



CHEOPS Feasibility Checker Guidelines

(v_3.0, March 2025)

(SFC 11.16.0)



The CHEOPS Scheduling Feasibility Checker (SFC) is a tool that simulates your observations and provides an overview of the expected schedulable opportunities of a given observation request with CHEOPS, considering all the constraints related to CHEOPS' orbit.

Note that the SFC is not updated with CHEOPS' latest orbital data. The SFC results are therefore to be taken with a grain of salt, especially when it comes to the timing of the Earth constraints.

This guide explains how to use the SFC.

PRELUDE

Using the SFC is the most advanced way of knowing when and how a target is schedulable with CHEOPS. While we emphasize that most of the time, it is **crucial** to make use of the SFC to maximize the chances of an observation request being scheduled, there are simpler ways to estimate, at first order, whether any given target is observable:

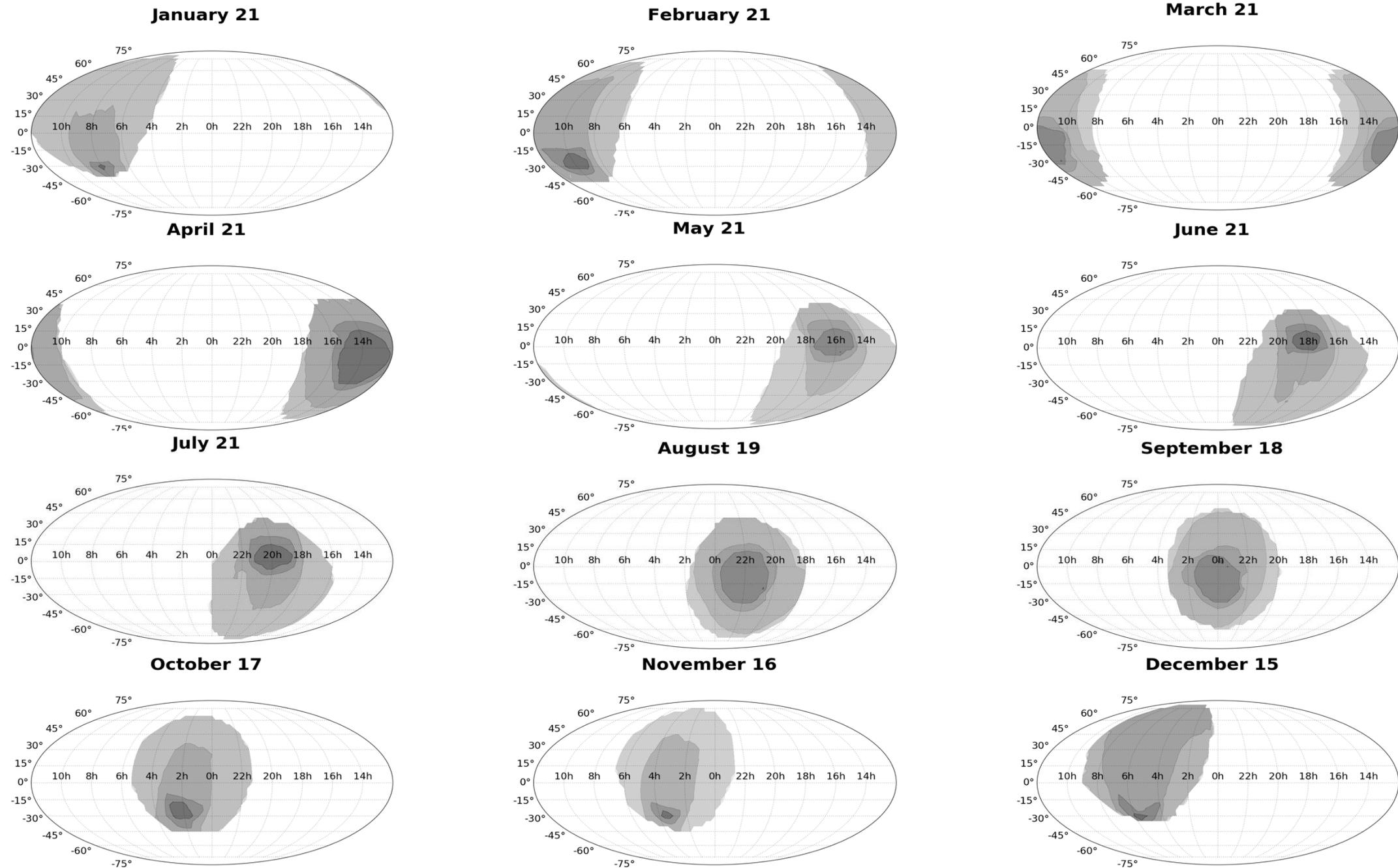
- Sky visibility maps
- CHEOPS Visibility Tool

Both are presented in the following slides, before moving on to the actual SFC guidelines.

Starting from the AO-6 call, the SFC and the Visibility Tool are available on **ESA's Datalabs platform**, which makes it possible to run the tools in a web browser without any prior software installation. Please follow the instructions on <https://www.cosmos.esa.int/web/datalabs/self-registration> to get access to Datalabs. Request your account two working days prior to its expected usage.

