

CDAW 3

Useful URLs

<http://helio-vo.eu/>

http://helio-vo.eu/services/service_interfaces.php

AMDA GUI: <http://cdpp-amda.cesr.fr/DDHTML/index.html> (Mozilla only)

<http://www.solarmonitor.org/>

Visualization software to be downloaded: JHelioviewer : <http://jhelioviewer.org/>

HELIO : GUI

HELIO Front End - HFE: <http://helio.i4ds.technik.fhnw.ch/Helio-dev>

HELIO Events Catalogue - HEC: http://hec.ts.astro.it/hec/hec_gui.php

HELIO Features Catalogue - HFC: <http://bass2000.obspm.fr/helio-fc/gui/index.php>

Propagation model: <http://cagnode58.cs.tcd.ie:8080/PropagationModelGUI/>

Exercise 1 : Found and visualize the biggest coronal hole referenced in HELIO. Estimate the solar wind speed coming from that coronal hole.

1) From **HFC**, found the epochs where Coronal Holes are identified

==> explore **Database Content** (at the bottom)

Query results

Requesting one type of features between begin and end dates

Your query:
Date selection: from 2003-04-16 00:00 to 2003-04-19 00:00
Features selection: | Coronal holes |
Output format: | XML | Maps: | PIXEL | | None |

Number of features retrieved: Filament: 0 VOTable | Active region: 0 VOTable | Sun spot: 0 VOTable | Coronal hole: 19 VOTable | Types III: 0 VOTable

Page:

2003-04-16 | 2003-04-17 | 2003-04-18

Coronal hole: results per hour at 2003-04-16

01:13:31

Map with observation image and features

ID_CORONALHOLES	Area in Min2 of the feature	Helio-graphic longitude of the CH gravity centre in degrees	Helio-graphic latitude of the CH gravity centre in degrees
5641	406643	25.33	-46.89
5642	76912.8	-17.54	-25.64
5643	883.3	-15.67	-24.72
5644	19792.5	-27.49	11.78
5645	3947.6	-24.3	-12.43
5646	1370.39	12.77	-14.32

SQL log

```
SELECT * from VIEW_CH_FULL WHERE OBS_DATE BETWEEN '2003-04-16 00:00' AND '2003-04-19 00:00' ORDER BY OBS_DATE ASC
```

Query form | Database and fields description | Database content | Free SQL query | Web Service | About HFC

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- Select the **Query Form** (bottom left), and choose dates e.g. from June 1st, 1996 to August 1st, 1996 (which correspond to the largest authorized selection: 60 days).

The Heliophysics Feature Catalogue (HFC) provides access to existing solar and heliophysics feature data, extracted from images by automated recognition codes. The catalogue contains geometrical (e.g., gravity center coordinates, contours, area, etc.) and photometric feature parameters (e.g., average, minimum, and maximum intensity, etc.), but also tracking information to identify co-rotating feature on the solar disc.

Query form

1 - Date and time selection 2 - Features selection 3 - Output options

From 1996-06-01 00:00 to 1996-07-31 00:00 Or Duration between 0 and 60 days 60

Or Upload start and end dates from VOTable

Submit

The list of the features for which data are currently available in the HFC is given in the following table

Feature	Instrument	Recognition code	Bibliography	Tracking information
Active Region	SOHO/MDI	SMART	Higgins et al., 2010	No
Coronal Hole	SOHO/MDI + SOHO/ET 195 A	CHARM	Krista and Gallagher, 2009	No
Filament	Meudon H Alpha Spectroheliograph	SFC_Filaments & TrackFil	Fuller et al., 2005 - Bonnin et al., submitted	Yes
Sunspot	SOHO/MDI		Zarkhov et al., 2005	No
Type III	Wind/Waves	RABAT3	X. Bonnin	No

Query form Database and fields description Database content Free SQL query Web Service About HFC

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- Select a structure: **Features Selection** ==> Coronal Hole

The Heliophysics Feature Catalogue (HFC) provides access to existing solar and heliophysics feature data, extracted from images by automated recognition codes. The catalogue contains geometrical (e.g., gravity center coordinates, contours, area, etc.) and photometric feature parameters (e.g., average, minimum, and maximum intensity, etc.), but also tracking information to identify co-rotating feature on the solar disc.

Query form

1 - Date and time selection 2 - Features selection 3 - Output options

Filament Active region Sun spots Coronal hole Type III

Extended criteria

Ignore date selection

Choose a coronal hole criteria None

Submit

The list of the features for which data are currently available in the HFC is given in the following table

Feature	Instrument	Recognition code	Bibliography	Tracking information
Active Region	SOHO/MDI	SMART	Higgins et al., 2010	No
Coronal Hole	SOHO/MDI + SOHO/ET 195 A	CHARM	Krista and Gallagher, 2009	No
Filament	Meudon H Alpha Spectroheliograph	SFC_Filaments & TrackFil	Fuller et al., 2005 - Bonnin et al., submitted	Yes
Sunspot	SOHO/MDI		Zarkhov et al., 2005	No
Type III	Wind/Waves	RABAT3	X. Bonnin	No

Query form Database and fields description Database content Free SQL query Web Service About HFC

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- Select criteria : **Output Options**
 ==> e.g. Latitude, longitude and surface.

HELIO - Service Interf... HELIO FrontEnd Heliophysics Feature ... HELIO Propagation M... Welcome to AMDA AMDA Plot

voparis-helio.obspm.fr/hfc-gui/index.php

Les plus visités Débuter avec Firefox À la une

HELIO Heliophysics Feature Catalogue

CAPACITIES

The Heliophysics Feature Catalogue (HFC) provides access to existing solar and heliophysics feature data, extracted from images by automated recognition codes. The catalogue contains geometrical (e.g., gravity center coordinates, contours, area, etc.) and photometric feature parameters (e.g., average, minimum, and maximum intensity, etc.), but also tracking information to identify co-rotating feature on the solar disc.

