

LOGISTICS OF SPACE (WEATHER) DATA

The PROBA2 team in Brussels



David.Berghmans@gmail.com

Royal Observatory of Belgium

<http://sidc.be>, <http://proba2.sidc.be>

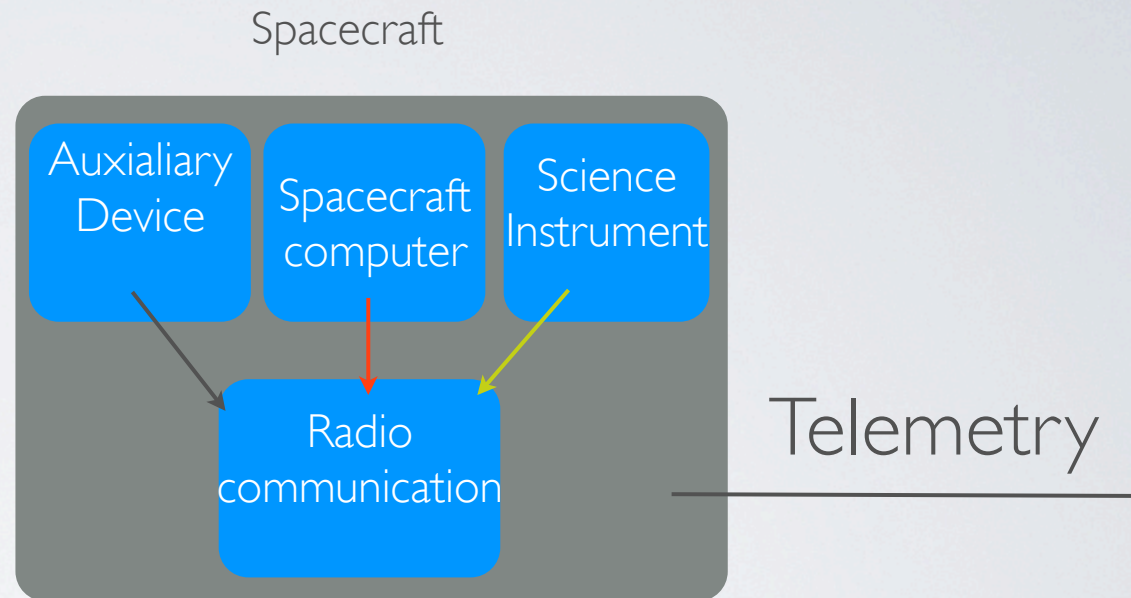


WHAT SHALL WE LEARN?

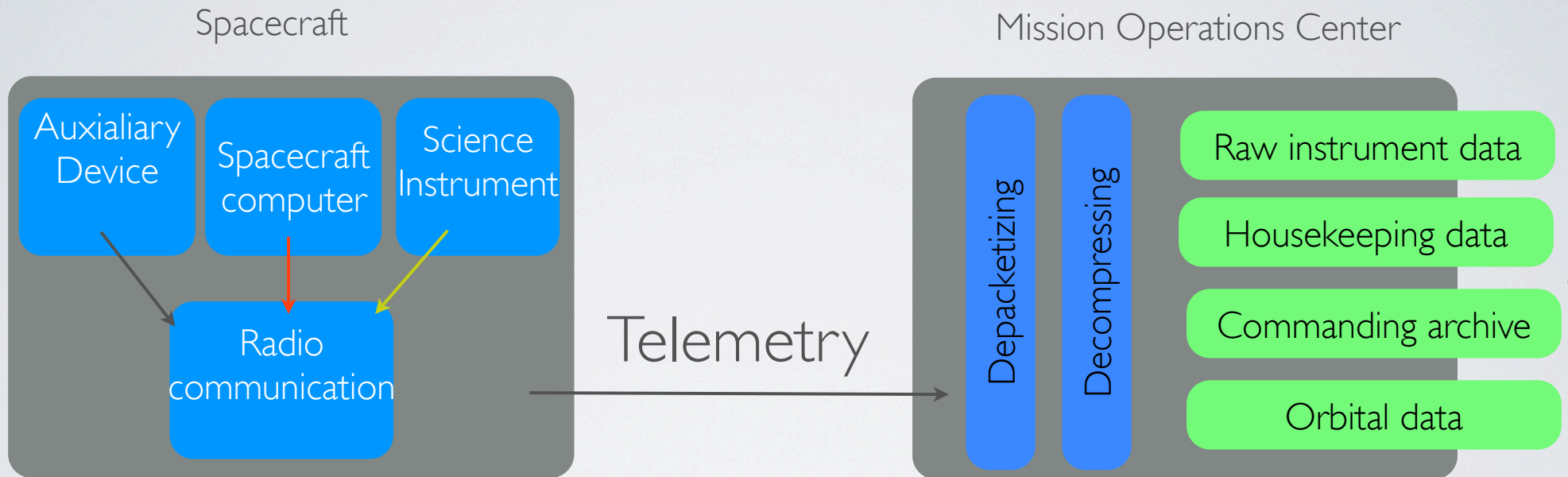
- How does space weather data get online?
- What determines how timely/recent the data is?
- What is the difference between telemetry, raw data, science data files and quick-look data?