PRELUDE 1 – Sky visibility maps

If your target is in the grey zone, then it is observable at that time. Lighter shades of grey indicate longer interruptions, down to 50% efficiency (i.e., 50% of the visit will contain data)

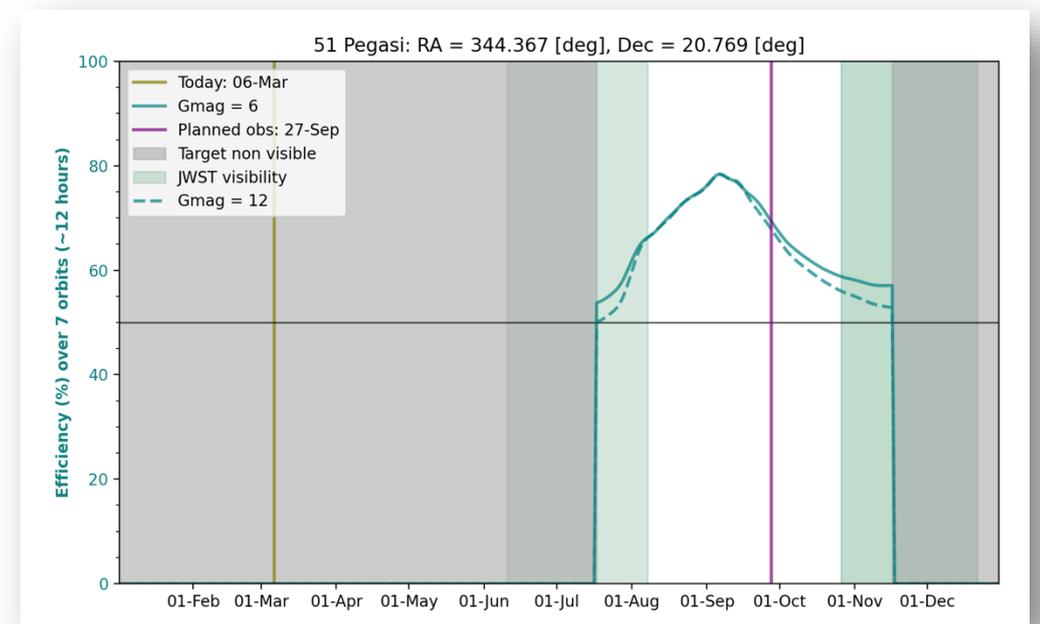
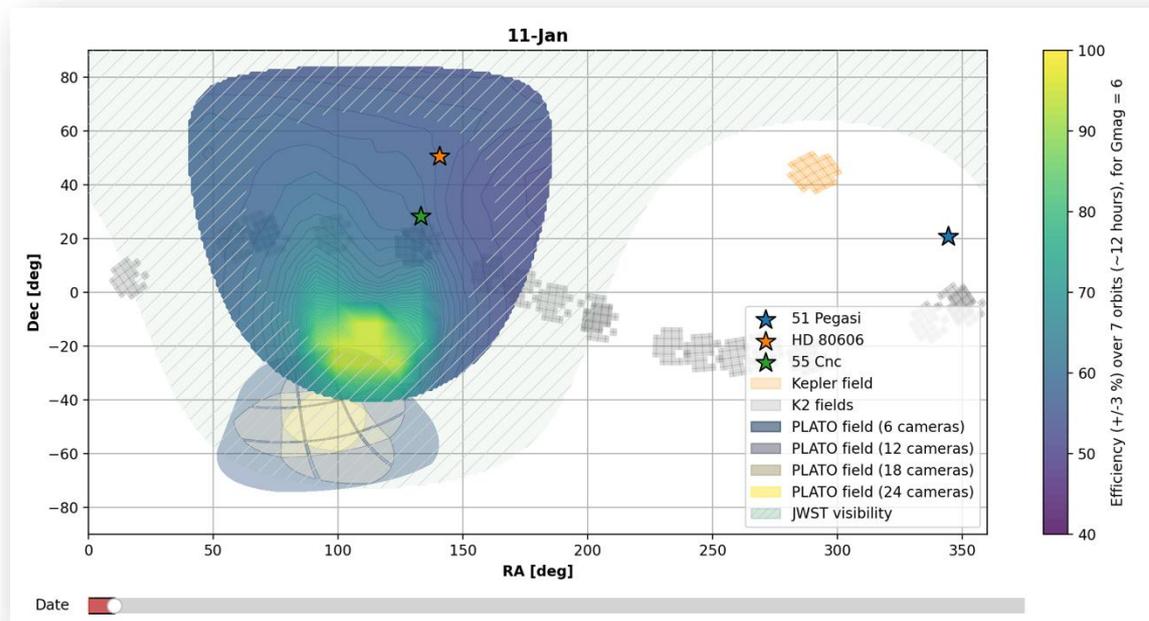


PRELUDE 2 – CHEOPS visibility tool

The CHEOPS Visibility Tool is a simple tool that will allow you to know when your target(s) is(are) visible and with what efficiency. Efficiencies (fraction of visit containing data) are estimated at a given RA/Dec for a 'standard' visit designed to average out all interruptions (Earth occultations, Earth straylight and South Atlantic Anomaly crossings).

This tool is made to:

- Easily and quickly check observability
- Assess if the efficiency is sufficient for the required science case
- Obtain the efficiency profile over the visibility window for the bright and faint case
- See if your target is the FOV of Kepler/K2, JWST and PLATO.



Since the CHEOPS AO-6 call, the CHEOPS Visibility Tool is on the [ESA's Datalabs platform](#). On the next slide we explain how to access and use the tool.