Query form

1 - Date and time selection 2 - Features selection 3 - Output options

Fields to include in results:

- For filaments
- For active regions
- For coronal holes
 - X Heliocentric coordinates of the CH gravity centre in arcsec (FEAT_X_ARCSEC)
 - Y Heliocentric coordinates of the CH gravity centre in arcsec (FEAT_Y_ARCSEC)
 - Area in Mm2 of the feature (FEAT_AREA_MM)
 - X image coordinates of the CH gravity centre in pixels (FEAT_X_PIX)
 - Y image coordinates of the CH gravity centre in pixels (FEAT_Y_PIX)
 - Heliographic longitude of the CH gravity centre in degrees (FEAT_HG_LONG_DEG)
 - Heliographic latitude of the CH gravity centre in degrees (FEAT_HG_LAT_DEG)
 - Carrington longitude of the CH gravity centre in degrees (FEAT_CARR_LONG_DEG)
 - Carrington latitude of the CH gravity centre in degrees (FEAT_CARR_LAT_DEG)
 - Mean of the feature to QS intensity ratio (FEAT_MEANQSUN)
 - Feature mean line-of-sight magnetic field in Gauss (FEAT_MEAN_BZ)
- For sunspots
- For type III

Additional output format:

Daily map:

?

- Submit

The result contains several answers, restricted to June, 1996 to August 1996.

HELIO - Service Interf... HELIO FrontEnd Heliophysics Feature ... HELIO Propagation M... Welcome to AMDA AMDA Plot

voparis-helio.obspm.fr/hfc-gui/results.php

Les plus visités Débuter avec Firefox À la une

HELIO Heliophysics Feature Catalogue

CAPACITIES

Query results

Requesting one type of features between begin and end dates

Your query:
 Date selection: from 1996-06-01 00:00 to 1996-07-31 00:00
 Features selection: | Coronal holes |
 Output format: | XML | Maps: | PIXEL | None |

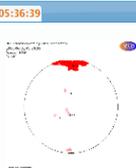
Number of features retrieved: Filament: 0 VOTable | Active region: 0 VOTable | Sun spot: 0 VOTable | Coronal hole: 140 VOTable | Types III: 0 VOTable

Page: 1 | 1 | 2 | 3 | 4 | 5

1996-06-01 1996-06-02 1996-06-03 1996-06-04 1996-06-05 1996-06-06 1996-06-07 1996-06-08 1996-06-09 1996-06-10

Coronal hole: results per hour at 1996-06-01

05:36:39



Map with observation image and features

ID_CORONALHOLES	Area in Mm2 of the feature	Heliographic longitude of the CH gravity centre in degrees	Heliographic latitude of the CH gravity centre in degrees
131	11292	-0.43	65.91
132	6357.68	-7.51	-72.19
133	3954.39	-3.54	-8.15
134	1704.35	-7.23	18.77
135	1513.73	-20.41	-11.96

SQL log
 SELECT * from VIEW_CH_FULL WHERE OBS_DATE BETWEEN '1996-06-01 00:00' AND '1996-07-31 00:00' ORDER BY OBS_DATE ASC

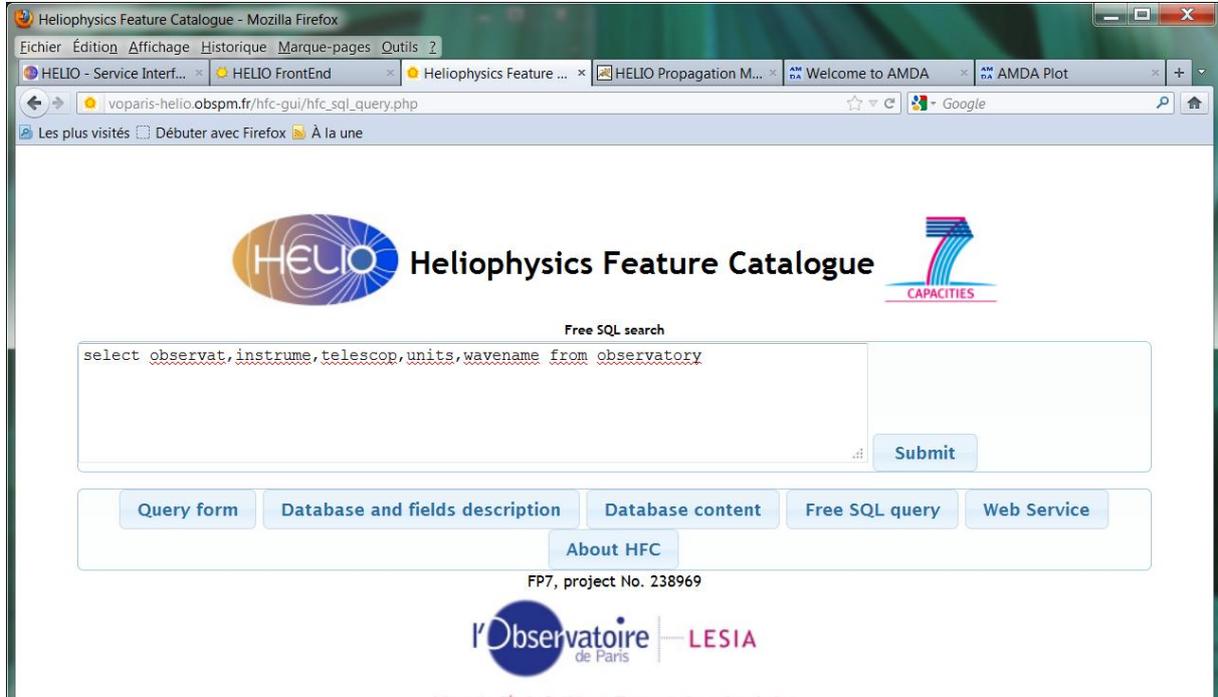
FP7, project No. 238959

The time selection must be extended manually to explore the whole database.

- Copy the sentence from the **SQL LOG** box at the bottom:

```
SELECT * from VIEW_CH_FULL WHERE OBS_DATE BETWEEN '1996-06-01 00:00' AND '1996-08-01 00:00' ORDER BY OBS_DATE ASC
```

- Select **Free SQL search** and remove the sentence written in the box and paste the previous one.



- Change manually the end-date : '2009-07-15 00:00' e.g.