<http://proba2.sidc.be/Presentations/ICTP>

HOW DOES SPACE WEATHER DATA GET ONLINE?



WHAT DETERMINES HOW TIMELY/RECENT THE DATA IS?



WHERE IS MY SATELLITE?

Go to
<http://www.heavens-above.com/>

Heavens-Above Home Page

data look up <meta conte... Query Page Lyra Main page In.be Belgacom B-...elodder.be

STS-133, currently scheduled for November 1st.

observing site: **unspecified, 0.0000°N, 0.0000°E**
[Select from map](#) or [from database](#) or [edit manually](#)
[Registered user login](#) | [Why register?](#)
[Create new user account](#)
AvantGo channel discontinued, please [click here](#) for details

Satellites

10 day predictions for: [ISS](#) | [X-37B](#) | [Genesis-1 / 2](#) | [Envisat](#) | [HST](#)
Daily predictions for all satellites brighter than magnitude:
(brightest) [3.5](#) | [4.0](#) | [4.5](#) (dimmiest)
New! [All passes of the ISS](#) - including daylight and invisible passes.
Iridium Flares
[next 24 hrs](#) | [next 7 days](#) | [previous 48 hrs](#)
[Daytime flares for 7 days](#) - see satellites in broad daylight!
[Spacecraft escaping the Solar System](#) - where are they now?
[Radio amateur satellites](#) - 24 hour predictions (all passes)
[Select a satellite from the database](#)
[Height of the ISS](#) - how does it vary with time

Astronomy

Comets currently brighter than mag. 12
[103P Hartley](#) | [10P Tempel 2](#)
Minor planets currently brighter than mag. 10
[4 Vesta](#) | [6 Hebe](#) | [8 Flora](#) | [1 Ceres](#) | [7 Iris](#) | [39 Laetitia](#) | [471 Papagena](#)
[Whole sky chart](#)
[Sun and Moon data for today](#)
[Planet summary data](#)
Planet details (under construction)
[Mercury](#) | [Venus](#) | [Earth](#) | [Mars](#) | [Jupiter](#) | [Saturn](#) | [Uranus](#) | [Neptune](#) | [Pluto](#)
[Solar system chart](#)
[Constellations](#)

Miscellaneous

[What time is it ?](#) | [Calendar](#)
[Frequently Asked Questions \(FAQ\)](#)
[Links to other sites](#)
[Help](#)
[Privacy Policy](#)
Statistics
[Daily page counts](#)
[Visits by country](#) | [by operating system and browser type](#)
Maps showing geographical distribution of visitors
[world](#) | [europe](#) | [USA](#)
[Observations, sorted by observer](#)



