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HELCATS Annual Meeting
STFC Contribution to WP3

Overview

STFC contribution to WP3 task 1 is to derive kinematic properties of CMEs identified in WP2 task 1.

- Each CME is identified in a time-elongation plot (J-map) at the appropriate position angle.
- The CME is manually tracked along what is assumed to be its leading edge
- Three simple, single-spacecraft geometrical models are then applied to determine the CME speed, direction and launch time.

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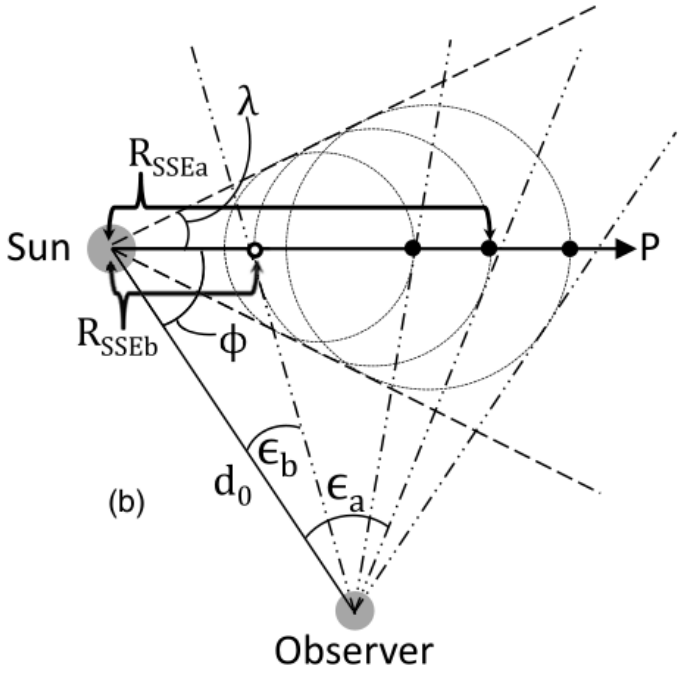
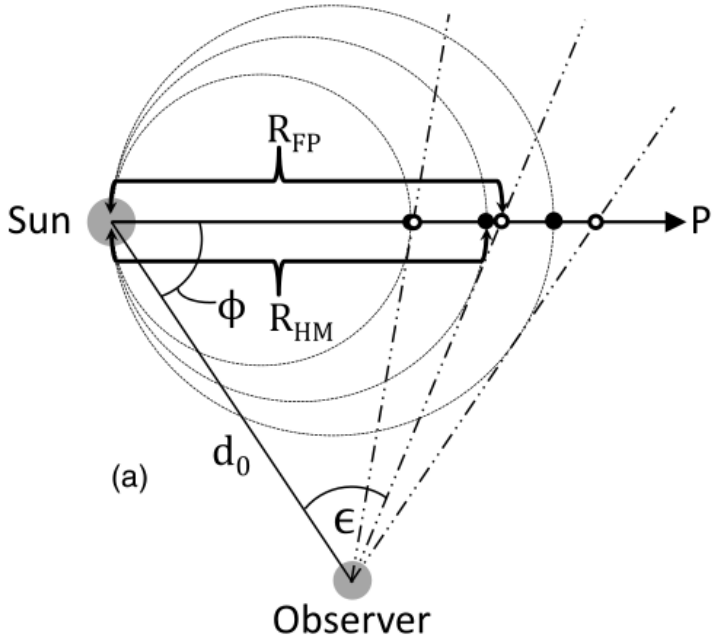
CME Models





Fixed phi	$\lambda = 0^o$
Self-similar expansion	$\lambda = 30^o$
Harmonic mean	$\lambda = 90^o$

$$R_{\mathrm{SSE}}(t) = \frac{d_0 \sin(\varepsilon(t))(1+\sin(\lambda(t)))}{\sin(\varepsilon(t)+\phi(t))+\sin(\lambda(t))}.$$

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CME Selection

ID	Date [UTC]	SC	PA-N [deg]	PA-S [deg]	Quality
HCME_A__20070419_01	2007-04-19 13:30	A	40	140	Good
HCME_A__20070502_01	2007-05-02 00:50	A	65	100	Fair
HCME_A__20070506_01	2007-05-06 06:50	A	85	120	Fair
HCME_A__20070509_01	2007-05-09 13:30	A	50	125	Fair
HCME_A__20070516_01	2007-05-16 01:30	A	30	120	Good
HCME_A__20070518_01	2007-05-18 00:10	A	95	115	Fair
HCME_A__20070520_01	2007-05-20 02:10	A	110	130	Fair
HCME_A__20070521_01	2007-05-21 21:30	A	65	120	Fair

