



# Forward modelling and CME kinematics

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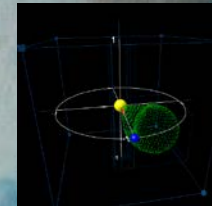




# Previous Presentations

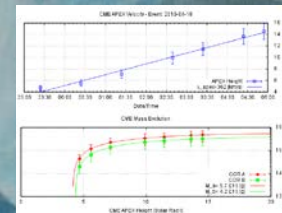
## CME velocities

- advanced GCS fitting (adding LASCO C3 images)
- timeseries fitting to derive the apex velocity
- defining standards for the initial velocities
- non-linear ht-fits



## CME masses

- creation of mass images
- mass detection with GCS
- mass-height function

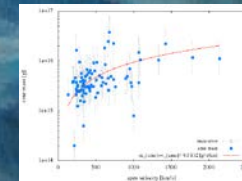


## Catalogue

- Kincat 2007-2011 (109 events)

## Results

- statistical analyses and intercomparison to HI results





# The KiNCAT Catalogue - Recommendation

## Extention of the catalogue(2007-2011)

+ earth-directed events (2012-2013)

KiNCAT - Catalogue    KiNCAT - small

Your search returned 122 results.

HEL no  
  CME no  
  Preevent date  
  Preevent time  
  Last COR2 date  
  Last COR2 time  
  GCS carlon  
  GCS stony lon  
  GCS stony lat  
  GCS tilt  
  GCS Asp. Ratio  
  GCS h\_angle

