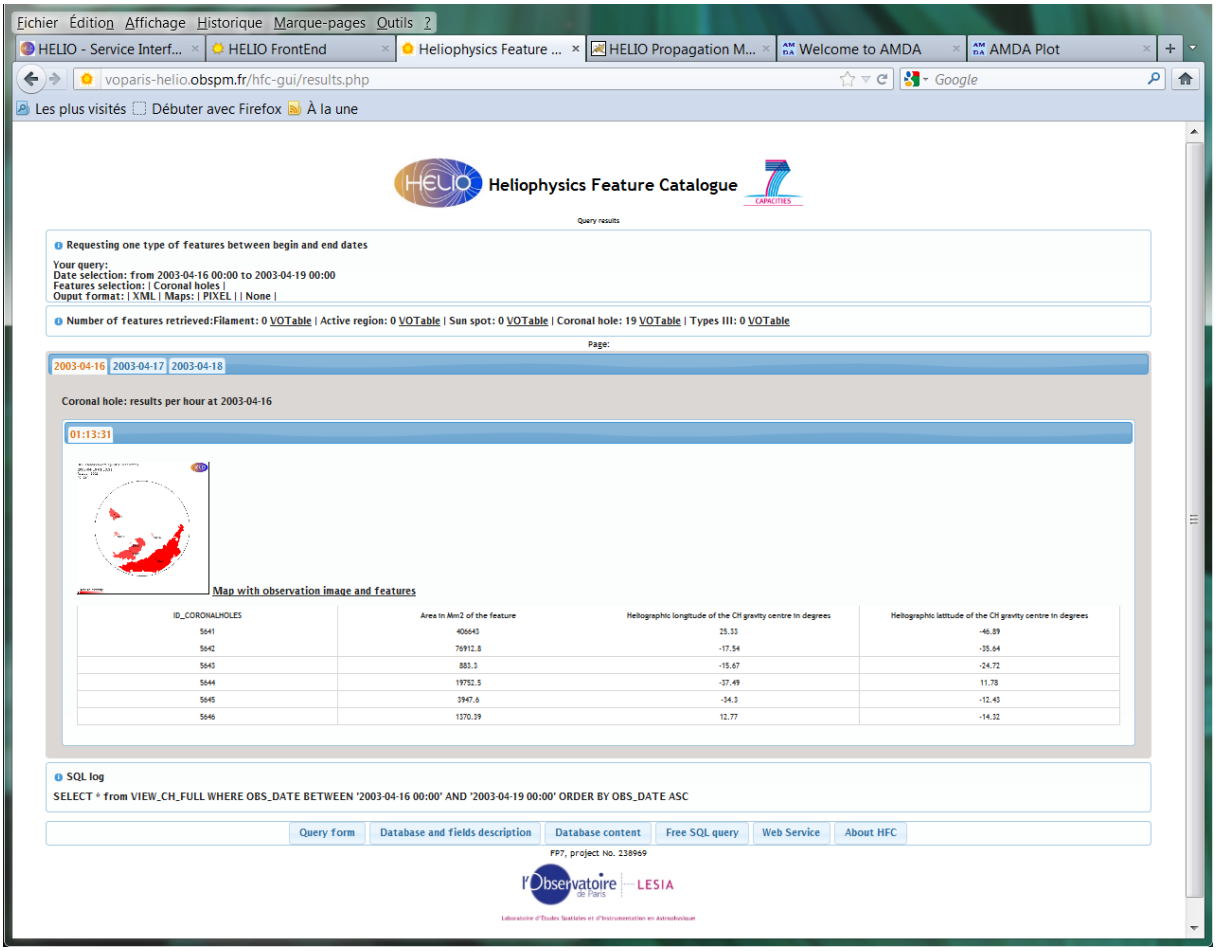
CDAW 3

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

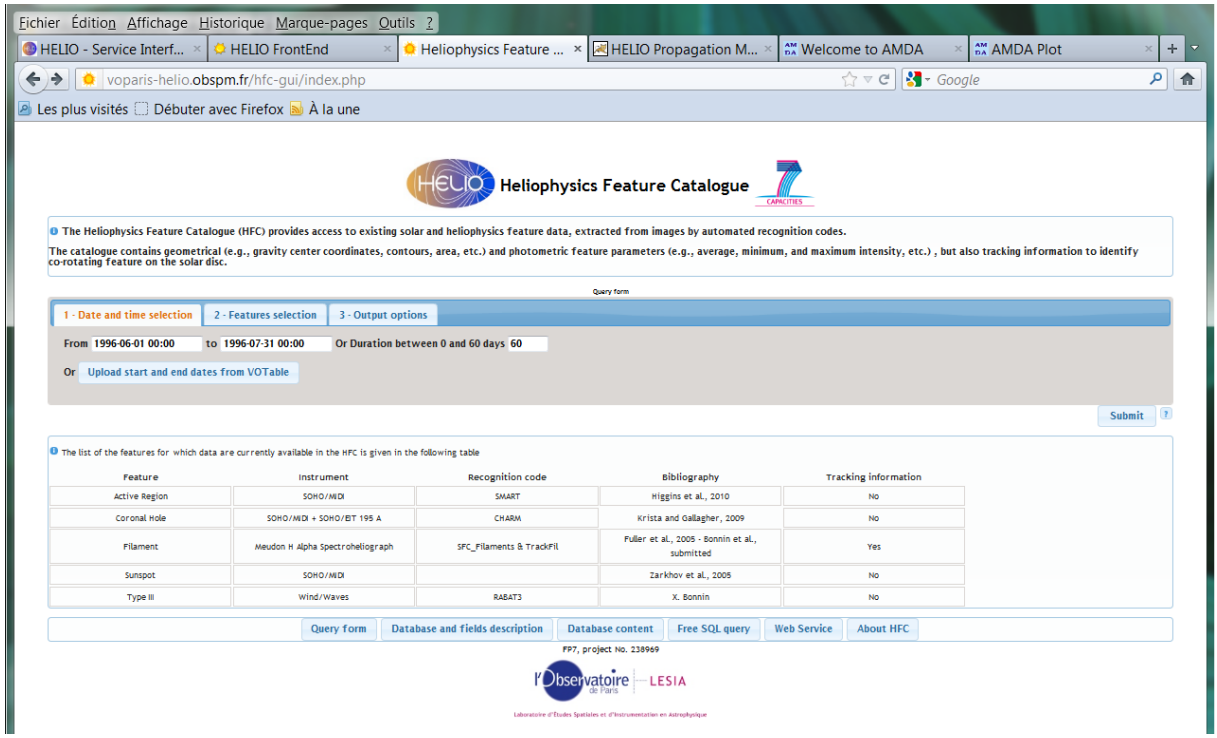
AMDA GUI: http://cdpp-amda.cesr.fr/DDHTML/index.html (Mozilla only)
http://www.solarmonitor.org/
Visualization software to be downloaded: JHelioviewer : http://jhelioviewer.org/

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/

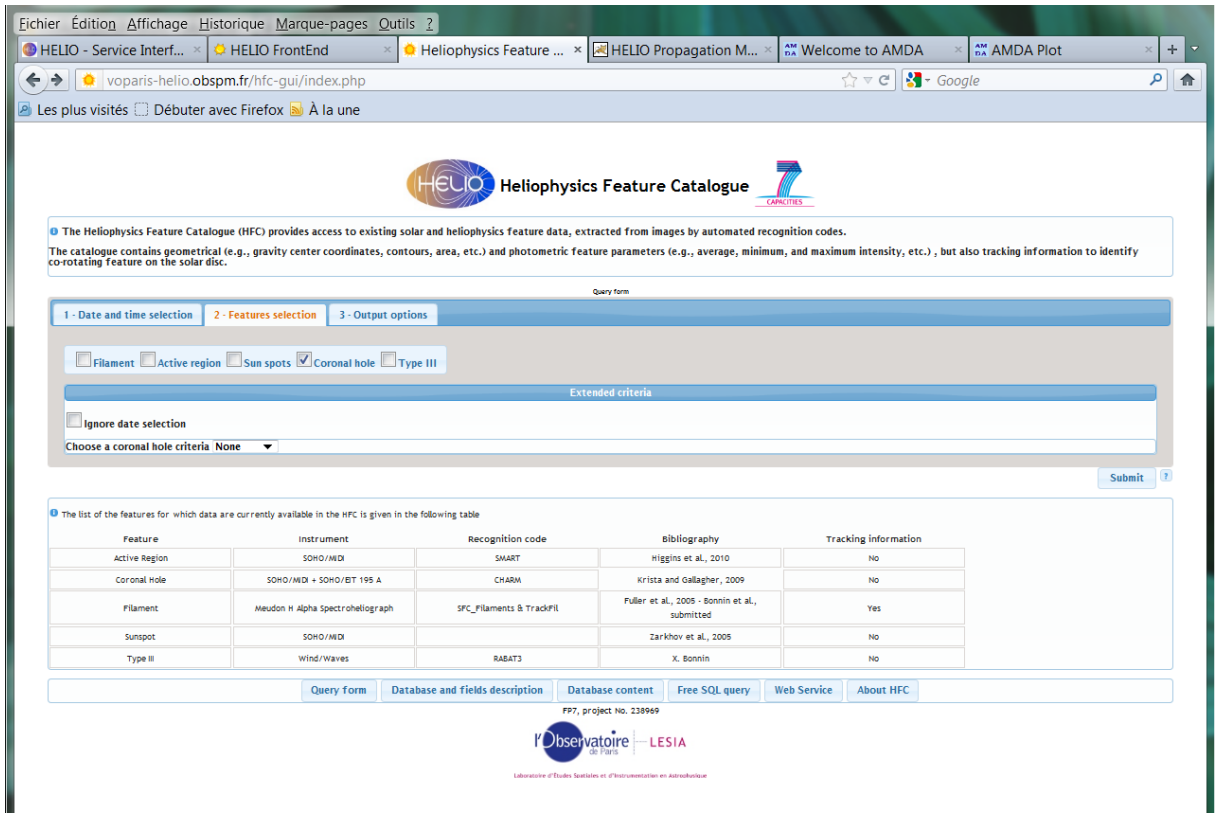
Exercise 1 : Found and visualize the biggest coronal hole referenced in HELIO. Estimate the solar wind speed coming from that coronal hole.
1) From HFC, found the epochs where Coronal Holes are identified
==> explore Database Content (at the bottom)