- Every CME from WP2 catalogue is tracked if the quality is *fair* or better
- Some *fair* or *good* events cannot be tracked and are excluded

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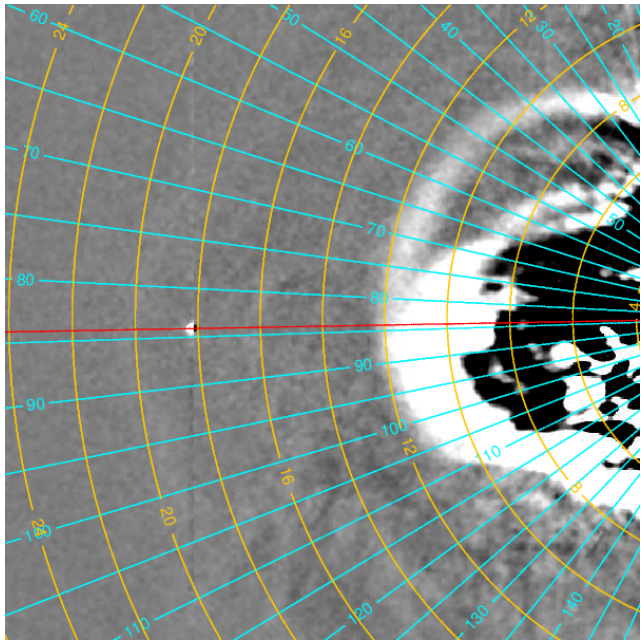
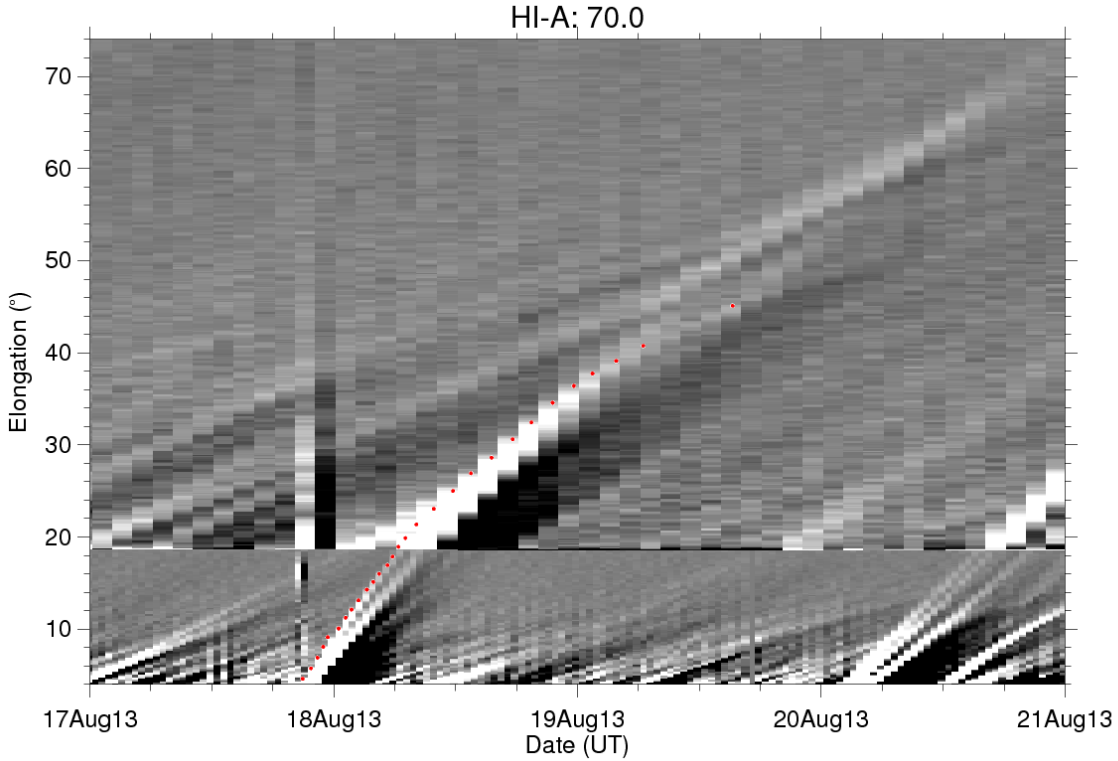
Time-Elongation Plots