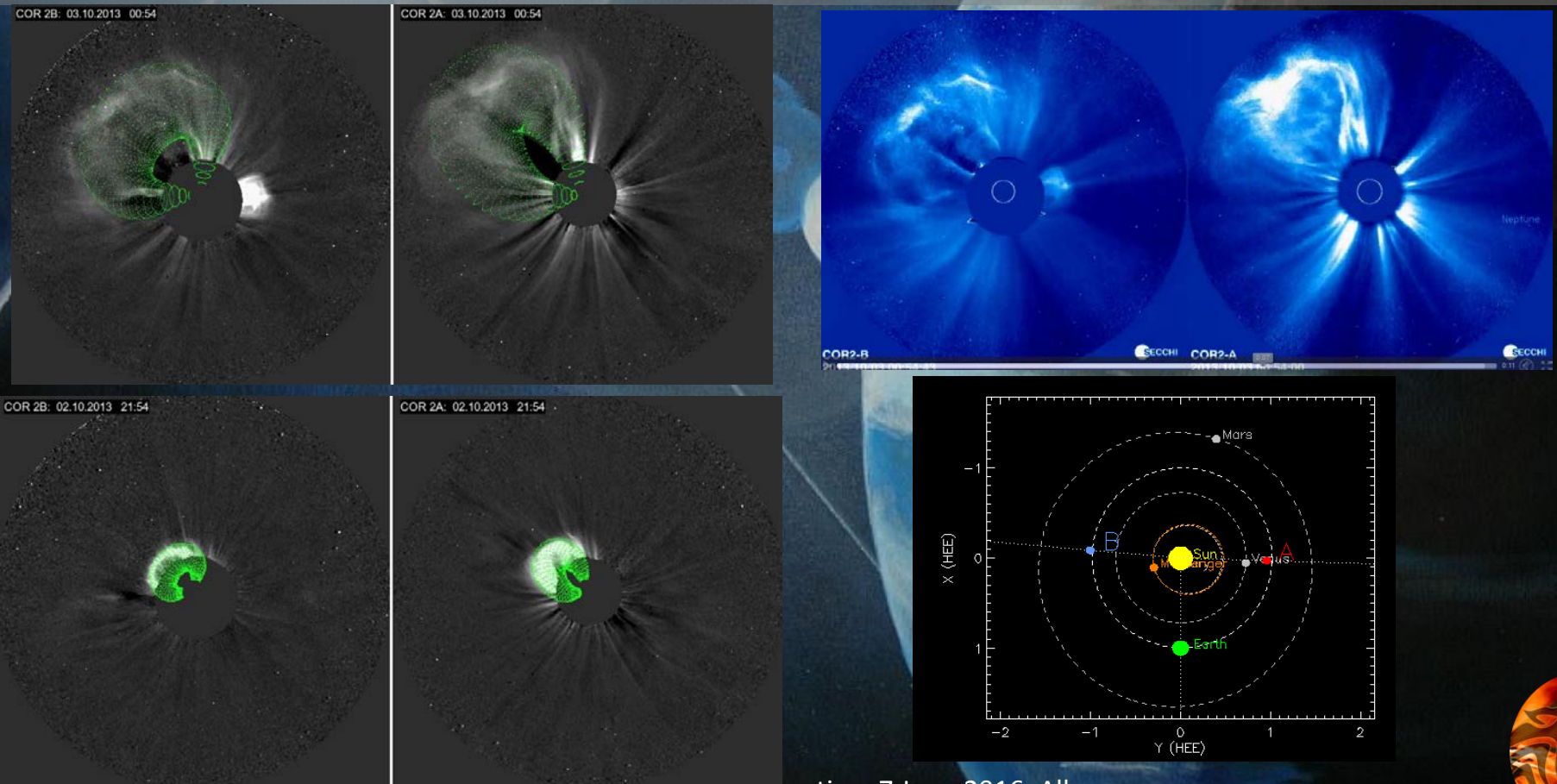
| HEL no | CME no | Preevent date | Preevent time | Last COR2 date | Last COR2 time | GCS carlon | GCS stony lon | GCS stony lat | GCS tilt | GCS Asp. Ratio | GCS h_angle |
|--------|--------|---------------|---------------|----------------|----------------|------------|---------------|---------------|----------|----------------|-------------|
| [-]    | [-]    | [yyyymmdd]    | [hh:mm:ss]    | [yyyymmdd]     | [hh:mm:ss]     | [deg]      | [lon]         | [deg]         | [deg]    | [-]            | [deg]       |
| 110    | 1069   | 2012-03-08    | 16:17:00      | 2012-03-08     | 20:39:00       | 191        | -113          | 9             | -53      |                |             |
| 111    | 1070   | 2012-07-12    | 15:37:00      | 2012-07-12     | 18:39:00       | 88         | 8             | -12           | 90       |                |             |
| 112    | 1071   | 2012-07-17    | 12:03:00      | 2012-07-17     | 16:55:00       | 78         | 63            | -28           | 34,6     |                |             |
| 113    | 1072   | 2012-10-05    | 02:45:00      | 2012-10-05     | 07:24:00       | 55         | 11            | -19           | 54       |                |             |
| 114    | 1073   | 2012-11-09    | 18:02:00      | 2012-11-09     | 17:49:00       | 289        | -6            | -13           | 22       |                |             |
| 115    | 1074   | 2012-11-11    | 02:11:00      | 2012-11-11     | 05:45:00       | 334        | 58            | -41           | 41       |                |             |
| 116    | 1075   | 2012-11-20    | 12:36:00      | 2012-11-20     | 13:51:00       | 170        | 17            | 19            | -65      |                |             |
| 117    | 1076   | 2013-05-17    | 08:43:00      | 2013-05-17     | 10:39:00       | 298        | -29           | 12            | -52      |                |             |
| 118    | 1077   | 2013-06-20    | 11:34:00      | 2013-06-20     | 15:39:00       | 186        | -52           | -34           | -41      |                |             |
| 119    | 1078   | 2013-07-18    | 19:57:00      | 2013-07-18     | 23:45:00       | 121        | -99           | 10            | 90       |                |             |
| 120    | 1079   | 2013-09-29    | 22:40:00      | 2013-09-29     | 23:24:00       | 9          | 33            | 43            | -67      |                |             |
| 121    | 1080   | 2013-10-02    | 19:54:00      | 2013-10-03     | 00:54:00       | 21         | 85            | 35            | -90      |                |             |
| 122    | 1081   | 2013-10-25    | 14:51:00      | 2013-10-25     | 17:20:00       | 281        | -74           | 13            | 68       |                |             |