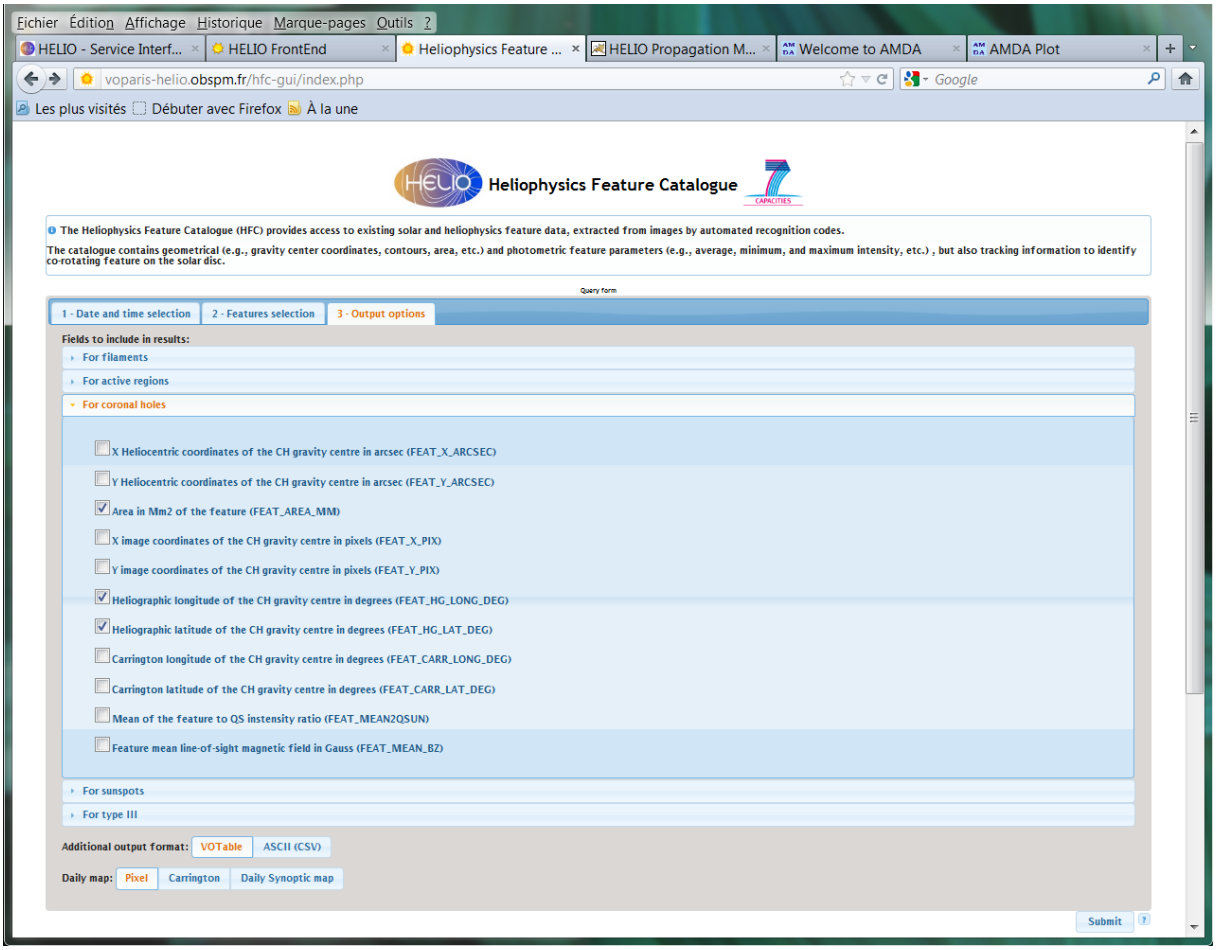
- Select the Query Form (bottom left), and choose dates e.g. from June 1st, 1996 to August 1st, 1996 (which correspond to the largest authorized selection: 60 days).



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

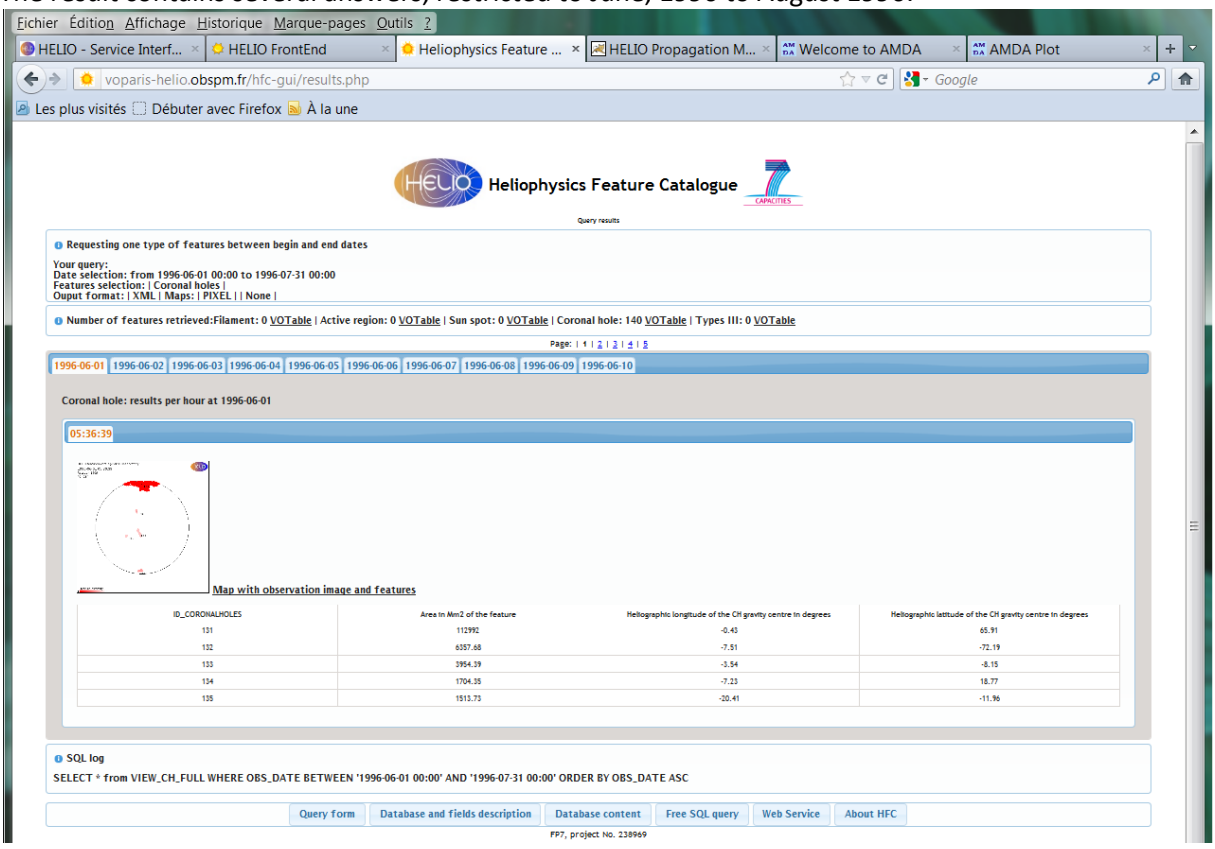


- Select criteria : Output Options
  ==> e.g. Latitude, longitude and surface.