© Heavens-Above.com
Current position of the ISS

TOTAL Eclipse 2010 & 2012

Annular Eclipse, Transit of Venus,
Aurora Borealis & Quadrantid Meteor
www.astro-expeditions.com

Saturn, Jupiter & Uranus

Their Positions revealed in a Vital Free
Reading of your Natal Chart!
AboutAstro.com

Soyuz parachute bags

Original Soyuz mission parachute bags.
Authenticated by astronaut
www.everquestdesign.com

Ads by Google

Sponsored Links

- Barcode Printer
- China Wholesale
- Manufacturers in China

Developed and maintained by [Chris Peat](#), Heavens-Above GmbH

WHERE IS MY SATELLITE?

Select a satellite

Heavens-Above Home Page

http://www.heavens-above.com/ solar observatory

Bonjour DSLP data look up <meta conte...Query Page Lyra Main page In.be Belgacom B-...elodder.be

Shuttle Missions

Next Shuttle mission will be STS-133, currently scheduled for November 1st.

Configuration

Current observing site: **Unspecified, 0.0000°N, 0.0000°E**
[select from map](#) or [from database](#) or [edit manually](#)
[Registered user login](#) | [Why register?](#)
[Create new user account](#)
AvantGo channel discontinued, please [click here](#) for details

Satellites

10 day predictions for: [ISS](#) | [X-37B](#) | [Genesis-1 / 2](#) | [Envisat](#) | [HST](#)
Daily predictions for all satellites brighter than magnitude:
(brightest) [3.5](#) | [4.0](#) | [4.5](#) (dimmiest)
NEW! [All passes of the ISS](#) - including daylight and invisible passes.
Iridium Flares
[next 24 hrs](#) | [next 7 days](#) | [previous 48 hrs](#)
Daytime flares for 7 days - see satellites in broad daylight!
[Spacecraft escaping the Solar System](#) - where are they now?
[Radio amateur satellites](#) - 24 hour predictions (all passes)
[Select a satellite from the database](#)
[Height of the ISS](#) - how does it vary with time

Astronomy

Comets currently brighter than mag. 12
[103P Hartley](#) | [10P Tempel 2](#)
Minor planets currently brighter than mag. 10
[4 Vesta](#) | [6 Hebe](#) | [8 Flora](#) | [1 Ceres](#) | [7 Iris](#) | [39 Laetitia](#) | [471 Papagena](#)
[Whole sky chart](#)
[Sun and Moon data for today](#)
[Planet summary data](#)
Planet details (under construction)
[Mercury](#) | [Venus](#) | [Earth](#) | [Mars](#) | [Jupiter](#) | [Saturn](#) | [Uranus](#) | [Neptune](#) | [Pluto](#)
[Solar system chart](#)
[Constellations](#)

Miscellaneous

[What time is it ?](#) | [Calendar](#)
[Frequently Asked Questions \(FAQ\)](#)
[Links to other sites](#)
[Help](#)
[Privacy Policy](#)
Statistics
[Daily page counts](#)
[Visits by country](#) | [by operating system and browser type](#)
Maps showing geographical distribution of visitors
[world](#) | [europe](#) | [USA](#)
[Observations, sorted by observer](#)



© Heavens-Above.com
Current position of the ISS

TOTAL Eclipse 2010 & 2012

Annular Eclipse, Transit of Venus, Aurora Borealis & Quadrantid Meteor
[www.astro-expeditions.com](#)

Saturn, Jupiter & Uranus

Their Positions revealed in a Vital Free Reading of your Natal Chart!
[AboutAstro.com](#)

Soyuz parachute bags

Original Soyuz mission parachute bags. Authenticated by astronaut
[www.everquestdesign.com](#)

Ads by Google

Sponsored Links

- Barcode Printer
- China Wholesale
- Manufacturers in China

Developed and maintained by [Chris Peat](#), Heavens-Above GmbH

WHERE IS MY SATELLITE?