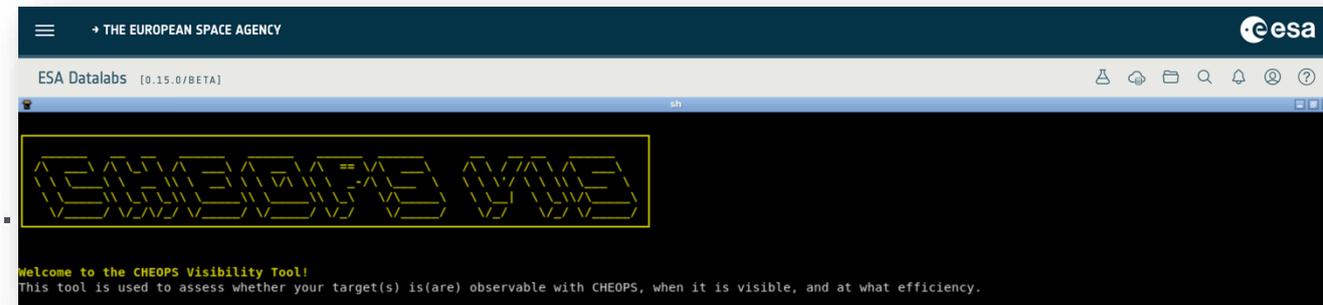
! The Visibility tool should not replace the use of the SFC to submit a CHEOPS proposal !

PRELUDE 2 – CHEOPS visibility tool

Accessing and starting the Visibility tool, i.e, the **cheops-vis** datalabs on the **ESA's Datalabs platform**, is done very similarly to the SFC as described later in the document:

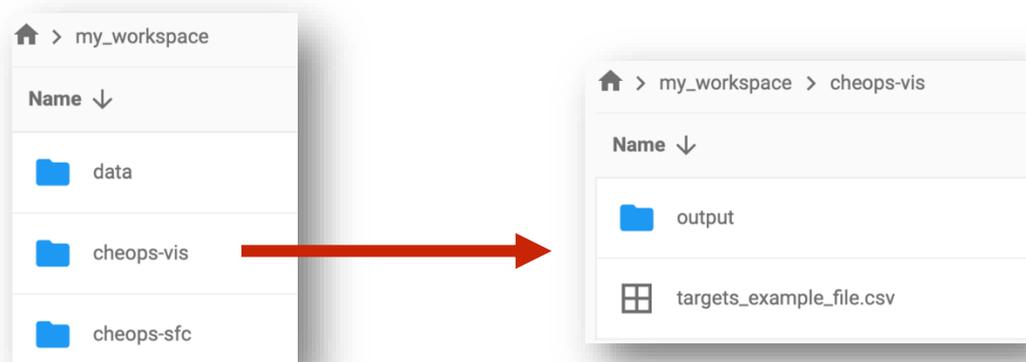
1. Follow the procedure described on *slide 7* , replacing **cheops-sfc** with **cheops-vis**

2. Wait for the datalab to start. Once ready, a terminal with all the instructions on how to use the tool will appear.



3. To access the folder associated with the visibility tool, follow the procedure described on *slide 9*. In */my_workspace/cheop-vis/*, you will find:

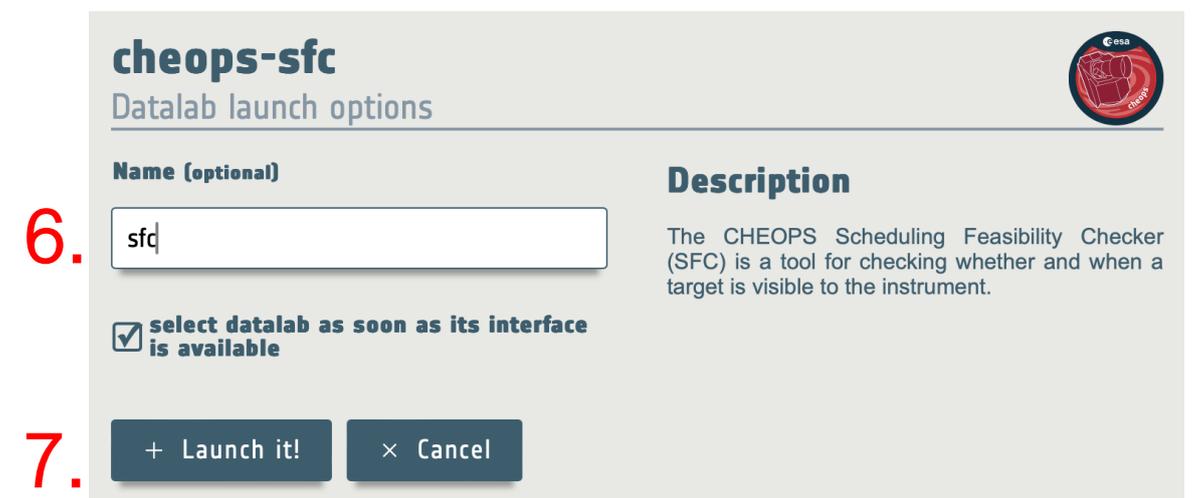
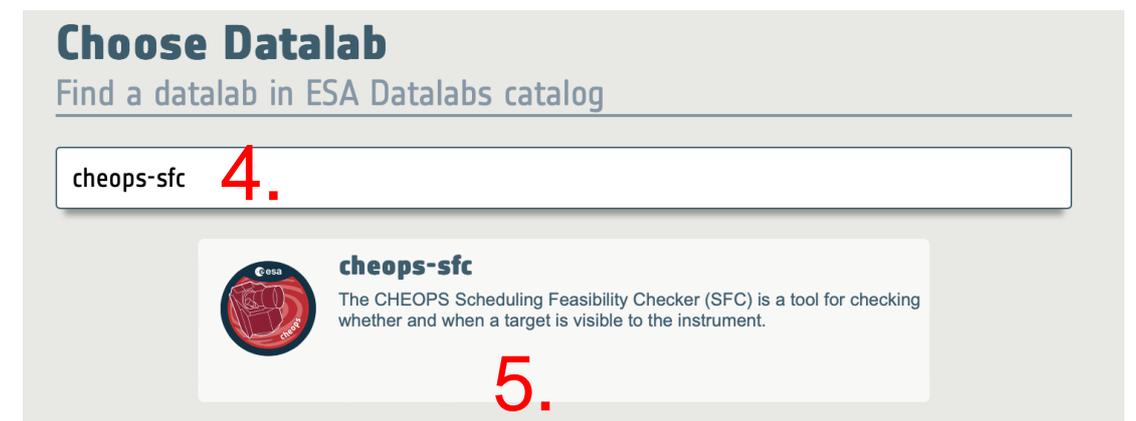
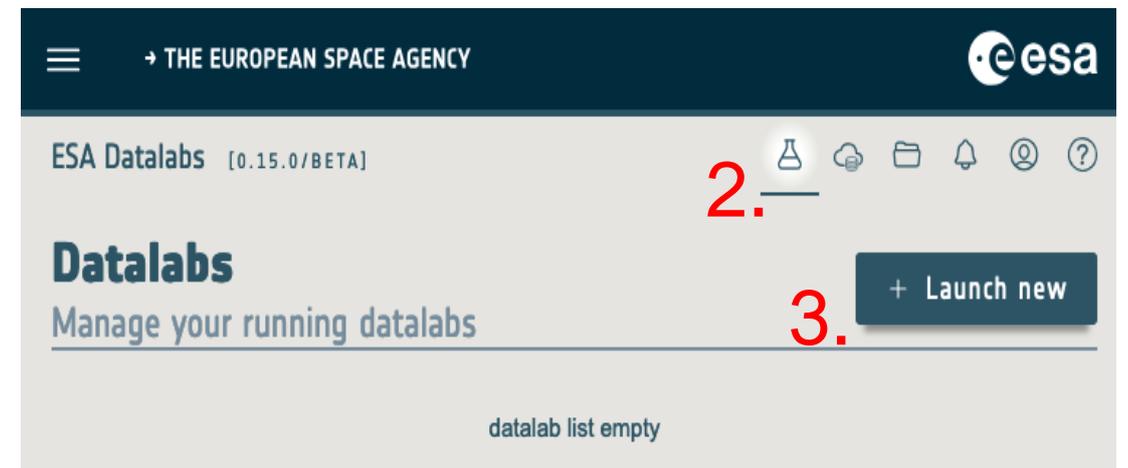
- The output folder, containing one efficiency plot and one summary .csv file for each target requested.
- An example 'targets_example_file.csv' file for the Multi-target mode of the tool. Note: You can copy this file as described on *slide 10* to have your own custom file. The file **needs** to be in this folder to be used with the '-- target_file' argument (see instructions in the datalabs).