- Submit

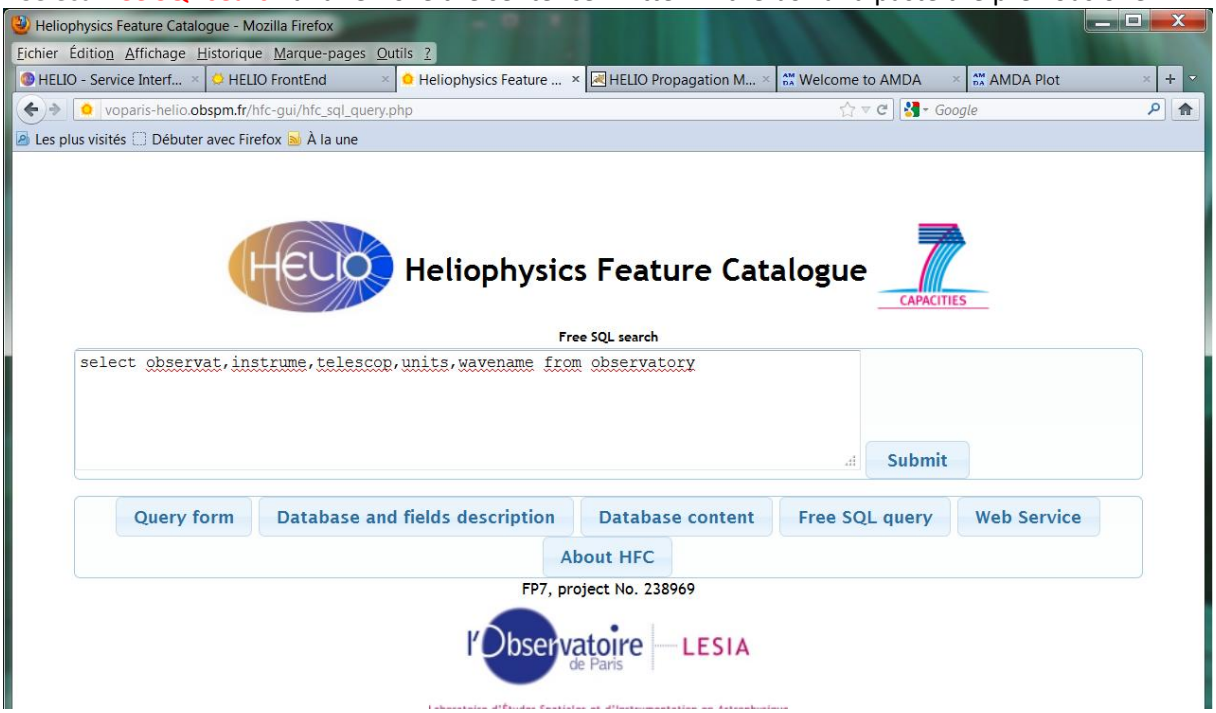
The result contains several answers, restricted to June, 1996 to August 1996.



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

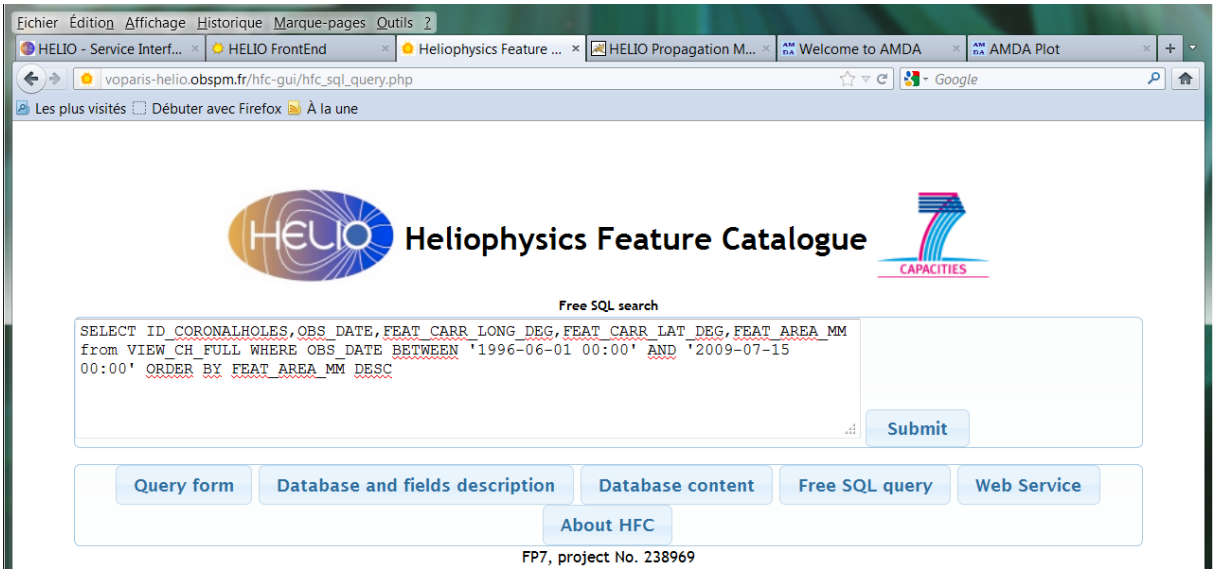
- Copy the sentence from the SQL LOG box at the bottom:
SELECT * from VIEW_CH_FULL WHERE OBS_DATE BETWEEN '1996-06-01 00:00' AND '1996-08-01 00:00' ORDER BY OBS_DATE ASC

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

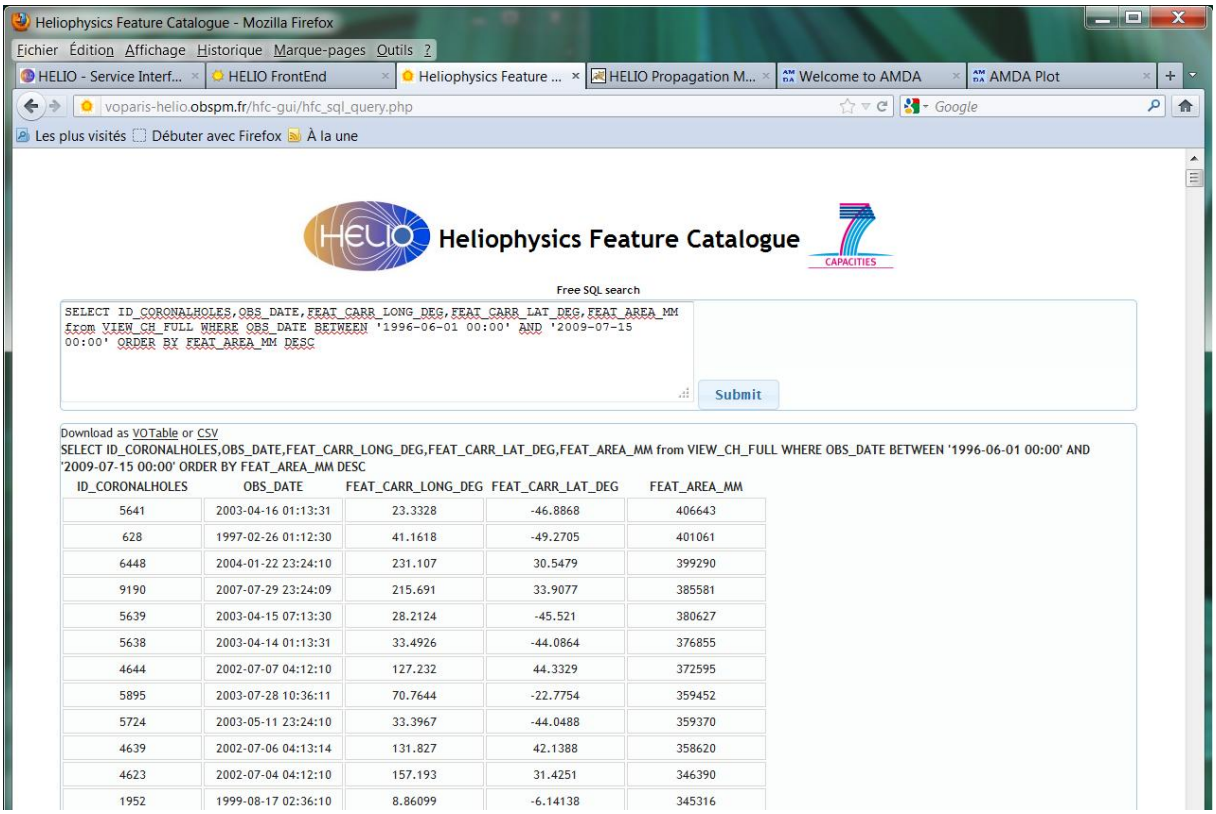


- Change manually the end-date : '2009-07-15 00:00' e.g.
- Replace the * by the relevant critria, selected in the keyword list:

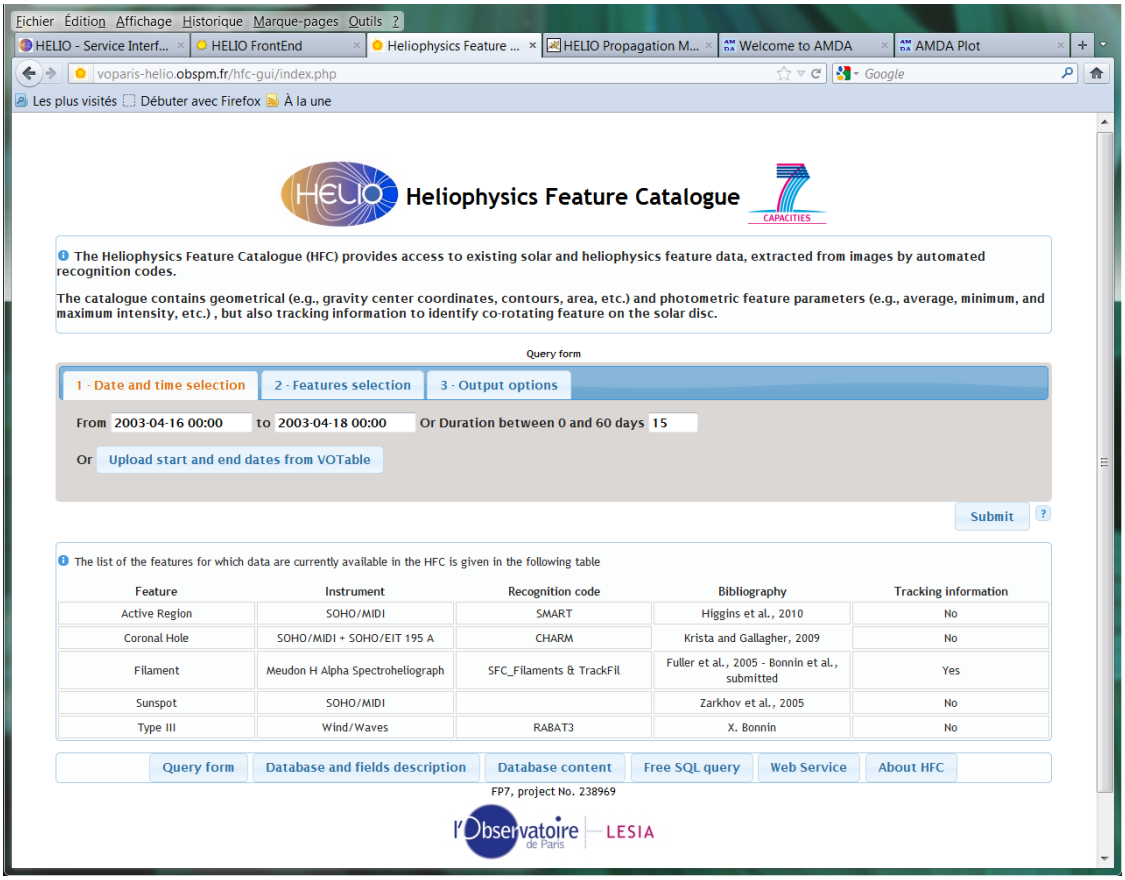
- Click on Database and fields description.
- From the new window: browse until Table CORONALHOLES.
Replace * by (copy-paste from the list):
ID_CORONALHOLES,OBS_DATE,FEAT_CARR_LONG_DEG,FEAT_CARR_LAT_DEG,FEAT_AREA_MM.
Replace ORDER BY OBS_DATE ASC par FEAT_AREA_MM DESC in order to obtain the results ordered by descending surfaces.



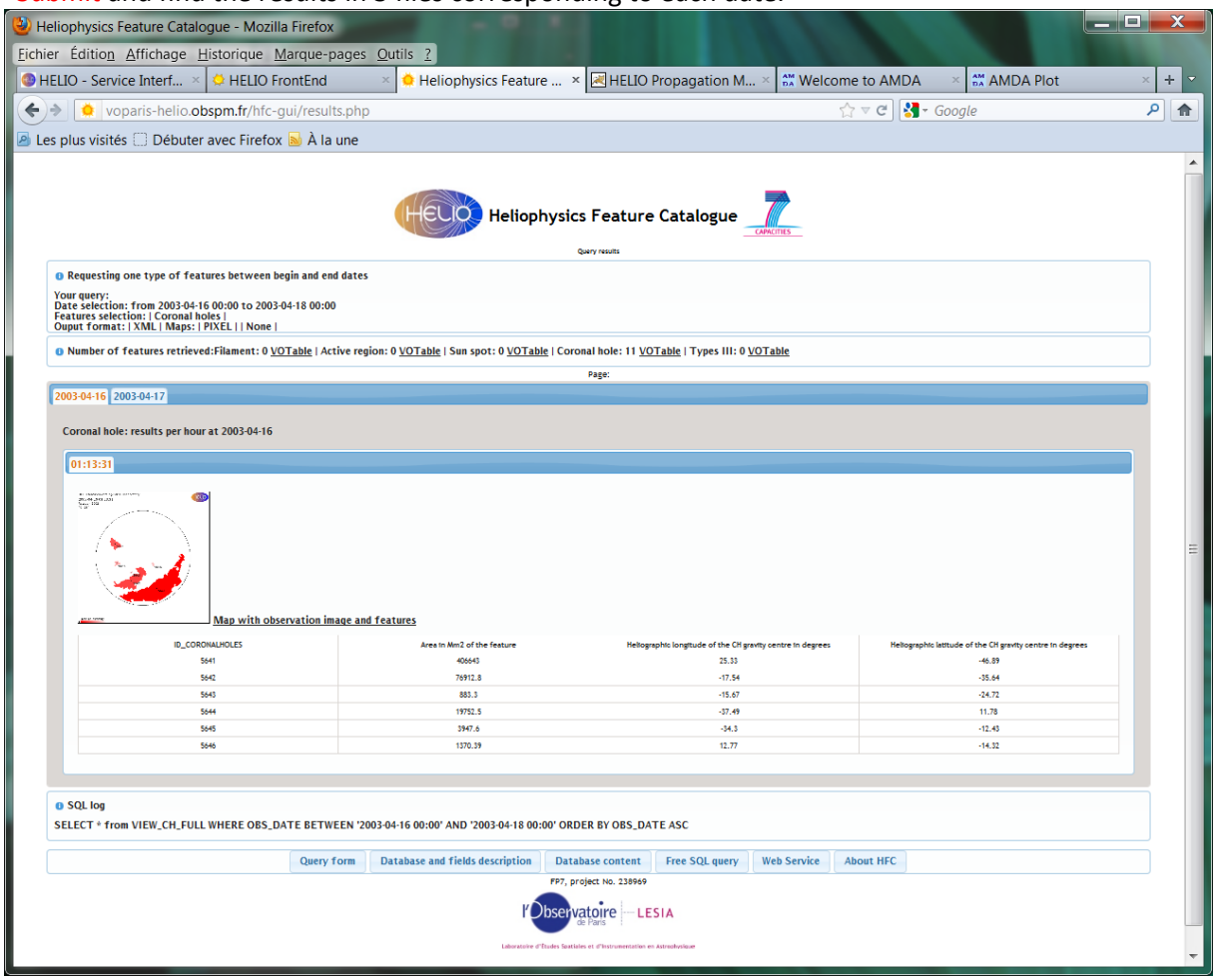
- Submit ==> The table contains the results, ordered by descending surfaces.



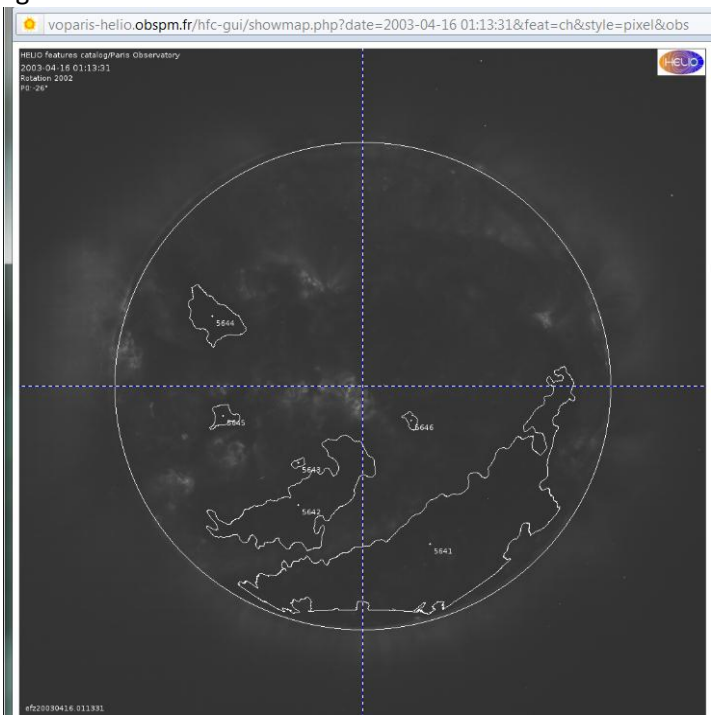
- Find the date of the biggest coronal hole.
- Copy-paste the date in the Query Form (bottom), to visualize the structure, over e.g. 3 days.