Select Satellite

http://www.heavens-above.com/sel solar observatory

Bonjour DSLP data look up <meta conte...Query Page Lyra Main page In.be

HEAVENS ABOVE
TELESCOPES.COM
VARIETY, SWEET VARIETY
hayneedle
Variety, Sweet Variety

Select Satellite

Use this page to select one or more satellites from our large database of orbiting objects. Once selected, you can then obtain information about the satellite, its orbit, and make pass predictions for it.


US Space Command ID:
(e.g. 16609)

International launch designator:
(e.g. 86017 which will list all objects from that launch)

Satellite name:
(Use the % character as a wildcard, e.g. Mir, Irid%, %Rocket, the search is NOT case sensitive)

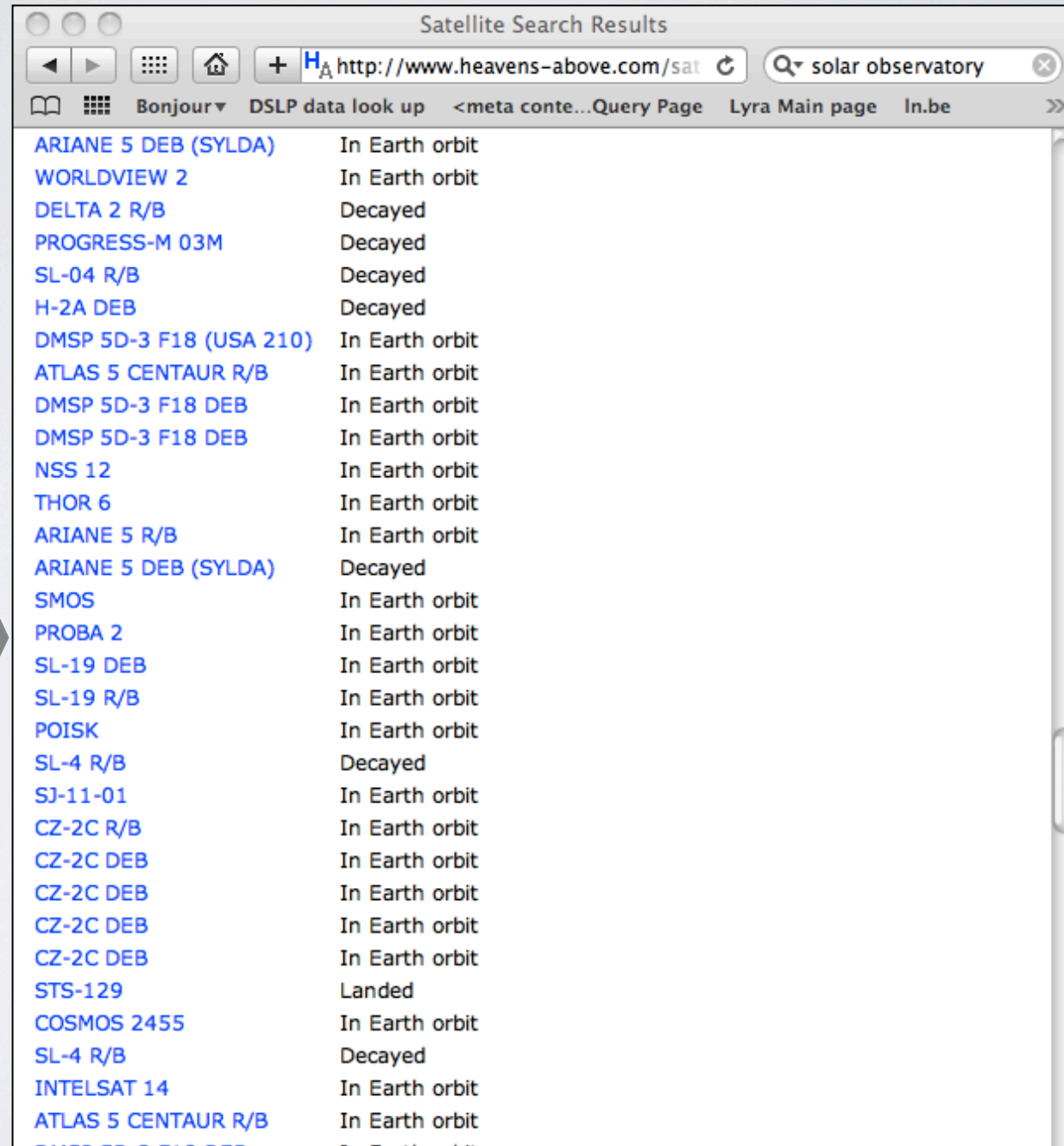
Enter year of launch:
(e.g. 98 or 1998 will list all objects launched that year)

