# PreviSat

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December 2024

# Software presentation

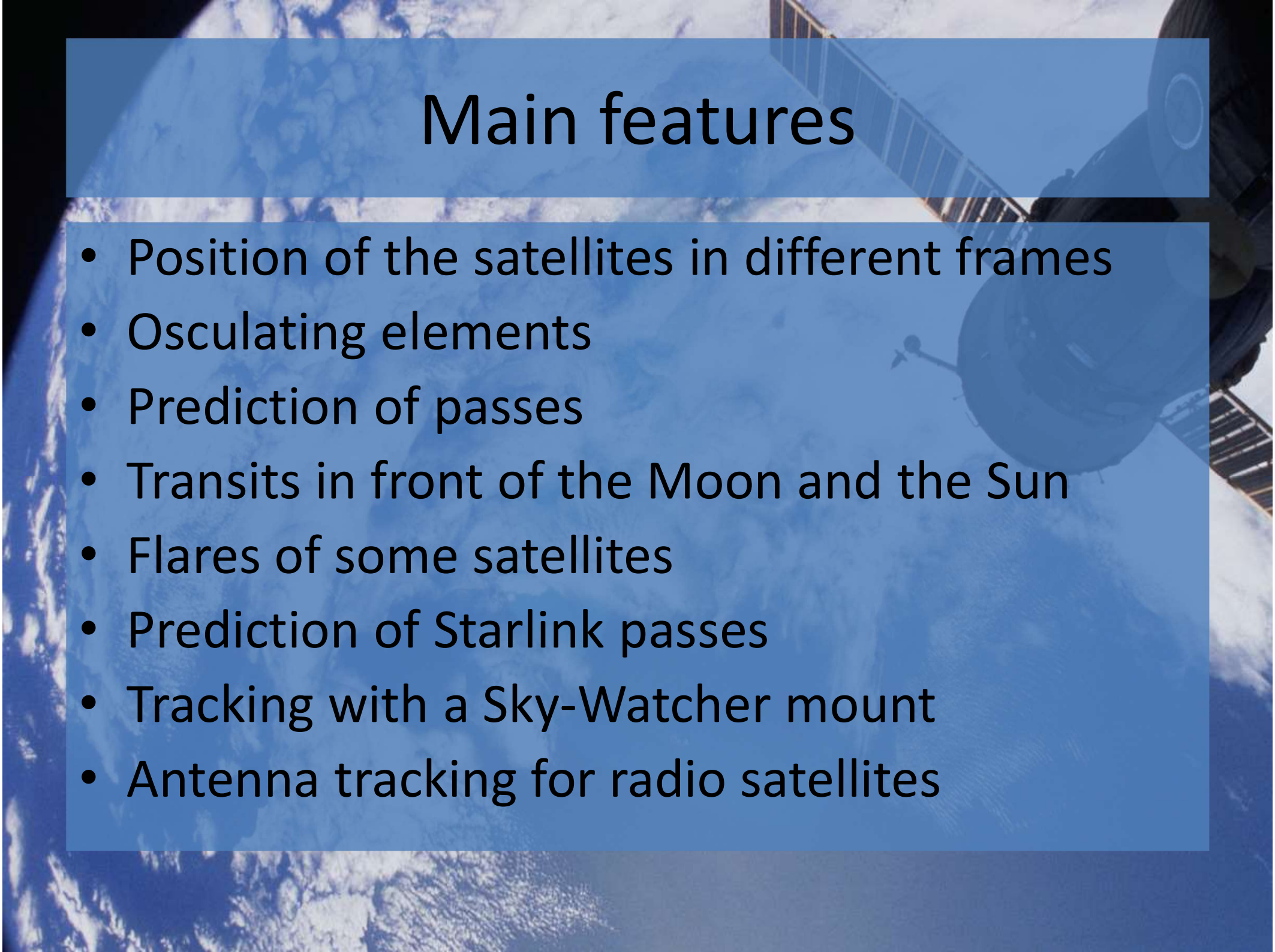
- Tracking of artificial satellites (SGP4 model)
- World map / sky map
- Different calculations of predictions
- ISS Live and visualization of NASA Wall Command Center
- Informations about the satellites
- Cross-platform (Windows, Linux…)

# History

- Project initiated in September 2005

- Versions 1.x : Visual Basic 6 (2005-2006)
- Versions 2.x : Visual Basic .NET (2008-2011)
- Versions 3.x and over : C++/Qt (since 2011)

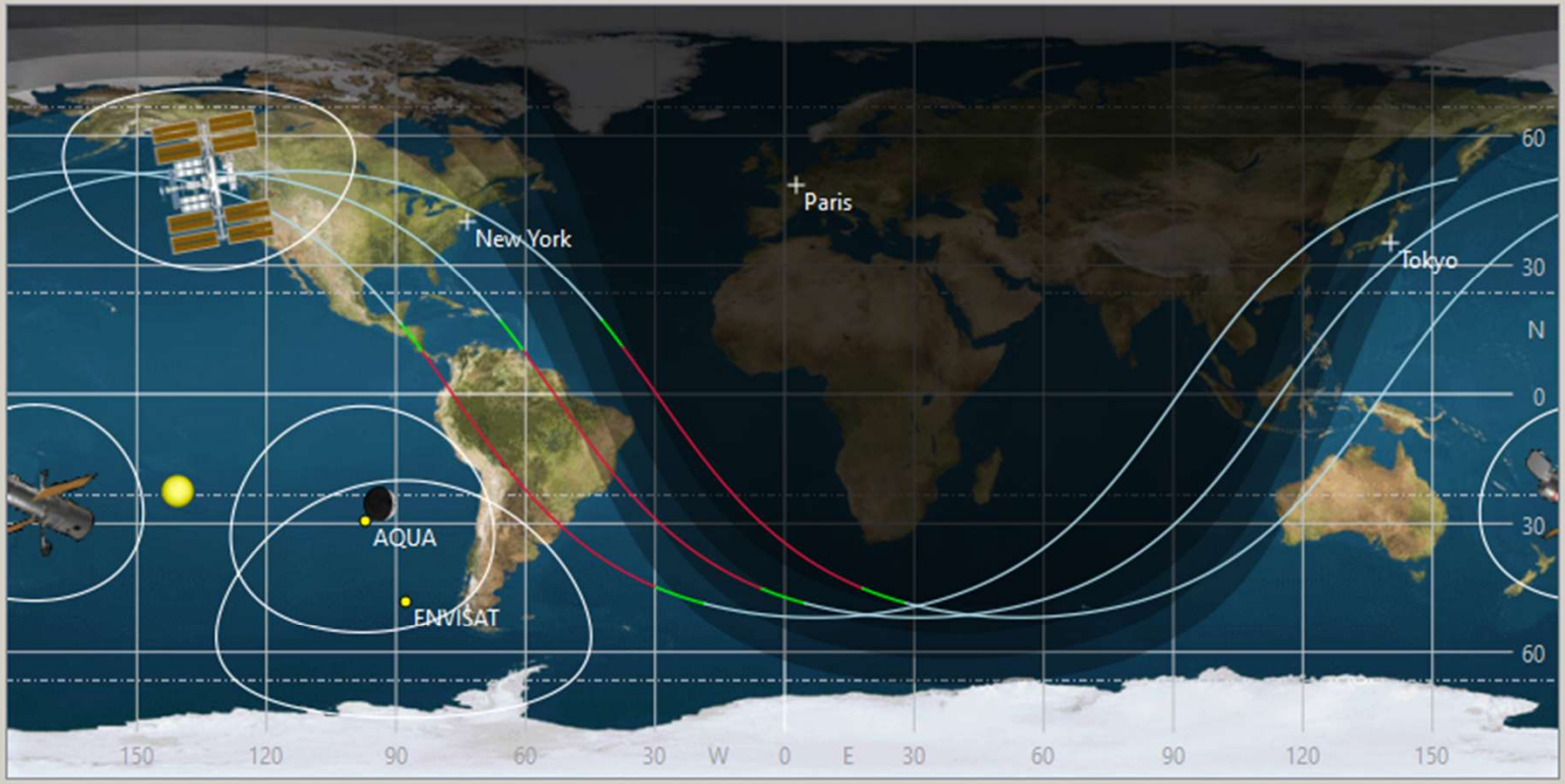
- Today : - version 7.0 (released in December 2024)



# Main features

- Position of the satellites in different frames
- Osculating elements
- Prediction of passes
- Transits in front of the Moon and the Sun
- Flares of some satellites
- Prediction of Starlink passes
- Tracking with a Sky-Watcher mount
- Antenna tracking for radio satellites

PreviSat 7.0 - ISS




Mode

Real time 5 seconds

Manual mode

ISS Live NASA

File : Visual

Filter

- ISS
- KORONAS-FOTON
- METEOR PRIRODA
- MIDORI II (ADEOS-II)
- OAO 2
- OAO 3 (COPERNICUS)
- OKEAN-3
- OKEAN-O
- ORBVIEW 2 (SEASTAR)
- RESURS-DK 1
- SAOCOM 1A
- SAOCOM 1B

Main | Osculating elements | Satellite information | Predictions | Telescope | Antenna

Date : Wednesday, December 04 2024 22:13:55 UTC + 01:00

Name of location : Paris

Conditions : Night

Longitude : 002° 20' 55" East Latitude : 48° 51' 12" North Altitude : 30 m

Name : ISS

Time elapsed since epoch : 0.12 days

| | | | | | |
|---|---|---|---|---|---|
| Longitude : | 133° 19' 21" West | Elevation : | -34° 36' 24" | Right ascension : | 15h 50m 36s |
| Latitude : | 49° 59' 01" North | Azimuth (N) : | 332° 08' 44" | Declination : | +02° 55' 54" |
| Altitude : | 425.1 km | Range : | 7963.5 km | Constellation : | Serpent |

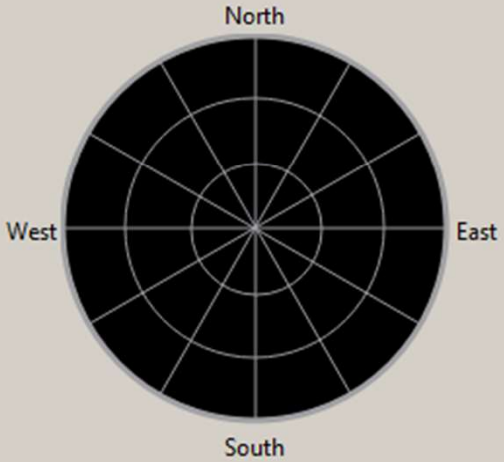
Direction : Ascending Orbit #148502 Satellite not eclipsed (35%)

Orbital velocity : 7.661 km/s Next D>N : 2024-12-04 22:36:55 (in 23min 00s). Beta : -061° 17'