Once you have found when and how well is your target visible with CHEOPS, move on to the following pages to use the SFC, which will tell you when each opportunity of your observation requests occurs.

Launch the CHEOPS-SFC datalab

1. Open <https://datalabs.esa.int> in a web browser and log in using your ESA Cosmos credentials.
2. Click on the flask icon in the top right menu.
3. Click the “Launch new” button.
4. Search for the name of the datalab
5. Then select the datalab by clicking on it in the results below.
6. Optionally, give the datalab a name of your choice.
7. Press “Launch it!”.



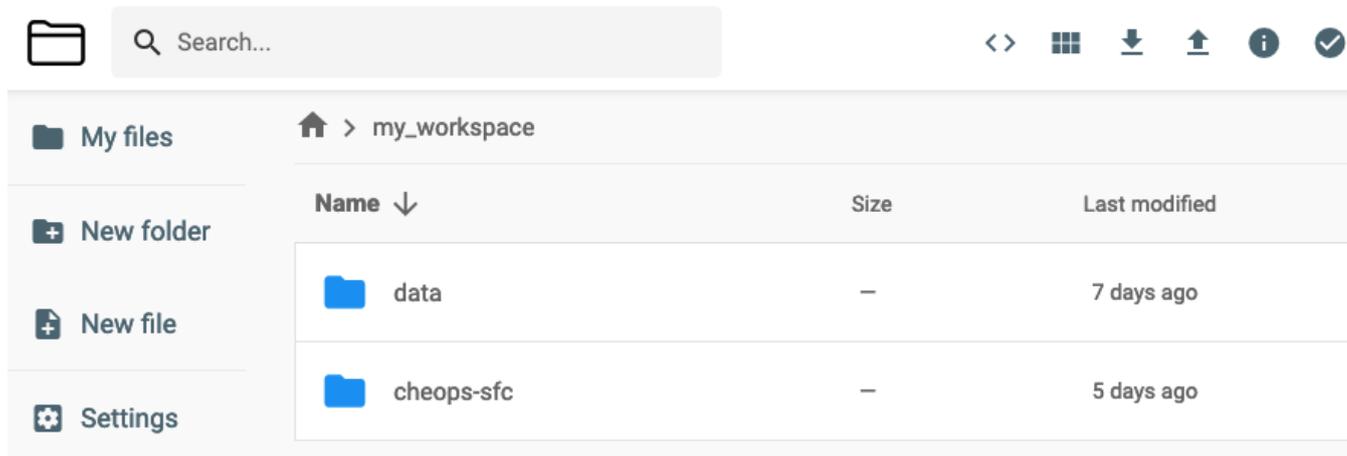
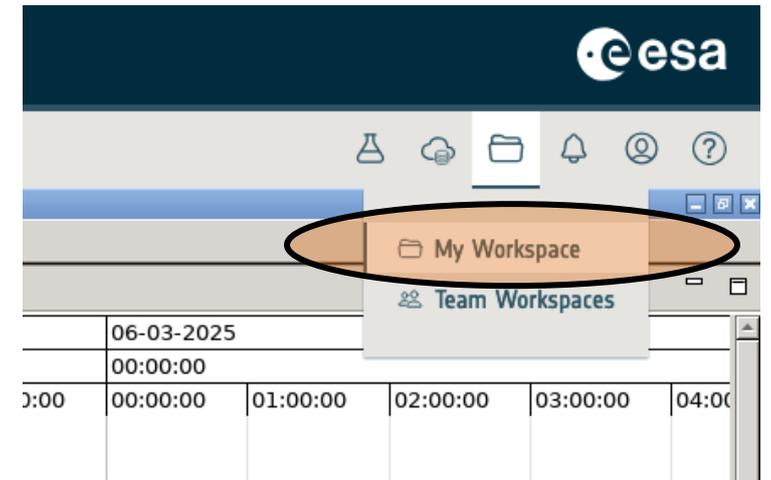
Launch the CHEOPS-SFC datalab