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



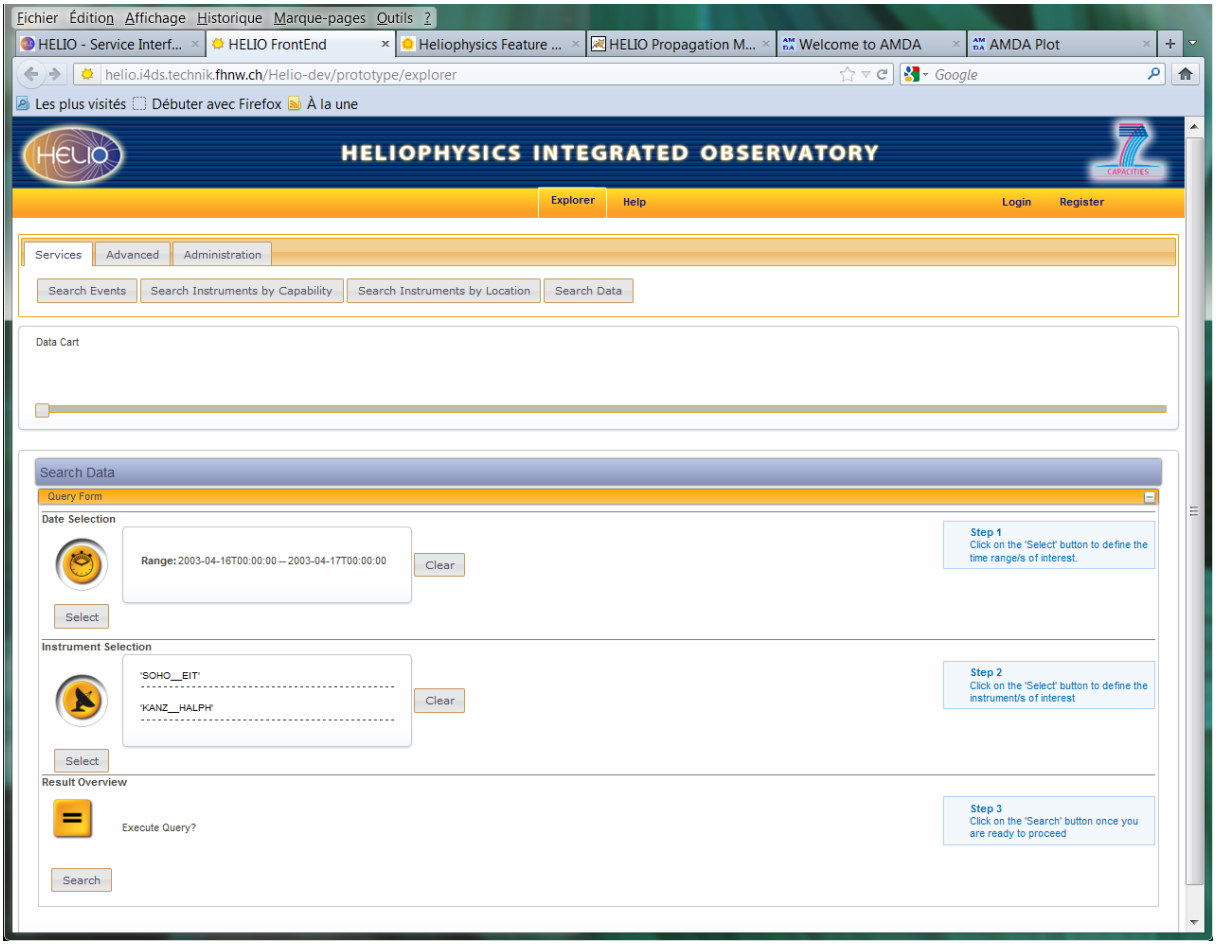
- Click on the image to enlarge it or
- Click on Map with observation image and features to overlay the identified structure with the corresponding EIT image if the Sun.



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

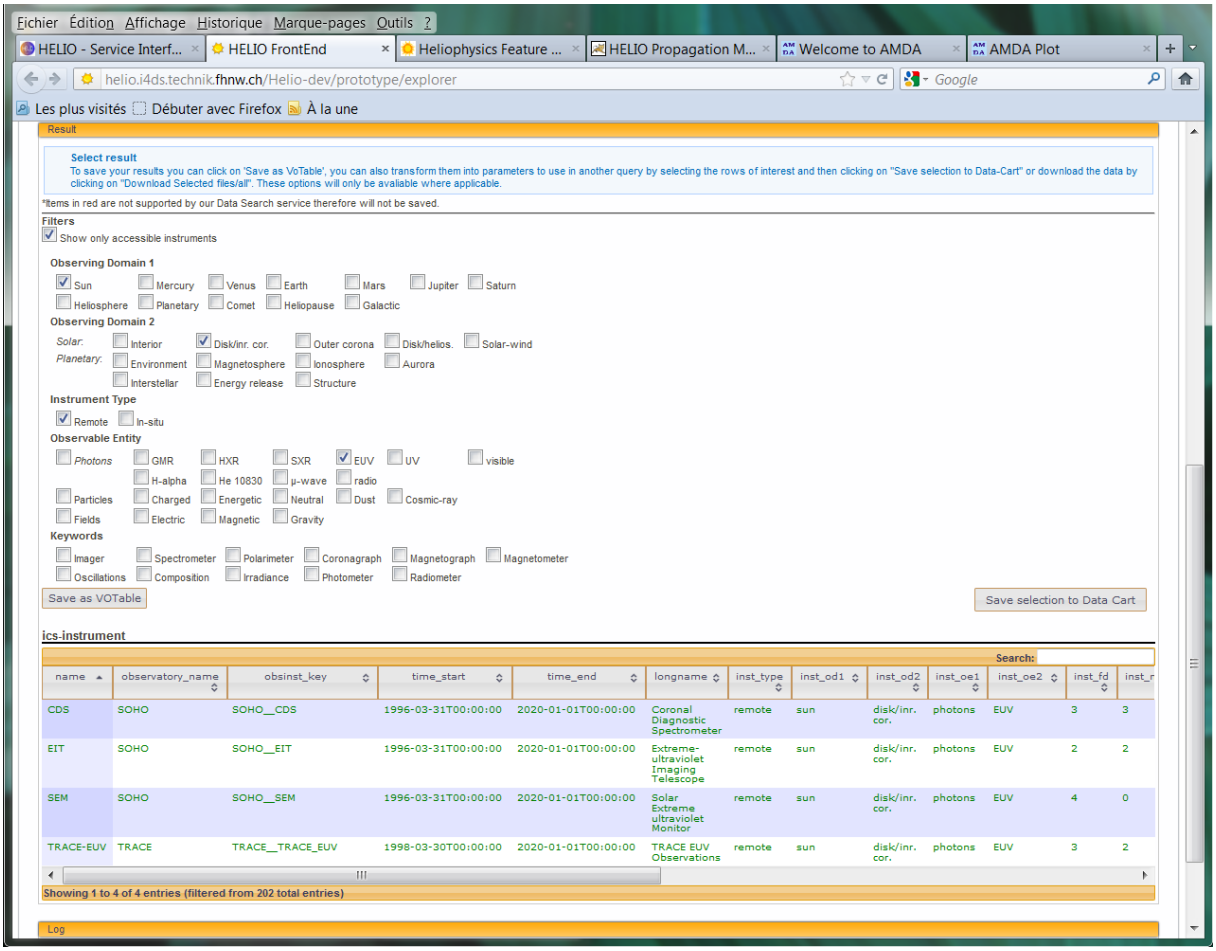
==> Services and Search Data

- 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...).



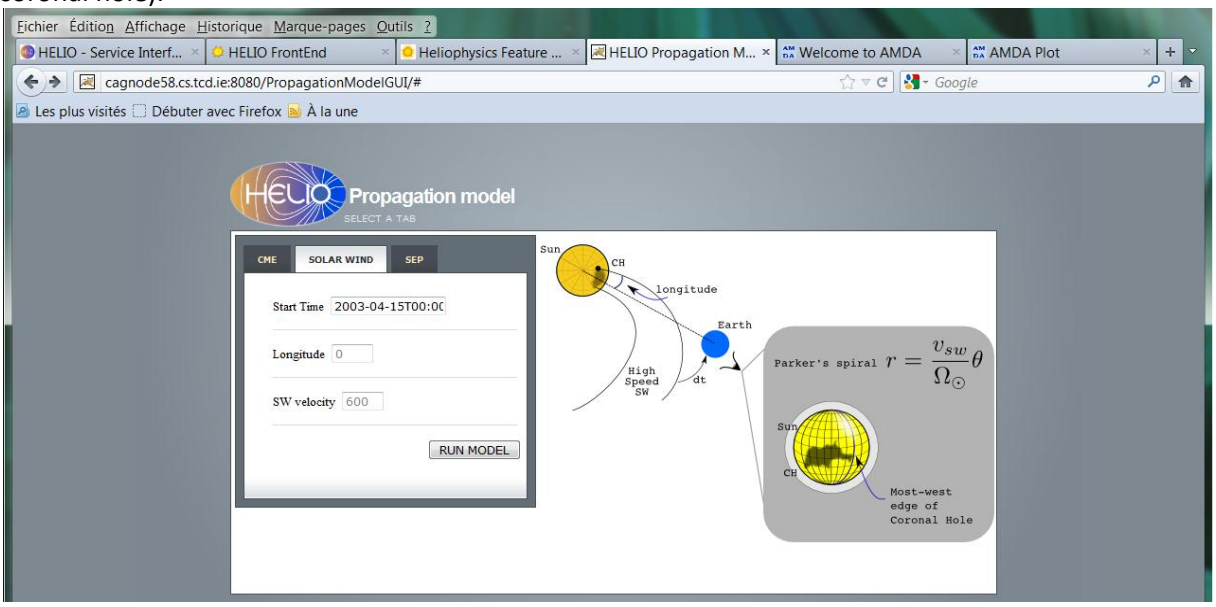
==> a lot's of EIT answers and one Halpha file: the links towards the databases are indicated. Click to download the data