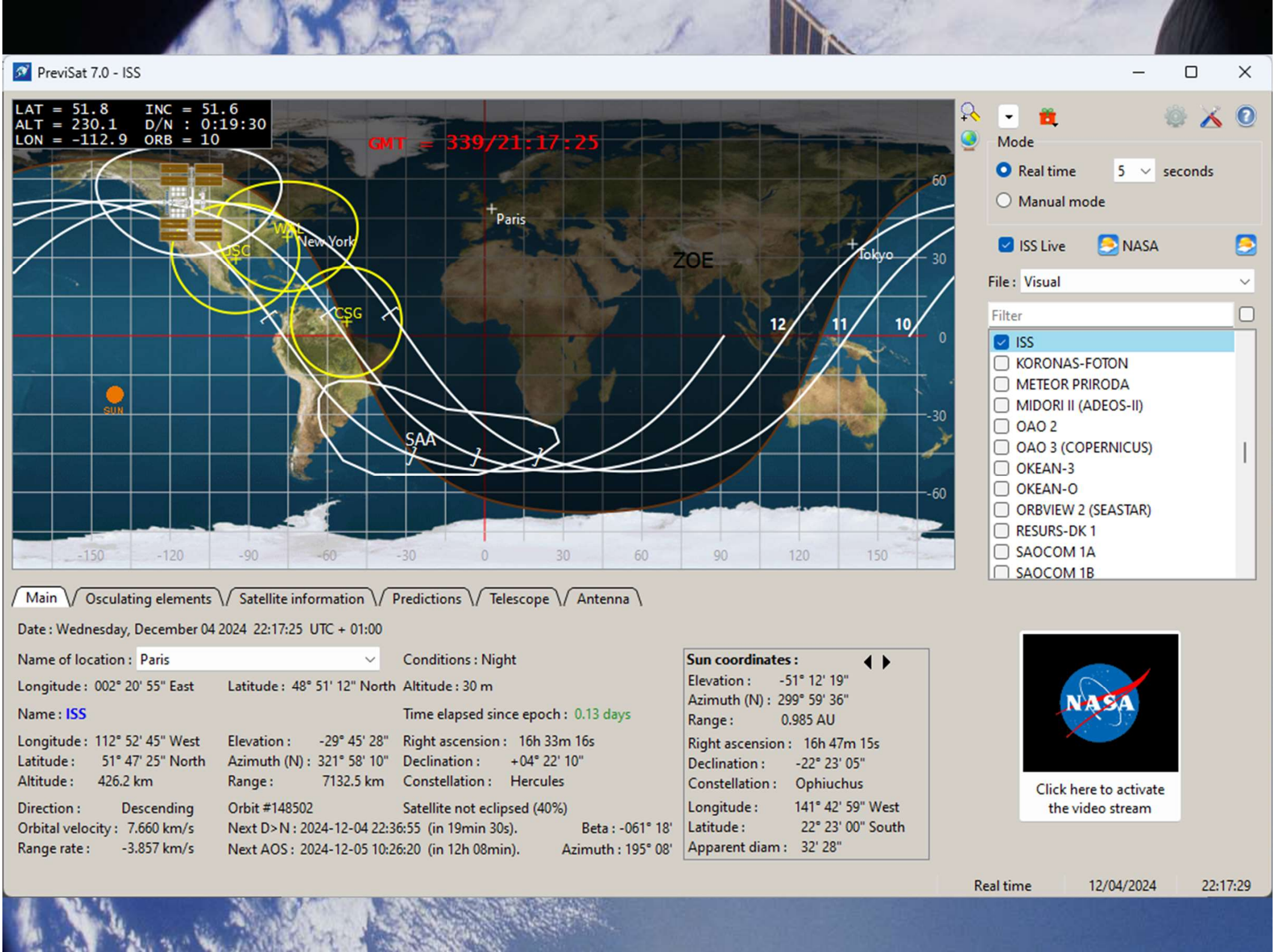
Range rate : -4.014 km/s Next AOS : 2024-12-05 10:26:20 (in 12h 12min). Azimuth : 195° 08'

**Sun coordinates :**

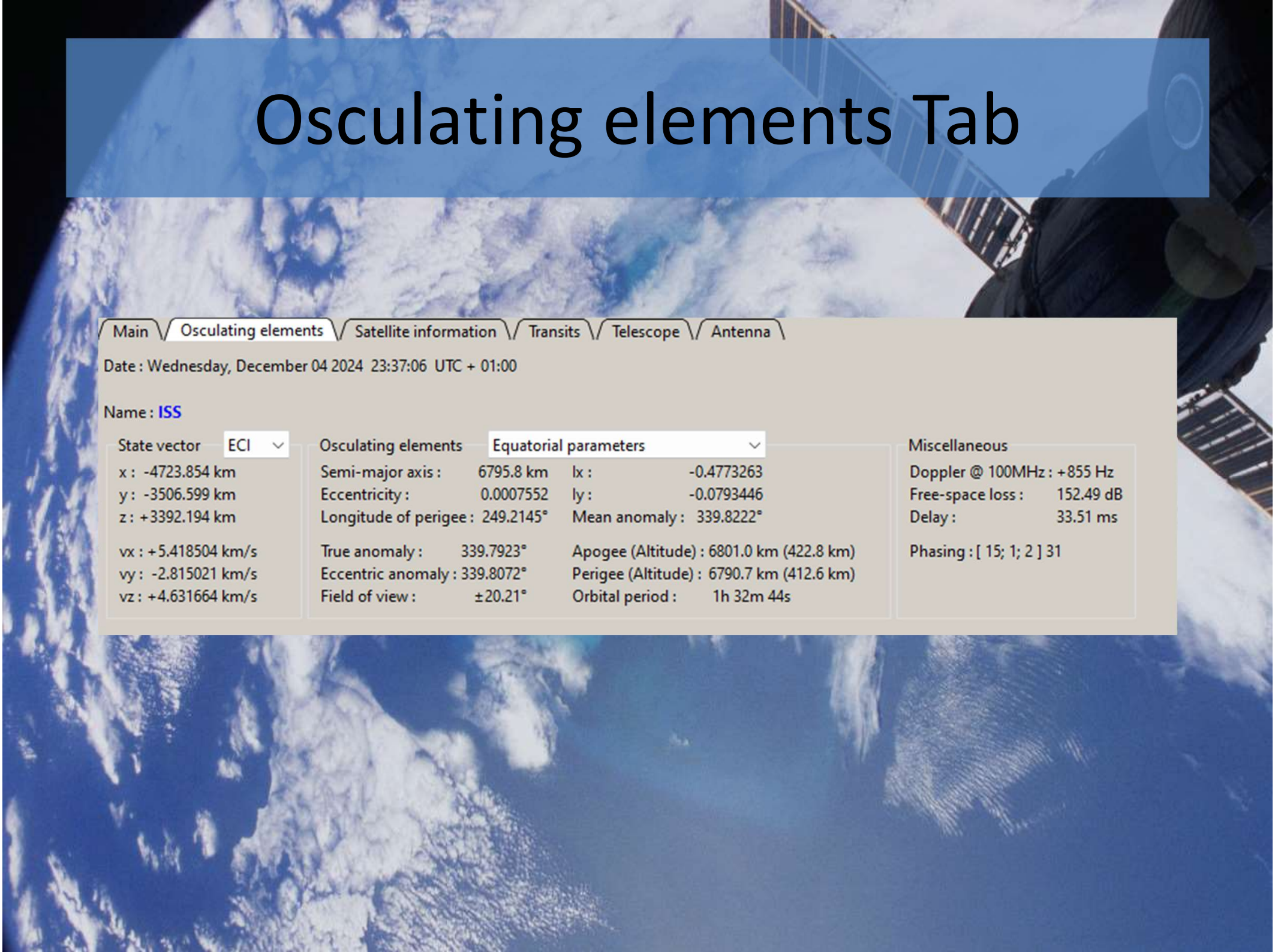
Elevation : -50° 42' 14"
Azimuth (N) : 298° 59' 08"
Range : 0.985 AU
Right ascension : 16h 47m 14s
Declination : -22° 23' 04"
Constellation : Ophiuchus
Longitude : 140° 50' 30" West
Latitude : 22° 22' 59" South
Apparent diam : 32' 28"