- Replace the * by the relevant criteria, selected in the keyword list:

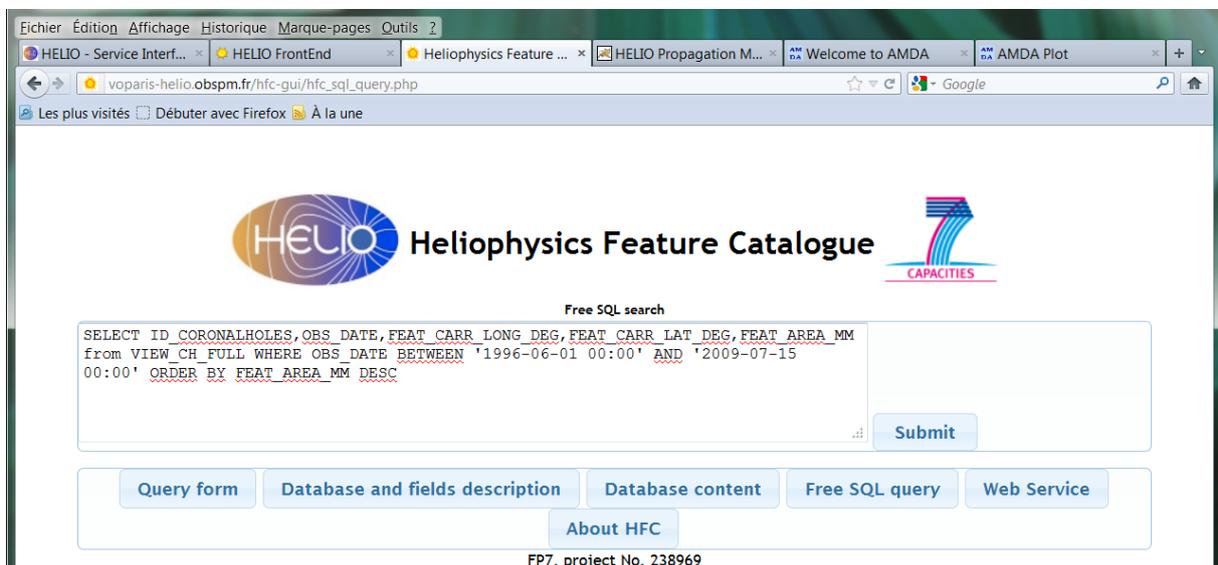
- Click on **Database and fields description**.

- From the new window: browse until **Table CORONALHOLES**.

Replace * by (copy-paste from the list):

```
ID_CORONALHOLES,OBS_DATE,FEAT_CARR_LONG_DEG,FEAT_CARR_LAT_DEG,FEAT_AREA_MM.
```

Replace ORDER BY OBS_DATE ASC par FEAT_AREA_MM DESC in order to obtain the results ordered by descending surfaces.



- **Submit** ==> The table contains the results, ordered by descending surfaces.

The screenshot shows the Heliophysics Feature Catalogue interface. A SQL query is entered in a text box and executed, resulting in a table of coronal hole data.

Free SQL search

```
SELECT ID_CORONALHOLES, OBS_DATE, FEAT_CARR_LONG_DEG, FEAT_CARR_LAT_DEG, FEAT_AREA_MM
from VIEW_CH_FULL WHERE OBS_DATE BETWEEN '1996-06-01 00:00' AND '2009-07-15
00:00' ORDER BY FEAT_AREA_MM DESC
```

Submit

Download as VOTable or CSV

```
SELECT ID_CORONALHOLES, OBS_DATE, FEAT_CARR_LONG_DEG, FEAT_CARR_LAT_DEG, FEAT_AREA_MM from VIEW_CH_FULL WHERE OBS_DATE BETWEEN '1996-06-01 00:00' AND '2009-07-15 00:00' ORDER BY FEAT_AREA_MM DESC
```

ID_CORONALHOLES	OBS_DATE	FEAT_CARR_LONG_DEG	FEAT_CARR_LAT_DEG	FEAT_AREA_MM
5641	2003-04-16 01:13:31	23.3328	-46.8868	406643
628	1997-02-26 01:12:30	41.1618	-49.2705	401061
6448	2004-01-22 23:24:10	231.107	30.5479	399290
9190	2007-07-29 23:24:09	215.691	33.9077	385581
5639	2003-04-15 07:13:30	28.2124	-45.521	380627
5638	2003-04-14 01:13:31	33.4926	-44.0864	376855
4644	2002-07-07 04:12:10	127.232	44.3329	372595
5895	2003-07-28 10:36:11	70.7644	-22.7754	359452
5724	2003-05-11 23:24:10	33.3967	-44.0488	359370
4639	2002-07-06 04:13:14	131.827	42.1388	358620
4623	2002-07-04 04:12:10	157.193	31.4251	346390
1952	1999-08-17 02:36:10	8.86099	-6.14138	345316

- Find the date of the biggest coronal hole.
- Copy-paste the date in the **Query Form** (bottom), to visualize the structure, over e.g. 3 days.

The screenshot shows the Heliophysics Feature Catalogue interface with the Query Form and a table of available features.

The Heliophysics Feature Catalogue (HFC) provides access to existing solar and heliophysics feature data, extracted from images by automated recognition codes.

The catalogue contains geometrical (e.g., gravity center coordinates, contours, area, etc.) and photometric feature parameters (e.g., average, minimum, and maximum intensity, etc.), but also tracking information to identify co-rotating feature on the solar disc.

Query form

1 - Date and time selection 2 - Features selection 3 - Output options

From 2003-04-16 00:00 to 2003-04-18 00:00 Or Duration between 0 and 60 days 15

Or Upload start and end dates from VOTable

Submit

The list of the features for which data are currently available in the HFC is given in the following table

Feature	Instrument	Recognition code	Bibliography	Tracking information
Active Region	SOHO/MIDI	SMART	Higgins et al., 2010	No
Coronal Hole	SOHO/MIDI + SOHO/EIT 195 A	CHARM	Krista and Gallagher, 2009	No
Filament	Meudon H Alpha Spectroheliograph	SFC_Filaments & TrackFil	Fuller et al., 2005 - Bonnin et al., submitted	Yes
Sunspot	SOHO/MIDI		Zarkhov et al., 2005	No
Type III	Wind/Waves	RABAT3	X. Bonnin	No

Query form Database and fields description Database content Free SQL query Web Service About HFC

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- **Submit** and find the results in 3 files corresponding to each date.

