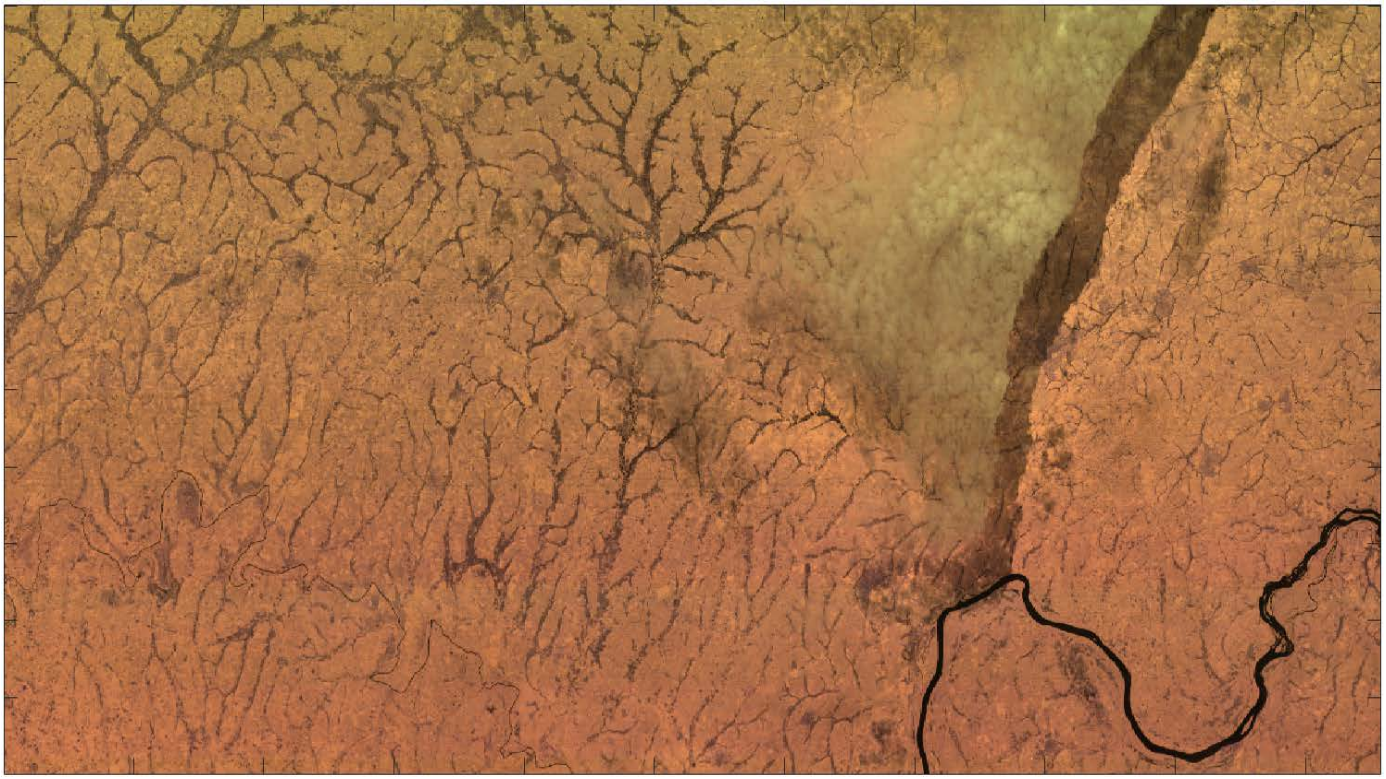

PRISMA Pre-Feasibility Tool User Manual
Issue 1.0 Date 10/09/2021

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1. SCOPE AND PURPOSE

1.1 SCOPE

This document contains the explanation of the usage of the PRISMA Pre-Feasibility Tool.

1.2 PURPOSE

The PRISMA Pre-Feasibility Tool is the results of ASI internal developments made available to the PRISMA user community for analyzing in time the spatial coverage of such a mission. With this tool it is hence possible to determine the time (in the future) at which the satellite geometrically sees an area of interest (represented by his central point) and so plan the acquisitions of PRISMA images.