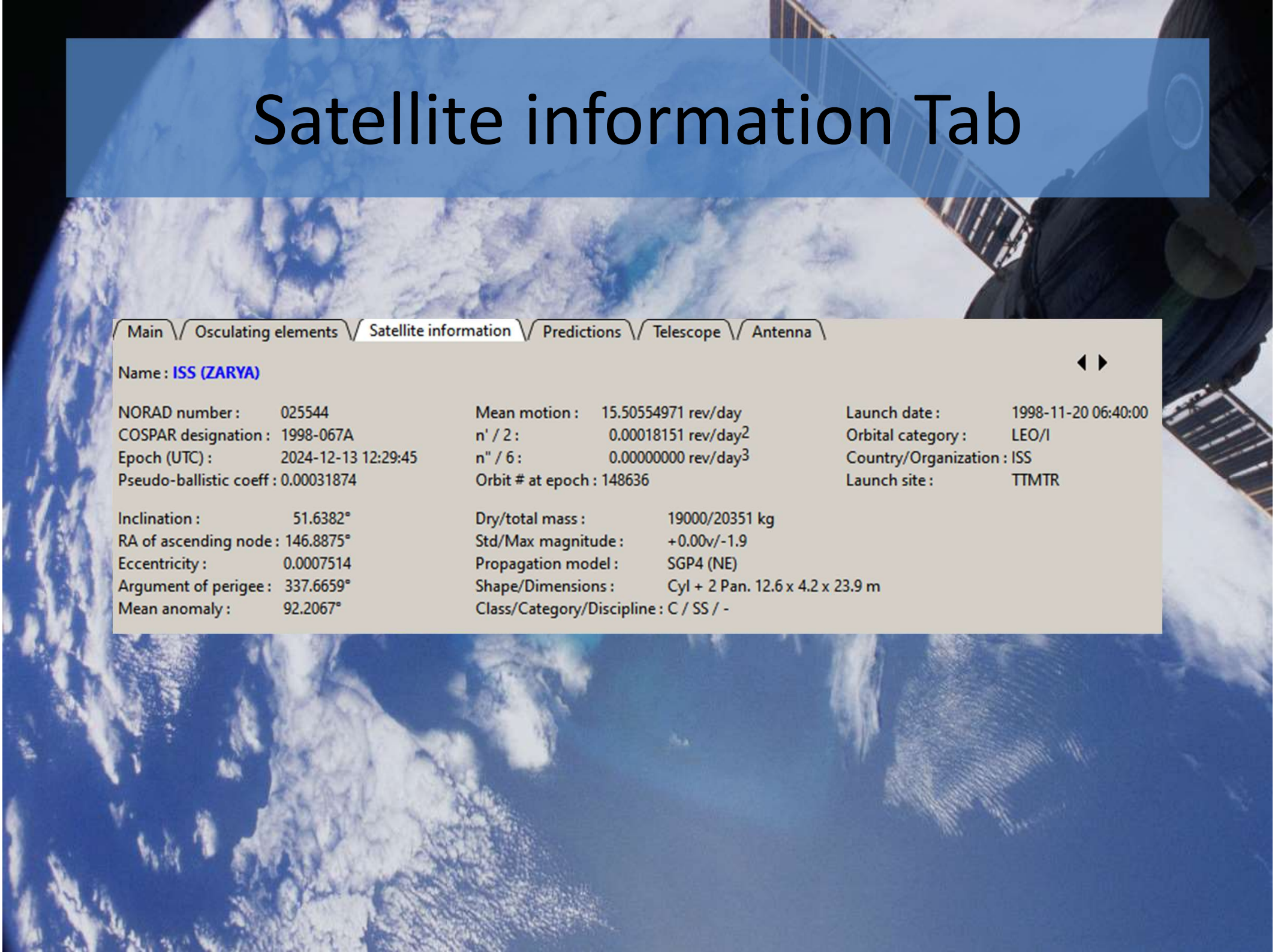

Azimuth : 336.28° Elevation : 25.76° Real time 12/04/2024 22:13:56


PreviSat 7.0 - ISS
LAT = 51.8 INC = 51.6
ALT = 230.1 D/N : 0:19:30
LON = -112.9 ORB = 10
GMT = 339/21:17:25
Paris
New York
Tokyo
ZOE
WTC
USC
CSG
SAA
SUN
12
11
10
60
30
0
-30
-60
-150
-120
-90
-60
-30
0
30
60
90
120
150
Mode
Real time
5
seconds
Manual mode
ISS Live
NASA
File : Visual
Filter
ISS
KORONAS-FOTON
METEOR PRIRODA
MIDORI II (ADEOS-II)
OAO 2
OAO 3 (COPERNICUS)
OKEAN-3
OKEAN-O
ORBVIEW 2 (SEASTAR)
RESURS-DK 1
SAOCOM 1A
SAOCOM 1B
Main
Osculating elements
Satellite information
Predictions
Telescope
Antenna
Date : Wednesday, December 04 2024 22:17:25 UTC + 01:00
Name of location : Paris
Conditions : Night
Longitude : 002° 20' 55" East
Latitude : 48° 51' 12" North
Altitude : 30 m
Name : ISS
Time elapsed since epoch : 0.13 days
Longitude : 112° 52' 45" West
Latitude : 51° 47' 25" North
Altitude : 426.2 km
Elevation : -29° 45' 28"
Azimuth (N) : 321° 58' 10"
Range : 7132.5 km
Right ascension : 16h 33m 16s
Declination : +04° 22' 10"
Constellation : Hercules
Direction : Descending
Orbital velocity : 7.660 km/s
Range rate : -3.857 km/s
Orbit #148502
Next D>N : 2024-12-04 22:36:55 (in 19min 30s).
Next AOS : 2024-12-05 10:26:20 (in 12h 08min).
Satellite not eclipsed (40%)
Beta : -061° 18'
Azimuth : 195° 08'
Sun coordinates :
Elevation : -51° 12' 19"
Azimuth (N) : 299° 59' 36"
Range : 0.985 AU
Right ascension : 16h 47m 15s
Declination : -22° 23' 05"
Constellation : Ophiuchus
Longitude : 141° 42' 59" West
Latitude : 22° 23' 00" South
Apparent diam : 32' 28"
NASA
Click here to activate the video stream
Real time
12/04/2024
22:17:29