Query results

Requesting one type of features between begin and end dates

Your query:
 Date selection: from 2003-04-16 00:00 to 2003-04-18 00:00
 Features selection: | Coronal holes |
 Output format: | XML | Maps: | PIXEL | None |

Number of features retrieved: Filament: 0 VOTable | Active region: 0 VOTable | Sun spot: 0 VOTable | Coronal hole: 11 VOTable | Types III: 0 VOTable

Page:

2003-04-16 | 2003-04-17

Coronal hole: results per hour at 2003-04-16

01:13:31

Map with observation image and features

ID_CORONALHOLES	Area in Min ² of the feature	Heliographic longitude of the CH gravity centre in degrees	Heliographic latitude of the CH gravity centre in degrees
5641	4064.0	25.33	-46.89
5642	76912.8	-17.54	-35.64
5643	883.3	-15.67	-24.72
5644	19752.5	-37.49	11.78
5645	3947.6	-34.3	-12.43
5646	1370.39	12.77	-14.32

SQL log

```
SELECT * from VIEW_CH_FULL WHERE OBS_DATE BETWEEN '2003-04-16 00:00' AND '2003-04-18 00:00' ORDER BY OBS_DATE ASC
```

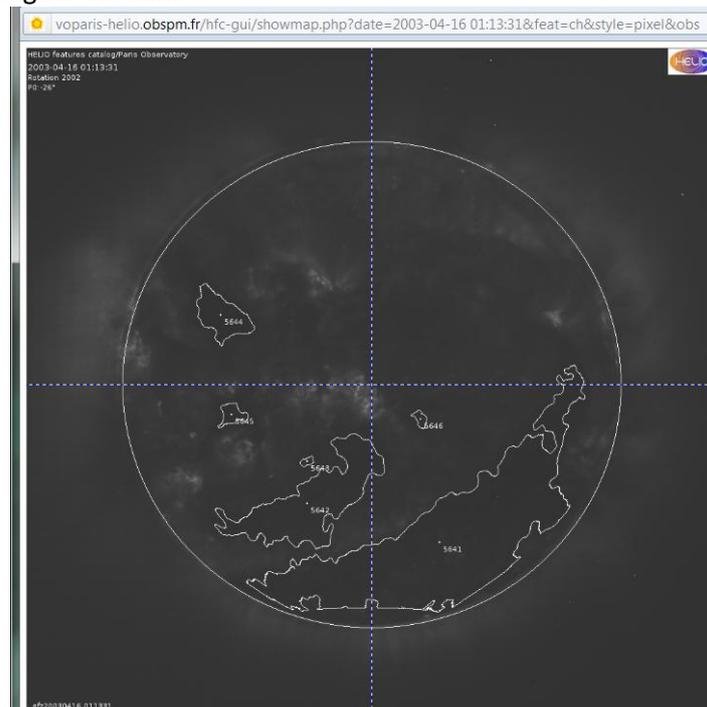
Query form | Database and fields description | Database content | Free SQL query | Web Service | About HFC

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- Click on the image to enlarge it or

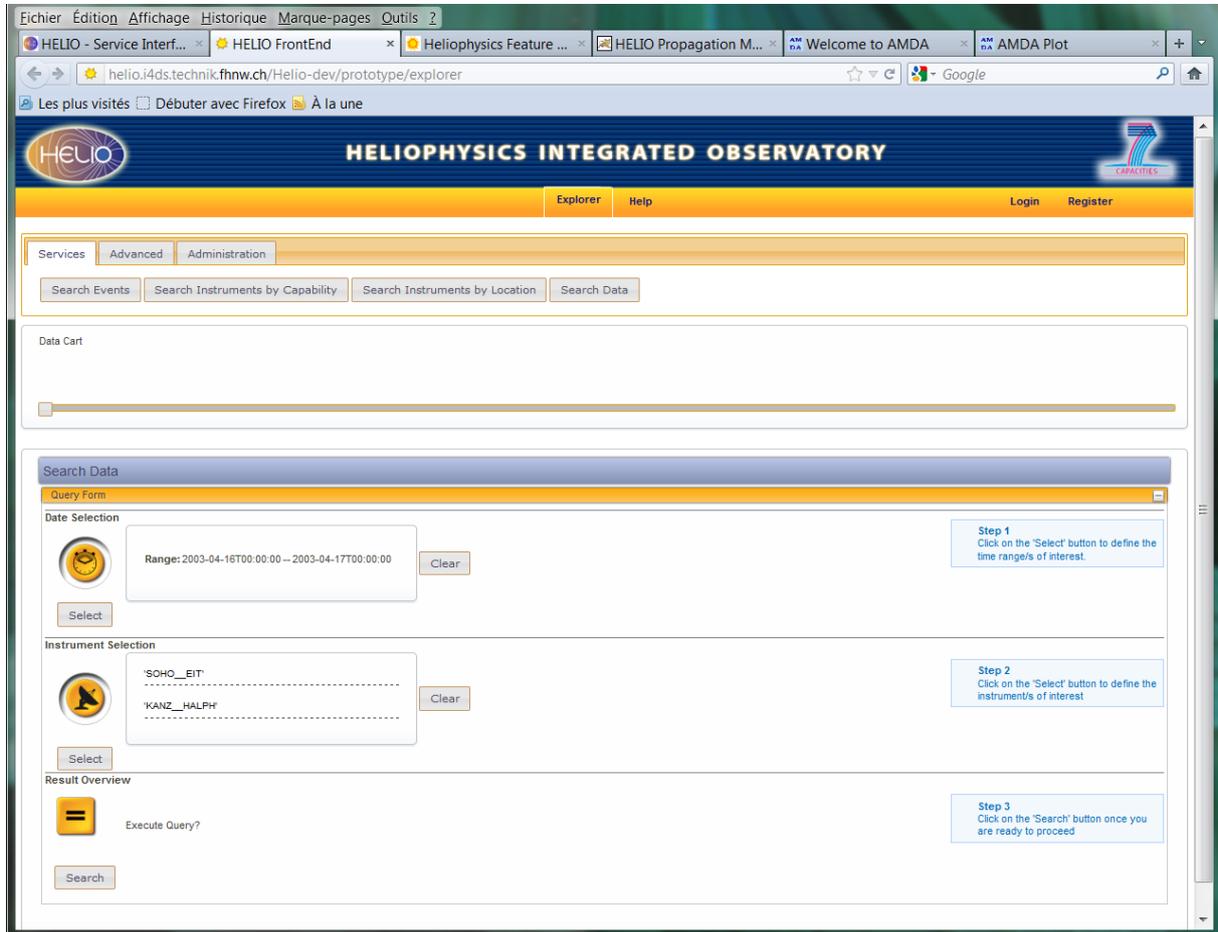
- Click on **Map with observation image and features** to overlay the identified structure with the corresponding EIT image of the Sun.