# The KiNCAT Catalogue - Recommendation

Adding videos + GCS STEREO added + Stereo orbit tool





# The KiNCAT Catalogue - Recommendation

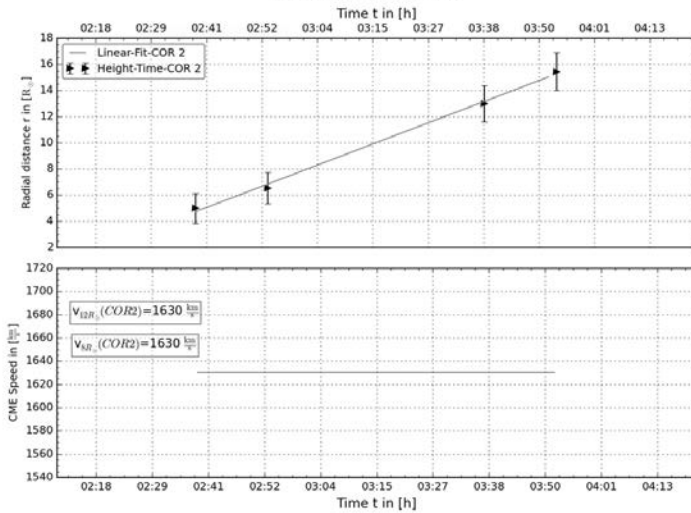
Adding ht-plots + **Voilà**

linear ht-plots

non linear ht-plots

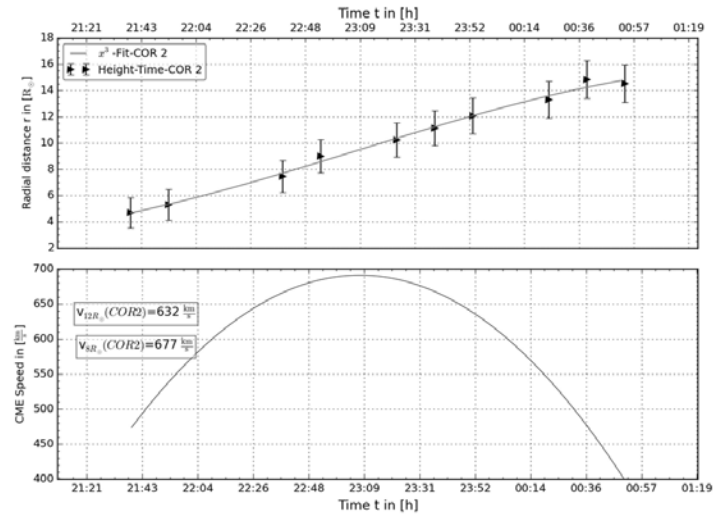
Radial distance and CME Speed between 02:08:15 2011-03-21 and 04:08:15 2011-03-21:

Event date: 2011-03-21



Radial distance and CME Speed between 19:54:00 2013-10-02 and 00:54:00 2013-10-03:

Event date: 2013-10-02





# Additional Outcome

Helcats paper – 3D GCS arrival time analyses (in progress)