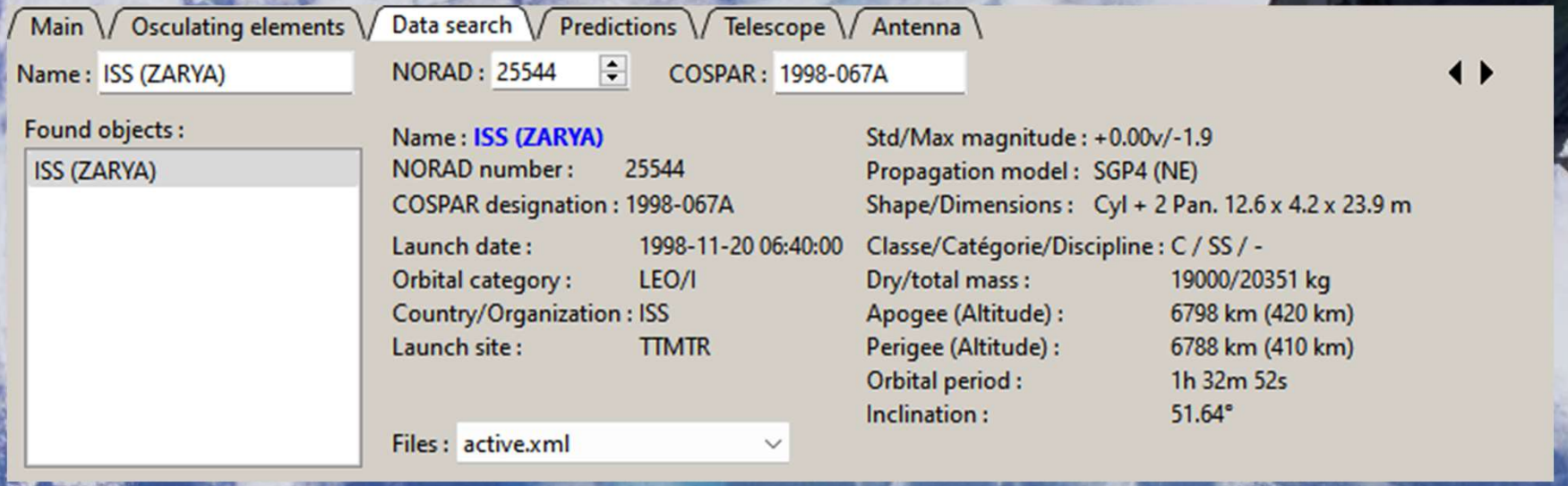
# Osculating elements Tab



# Satellite information Tab

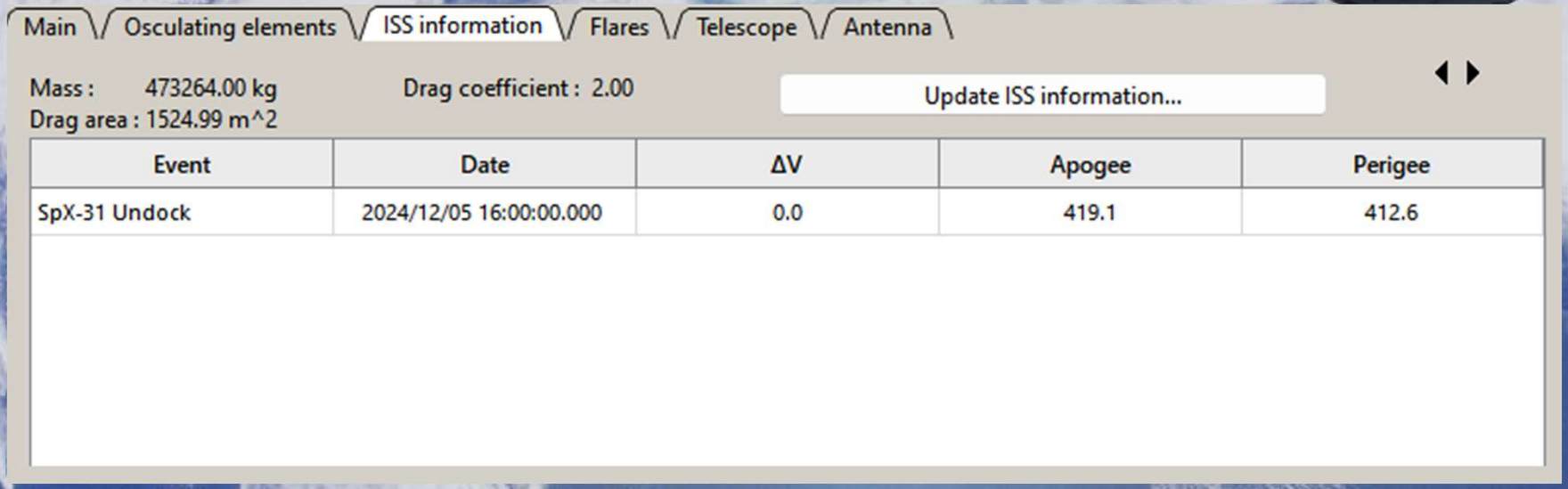


# Data search Tab

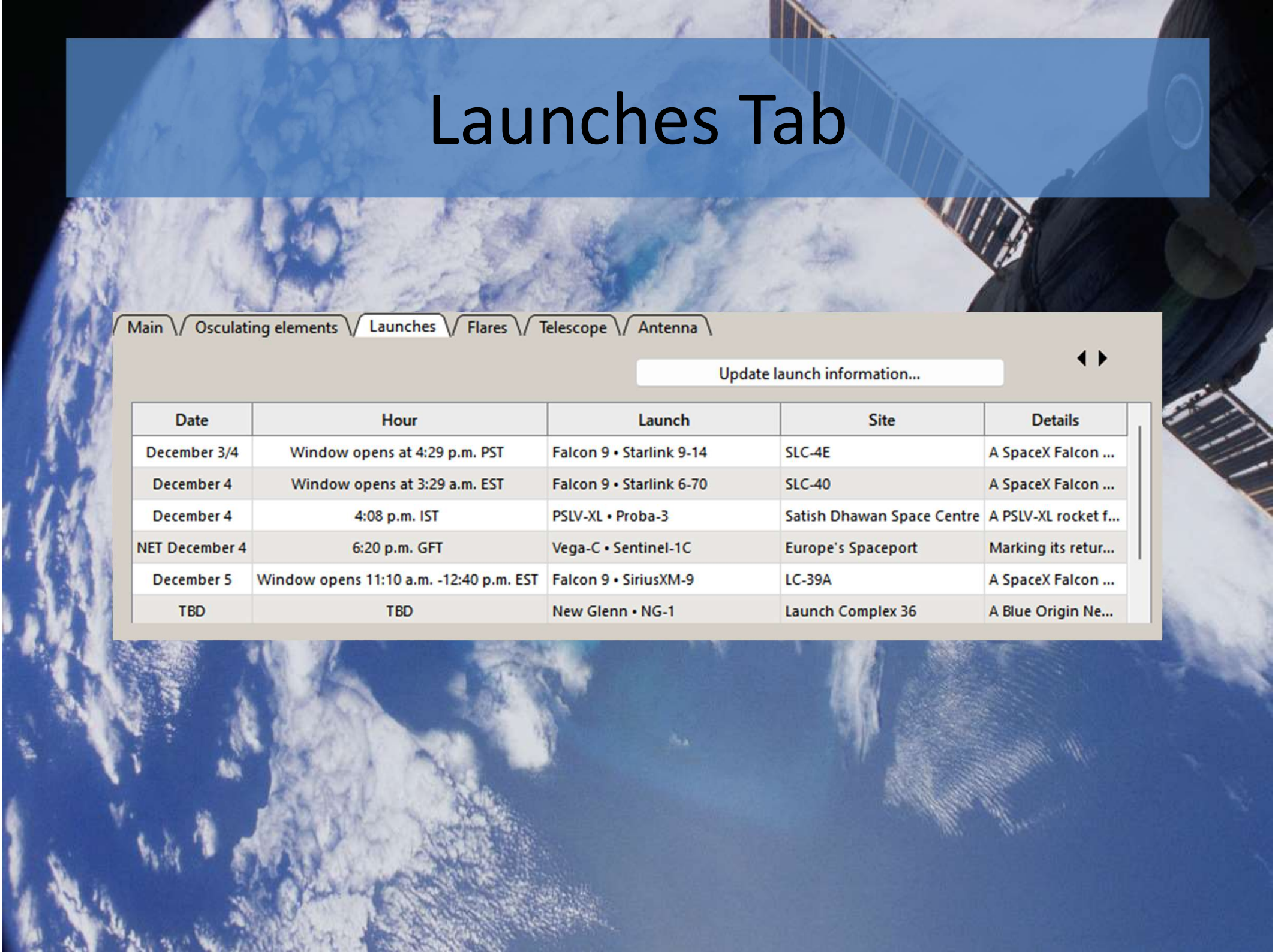


# ISS information Tab

- The only software to give information about ISS

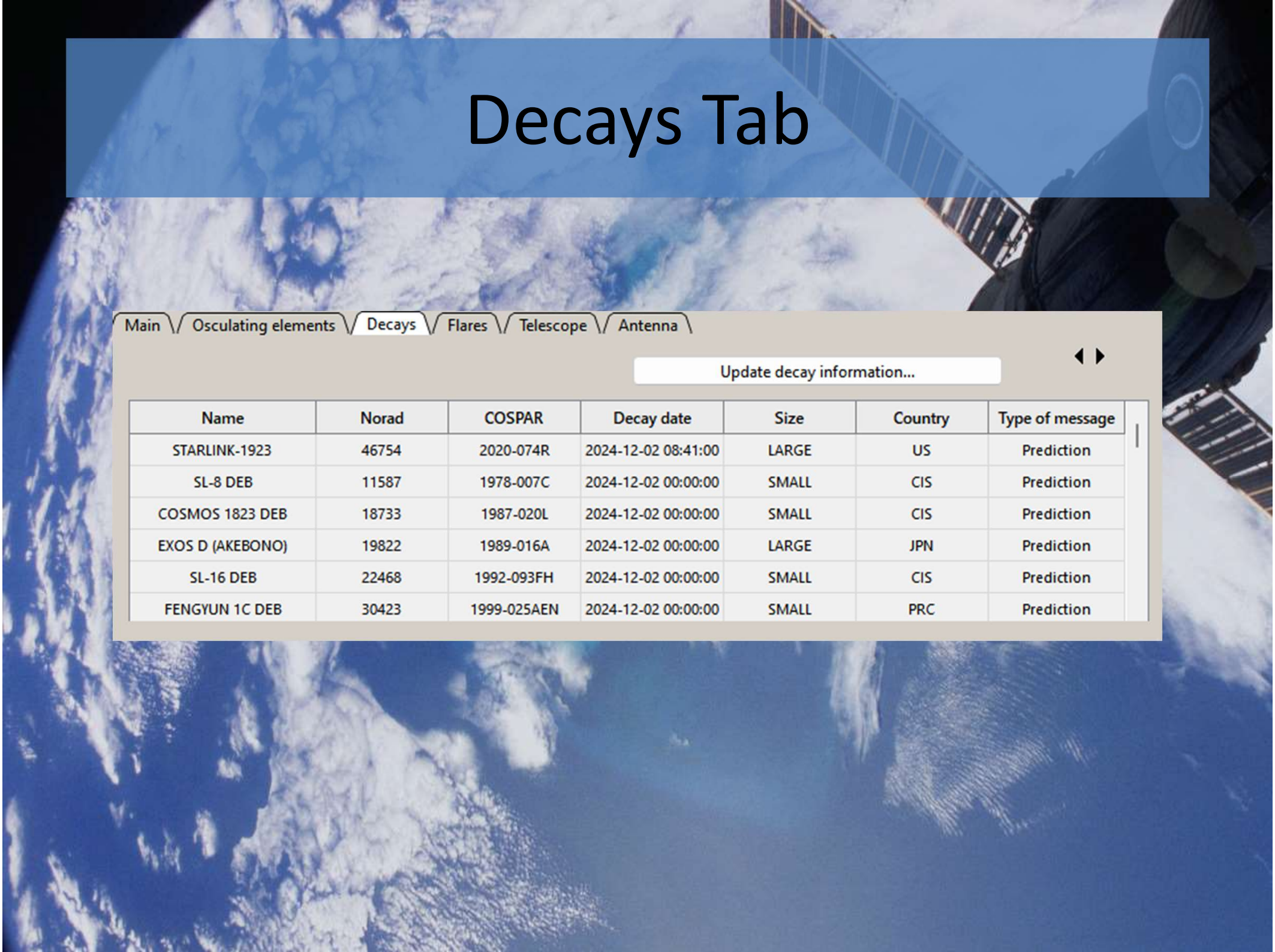


# Launches Tab



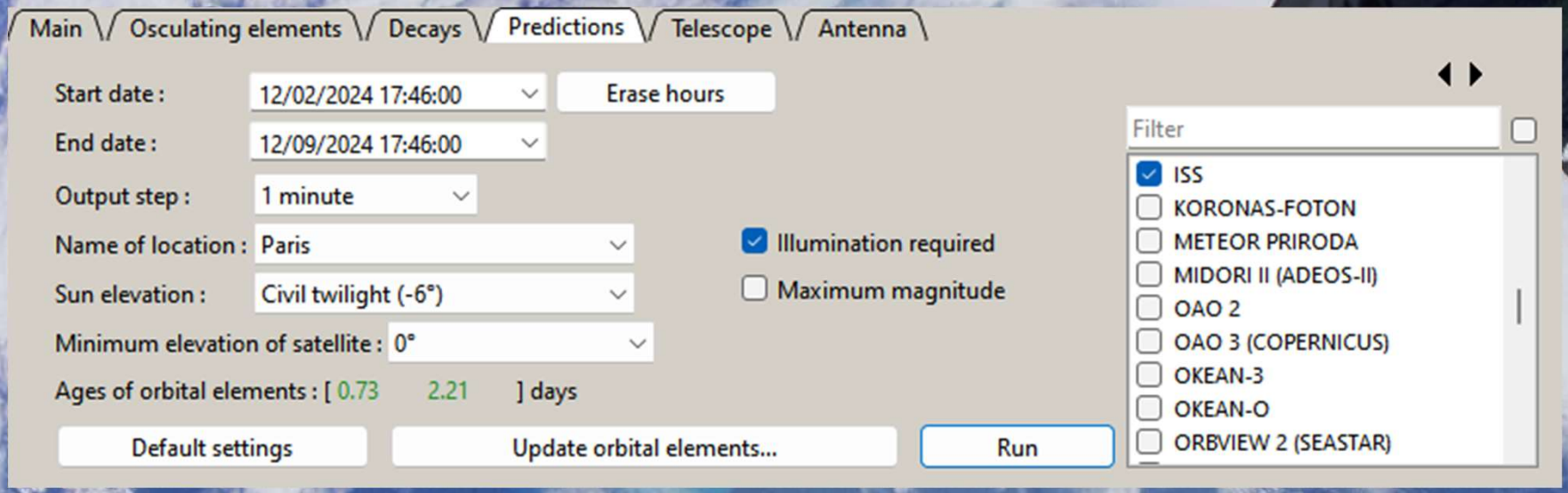

| Date | Hour | Launch | Site | Details |
|---|---|---|---|---|
| December 3/4 | Window opens at 4:29 p.m. PST | Falcon 9 • Starlink 9-14 | SLC-4E | A SpaceX Falcon ... |
| December 4 | Window opens at 3:29 a.m. EST | Falcon 9 • Starlink 6-70 | SLC-40 | A SpaceX Falcon ... |
| December 4 | 4:08 p.m. IST | PSLV-XL • Proba-3 | Satish Dhawan Space Centre | A PSLV-XL rocket f... |
| NET December 4 | 6:20 p.m. GFT | Vega-C • Sentinel-1C | Europe's Spaceport | Marking its retur... |
| December 5 | Window opens 11:10 a.m. -12:40 p.m. EST | Falcon 9 • SiriusXM-9 | LC-39A | A SpaceX Falcon ... |
| TBD | TBD | New Glenn • NG-1 | Launch Complex 36 | A Blue Origin Ne... |

# Decays Tab




| Name | Norad | COSPAR | Decay date | Size | Country | Type of message |
|---|---|---|---|---|---|---|
| STARLINK-1923 | 46754 | 2020-074R | 2024-12-02 08:41:00 | LARGE | US | Prediction |
| SL-8 DEB | 11587 | 1978-007C | 2024-12-02 00:00:00 | SMALL | CIS | Prediction |
| COSMOS 1823 DEB | 18733 | 1987-020L | 2024-12-02 00:00:00 | SMALL | CIS | Prediction |
| EXOS D (AKEBONO) | 19822 | 1989-016A | 2024-12-02 00:00:00 | LARGE | JPN | Prediction |
| SL-16 DEB | 22468 | 1992-093FH | 2024-12-02 00:00:00 | SMALL | CIS | Prediction |
| FENGYUN 1C DEB | 30423 | 1999-025AEN | 2024-12-02 00:00:00 | SMALL | PRC | Prediction |