2. APPLICABLE AND REFERENCE DOCUMENTS

2.1 APPLICABLE DOCUMENTS

[AD1] None

2.2 REFERENCE DOCUMENTS

[RD-1] None

3. ACRONYMS AND DEFINITIONS

3.1 ACRONYMS

Acronym	Meaning
AoI	Area of Interest
ASI	Italian Space Agency
LoS	Line of Sight

Table 3-1 Acronyms

3.2 DEFINITIONS

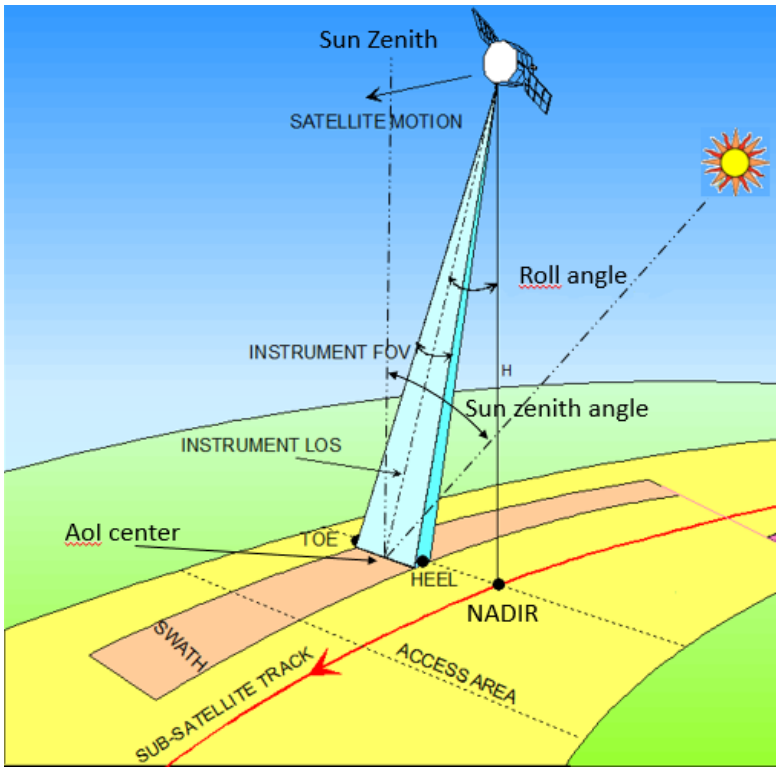
Look angle **Roll ange**	The angle between the two directions satellite-nadir and the line of sight of the sensor 
Nadir	The subsatellite point, obtained as the intersection of the earth surface with the direction normal to such surface and passing to the satellite
Subsatellite track	The curve described by the nadir during the time. Such curve also represents the along track direction
Sun Zenith	The position od the sun at his highest altitude respect the earth surface at AoI center
Sun Zenith angle	The angle between the two directions AoI center-Sun and AoI center-Sun Zenith

Table 3-2 Definitions

4. USER MANUAL

The tool, which is web-based and freely accessible even without a PRISMA account, performs the analysis on a single or multiple Areas of Interest (AoI) described as the lat,lon of their central point and gives in output the UTC time at which the satellite have in view the AoI along with the some characteristic parameters of that view (the roll angle and the solar zenith angle).

The tool can be accessed at http://90.147.170.162 (next also at http://prisma-prefeasibility.asi.it)

For a single AoI analisiys press the button

Single Point

or select a csv file and press the button

Upload CSV

for a multiple AoI analisys.