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

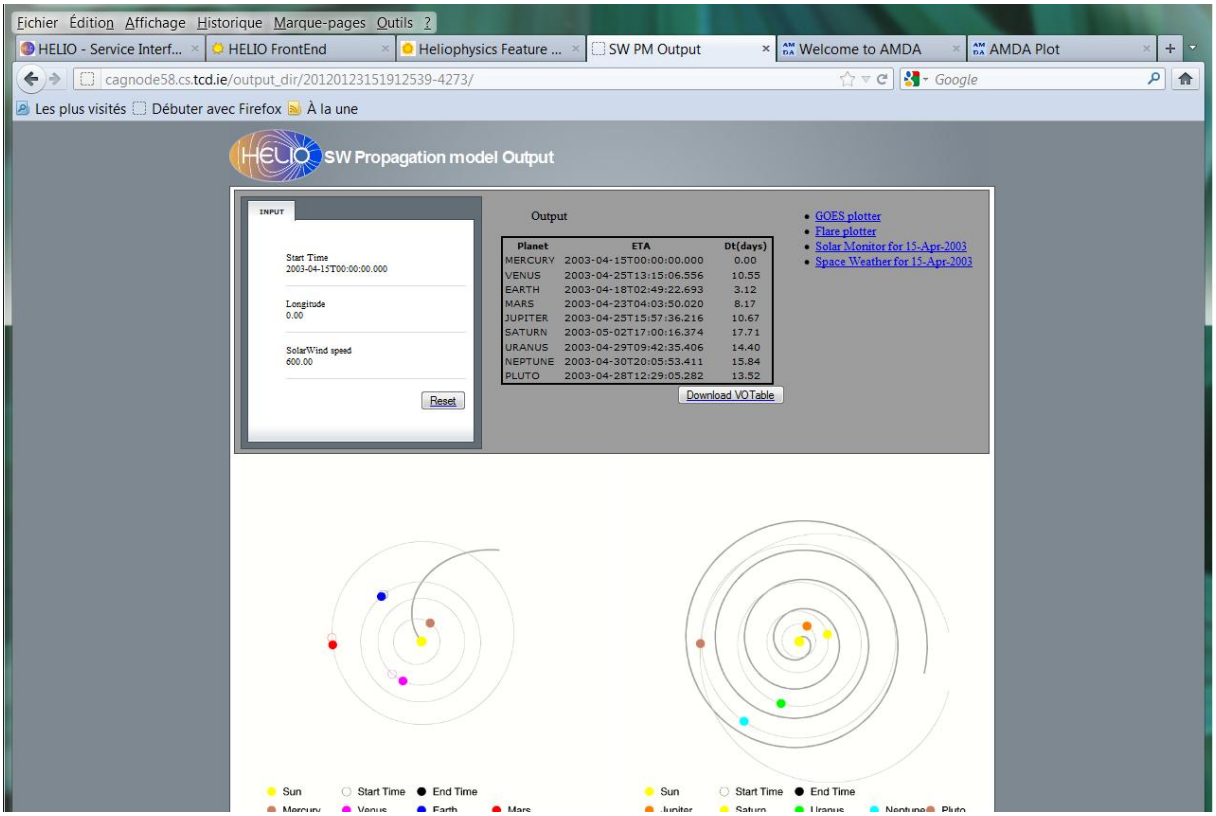


3) Use the propagation model to measure the solar wind velocity coming from that Coronal Hole.

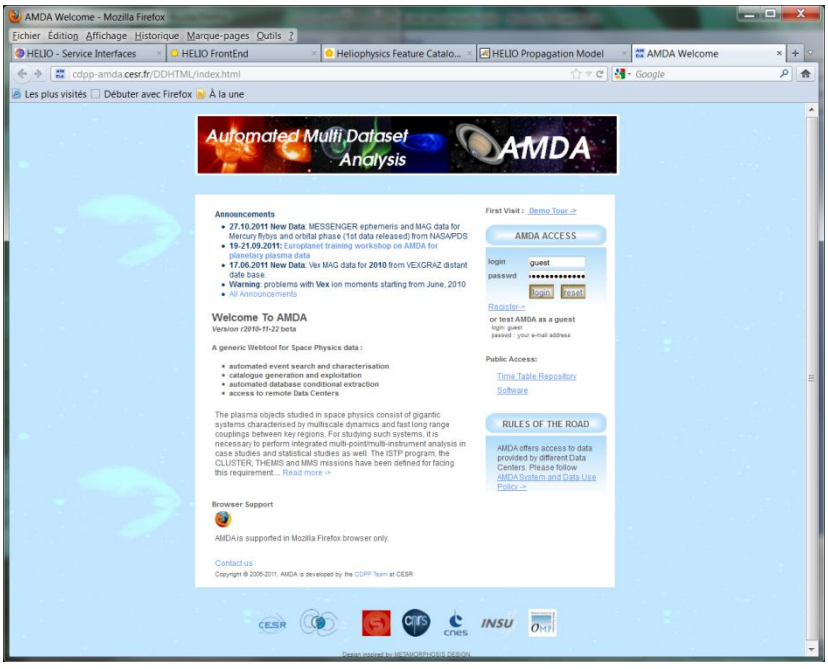
- Enter the departure date (from the Sun), suggest a speed of 600 km/s (fast wind coming from a coronal hole).



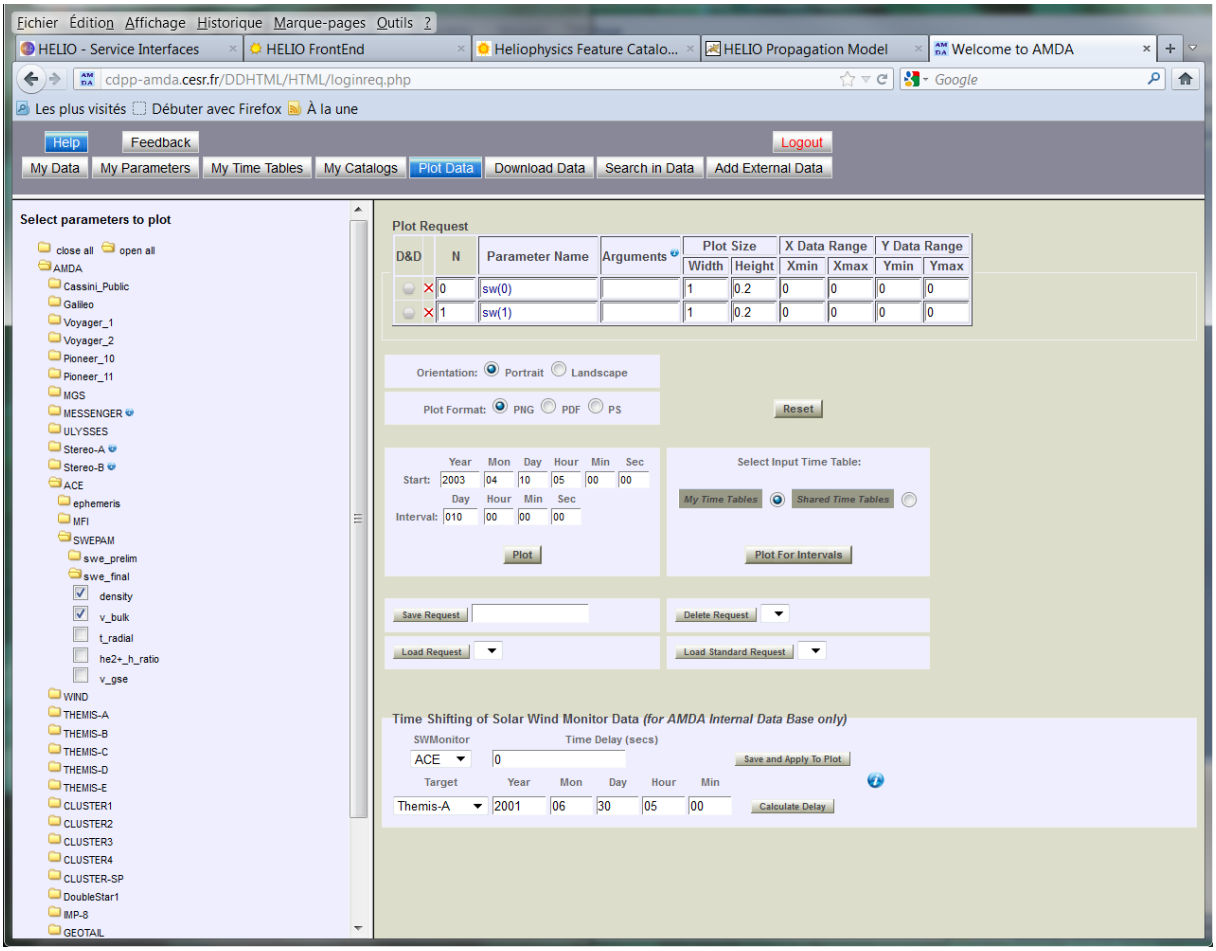
==> 3 days after, the effects could be seen on the Earth, taking into account the position of the hole and the Parker's spiral).