# Prediction Tab



# Prediction results

Predictions of passes

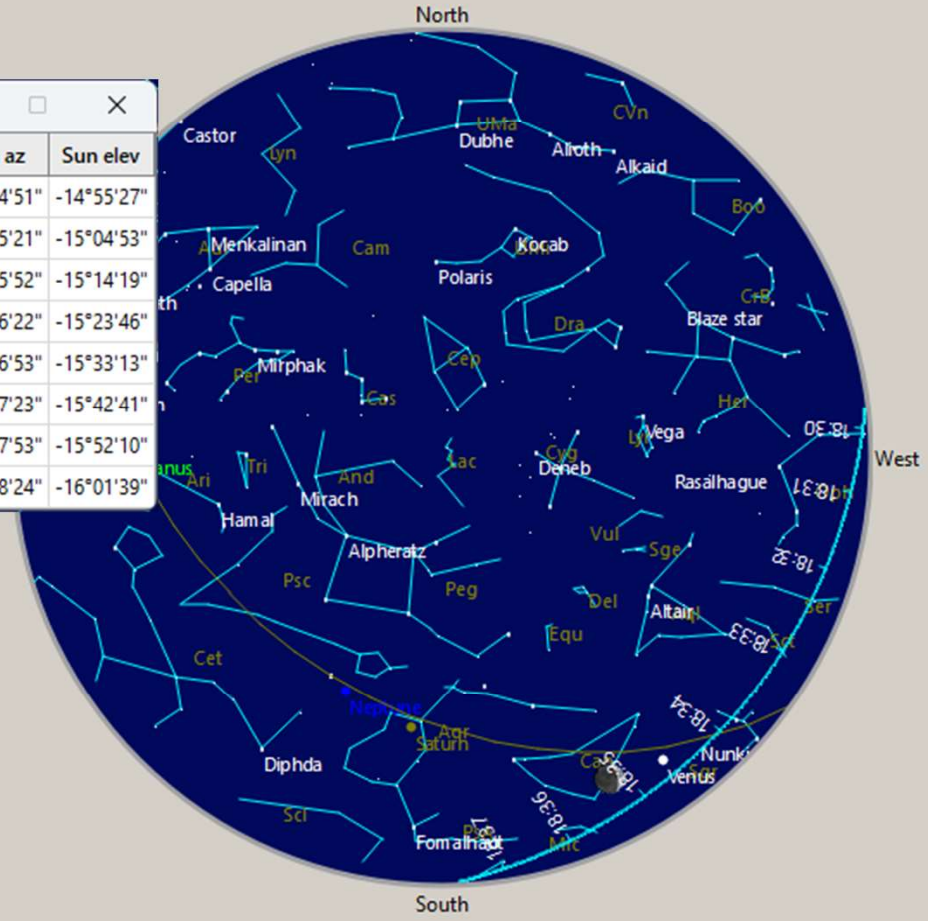
Save  Save text file

| Satellite | Start date | End date | Max elevation | Magnitude | Sun elevation |
|---|---|---|---|---|---|
| ENVISAT | 2024/12/08 07:03:00 | 2024/12/08 07:03:00 | 00°32'23" | +15.6* | -13°44'19" |

Pass details

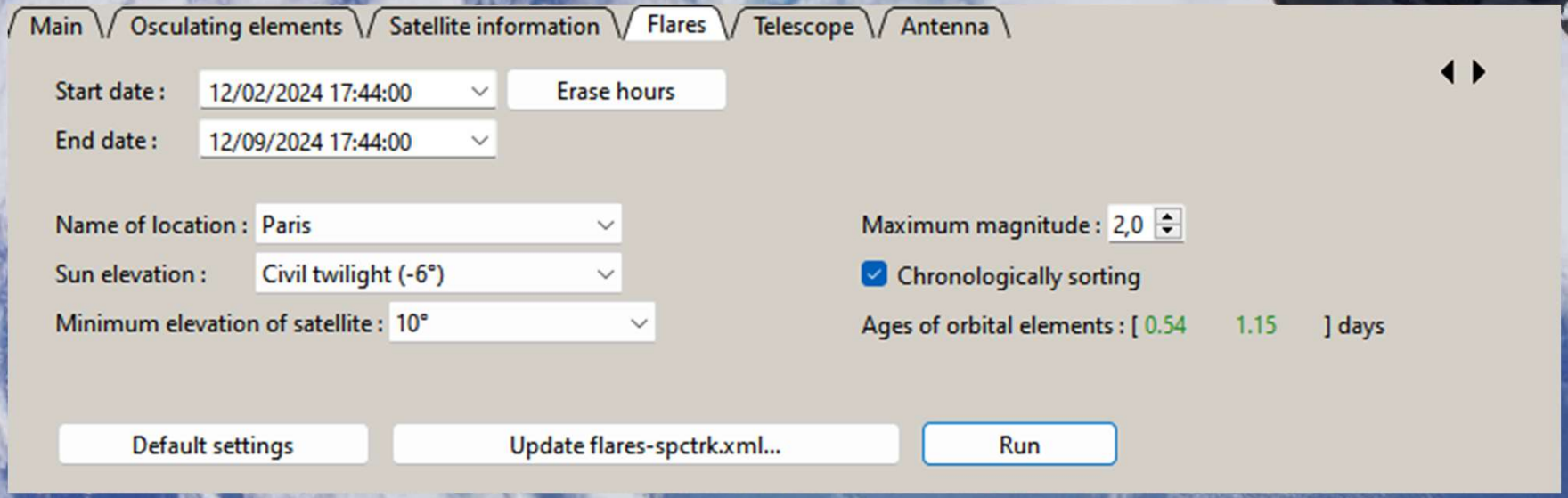
| Satellite | Date | Sat azimuth | Sat elevation | Sat RA | Sat Decl | Const | Magn | Altitude | Range | Sun az | Sun elev |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ISS | 2024/12/05 18:30:00 | 273°57'48" | 00°42'16" | 16h29m20s | +03°08'15" | Oph | +10.1 | 425.4 | 2341.7 | 252°44'51" | -14°55'27" |
| ISS | 2024/12/05 18:31:00 | 265°09'34" | 03°02'56" | 17h03m01s | -00°52'55" | Oph | +5.8 | 425.1 | 2076.1 | 252°55'21" | -15°04'53" |
| ISS | 2024/12/05 18:32:00 | 254°00'39" | 05°13'59" | 17h43m40s | -06°25'11" | Oph | +4.1 | 424.7 | 1869.0 | 253°05'52" | -15°14'19" |
| ISS | 2024/12/05 18:33:00 | 240°34'43" | 06°44'14" | 18h31m13s | -13°27'11" | Sct | +3.4 | 424.2 | 1742.2 | 253°16'22" | -15°23'46" |
| ISS | 2024/12/05 18:34:00 | 225°50'21" | 07°04'17" | 19h24m14s | -21°14'10" | Sgr | +3.3 | 423.7 | 1714.2 | 253°26'53" | -15°33'13" |
| ISS | 2024/12/05 18:35:00 | 211°31'20" | 06°06'07" | 20h19m19s | -28°32'00" | Sgr | +3.6 | 423.2 | 1789.7 | 253°37'23" | -15°42'41" |
| ISS | 2024/12/05 18:36:00 | 199°05'25" | 04°10'51" | 21h12m16s | -34°25'11" | Mic | +4.7 | 422.7 | 1956.3 | 253°47'53" | -15°52'10" |
| ISS | 2024/12/05 18:37:00 | 189°02'57" | 01°50'37" | 21h59m57s | -38°41'58" | Gru | +7.2 | 422.1 | 2192.6 | 253°58'24" | -16°01'39" |

| | | | | | |
|---|---|---|---|---|---|
| HST | 2024/12/08 19:49:00 | 2024/12/08 19:50:00 | 00°54'29" | +12.2 | -27°51'29" |
| HST | 2024/12/09 17:46:00 | 2024/12/09 17:50:00 | 02°05'12" | +10.1 | -08°32'10" |
| HST | 2024/12/09 19:26:00 | 2024/12/09 19:28:00 | 00°42'23" | +12.9 | -24°05'13" |
| HST | 2024/12/10 19:03:00 | 2024/12/10 19:05:00 | 00°29'41" | +13.7 | -20°20'56" |
| HST | 2024/12/11 18:40:00 | 2024/12/11 18:42:00 | 00°16'22" | +14.8 | -16°39'51" |
| ISS | 2024/12/05 18:30:00 | 2024/12/05 18:37:00 | 07°04'17" | +3.3 | -15°33'13" |
| ISS | 2024/12/06 17:41:00 | 2024/12/06 17:50:00 | 11°53'39" | +2.1 | -08°03'13" |
| ISS | 2024/12/07 18:32:00 | 2024/12/07 18:33:00 | 00°21'05" | +11.4 | -15°25'32" |
| ISS | 2024/12/08 17:41:00 | 2024/12/08 17:47:00 | 03°43'27" | +5.3 | -07°56'13" |
| ISS | 2024/12/11 07:14:00 | 2024/12/11 07:19:00 | 03°11'12" | +5.7 | -12°08'30" |



# Flares Tab

- From 2005 to 2019 : calculation of Iridium flares
- Since 2015 : calculation of flares from satellites with reflective antennas/panels