4.1 SINGLE POINT ANALYSIS

Figure 4-1 Single AoI analysis

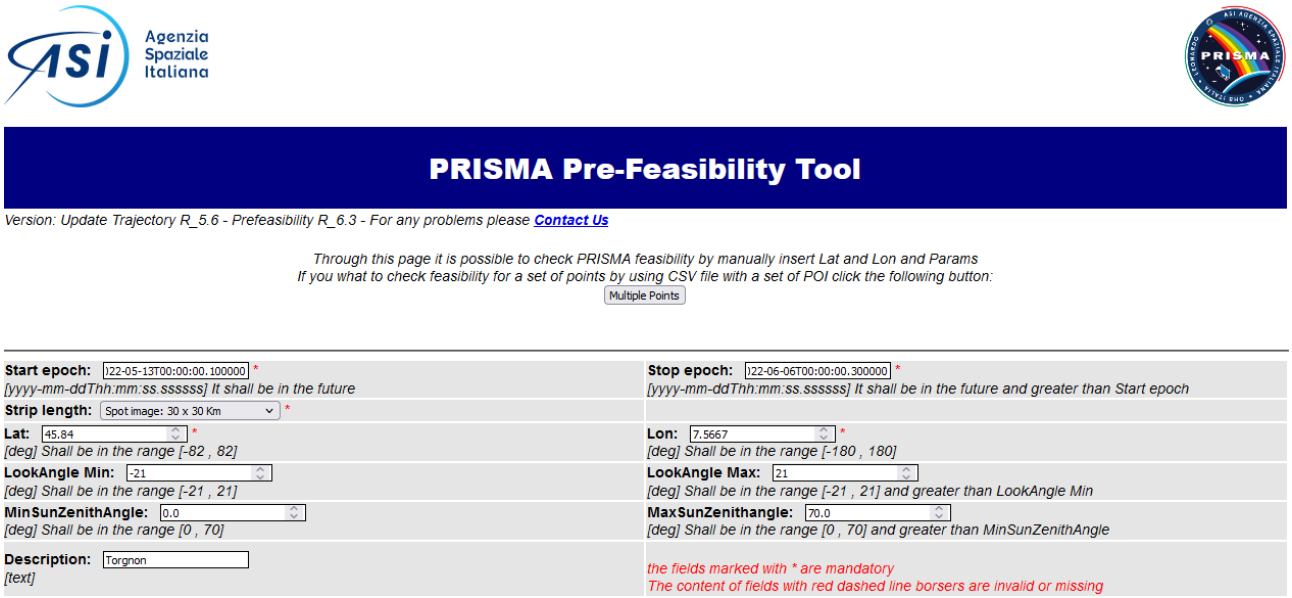


Figure 4-2 Inputs for a single AoI analysis

For making such analysis the user shall specify in input:

- [mandatory] The future time window at which the analysis is wanted, by mean of Start and Stop epoch in UTC, in the format *yyyy-mm-ddThh:mm:ss.ssssss* Example: 2022-05-13T00:00:00.100000, 2022-06-06T00:00:00.300000
- [mandatory] The geographic position of the AoI, by latitude and longitude of the central point in decimal degrees. The latitude is constrained to be within the area accessible to the satellite sensor, i.e. within ±82 deg. Example *45.84, 7.5667*
- [optional] The length of the AoI in the satellite along track direction, expressed as multiples of the minimum PRISMA length which can be acquired i.e. 30km: Example: 1
- [optional] The range of admissible look angles (the angle between the two directions satellite-nadir and the line of sight of the sensor), in decimal degrees. Such interval is constrained to be within the maximum range allowed by the satellite i.e. [-21, 21] Example -21.0, 21.0
- [optional] The range of admissible sun zenith angles (the angle between the two directions AoI center-zenith and AoI center-sun), in decimal degrees. Such interval is constrained to be within the range allowed by the satellite i.e. [0, 70] Example 0.0, 70.0
- [optional] The name of the AoI in plain text. Example Torgnon

After the ending of the computation (allow at least one minute per AoI without reloading the page), the tool gives in output a text file with one line for each observation opportunity and with values separated by commas (a csv type of file).