## Topics:

Best-Pratice GCS Fitting strategies

Deriving earth directed velocities

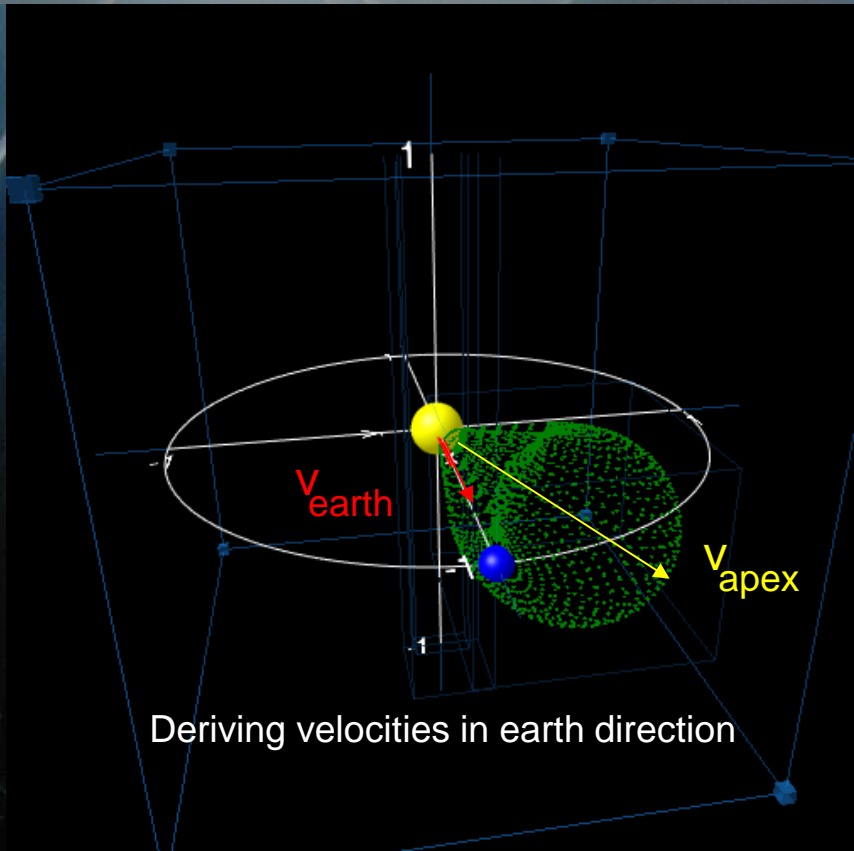
Connecting GCS – DBM parameters



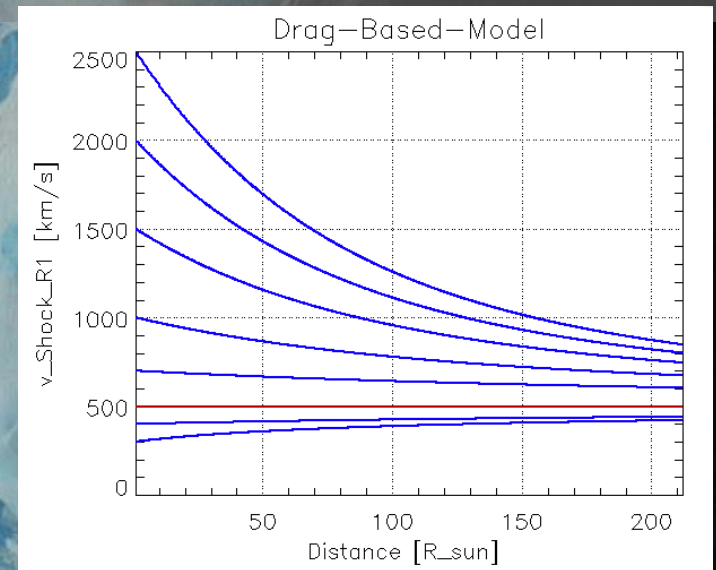


# Additional Outcome

Further developing of the DoomDayCalculator (DDC) + Poster



Deriving velocities in earth direction



$$\frac{d^2r}{dt^2} = -\gamma(r) \left( \frac{dr}{dt} - w(r) \right) \left| \frac{dr}{dt} - w(r) \right|$$

DBM developed by Vršnak (2001)





**Thank you**