# Flares results

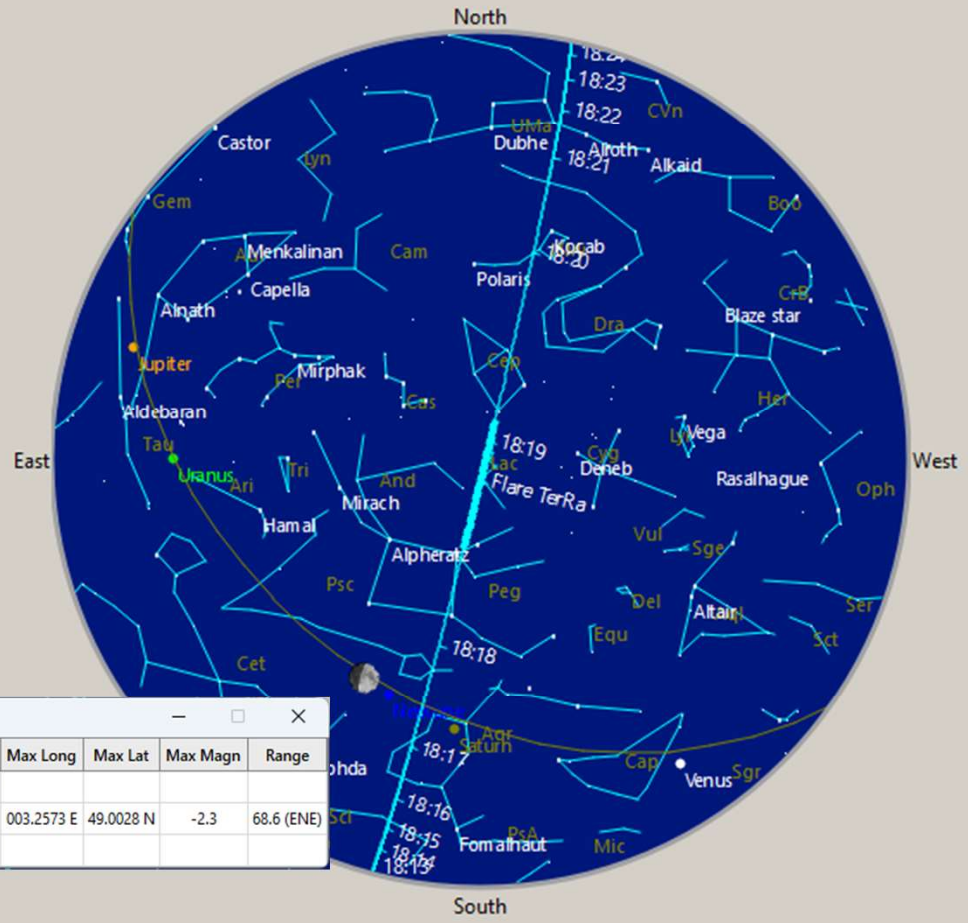
Flares

Save  Save text file

| Satellite | Start date | End date | Max elevation | Magn | Mir | Sun elev |
|---|---|---|---|---|---|---|
| SkyMed3 | 2024/12/05 07:04:54.9 | 2024/12/05 07:06:02.0 | 66°14'04" | -1.8 | S | -12°49'07" |
| SkyMed4 | 2024/12/06 05:58:58.7 | 2024/12/06 05:59:55.3 | 82°32'44" | -1.6 | S | -23°30'41" |
| SkyMed3 | 2024/12/06 07:05:04.8 | 2024/12/06 07:06:12.1 | 66°15'18" | -1.8 | S | -12°56'47" |
| SkyMed4 | 2024/12/06 19:20:06.0 | 2024/12/06 19:20:41.6 | 68°38'28" | +1.2 | S | -22°57'52" |
| SkyMed2 | 2024/12/07 05:58:57.1 | 2024/12/07 05:59:53.4 | 82°21'33" | -1.6 | S | -23°39'59" |
| SkyMed3 | 2024/12/07 07:05:13.7 | 2024/12/07 07:06:21.2 | 66°16'18" | -1.8 | S | -13°04'22" |
| SkyMed2 | 2024/12/07 19:20:04.6 | 2024/12/07 19:20:40.4 | 68°28'43" | +1.2 | S | -22°58'02" |
| SkyMed3 | 2024/12/08 07:05:21.6 | 2024/12/08 07:06:29.3 | 66°17'04" | -1.8 | S | -13°11'51" |
| TerraSAR-X | 2024/12/09 18:18:34.1 | 2024/12/09 18:19:05.7 | 83°20'27" | -0.0 | S | -13°13'13" |
| TanDEM-X | 2024/12/09 18:18:34.6 | 2024/12/09 18:19:06.3 | 83°19'41" | -0.0 | S | -13°13'17" |
| SkyMed1 | 2024/12/09 19:07:59.7 | 2024/12/09 19:08:53.9 | 75°36'06" | -0.4 | S | -21°00'16" |
| SkyMed1 | 2024/12/10 06:05:05.2 | 2024/12/10 06:05:55.8 | 75°20'48" | -0.3* | S | -23°06'32" |
| TerraSAR-X | 2024/12/10 07:19:08.4 | 2024/12/10 07:19:47.2 | 73°40'43" | -1.6 | S | -11°31'47" |
| TanDEM-X | 2024/12/10 07:19:09.0 | 2024/12/10 07:19:47.9 | 73°42'58" | -1.6 | S | -11°31'41" |
| SkyMed4 | 2024/12/11 05:53:05.0 | 2024/12/11 05:53:31.3 | 69°26'11" | +1.5* | S | -25°15'45" |
| SkyMed4 | 2024/12/11 19:13:46.8 | 2024/12/11 19:14:46.6 | 79°11'32" | -1.6 | S | -21°54'28" |

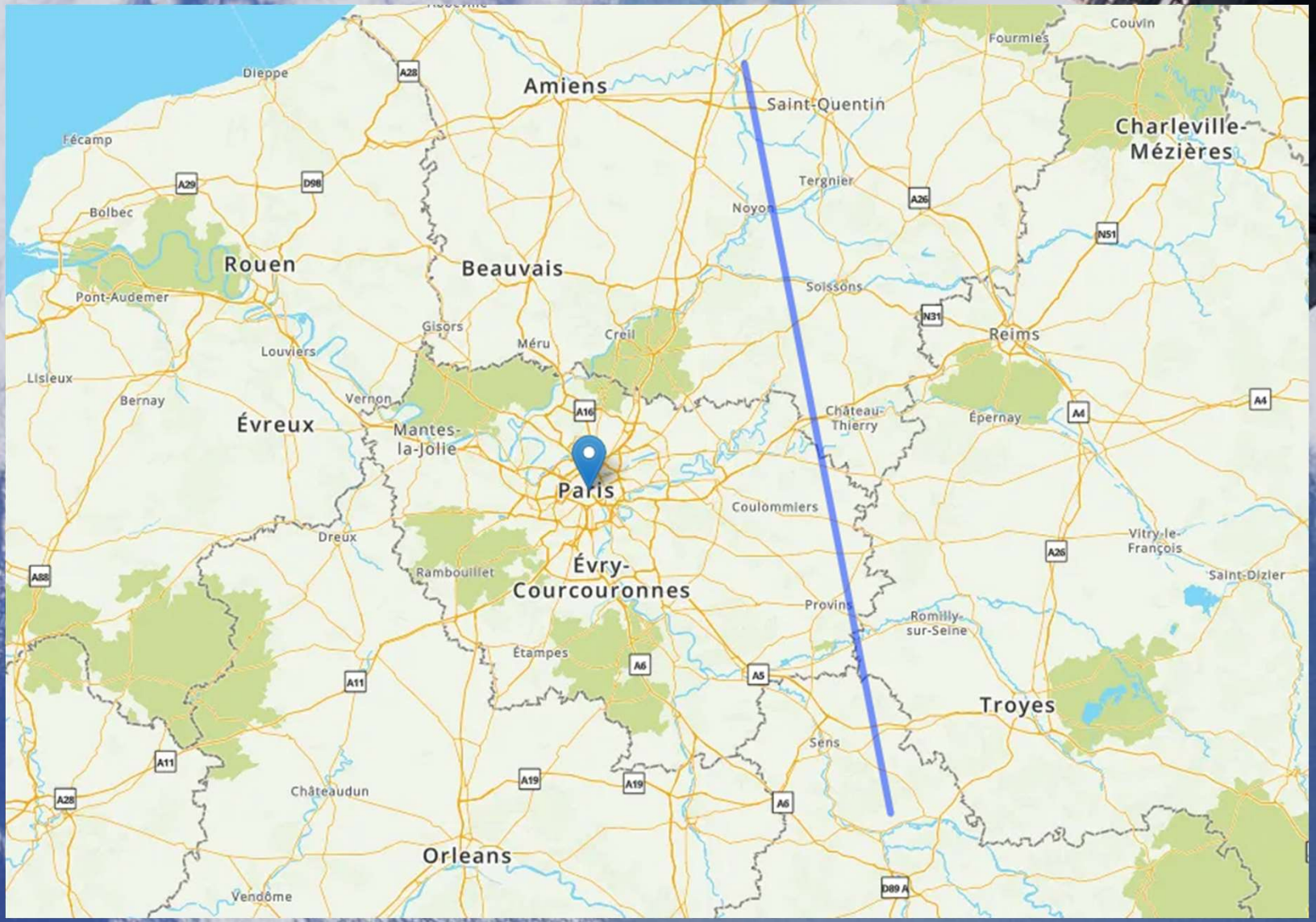
Flare details

| Satellite | Date | Sat azimuth | Sat elevation | Sat RA | Sat Decl | Const | Ang | Mir | Magn | Altitude | Rng | Sun az | Sun elev | Max Long | Max Lat | Max Magn | Range |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TerraSAR-X | 2024/12/09 18:18:34.1 | 171°33'05" | 70°22'38" | 22h56m43s | +29°23'17" | Peg | 14.08 | S | +2.0 | 514.3 | 543.5 | 250°08'48" | -13°10'43" | | | | |
| TerraSAR-X | 2024/12/09 18:18:50.3 | 182°24'58" | 83°20'27" | 22h42m29s | +42°11'59" | Lac | 7.51 | S | -0.0 | 514.5 | 517.7 | 250°11'38" | -13°13'13" | 003.2573 E | 49.0028 N | -2.3 | 68.6 (ENE) |
| TerraSAR-X | 2024/12/09 18:19:05.7 | 331°18'44" | 82°57'51" | 22h20m47s | +54°53'28" | Lac | 14.13 | S | +2.0 | 514.8 | 518.3 | 250°14'21" | -13°15'37" | | | | |



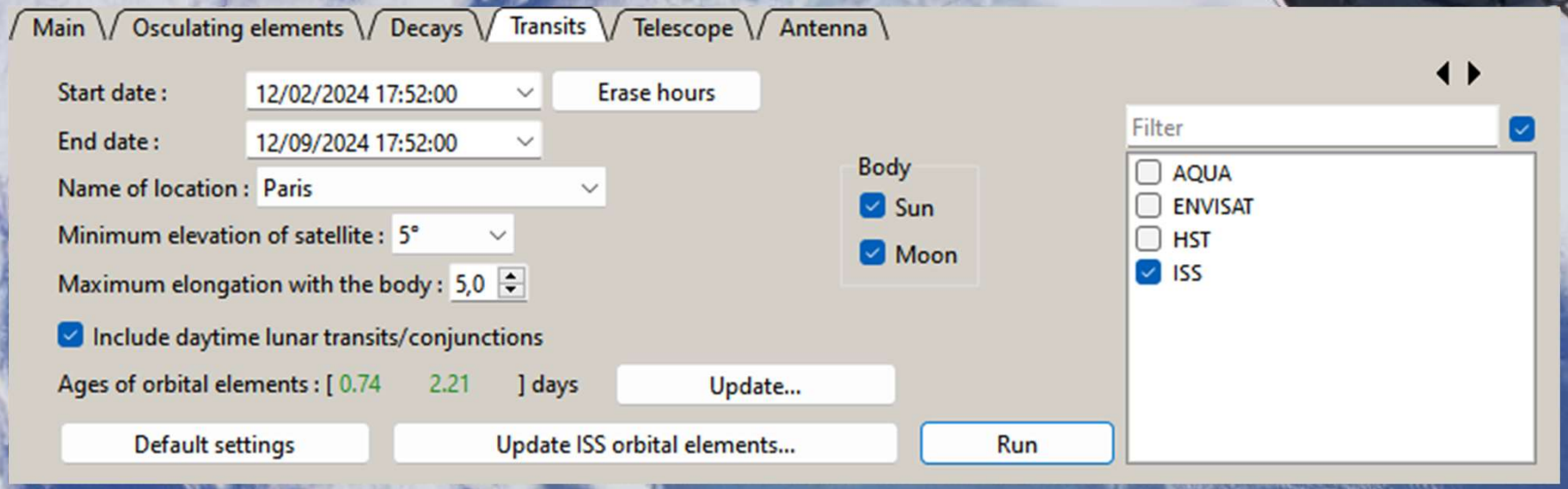

Show the map

# Flares results



# Transits Tab

- Since 2010 : calculation of ISS transits only (the first software to make these predictions !)
- Since PreviSat 6.0 : calculation of transits for all satellites

