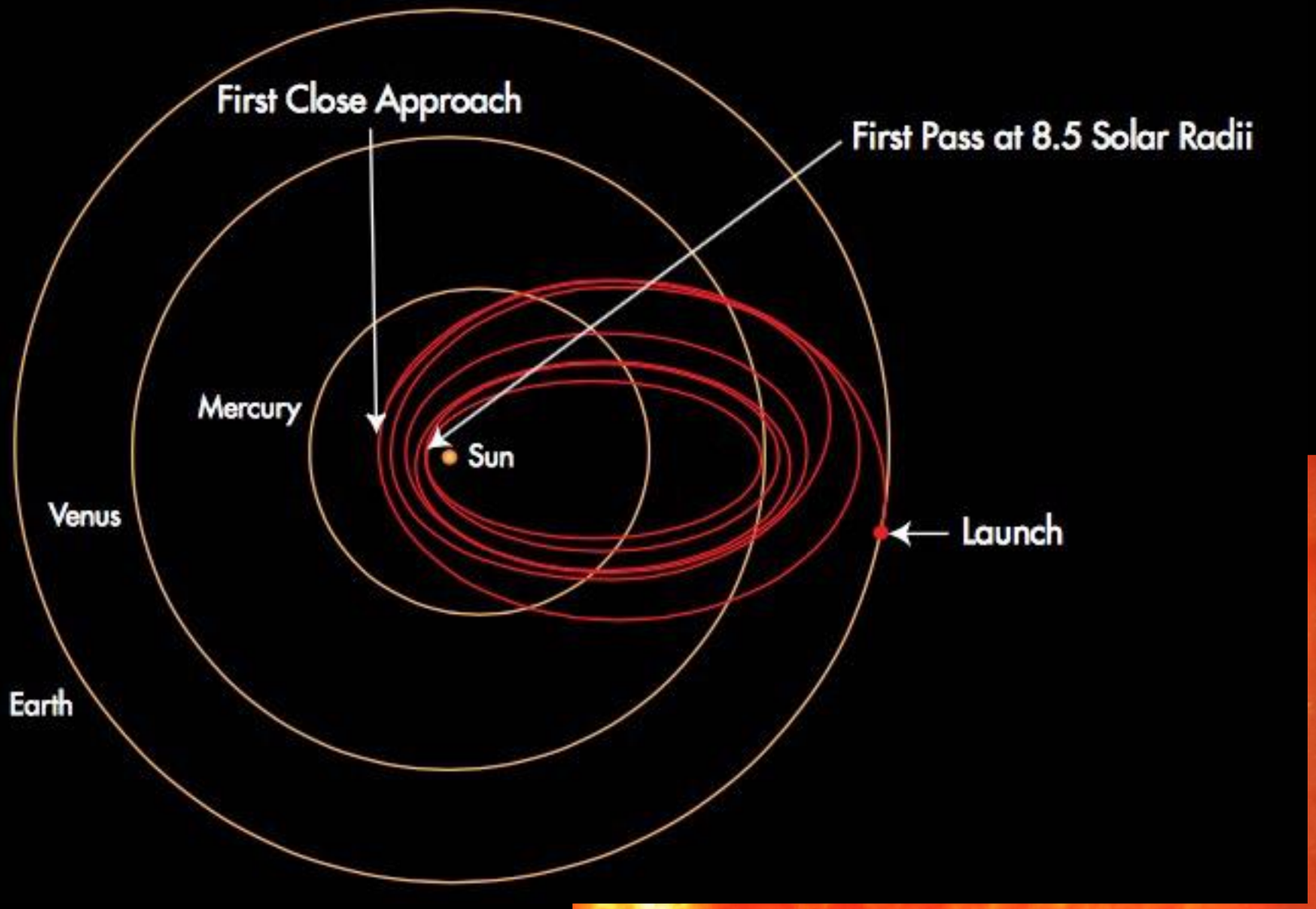

Magnetic flux rope
Sun
CME
B
sheath
shock
bow shock
B
Earth
magnetosphere


3DCORE


Observation of magnetic field


Simulation
$B_X$
$B_Y$
$B_Z$
magnetic field B [nT]
40
30
20
10
0
−10
−20
−30
−40
Dst
Dst index [nT]
0
−20
−40
−60
−80
−100
−120
Burton et al.
OBrien & McPherron
Observed hourly Dst
13 Jul 00h
14 Jul 00h
15 Jul 00h
16 Jul 00h
17 Jul
Year 2013