Wait for the datalab to start, which can take up to 20 seconds. Once ready, the SFC GUI will pop up.

The screenshot displays the CHEOPS SFC GUI interface. At the top, it shows the ESA logo and the text 'THE EUROPEAN SPACE AGENCY'. Below this, the application title is 'ESA Datalabs [0.15.0/BETA]'. The main window title is 'CHEOPS SOC MPS HMI FC'. The interface includes a menu bar with 'MPS', 'File', 'Edit', 'Analysis', 'View', and 'Help'. A 'Gantt' tab is selected, showing a feasibility analysis grid for the date '05-03-2025'. The grid has columns for time slots from 11:00:00 to 02:00:00 and rows for different observation categories: 'FEASIBILITY', 'Visits', 'SAA', 'Earth Limb', and 'Stray Light'. Below the grid, there are tabs for 'Observation Request', 'Visits', and 'Feasibility Report'. At the bottom, a 'Property' table is visible with columns for 'Property' and 'Value'. The system tray at the bottom shows 'desktop 1', 'CHEOPS SOC MP...', the time '11:34', and the date 'Tuesday 04 March'.

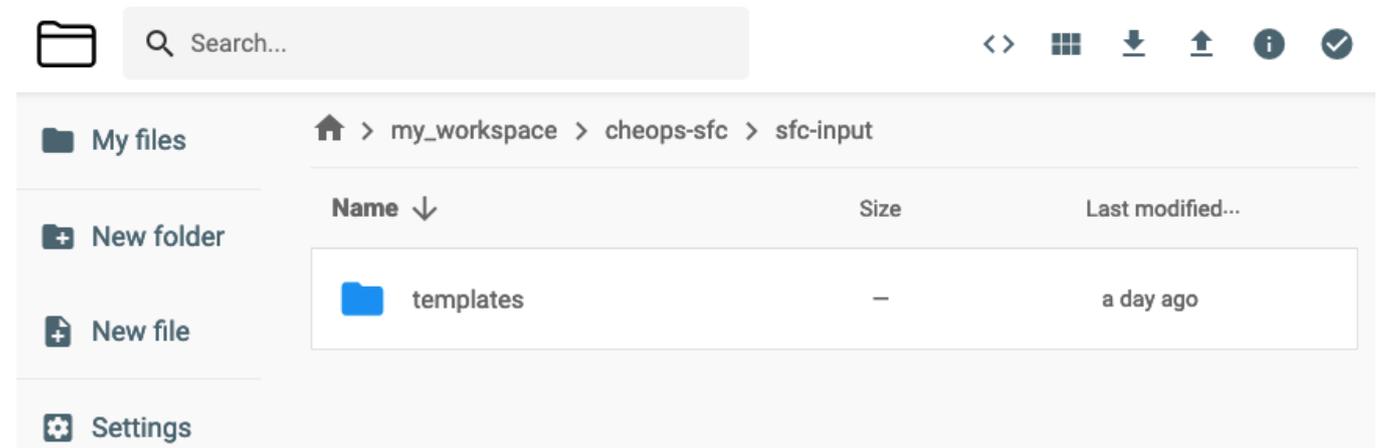
Datalabs Workspace

Go to your Datalabs Workspace by hovering the mouse pointer over the “Folder” icon in the top menu, then click on “My Workspace”.



This will open your private file storage area. The sub-folder cheops-sfc was created automatically when you launched the CHEOPS-SFC datalab.

Double click on the cheops-sfc folder to enter inside it, then double click on the folder named sfc-input. This is the folder where you will store your observation request files.