2) From **HFE** (from **HELIO Service Interface**: choose **Development version of the HFE**), download the files of interest for these dates:

==> **Services** and **Search Data**

- Choose e.g. from 16 April 00:00 to 17 April 2003 in the Date selection box.
- Choose instruments : e.g. SOHO/EIT and Kanzelhöhe Halpha (KANZ_HALPH).
- Click on **Search** (it could take one minute or more...).



==> a lot's of EIT answers and one Halpha file: the links towards the databases are indicated. Click to download the data

The button **Search Instruments by Capability** describes the capabilities of the instruments (imagery, spectroscopy, particles, etc...).

Result

Select result
To save your results you can click on "Save as VoTable", you can also transform them into parameters to use in another query by selecting the rows of interest and then clicking on "Save selection to Data-Cart" or download the data by clicking on "Download Selected Files/all". These options will only be available where applicable.

*Items in red are not supported by our Data Search service therefore will not be saved.

Filters

Show only accessible instruments

Observing Domain 1

Sun Mercury Venus Earth Mars Jupiter Saturn

Heliosphere Planetary Comet Helopause Galactic

Observing Domain 2

Solar: Interior Disk/inr. cor. Outer corona Disk/helos. Solar-wind

Planetary: Environment Magnetosphere Ionosphere Aurora

Interstellar Energy release Structure

Instrument Type

Remote In-situ

Observable Entity

Photons GMR HXR SXR EUV UV visible

H-alpha He 10830 j-wave radio

Particles Charged Energetic Neutral Dust Cosmic-ray

Fields Electric Magnetic Gravity

Keywords

Imager Spectrometer Polarimeter Coronagraph Magnetograph Magnetometer

Oscillations Composition Irradiance Photometer Radiometer

Save as VoTable Save selection to Data Cart

ics-instrument

name	observatory_name	obsinst_key	time_start	time_end	longname	inst_type	inst_od1	inst_od2	inst_oe1	inst_oe2	inst_fd	inst_r
CDS	SOHO	SOHO_CDS	1996-03-31T00:00:00	2020-01-01T00:00:00	Coronal Diagnostic Spectrometer	remote	sun	disk/inr. cor.	photons	EUV	3	3
EIT	SOHO	SOHO_EIT	1996-03-31T00:00:00	2020-01-01T00:00:00	Extreme-ultraviolet Imaging Telescope	remote	sun	disk/inr. cor.	photons	EUV	2	2
SEM	SOHO	SOHO_SEM	1996-03-31T00:00:00	2020-01-01T00:00:00	Solar Extreme ultraviolet Monitor	remote	sun	disk/inr. cor.	photons	EUV	4	0
TRACE-EUV	TRACE	TRACE_TRACE_EUV	1998-03-30T00:00:00	2020-01-01T00:00:00	TRACE EUV Observations	remote	sun	disk/inr. cor.	photons	EUV	3	2

Showing 1 to 4 of 4 entries (filtered from 202 total entries)

Log

3) Use the **propagation model** to measure the solar wind velocity coming from that Coronal Hole.

- Enter the departure date (from the Sun), suggest a speed of 600 km/s (fast wind coming from a coronal hole).