Developed and maintained by [Chris Peat](#), Heavens-Above GmbH
Please read the updated [FAQ](#) before sending e-mail.

Hosted by  DLR/GSOC

**PROBA2 is launched
on Nov 2 2009**

WHERE IS MY SATELLITE?

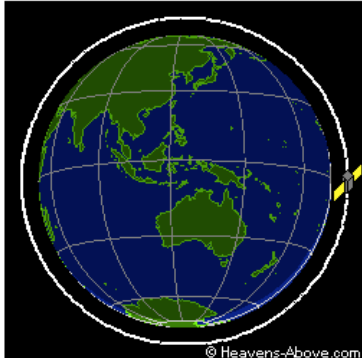


Satellite Name	Status
ARIANE 5 DEB (SYLDA)	In Earth orbit
WORLDVIEW 2	In Earth orbit
DELTA 2 R/B	Decayed
PROGRESS-M 03M	Decayed
SL-04 R/B	Decayed
H-2A DEB	Decayed
DMSP 5D-3 F18 (USA 210)	In Earth orbit
ATLAS 5 CENTAUR R/B	In Earth orbit
DMSP 5D-3 F18 DEB	In Earth orbit
DMSP 5D-3 F18 DEB	In Earth orbit
NSS 12	In Earth orbit
THOR 6	In Earth orbit
ARIANE 5 R/B	In Earth orbit
ARIANE 5 DEB (SYLDA)	Decayed
SMOS	In Earth orbit
PROBA 2	In Earth orbit
SL-19 DEB	In Earth orbit
SL-19 R/B	In Earth orbit
POISK	In Earth orbit
SL-4 R/B	Decayed
SJ-11-01	In Earth orbit
CZ-2C R/B	In Earth orbit
CZ-2C DEB	In Earth orbit
CZ-2C DEB	In Earth orbit
CZ-2C DEB	In Earth orbit
CZ-2C DEB	In Earth orbit
STS-129	Landed
COSMOS 2455	In Earth orbit
SL-4 R/B	Decayed
INTELSAT 14	In Earth orbit
ATLAS 5 CENTAUR R/B	In Earth orbit

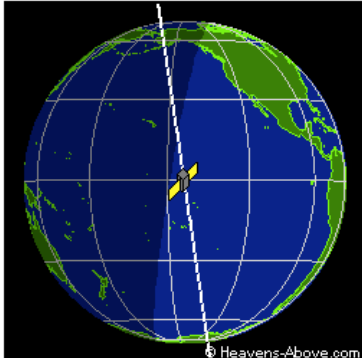
Select PROBA2

WHERE IS MY SATELLITE?