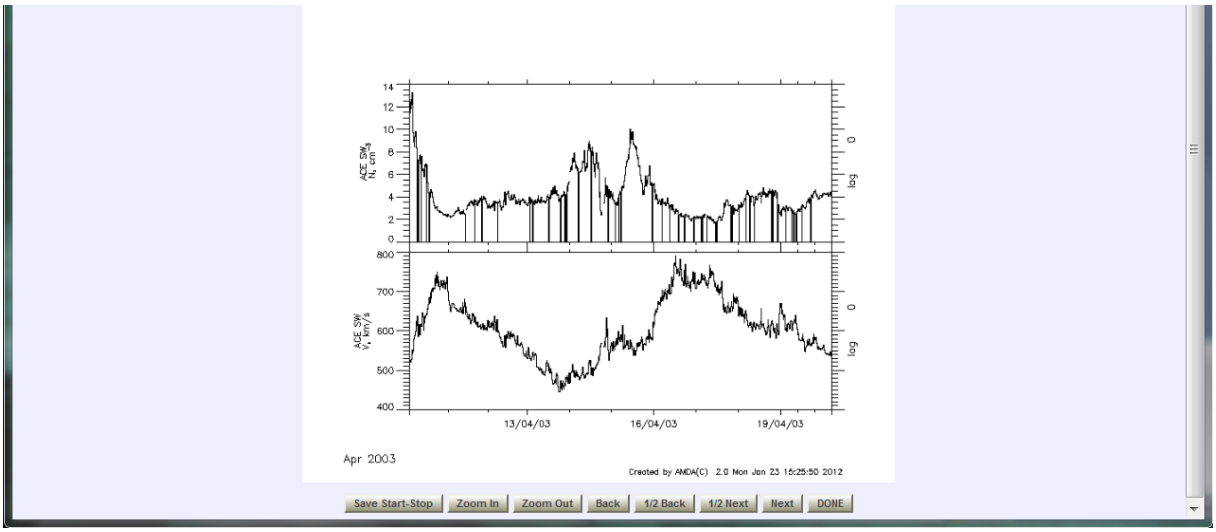
4) Visualize the speeds with AMDA (MOZILLA only) : login = guest, password = mail_address



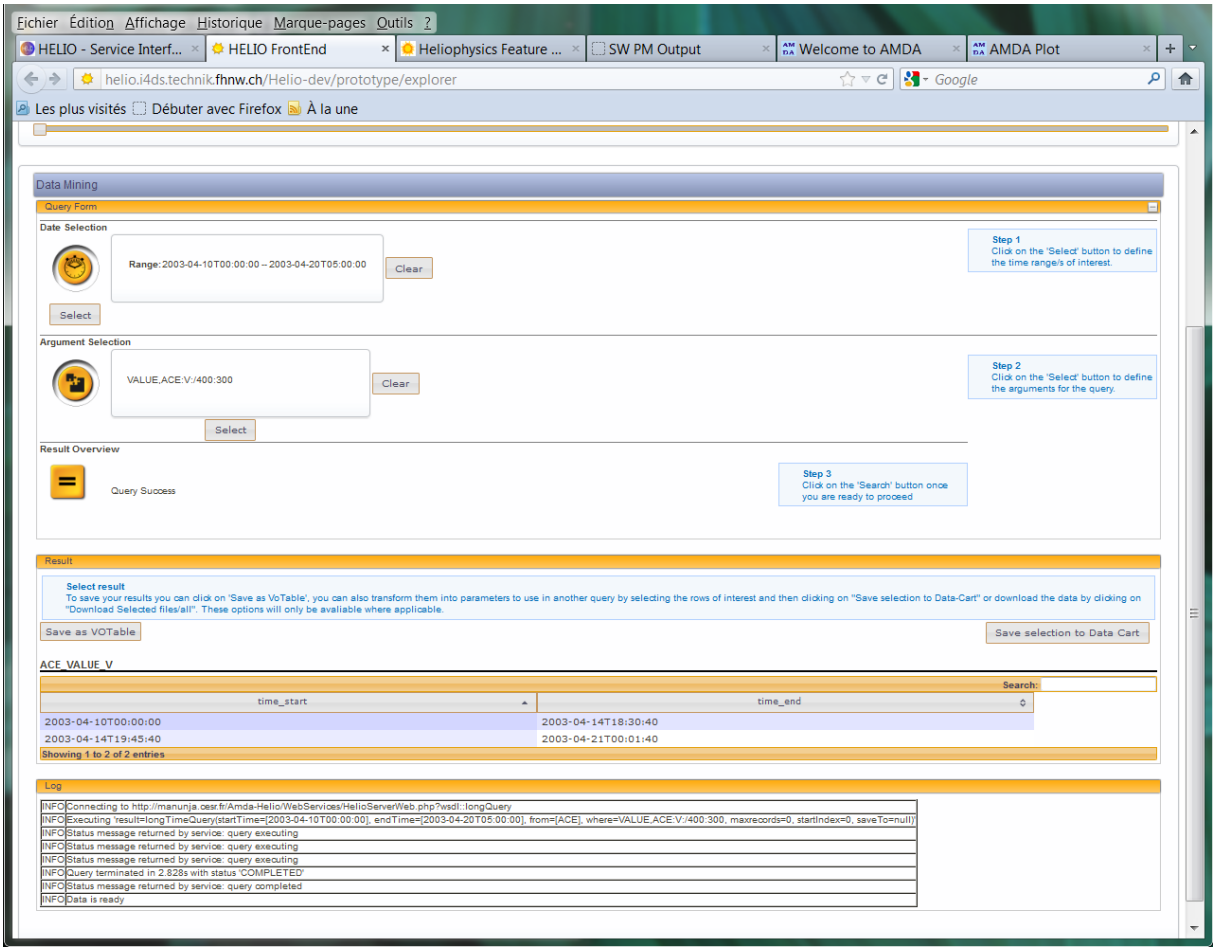
- Click on the left on AMDA, then ACE then SWEPAM then swe_final then select e.g. Density and v_bulk.



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

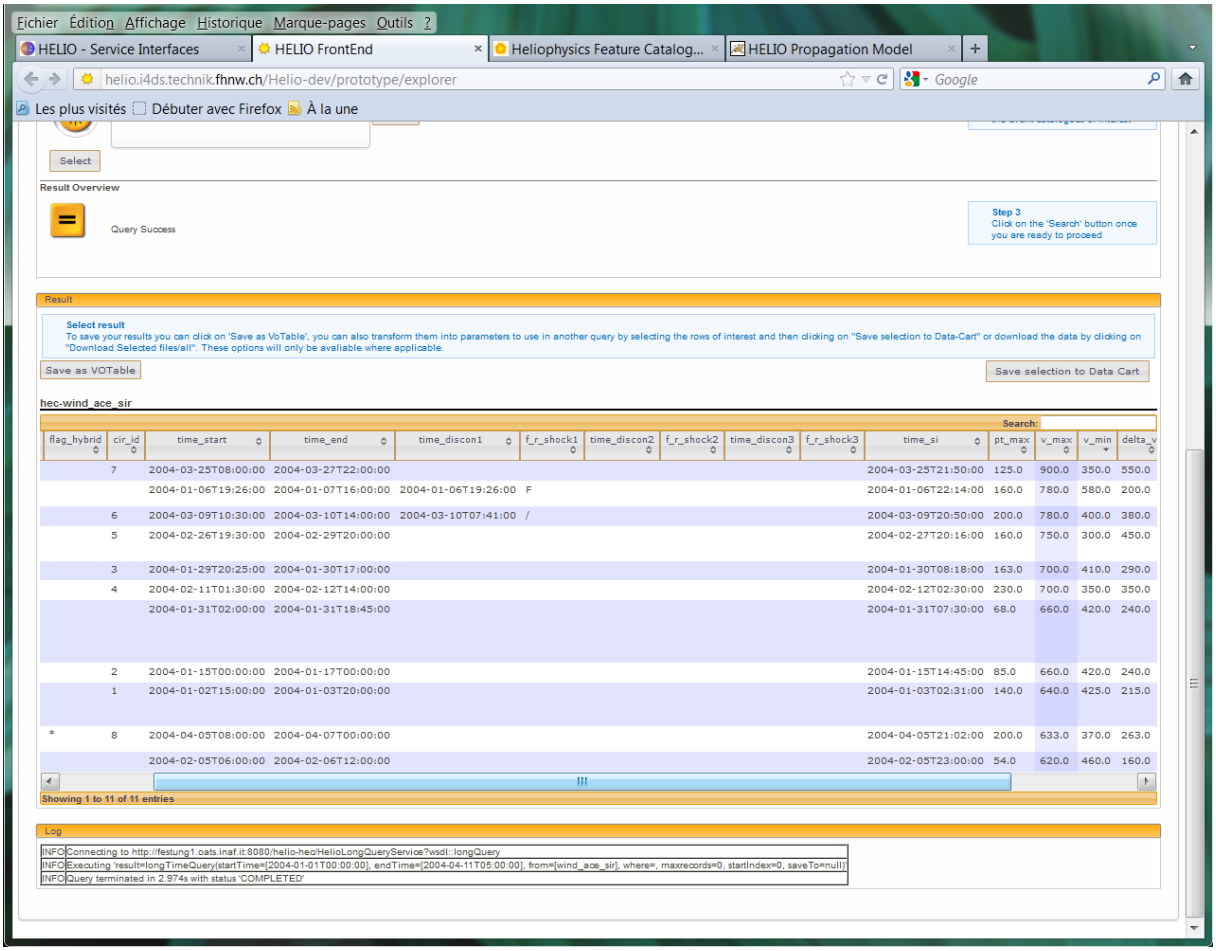


5) From HFE again, get the files for in-situ measurements of the solar wind speed.
- Click on Advanced, and on in situ data mining.
- Extend the selection dates from 10 April to 20 April 2003.
- Choose ACE and SWEPAM, Parameter Value, Velocity_Magnitude, >400 km/s, Average Time=300 s.
- Execute Query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



