FP7 Project – HELCATS – WP 5

Alexis P Rouillard[1], I. Plotnikov[1], E. Sanchez-Diaz[1], Manu Penou[1], Emilia Kilpua[6]

(1) IRAP-CNRS / UPS, (2) CNES, (3) STFC, (4) IAS, (6) University of Helsinki, (7) George Mason University

T5.1: Cataloguing the occurrence of CIRs

Using J-maps and optimized running-difference images, we will:

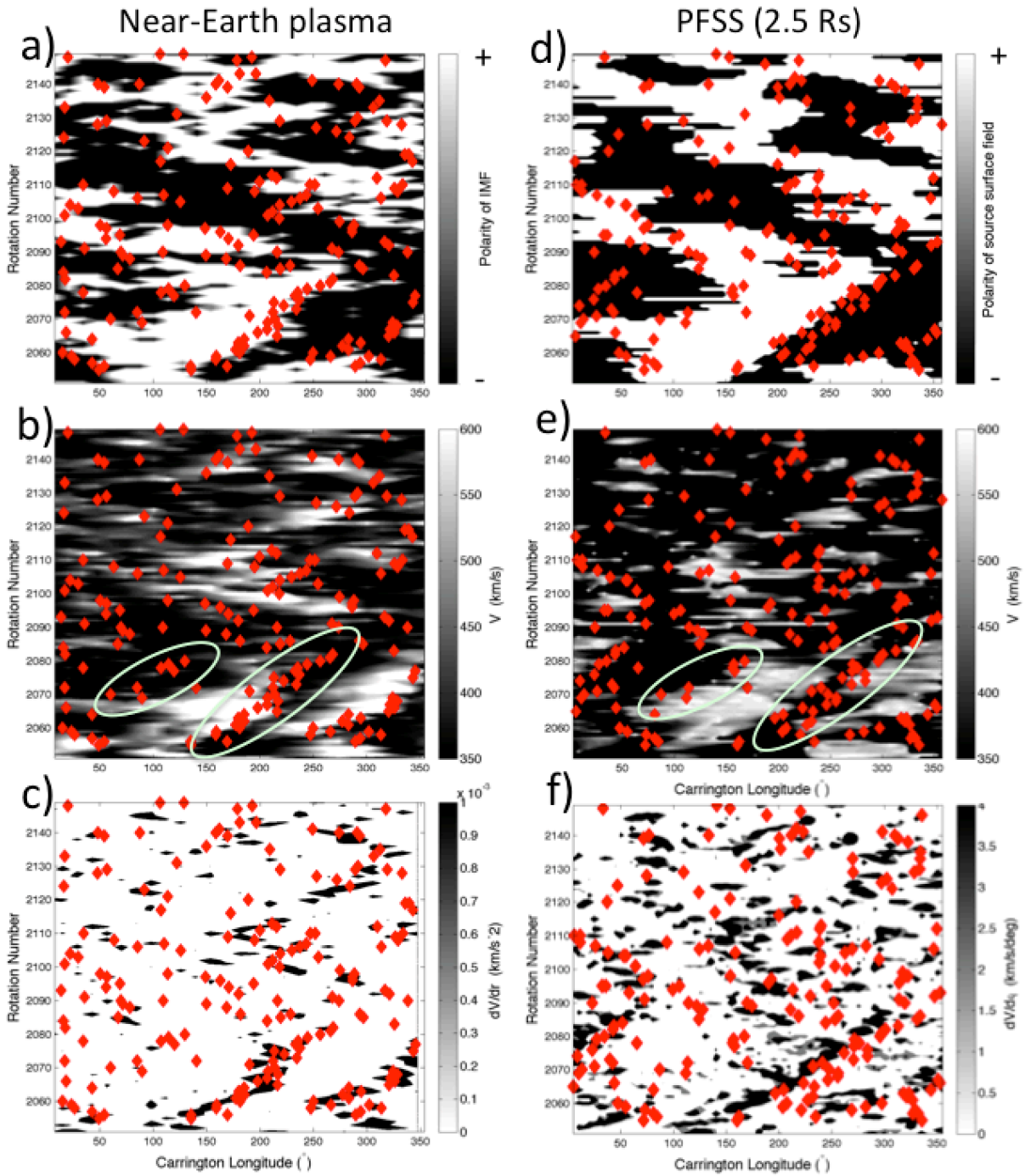
D5.1.1 List the times of observations of each CIR in HI images (Done for STA 2007-2014)

D5.1.2 Measure the number of small-scale transients entrained inside each CIR in the ecliptic plane (Eduardo on this task)

D5.1.3 Determine the minimum and maximum radial distance at which CIR are observed, and establish a common timeline (first order catalogue) of remote-sensing and in-situ measurements of CIRs (WIP)

D5.1.4 From the in-ecliptic CIR fitted trajectories, we will provide an estimate of the arrival times of CIRs at Mercury, Venus, Mars, Earth, Saturn, thereby providing support to European-funded space missions around these planets (Done for STA 2007-2009)

Illya, Alexis, Eduardo


Near-Earth plasma
PFSS (2.5 Rs)
a)
b)
c)
d)
e)
f)
Rotation Number
Carrington Longitude (°)
Polarity of IMF
Polarity of source surface field
V (km/s)
dV/dr (km/s^2)
dV/dθc (km/s/deg)
+
-
x 10^-3

T5.2 Deriving/cataloguing the kinematic variation of CIRs

D5.2.1 We will fit the leading edge of each CIR in HI J-maps derived at all available latitudes to obtain the spatial/temporal evolution of each CIR over ~180o longitude and ~90o latitude (Done for STA 2007-2014 in ecliptic)

D5.2.2 We will fit the kinematic evolution of transients entrained inside CIRs using different fitting techniques. For small-scale transients identified simultaneously in STEREO-A/HI and STEREO-B/HI, we will use triangulation techniques to detect potential speed variations near the Sun (Eduardo's task)

D5.2.3 This catalogue will be useful to determine the kinematic properties of the slow-solar wind in the upper corona (Eduardo's task) [month 24]

Illya, Eduardo, Alexis

T5.3 - Comparing back-projected CIR tracks with coronal sources [Months: 1-36]
UPS

D5.3.1 Using the derived trajectories and kinematic properties of CIRs and their small-scale transients, we will determine for each CIR observed in white-light images if there is an associated coronal hole observed in EUV (Done by Illya)

D5.3.2 We will create a catalogue of these identified coronal holes by combining EUV images from STEREO and SDO images with potential field source surface calculations based on HMI and GONG magnetograms. This catalogue will enable scientists to study the time- dependent evolution of coronal holes with direct space-weather applications (Done for STA)

D5.3.3 Using trajectories of small-scale transients derived from HI we will determine the portions in the streamer belt that generate small-scale transients (Eduardo's). [month 36]

Illya, Eduardo, Alexis

T5.4 - Comparing forward-projected CIR tracks with in-situ measurements [Months: 1-36]
UPS, UH

D5.4.1 We will track small-scale transients to 1 AU and make a list of predicted impacts at points in the heliosphere where in-situ measurements are taken (Eduardo, Emilia, Alexis)

D5.4.2 We will catalogue the in-situ properties of each small-scale transient. This latter catalogue will enable scientists to study the origin and variability of the slow solar wind (Eduardo, Emilia, Alexis). [month 36]

D5.4.3 We will analyse the in-situ signature of small-scale transients that are predicted to impact a spacecraft. We will provide a report on the magnetic, plasma and particle signatures of these small transients (Not Done). [month 36]

Eduardo, Alexis

⟷ Collaboration with University of Helsinki

WP5: Catalogue of CIRs