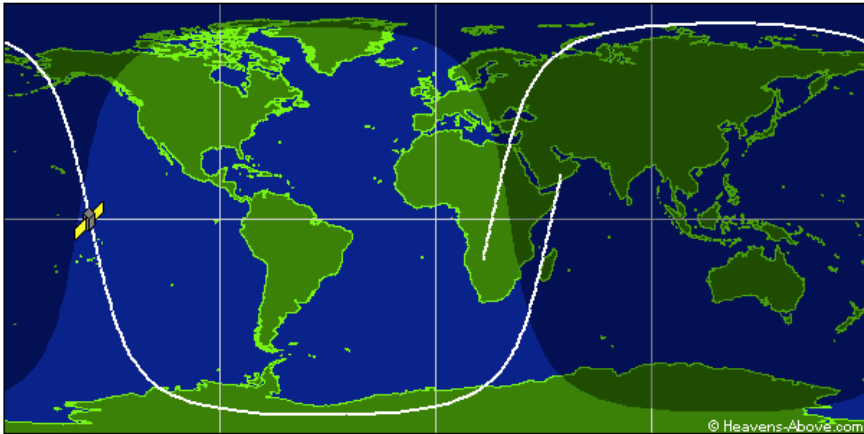
PROBA 2 - Orbit Data



View from above orbital plane



View from above satellite



Ground track

The orbit data is extracted from the following two-line orbital elements,

```
1 36037U 09059B 10289.96506741 -.00000045 00000-0 00000+0 0 2891
2 36037 098.3075 116.7492 0012273 263.8229 096.1579 14.52002220 50628
```


Epoch (UTC): 23:09:41, Saturday, October 16, 2010
Eccentricity: 0.0012273

PROBA 2- Information

Identification
USSPACECOM Catalog No.: 36037
International Designation Code: 2009-059-B

Satellite Details
Orbit: 710 x 728 km, 98.3°
Country/Org. of Origin: ESA
Intrinsic brightness (Mag): ?

Launch
Date (UTC): November 2, 2009



At what speed does PROBA2 fly?

- a) 260 km/h
- b) 2600 km/h
- c) 26000 km/h

WHERE IS MY GROUND STATION?

Google on “ESA spacecraft operations Redu” and find the location of Redu (in degrees North & East)



Redu (Belgium)



WHERE IS MY GROUND STATION?

Enter Redu
coordinates

Heavens-Above Home Page

http://www.heavens-above.com/ solar observatory

Bonjour DSLP data look up <meta conte...Query Page Lyra Main page In.be Belgacom B-...elodder.be

Shuttle Missions

Next Shuttle mission will be STS-133, currently scheduled for November 1st.

Configuration

Current observing site: **Unspecified, 0.0000°N, 0.0000°E**
[select from map](#) or [from database](#) or [edit manually](#)
[Registered user login](#) | [Why register?](#)
[Create new user account](#)
AvantGo channel discontinued, please [click here](#) for details

Satellites

10 day predictions for: [ISS](#) | [X-37B](#) | [Genesis-1 / 2](#) | [Envisat](#) | [HST](#)
Daily predictions for all satellites brighter than magnitude:
(brightest) [3.5](#) | [4.0](#) | [4.5](#) (dimmiest)
NEW! [All passes of the ISS](#) - including daylight and invisible passes.
Iridium Flares
[next 24 hrs](#) | [next 7 days](#) | [previous 48 hrs](#)
[Daytime flares for 7 days](#) - see satellites in broad daylight!
[Spacecraft escaping the Solar System](#) - where are they now?
[Radio amateur satellites](#) - 24 hour predictions (all passes)
[Select a satellite from the database](#)
[Height of the ISS](#) - how does it vary with time

Astronomy

Comets currently brighter than mag. 12
[103P Hartley](#) | [10P Tempel 2](#)
Minor planets currently brighter than mag. 10
[4 Vesta](#) | [6 Hebe](#) | [8 Flora](#) | [1 Ceres](#) | [7 Iris](#) | [39 Laetitia](#) | [471 Papagena](#)
[Whole sky chart](#)
[Sun and Moon data for today](#)
[Planet summary data](#)
Planet details (under construction)
[Mercury](#) | [Venus](#) | [Earth](#) | [Mars](#) | [Jupiter](#) | [Saturn](#) | [Uranus](#) | [Neptune](#) | [Pluto](#)
[Solar system chart](#)
[Constellations](#)