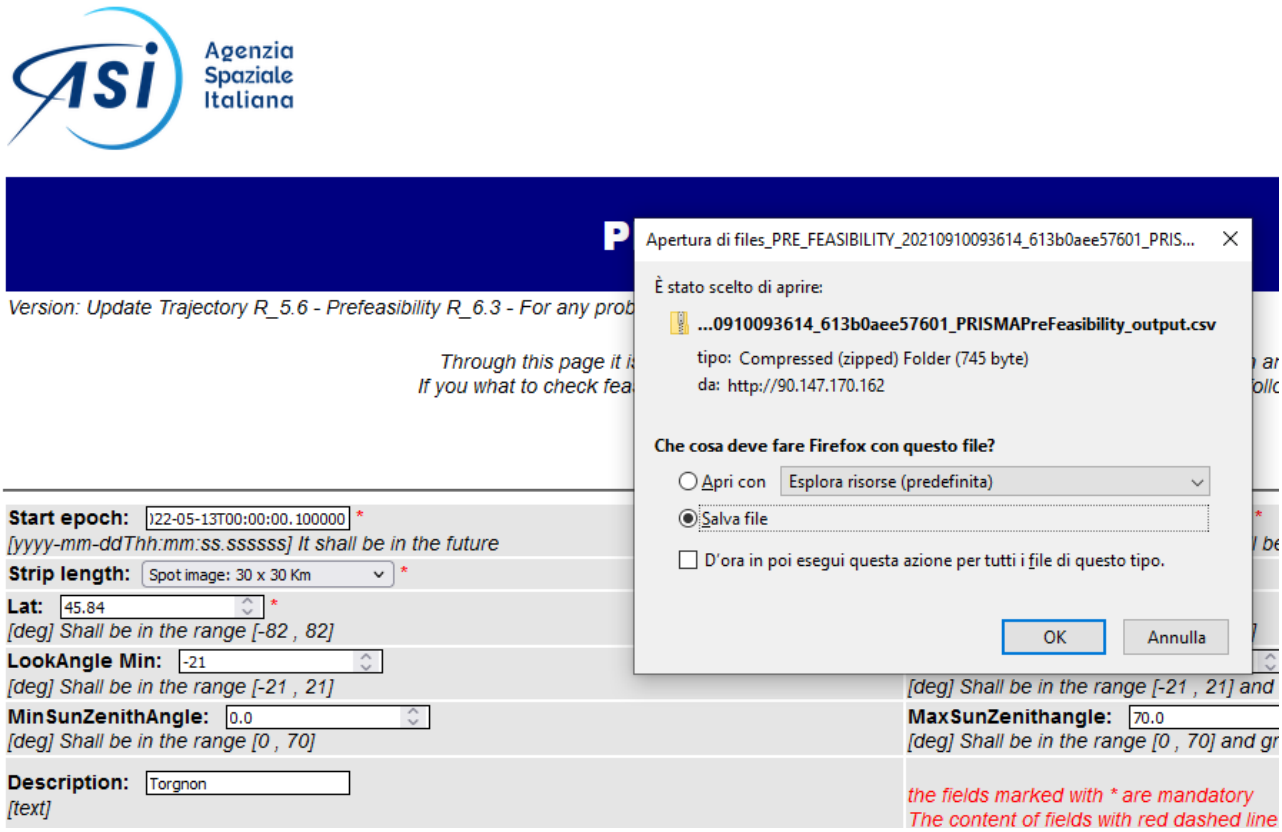


Figure 4-3 Output csv containing the results of the analysis

The data in output is:

- The time window at which the acquisition by PRISMA is foreseen, as Start and Stop epoch in UTC
- The geographic position of the acquisition, by latitude and longitude of the central point in decimal degrees (this is the same of the AoI position specified in input)
- The roll angle of the acquisition (it is the same of the look angle mentioned before) in decimal degrees. This value is acquisition time dependent and is checked for consistency with the range of admissible look angles specified in input and the range of admissible look angles for the AoI latitude (the range of allowed

roll angles changes with latitude of the AoI). When the latter condition is not met, a warning message is issued (“Acquisition can be discarded due to roll uncertainties”)