Sun
HelioRing
CME
energetic particles
magnetic field
L5 imager
Carrington
HelioStorm
L1
CuSP
Earth
HelioGate



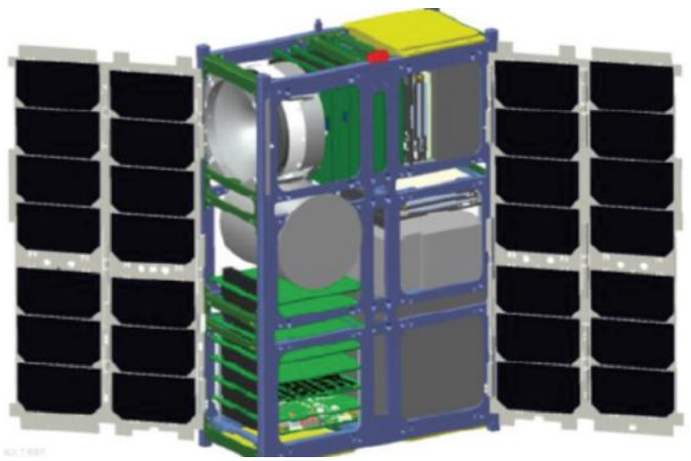

## Solar Probe Plus

## How does the CME flux rope form?

# Wieso können wir Sonnenstürme nicht vorhersagen?

Weil wir das Magnetfeld im Kern des Sturms (noch?) nicht aus Sonnenbeobachtungen vorhersagen können. Nur die Geschwindigkeit und Dichte zu kennen reicht nicht aus für genaue Vorhersagen.

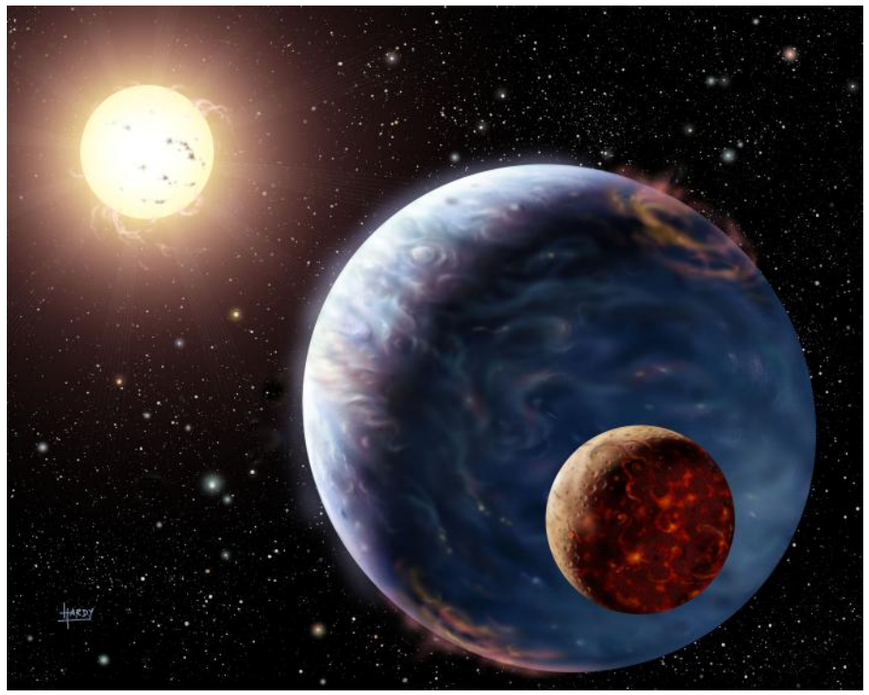
Mit Raumsonden die dieses Magnetfeld zwischen Sonne und Erde messen könnte dies allerdings in Zukunft möglich sein.



**CuSP** (2018)

ÖAW ÖSTERREICHISCHE AKADEMIE DER WISSENSCHAFTEN

IWF INSTITUT FÜR WELTRAUMFORSCHUNG



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- **A position for a student: 20 hours per week, for up to 1 year** financed by an Austrian Science Fund (FWF) project with **13.451,00 €** gross salary per year.
- A desk at the Space Research Institute in Graz (www.iwf.oeaw.ac.at).
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- Good **English** skills, in particular scientific writing.
- **Programming** skills: preferably IDL and/or python.

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christian.moestl@oeaw.ac.at and tanja.amerstorfer@oeaw.ac.at