Fixed phi	v = 1246 kms^{-1}	φ = -22^o
Self-similar expansion	v = 1485 kms^{-1}	φ = 0^o
Harmonic mean	v = 1871 kms^{-1}	φ = 26^o

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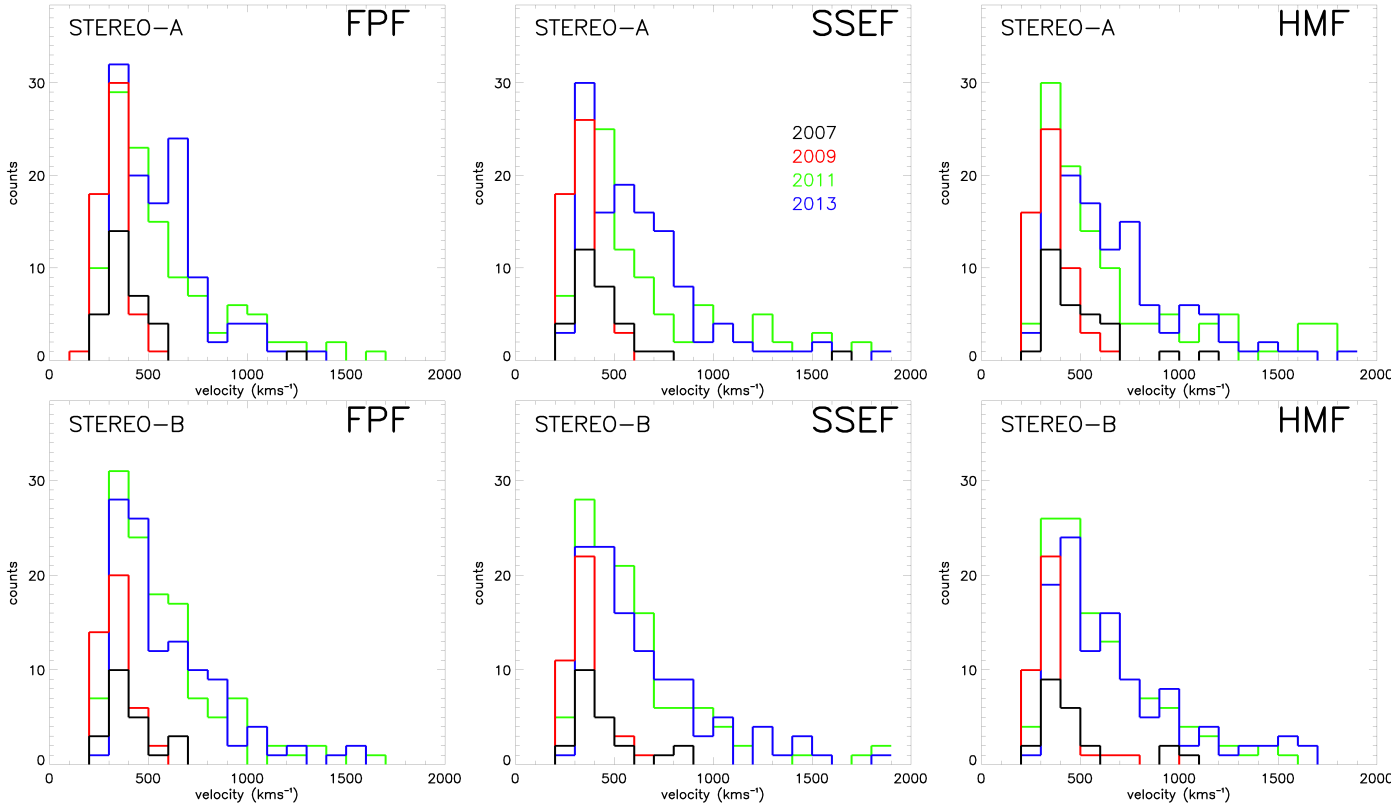
Catalogue



Complete for the odd-number years
2007, 09, 11 & 13

STEREO A (323 CMEs)
STEREO B (299 CMEs)

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Summary

Catalogue containing kinematic properties of CMEs

- speed
- direction
- launch time

Three different geometries using half-widths of 0^o (FP), 30^o (SSE) and 90^o (HM)

Catalogue is currently complete for the years 2007, 09, 11 and 13

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