HELIO Propagation model

SELECT A TAB

CME SOLAR WIND SEP

Start Time 2003-04-15T00:00

Longitude 0

SW velocity 600

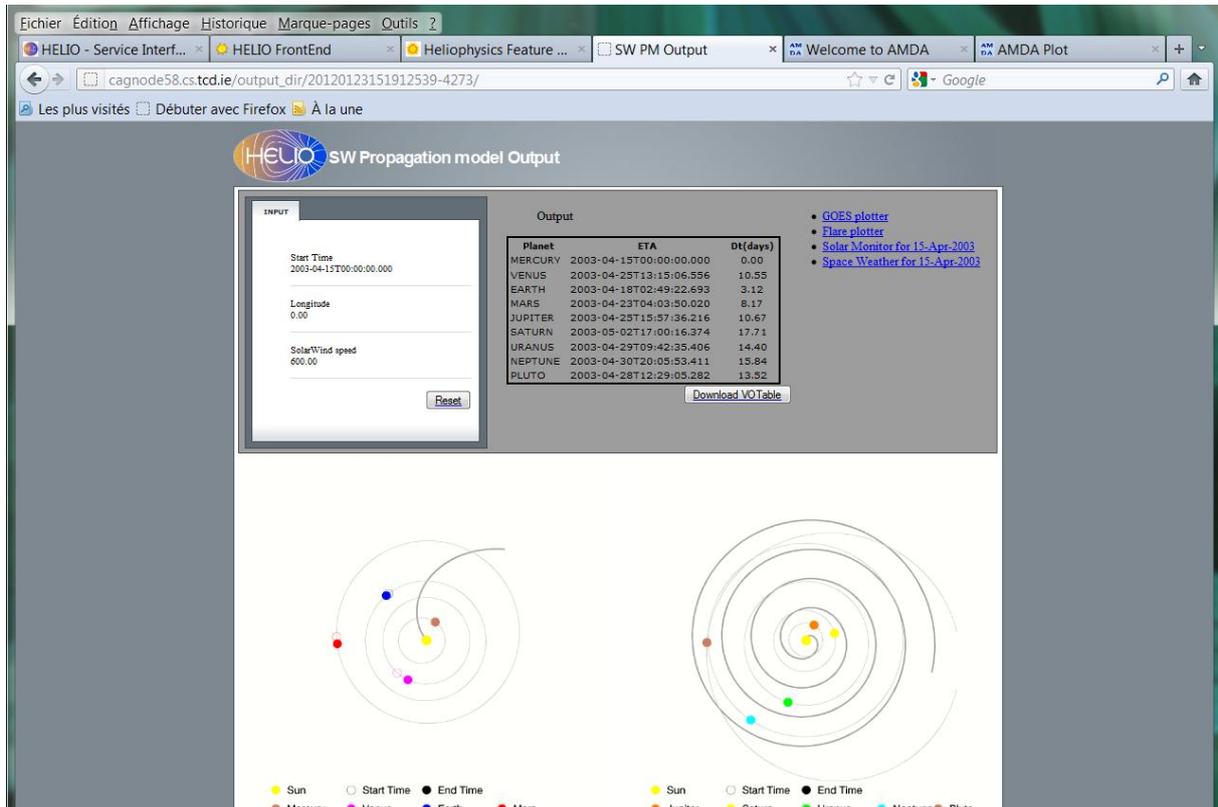
RUN MODEL

Sun CH longitude Earth dt High Speed SW

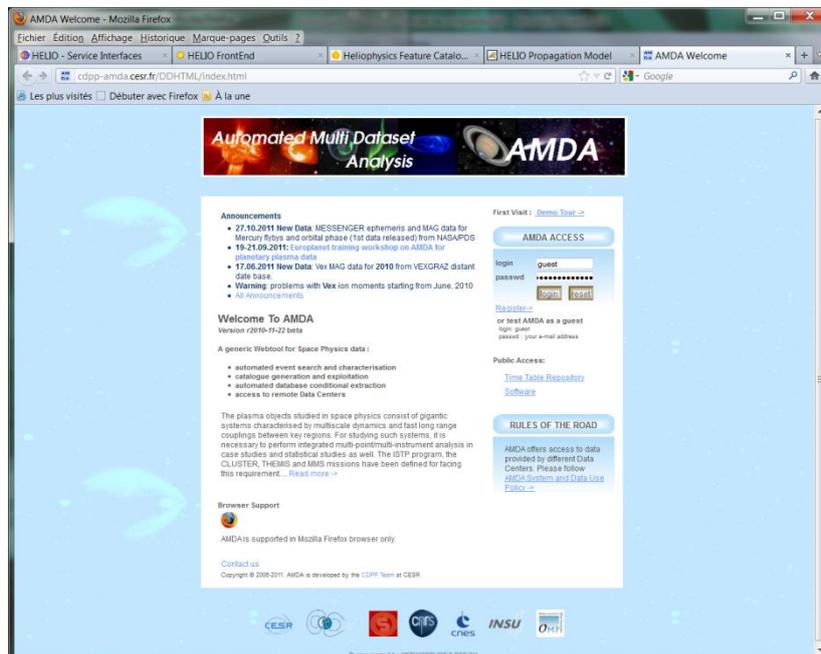
Parker's spiral $r = \frac{v_{sw}}{\Omega_{\odot}} \theta$

Sun CH Most-west edge of Coronal Hole

==> 3 days after, the effects could be seen on the Earth, taking into account the position of the hole and the Parker's spiral).



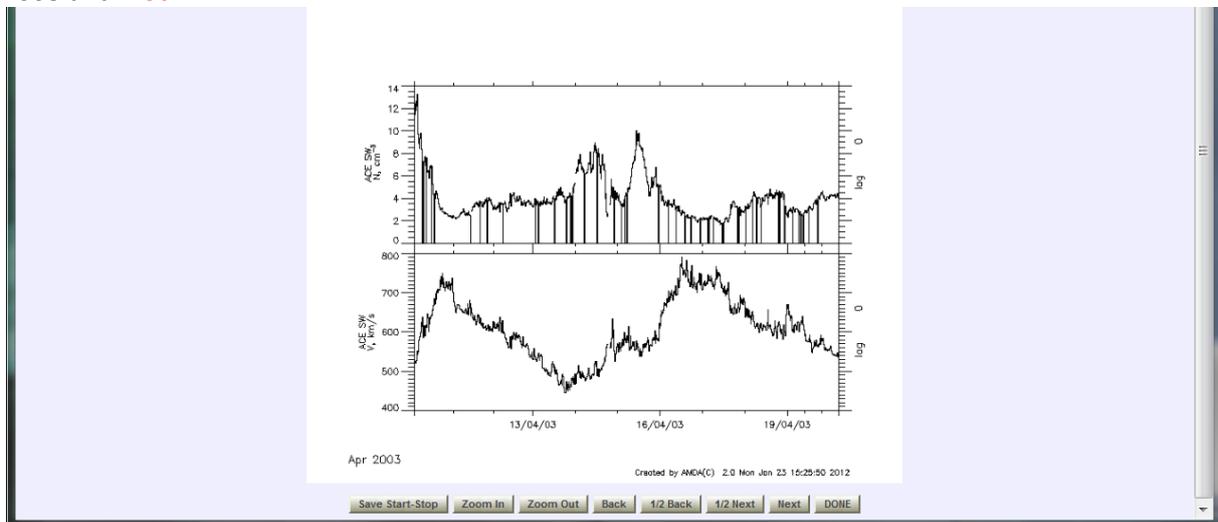
4) Visualize the speeds with **AMDA** (MOZILLA only) : login = guest, password = mail_address



- Click on the left on **AMDA**, then **ACE** then **SWEPAM** then **swe_final** then select e.g. Density and **v_bulk**.

The screenshot shows the HELIO Service Interfaces web application. The browser window displays the URL 'cdpp-amda.cesr.fr/DDHTML/HTML/loginreq.php'. The interface includes a navigation menu with 'Plot Data' selected. On the left, a tree view shows a folder structure with 'ACE' expanded and 'density' and 'v_bulk' checked. The main area is titled 'Plot Request' and contains a table for parameter selection, orientation and format options, time table selection, and a 'Plot' button. Below this, there are options for saving, deleting, and loading requests. At the bottom, there is a section for 'Time Shifting of Solar Wind Monitor Data' with a 'Calculate Delay' button.

- Choose a large period around the supposed arrival date of the wind at ACE, e.g. from 10 to 20 April 2003 and **Plot**.



5) From **HFE** again, get the files for in-situ measurements of the solar wind speed.

- Click on **Advanced**, and on **in situ data mining**.
- Extend the selection dates from 10 April to 20 April 2003.
- Choose ACE and SWEPAM, Parameter Value, Velocity_Magnitude, >400 km/s, Average Time=300 s.
- **Execute Query** ==> The dates of ACE/SWEPAM observations are listed.
- Go back to **Services**, **Search Data** to download the files.