Miscellaneous

[What time is it ?](#) | [Calendar](#)
[Frequently Asked Questions \(FAQ\)](#)
[Links to other sites](#)
[Help](#)
[Privacy Policy](#)
Statistics
[Daily page counts](#)
[Visits by country](#) | [by operating system and browser type](#)
[Maps showing geographical distribution of visitors](#)
[world](#) | [europe](#) | [USA](#)
[Observations, sorted by observer](#)



© Heavens-Above.com
Current position of the ISS

TOTAL Eclipse 2010 & 2012

Annular Eclipse, Transit of Venus, Aurora Borealis & Quadrantid Meteor
[www.astro-expeditions.com](#)

Saturn, Jupiter & Uranus

Their Positions revealed in a Vital Free Reading of your Natal Chart!
[AboutAstro.com](#)

Soyuz parachute bags

Original Soyuz mission parachute bags. Authenticated by astronaut
[www.everquestdesign.com](#)

Ads by Google

Sponsored Links

- Barcode Printer
- China Wholesale
- Manufacturers in China

Developed and maintained by [Chris Peat](#), Heavens-Above GmbH

WHEN CAN WE HAVE CONTACT?

Select "Visible Passes"

In how many minutes must the antennas of the ground station rotate from 1 horizon to the other?

PROBA 2 - Visible Passes

Search period start: 00:00 Sunday, 17 October, 2010
Search period end: 00:00 Wednesday, 27 October, 2010
Observer's location: Redu, 50.0000°N, 5.1670°E
Local time zone: Central European Summer Time (UTC + 2:00)
Orbit: 710 x 728 km, 98.3° (Epoch Oct 16)

Click on the date to get a star chart and other pass details.

Date	Mag	Starts			Max. altitude			Ends		
		Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.
17 Oct	?	06:17:27	10	SE	06:21:58	40	ENE	06:26:31	10	N
17 Oct	?	19:52:24	10	NNE	19:57:12	53	E	20:01:56	10	S
17 Oct	?	21:31:01	10	N	21:34:59	25	WNW	21:38:54	10	WSW
18 Oct	?	05:29:09	10	E	05:32:17	17	NE	05:35:26	10	NNE
18 Oct	?	07:04:52	10	SSE	07:09:45	83	WSW	07:14:40	10	NNW
18 Oct	?	19:03:03	10	NE	19:06:39	20	E	19:10:12	10	SE
18 Oct	?	20:40:19	10	N	20:45:08	61	WNW	20:49:55	10	SSW
18 Oct	?	22:20:43	10	NNW	22:22:15	11	NW	22:23:48	10	WNW
19 Oct	?	06:15:14	10	SE	06:19:44	38	ENE	06:24:15	10	N
19 Oct	?	19:50:10	10	NNE	19:54:56	50	E	19:59:39	10	S
19 Oct	?	21:28:45	10	N	21:32:45	26	WNW	21:36:43	10	WSW
20 Oct	?	05:27:01	10	E	05:30:04	17	NE	05:33:06	10	NNE
20 Oct	?	07:02:36	10	SSE	07:07:30	86	WSW	07:12:25	10	NNW
20 Oct	?	19:00:53	10	NE	19:04:22	19	E	19:07:49	10	SE
20 Oct	?	20:38:02	10	N	20:42:54	64	WNW	20:47:41	10	SSW
20 Oct	?	22:18:19	10	NNW	22:20:02	12	NW	22:21:46	10	WNW
21 Oct	?	06:13:02	10	SE	06:17:30	37	ENE	06:21:58	10	N

YOUR TURN

- You are the PROBA2 operator scheduling a special observation Oct 20 12:00 UT. When is your last chance to upload the commanding? When is your first chance to get the data?
- Hinode was launched on September 22, 2006. One of its ground-stations is Svalbard (Norway). How comes there are so many passes?
- GOES 14 was launched on June 27, 2009. Why is there no ground-track? Compare with SDO (launched on February 11, 2010).

HOW DOES SPACE WEATHER DATA GET ONLINE?