- The sun zenith angle of the acquisition, in decimal degrees
- The name of the AoI in plain text (this is the same of the field specified in input, when used)

```
Start Time,Stop Time,Latitude (deg),Longitude (deg),Roll (deg),SZA (deg),Site,,
2022-05-13 10:28:57.390717558,2022-05-13 10:29:01.500717558,45.84,7.5667,-2.7,29.9,Torgnon,,
2022-05-19 10:32:14.073356585,2022-05-19 10:32:18.183356585,45.84,7.5667,3.1,28.3,Torgnon,,
2022-05-25 10:35:30.426396568,2022-05-25 10:35:34.536396568,45.84,7.5667,8.8,27.0,Torgnon,,
2022-05-30 10:22:13.432778293,2022-05-30 10:22:17.542778293,45.84,7.5667,-14.0,27.5,Torgnon,Acquisition can be discarded due to roll uncertainties,
2022-05-31 10:38:46.304014688,2022-05-31 10:38:50.414014688,45.84,7.5667,14.3,25.9,Torgnon,Acquisition can be discarded due to roll uncertainties,
2022-06-05 10:25:29.829450946,2022-06-05 10:25:33.939450946,45.84,7.5667,-8.4,26.5,Torgnon,,
```

Figure 4-4 Output csv contents

4.2 MULTIPLE POINT ANALYSIS

In case you need the analyze the coverage of more than one AoI in a single round, you have to create a csv file containing the same information previously loaded in the web page, with one test line per AoI.

```
2022-01-10T00:00:00.000000, 2022-02-06T00:00:00.000000, 1, 45.84, 7.5667, -21, 20, 0, 70, Torgnon
2022-01-01T00:00:00.000000, 2022-03-01T00:00:00.000000, 1, 41.9027, 12.4963, -10, 10, 0, 70, Rome
```

Figure 4-5 A csv specifying multiple AoI

Figure 4-6 Analysis with multiple AoI

```
Start Time,Stop Time,Latitude (deg),Longitude (deg),Roll (deg),SZA (deg),Site,,
2022-01-11 10:26:19.960223960,2022-01-11 10:26:24.070223960,45.84,7.5667,-8.4,69.5, Torgnon,,Acquisition can be discarded due to SZA uncertainties
2022-01-17 10:29:37.495335968,2022-01-17 10:29:41.605335968,45.84,7.5667,-2.7,68.4, Torgnon,,
2022-01-23 10:32:54.177974995,2022-01-23 10:32:58.287974995,45.84,7.5667,3.1,67.1, Torgnon,,
2022-01-29 10:36:10.531014978,2022-01-29 10:36:14.641014978,45.84,7.5667,8.8,65.5, Torgnon,,
2022-02-03 10:22:53.537396705,2022-02-03 10:22:57.647396705,45.84,7.5667,-14.0,64.9, Torgnon,Acquisition can be discarded due to roll uncertainties,
2022-02-04 10:39:26.408633100,2022-02-04 10:39:30.518633100,45.84,7.5667,14.3,63.7, Torgnon,Acquisition can be discarded due to roll uncertainties,
2022-01-04 10:07:18.935547911,2022-01-04 10:07:23.045547911,41.9027,12.4963,-0.2,66.5, Rome,,
2022-01-10 10:10:34.889720539,2022-01-10 10:10:38.999720539,41.9027,12.4963,6.2,65.7, Rome,,
2022-01-27 10:03:52.346057286,2022-01-27 10:03:56.456057286,41.9027,12.4963,-6.2,63.0, Rome,,
2022-02-02 10:07:08.909393309,2022-02-02 10:07:13.019393309,41.9027,12.4963,-0.2,61.3, Rome,,
2022-02-08 10:10:24.863565937,2022-02-08 10:10:28.973565937,41.9027,12.4963,6.2,59.3, Rome,,
2022-02-25 10:03:42.319902684,2022-02-25 10:03:46.429902684,41.9027,12.4963,-6.2,54.1, Rome,,
```

Figure 4-7 results of the multiple AoI analysis

An empty results with only the name of the site signals the absence of geometric conditions for the acquisition of the AoI during the time window and parameters which has been specified.