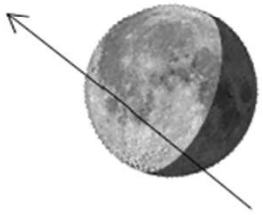


# Transits results

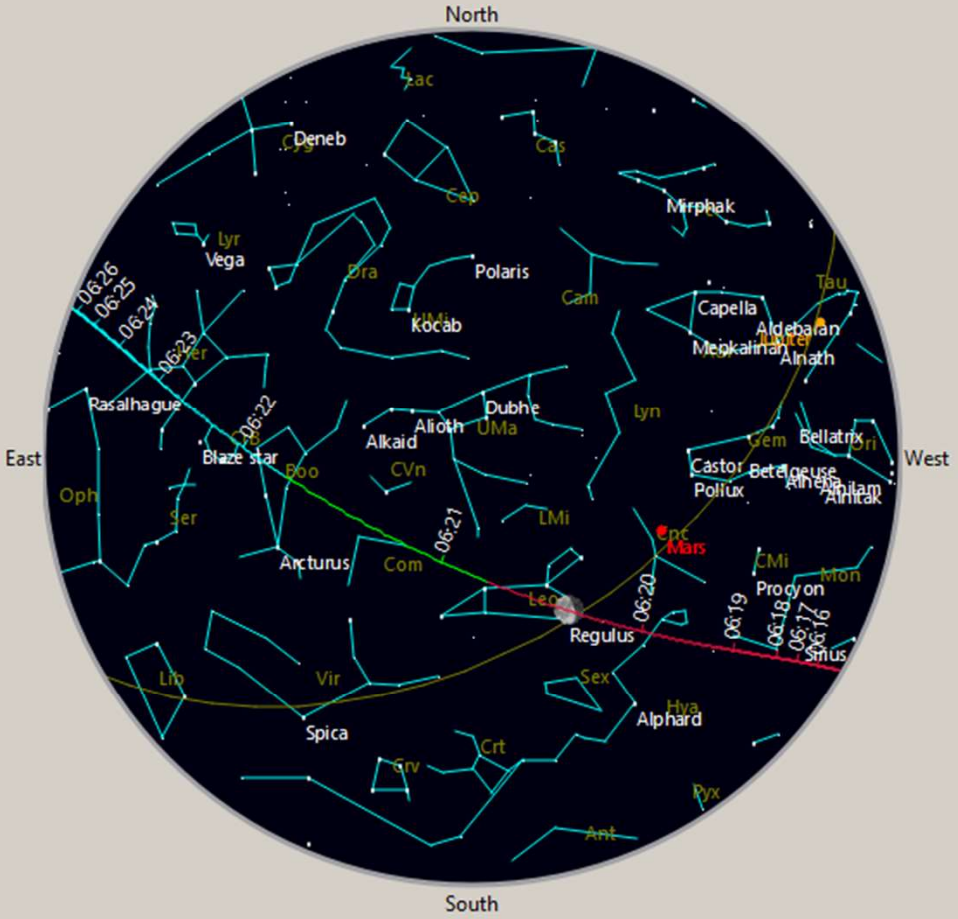
Transits

Save  Save text file

| Satellite | Date of maximum | Cst | Angle | Type | Body | Illum | Duration | Sun elevation |
|---|---|---|---|---|---|---|---|---|
| ISS | 2024/12/05 10:30:25.0 | Oph | 0.23 | T | S | III | 0.9 | +13°00'47" |
| AQUA | 2024/12/14 04:55:58.1 | Tau | 2.01 | C | M | Sha | 29.2 | -35°04'54" |
| ENVISAT | 2024/12/14 06:40:57.2 | Tau | 3.28 | C | M | Sha | 47.2 | -17°59'01" |
| AQUA | 2024/12/14 16:00:07.0 | Oph | 0.19 | T | S | III | 2.9 | +06°00'00" |
| ISS | 2024/12/18 07:57:48.2 | Cnc | 0.18 | T | M | III | 1.0 | -06°40'44" |
| ISS | 2024/12/18 09:33:25.7 | Cnc | 4.57 | C | M | III | 24.9 | +05°56'59" |
| ISS | 2024/12/19 07:09:11.2 | Cnc | 4.81 | C | M | III | 5.1 | -14°04'06" |
| ISS | 2024/12/20 06:20:28.9 | Leo | 0.19 | T | M | Sha | 0.5 | -21°52'19" |
| ISS | 2024/12/20 11:08:29.9 | Leo | 1.94 | C | M | III | 60.1 | +14°24'39" |
| ENVISAT | 2024/12/22 03:20:30.0 | Vir | 2.46 | C | M | Sha | 30.2 | -50°55'50" |
| ISS | 2024/12/22 11:08:08.0 | Vir | 1.33 | C | M | III | 35.1 | +14°19'19" |
| AQUA | 2024/12/23 02:42:45.6 | Vir | 2.94 | C | M | Sha | 32.7 | -56°13'00" |
| ENVISAT | 2024/12/23 02:42:58.5 | Vir | 1.75 | C | M | Sha | 47.2 | -56°11'21" |
| ISS | 2024/12/23 10:20:19.6 | Vir | 2.33 | C | M | III | 19.4 | +10°28'50" |

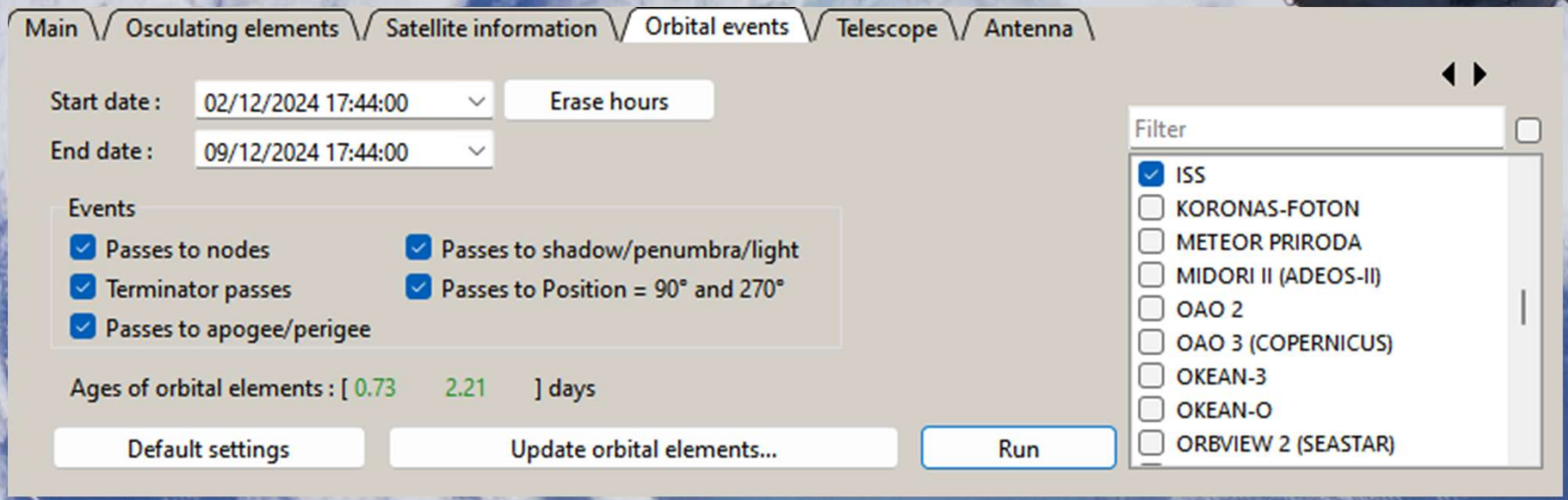


Show the map

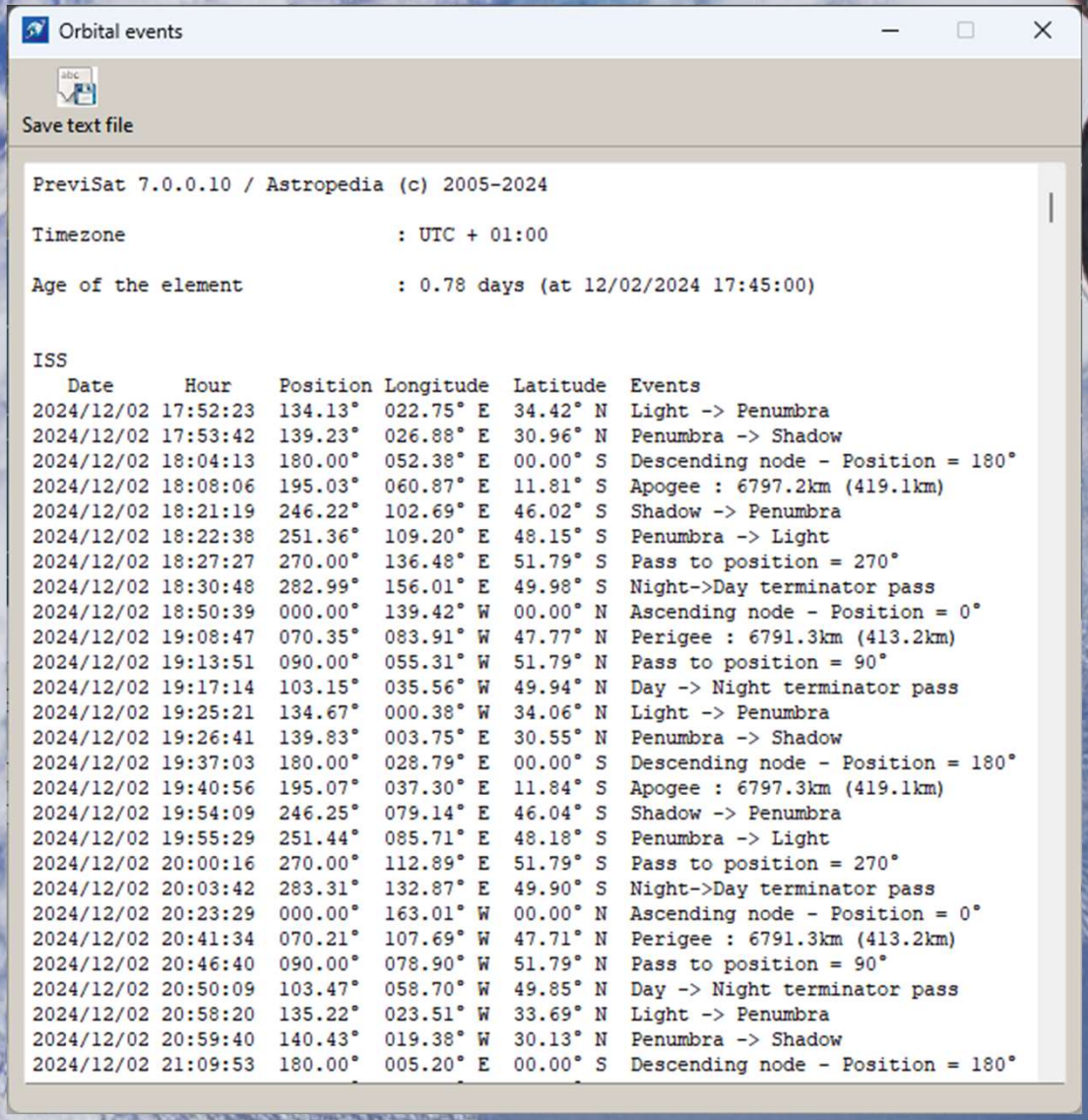


# Orbital events Tab

- Calculation of shadow-penumbra-light transitions, perigee-apogee passes, nodes passes…