Copy observation request template file

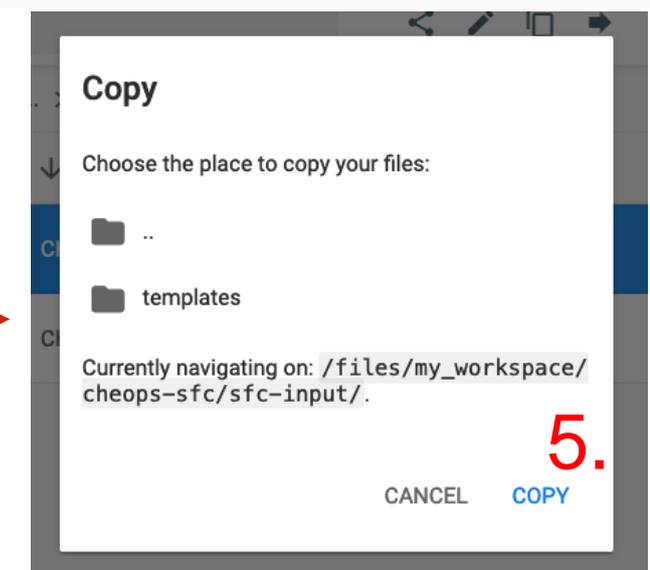
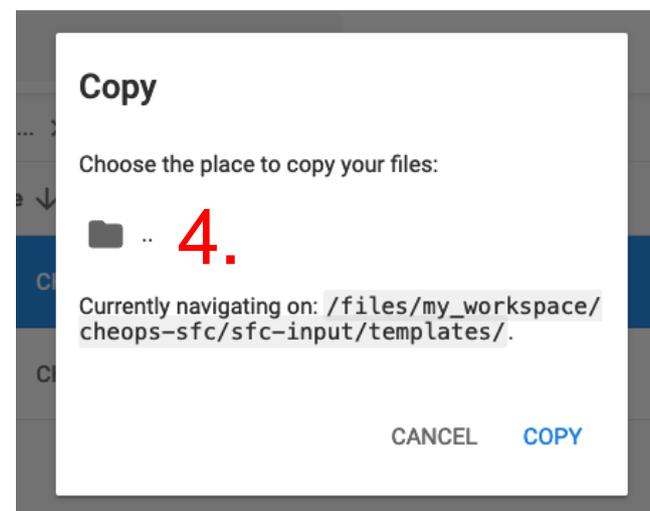
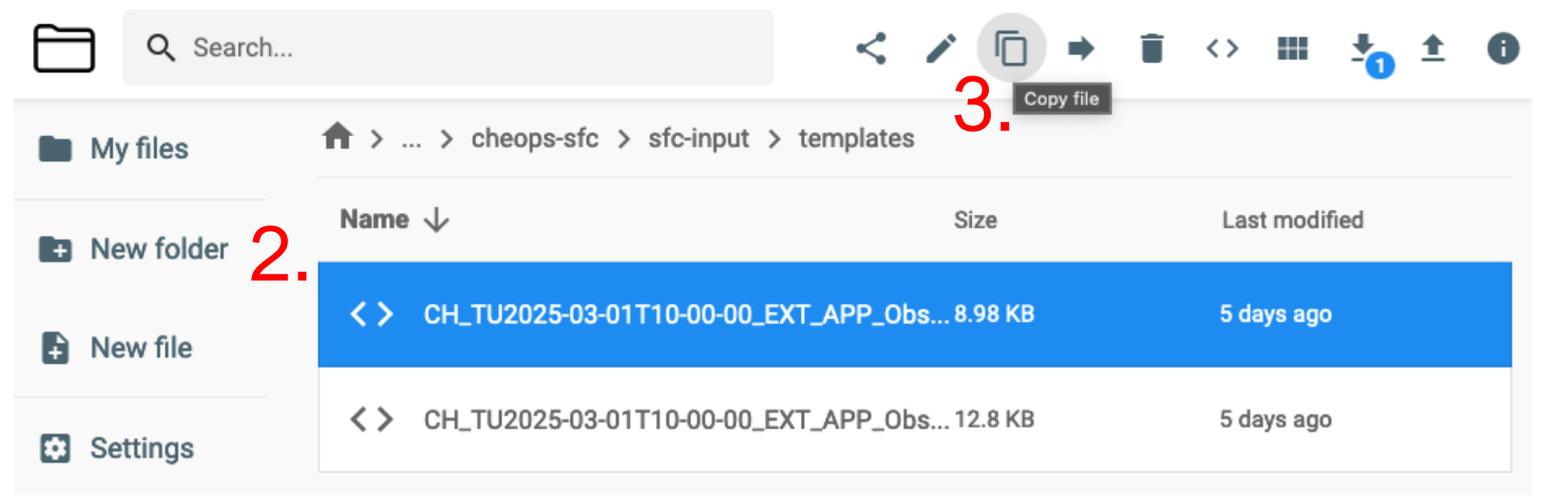
The templates folder contains two observation request templates that you can use as a starting point:

CH_TU2025-03-01T10-00-00_EXT_APP_ObservationRequests_V0003.xml (time critical observations)

CH_TU2025-03-01T10-00-00_EXT_APP_ObservationRequests_V0004.xml (non-time critical observations)

Copy the file you wish to use into the sfc-input folder following the steps below. *Do not modify the templates themselves!*

1. Double click on the templates folder to go inside it.
2. Mark the template file you wish to copy by clicking on it.
3. Click on the “copy” icon in the menu.
4. In the popup window, double-click on the “folder” icon to select the parent folder.
5. Click “Copy”.
6. You will be taken back up to the sfc-input folder which will now contain the copied file.



TIPS:
It is also possible to drag-and-drop files from your computer into the sfc-input folder.

Edit the observation request file to define technical details of your desired observation

You can edit your file directly in the Datalabs Workspace by double-clicking on it. This example shows the copy of the template file CH_TU2025-03-01T10-00-00_EXT_APP_ObservationRequests_V0003.xml.