The screenshot shows the HELIO web interface with the following components:

- Data Mining Query Form:**
 - Date Selection:** Range: 2003-04-10T00:00:00 - 2003-04-20T05:00:00. Includes a 'Clear' button and a 'Select' button.
 - Argument Selection:** VALUE.ACE.V/400.300. Includes a 'Clear' button and a 'Select' button.
 - Result Overview:** Shows 'Query Success' with a minus sign icon.
- Result Section:**
 - Instructions: 'Select result. To save your results you can click on 'Save as VoTable', you can also transform them into parameters to use in another query by selecting the rows of interest and then clicking on "Save selection to Data-Cart" or download the data by clicking on "Download Selected files/all". These options will only be available where applicable.'
 - Buttons: 'Save as VoTable' and 'Save selection to Data Cart'.
- Table:**

time_start	time_end
2003-04-10T00:00:00	2003-04-14T18:30:40
2003-04-14T19:45:40	2003-04-21T00:01:40

Showing 1 to 2 of 2 entries
- Log:**

```

INFO Connecting to http://manunja.cea.fr/Amda-Helio/WebServices/HelioServerWeb.php?wsdl: longQuery
INFO Executing result(longTimeQuery(startTime=2003-04-10T00:00:00, endTime=2003-04-20T05:00:00), from=[ACE], where=VALUE.ACE.V/400.300, maxrecords=0, startIndex=0, saveTo=null)
INFO Status message returned by service: query executing
INFO Status message returned by service: query executing
INFO Status message returned by service: query executing
INFO Query terminated in 2.828s with status 'COMPLETED'
INFO Status message returned by service: query completed
INFO Data is ready

```

Exercise 2 : Identify the solar source of a large velocity measured in the solar wind

- From **HFE**, find a high velocity solar wind event.
 - Select **Services**, then **Search Events**, choose a period, from January 1st, 2004 to April 30, 2004 e.g.
 - Select an event : click on **Solar Wind** and select **"Stream Interaction Regions from Wind and ACE"** data e.g.
 - **Submit** : large list of ACE observations, ordered by descending velocity v_{max} .
 - The event observed on March 25, 2004 has the highest velocity: 900 km/s.

HELIO - Service Interfaces | HELIO FrontEnd | Heliophysics Feature Catalog... | HELIO Propagation Model

helio.i4ds.technik.fhnw.ch/Helio-dev/prototype/explorer

Result Overview

Query Success

Step 3
Click on the "Search" button once you are ready to proceed

Select result
To save your results you can click on "Save as VoTable", you can also transform them into parameters to use in another query by selecting the rows of interest and then clicking on "Save selection to Data-Cart" or download the data by clicking on "Download Selected files/all!". These options will only be available where applicable.

Save as VoTable | Save selection to Data Cart

hec-wind_ace_sir

flag_hybrid	cir_id	time_start	time_end	time_discon1	f_r_shock1	time_discon2	f_r_shock2	time_discon3	f_r_shock3	time_sl	pt_max	v_max	v_min	delta_v
7		2004-03-25T08:00:00	2004-03-27T22:00:00							2004-03-25T21:50:00	125.0	900.0	350.0	550.0
		2004-01-06T19:26:00	2004-01-07T16:00:00	2004-01-06T19:26:00	F					2004-01-06T22:14:00	160.0	780.0	580.0	200.0
6		2004-03-09T10:30:00	2004-03-10T14:00:00	2004-03-10T07:41:00	/					2004-03-09T20:50:00	200.0	780.0	400.0	380.0
5		2004-02-26T19:30:00	2004-02-29T20:00:00							2004-02-27T20:16:00	160.0	750.0	300.0	450.0
3		2004-01-29T20:25:00	2004-01-30T17:00:00							2004-01-30T08:18:00	163.0	700.0	410.0	290.0
4		2004-02-11T01:30:00	2004-02-12T14:00:00							2004-02-12T02:30:00	230.0	700.0	350.0	350.0
		2004-01-31T02:00:00	2004-01-31T18:45:00							2004-01-31T07:30:00	68.0	660.0	420.0	240.0
2		2004-01-15T00:00:00	2004-01-17T00:00:00							2004-01-15T14:45:00	85.0	660.0	420.0	240.0
1		2004-01-02T15:00:00	2004-01-03T20:00:00							2004-01-03T02:31:00	140.0	640.0	425.0	215.0
*	8	2004-04-05T08:00:00	2004-04-07T00:00:00							2004-04-05T21:02:00	200.0	633.0	370.0	263.0
		2004-02-05T06:00:00	2004-02-06T12:00:00							2004-02-05T23:00:00	54.0	620.0	460.0	160.0

Showing 1 to 11 of 11 entries

Log

```

INFO Connecting to http://helio.i4ds.technik.fhnw.ch:8080/helio-hec/HelioLongQueryService/wsdl: longQuery
INFO Executing result/longTimeQuery/startTime=[2004-01-01T00:00:00], endTime=[2004-04-11T05:00:00], from=[wind_ace_sir], where={}, maxRecords=0, startIndex=0, saveTo=null
INFO Query terminated in 2.974s with status 'COMPLETED'

```

2) Use the **Propagation Model** to find the source of that event.

The propagation is not yet able to go back in time for the Solar Wind option. The departure time must be estimated with a propagation velocity of 900 km/s: a departure date as March 23, 2004 is fine.

HELIO - Service Interfaces | HELIO FrontEnd | Heliophysics Feature Catalog... | Connexion...