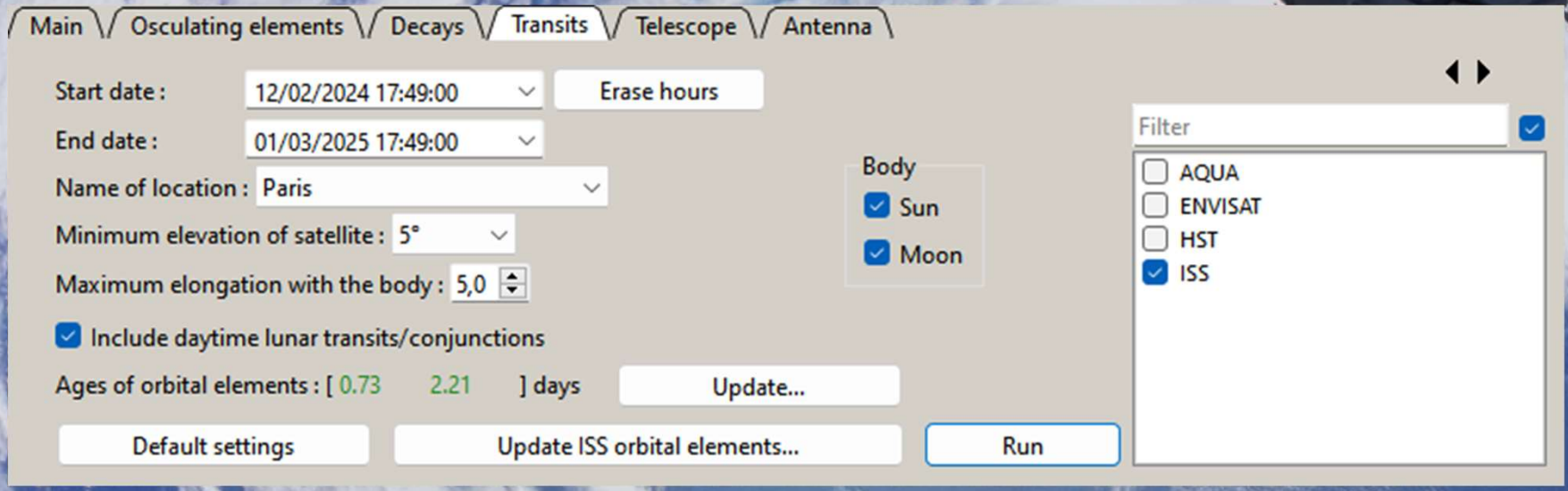


# Orbital events results



# Starlink Tab

- Calculation of Starlink satellites passes after a launch



# Starlink Tab

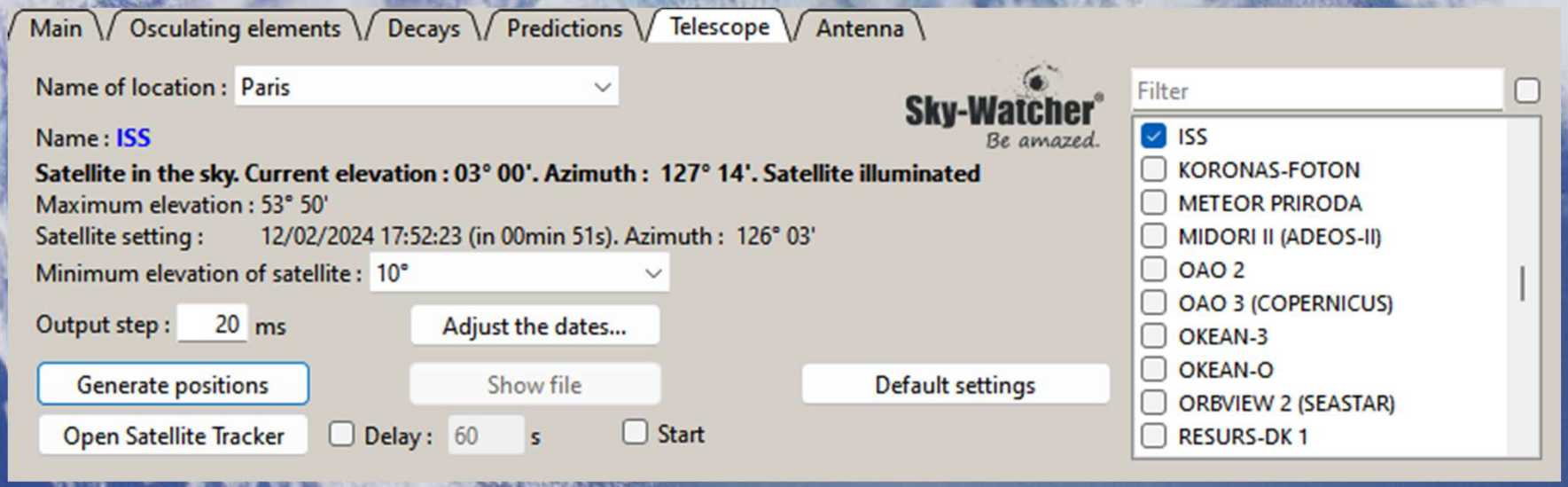
Starlink passes

Save  Save text file

| Satellite | Start date | End date | Max elevation | Magnitude | Sun elevation |
|---|---|---|---|---|---|
| STARLINK-G6-70 | 2024/12/10 18:17:00 | 2024/12/10 18:17:00 | 03°20'11" | +9.7 | -12°55'48" |
| STARLINK-G6-70 | 2024/12/11 18:17:00 | 2024/12/11 18:18:00 | 06°26'50" | +7.7 | -13°04'17" |
| STARLINK-G6-70 | 2024/12/11 19:49:00 | 2024/12/11 19:49:00 | 04°50'00" | +10.0* | -27°39'01" |
| STARLINK-G6-70 | 2024/12/12 18:17:00 | 2024/12/12 18:20:00 | 09°48'05" | +6.6 | -13°12'23" |
| STARLINK-G6-70 | 2024/12/12 19:50:00 | 2024/12/12 19:50:00 | 04°31'16" | +9.0* | -27°47'14" |
| STARLINK-G6-70 | 2024/12/13 18:18:00 | 2024/12/13 18:21:00 | 13°17'30" | +5.9 | -13°20'05" |
| STARLINK-G6-70 | 2024/12/13 19:51:00 | 2024/12/13 19:51:00 | 04°15'44" | +8.9* | -27°55'04" |
| STARLINK-G6-70 | 2024/12/14 18:19:00 | 2024/12/14 18:22:00 | 16°40'07" | +5.4 | -13°27'24" |
| STARLINK-G6-70 | 2024/12/14 19:52:00 | 2024/12/14 19:52:00 | 04°09'25" | +9.0 | -28°02'31" |

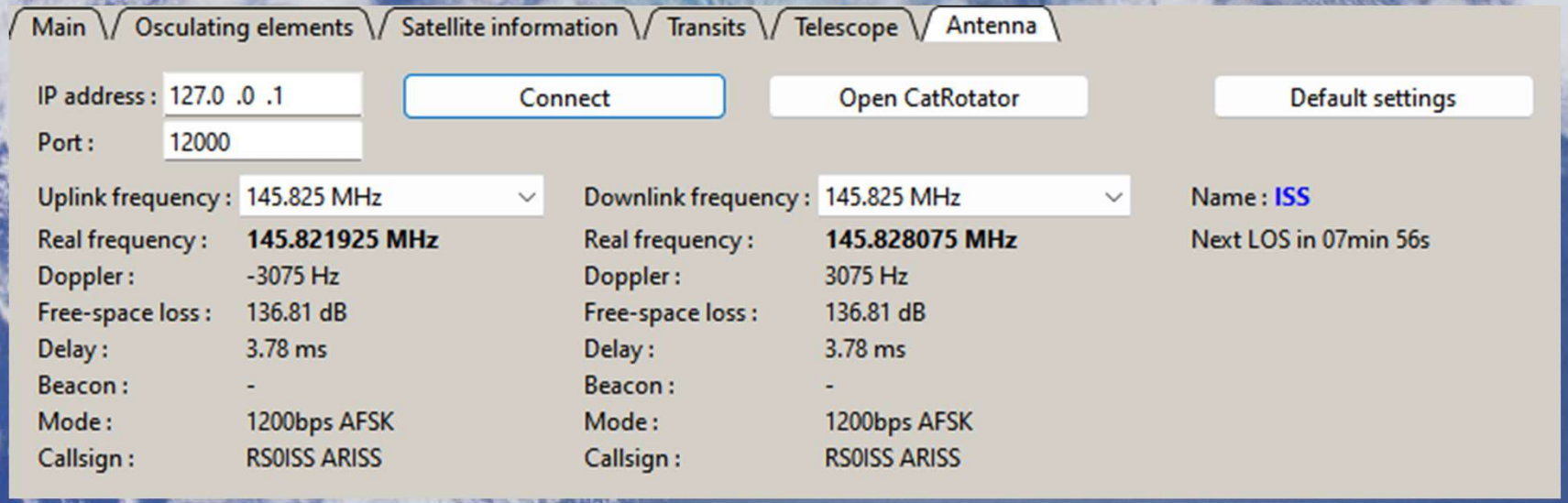
# Telescope Tab

- Developed in partnership with Sky-Watcher
- PreviSat generates the positions and provides them to the Satellite Tracker software (developed by Sky-Watcher), the latter allows to pilot the mount and follow the satellite



# Antenna Tab

- Developed in partnership with CatRotator
- PreviSat provides the position of a radio satellite to the CatRotator software by means of UDP protocol, the latter allows to pilot the antenna and follow the radio satellite



# Software options

- Management of several places of location (grouped by countries and by frequently used locations)
- Predictions calculations for any location on Earth
- Many display options
- …

# Software tools

- Orbital elements updating (can be made automatically at launch)
- Management of files with the old format of orbital elements (TLE)

# Version 7.0

- Version 7.0 currently available :
  - 52,806 lines of code
  - New features:
    - Information about upcoming launches
    - Information about decays
    - Satellite information more complete$
    - …
  - User interface available in French, English and Japanese

# About the software

- Download :
  - https://sourceforge.net/projects/previsat/
- Software presentation (in English) :
  - http://previsat.sourceforge.net/
- Referenced on https://celestrak.org/