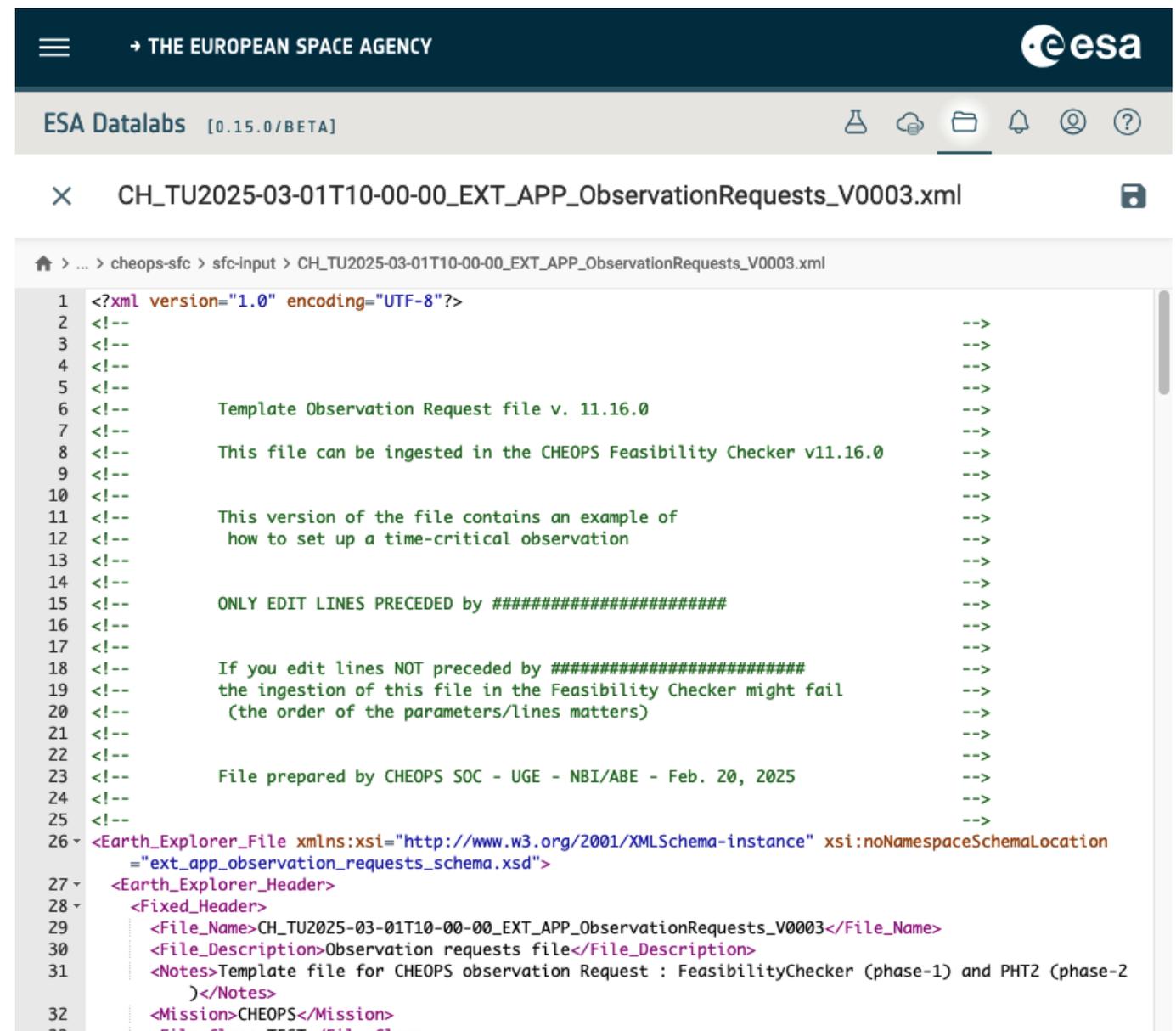
Follow instructions from file header, only edit relevant parameters:

Target_Name
Target_Magnitude
R.A. — Dec
Earliest_Start / Latest_End (optional)
Transit_Time
Transit_Period
Visit_Duration
Minimum_Effective_Duration
Earliest/Latest_Observation_Start
Critical phase ranges (optional)

Save the file after editing

WARNING:

This file must contain only one request (it will fail otherwise), and only the above parameters should be modified. They are identified as such in the file (see header). Re-organizing the file structure or changing not-recommended parameters will likely make the file ingestion fail!