cagnode58.cs.tcd.ie:8080/PropagationModelGUI/#

HELIO Propagation model

CME: SOLAR WIND SEP

Start Time: 2004-03-23T00:00

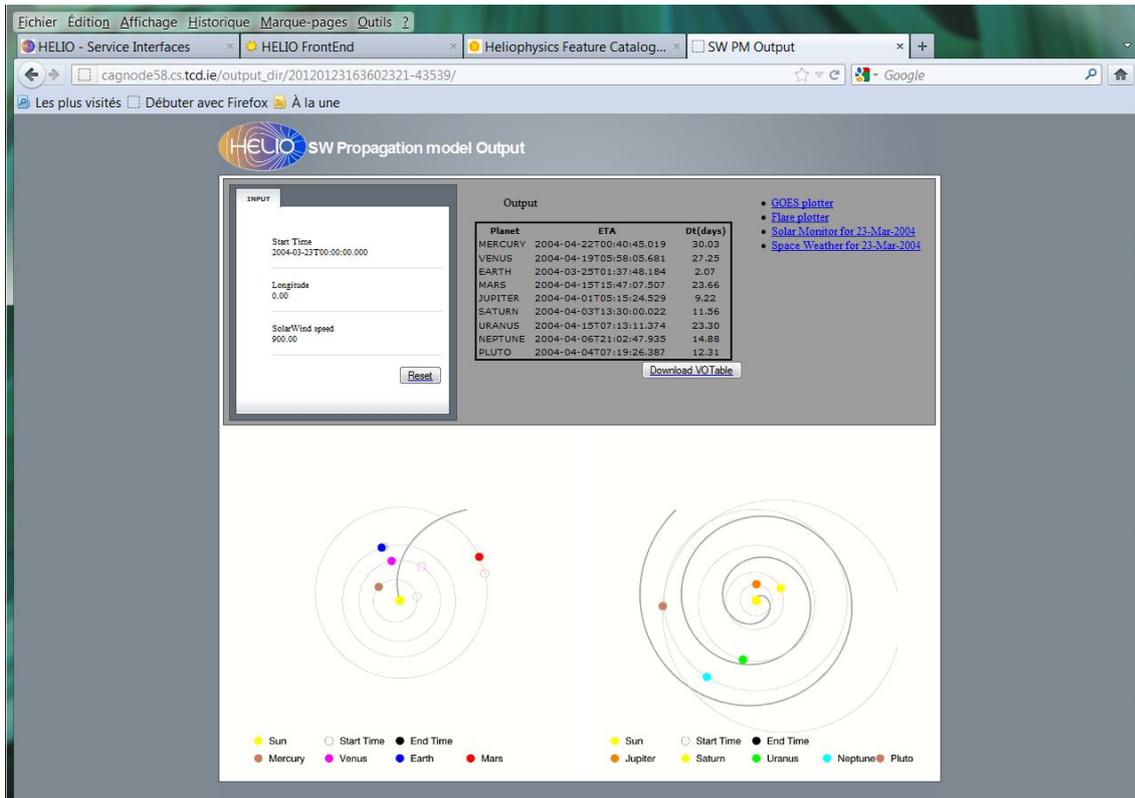
Longitude: 0

SW velocity: 900

RUN MODEL

Parker's spiral $r = \frac{v_{sw} \theta}{\Omega_{\odot}}$

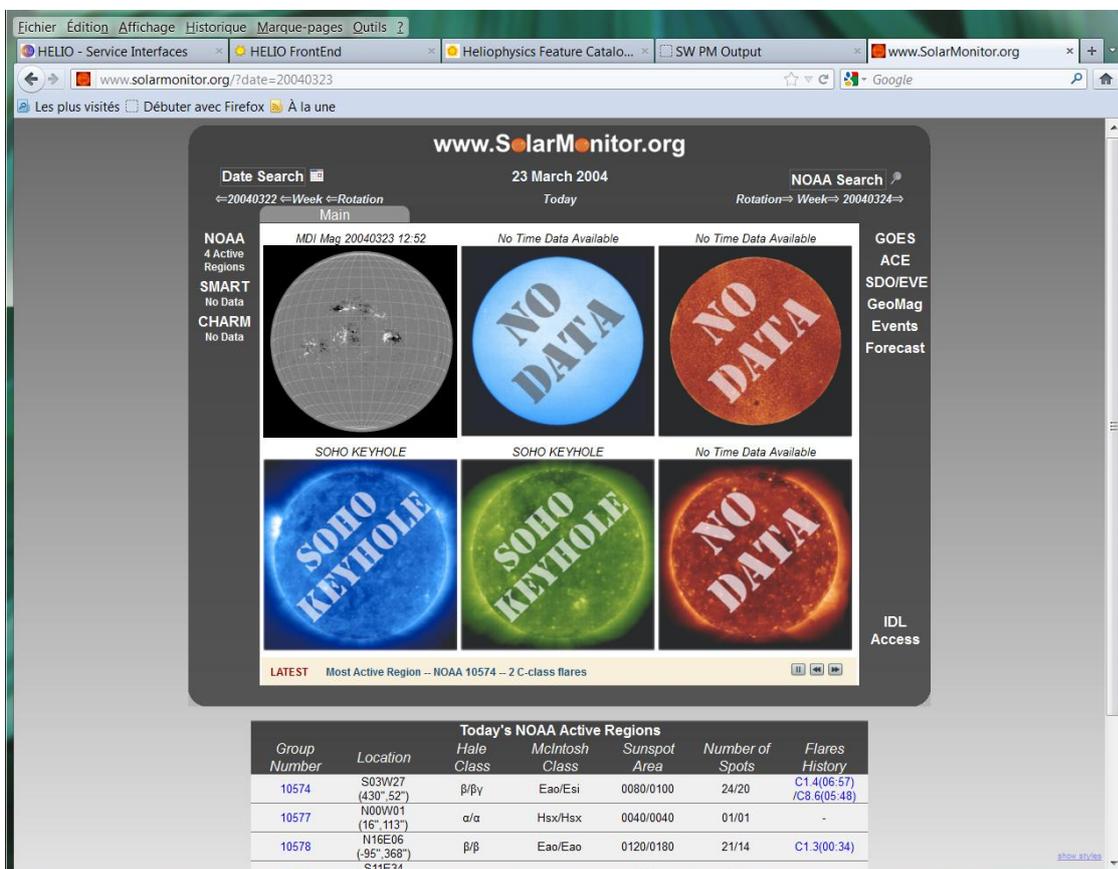
Most-west edge of Coronal Hole



3) Select SOHO data e.g. using HFE to get an image of the Sun at that time.

- Select the period from 20 to 23 March 2004 e.g., EIT/SOHO, however there are no data on March 23, 2004.

- From Solar Monitor : <http://www.solarmonitor.org/> click on the right on Search, select 23 March 2004: EIT was not observing on that day !



4) Explore the Sun one rotation before using **HFC**, if an equatorial coronal hole is supposed to be already there.

- Select the dates e.g. February 25, 2004 to February 27, 2004 e.g.

- Select **Features Selection**

- Select **Output Options**

==> Latitude, longitude and surface e.g.

- **Submit**

==> 2 answers : On February 25, 2004, a small equatorial coronal hole is there, which will grow up during the next 30 following days.

5) Find the in-situ velocities associated to this small coronal hole from **HFE**.

- Select **Advanced**, then **In situ data mining**.

- Choose a period between February 25 and 29, 2004 e.g then ACE then SWEPAM, Parameter Value, Velocity_Magnitude, > 400 km/s, Average Time = 300 s.

==> ACE data are available for February 27 and 28, 2004.

6) Visualize the velocities with **AMDA** (MOZILLA only) : login = guest, password = mail_address

- Click on the left on **AMDA**, then **ACE** then **SWEPAM** then **swe_final** and select Density et v_bulk.

- Enter a large period around the arrival date at ACE, e.g from February 25 to 29, 2004

- and **Plot**.