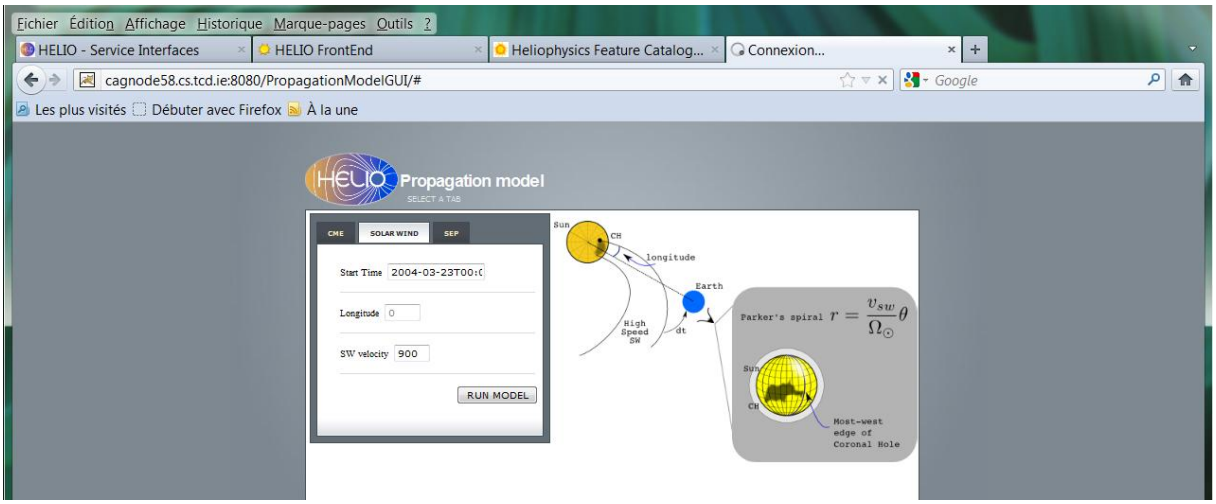
Exercise 2 : Identify the solar source of a large velocity measured in the solar wind

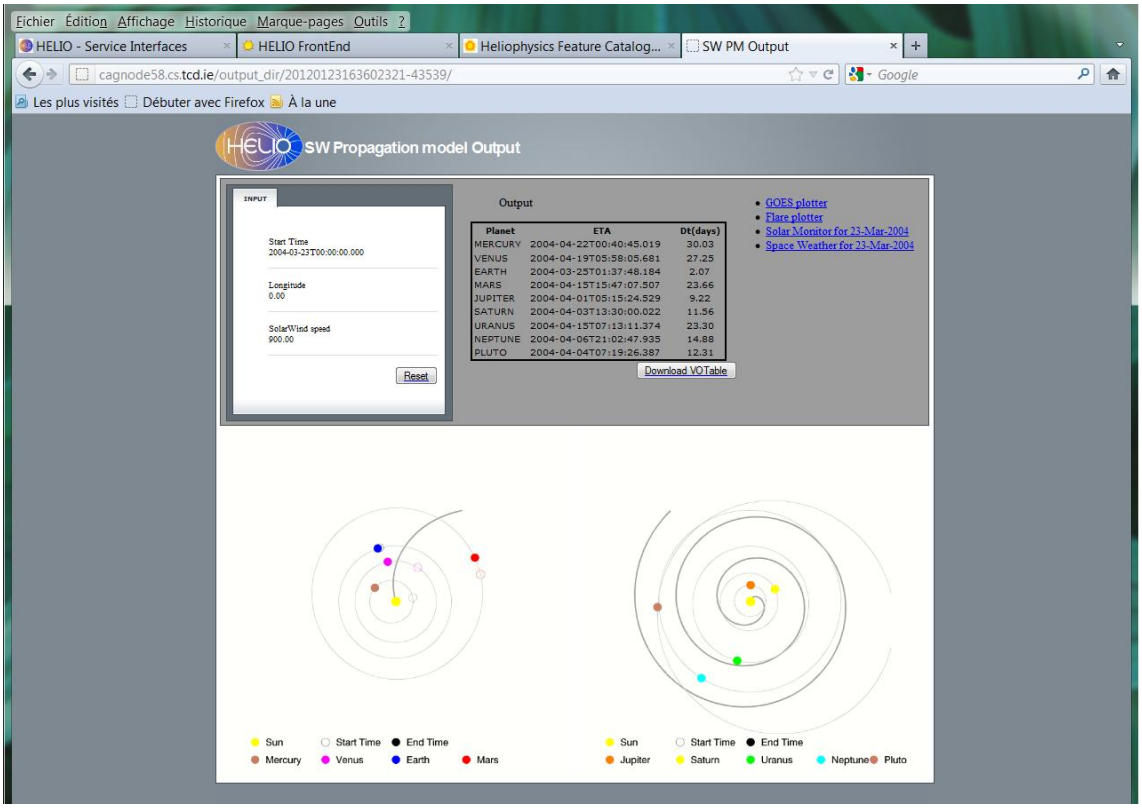
1) From HFE, find a high velocity solar wind event.
- Select Services, then Search Events, choose a period, from January 1st, 2004 to April 30, 2004 e.g.
- Select an event : click on Solar Wind and select "Stream Interaction Regions from Wind and ACE" data e.g.
- Submit : large list of ACE observations,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



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.

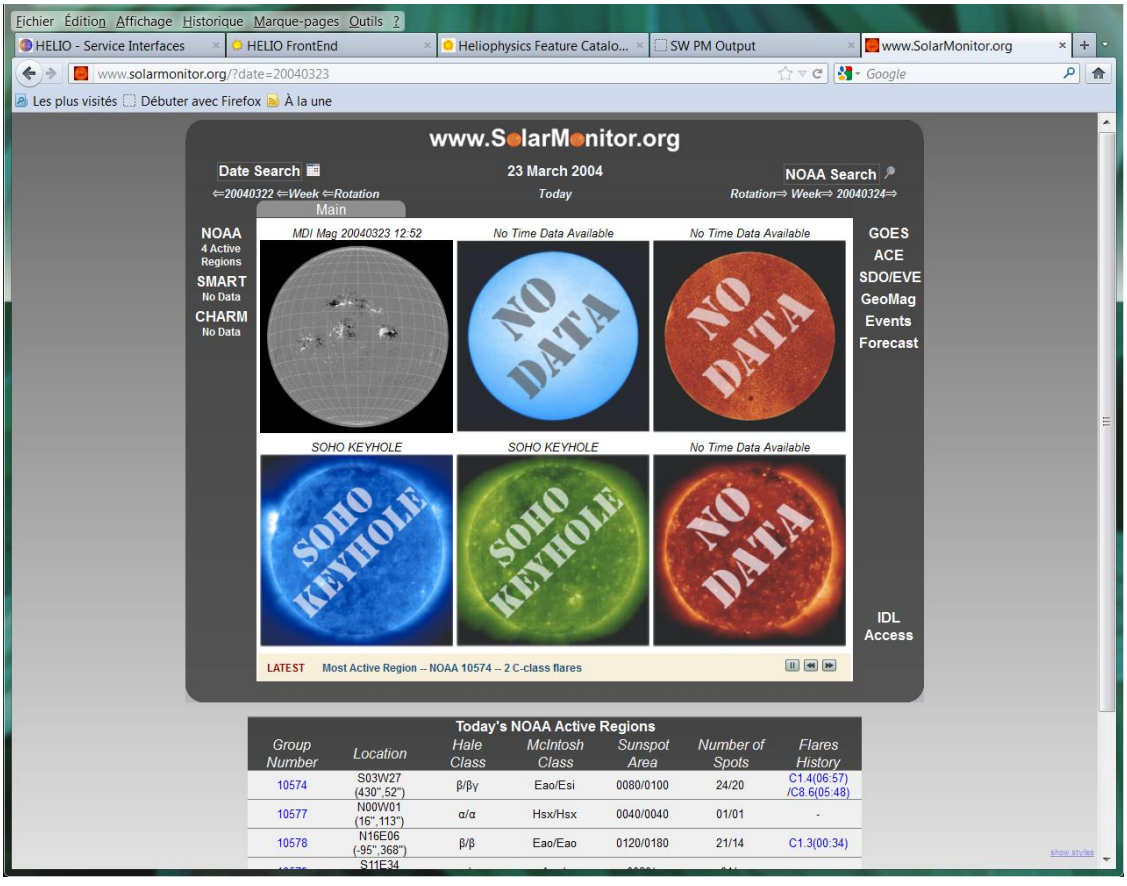




3) Select SOHO data e.g. using HFE to get an image of the Sun at that time.

- 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 Février 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.