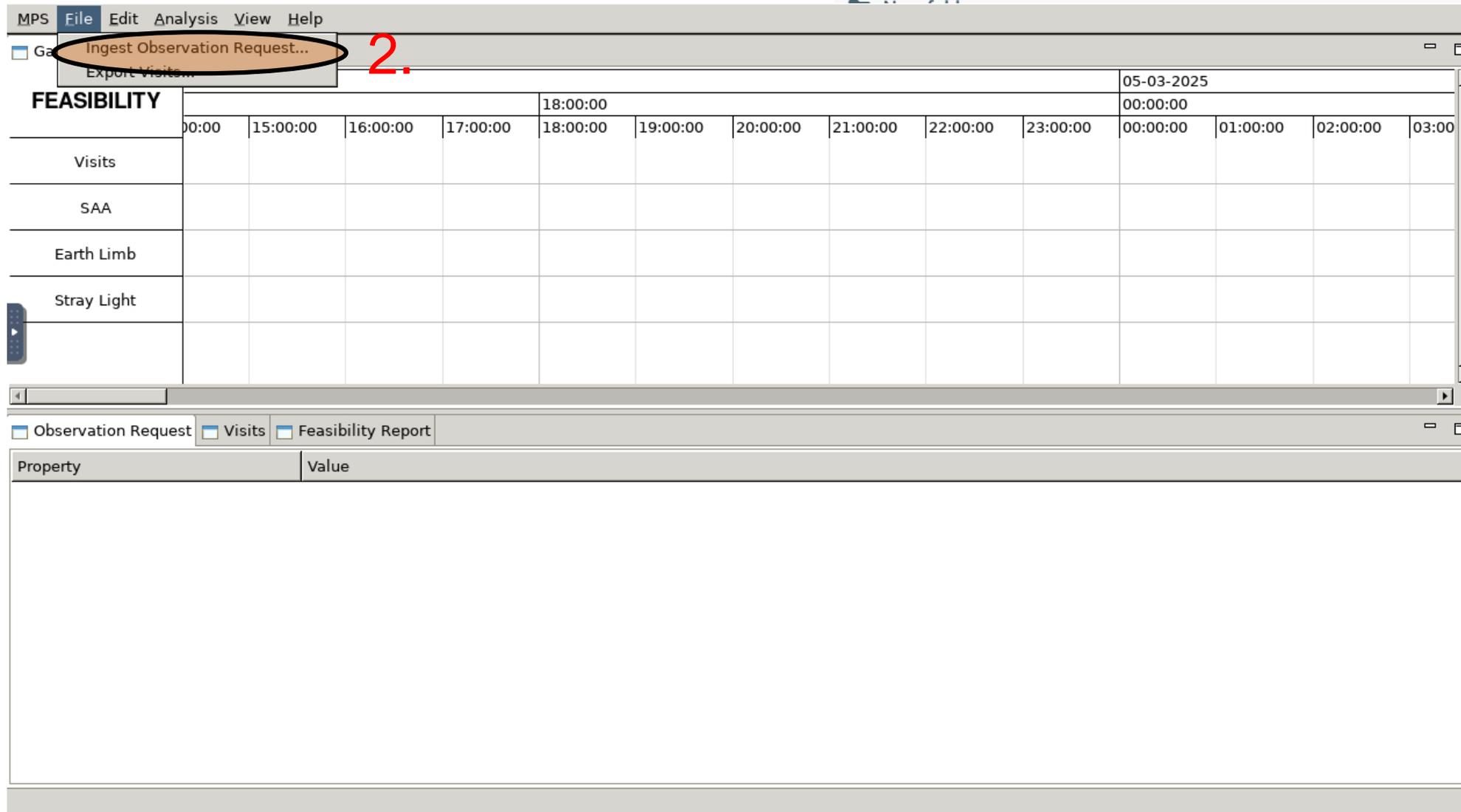
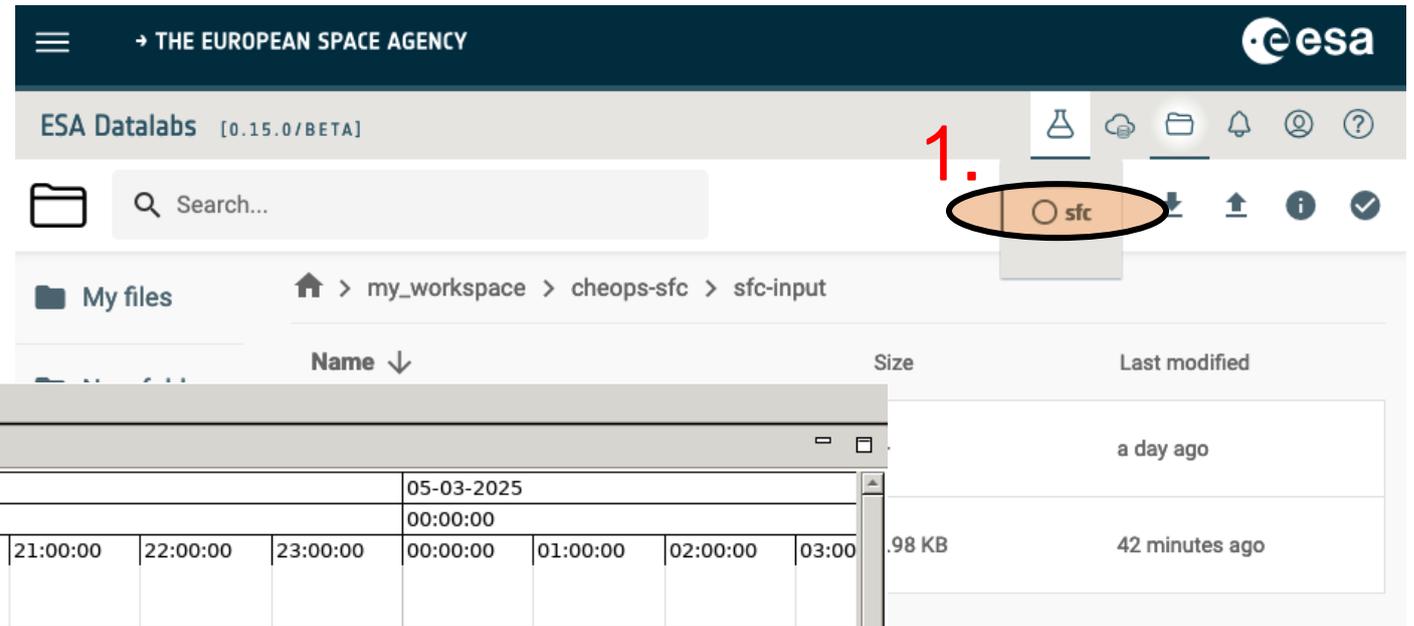


```

1 <?xml version="1.0" encoding="UTF-8"?>
2 <!-- -->
3 <!-- -->
4 <!-- -->
5 <!-- -->
6 <!-- Template Observation Request file v. 11.16.0 -->
7 <!-- -->
8 <!-- This file can be ingested in the CHEOPS Feasibility Checker v11.16.0 -->
9 <!-- -->
10 <!-- -->
11 <!-- This version of the file contains an example of -->
12 <!-- how to set up a time-critical observation -->
13 <!-- -->
14 <!-- -->
15 <!-- ONLY EDIT LINES PRECEDED by ##### -->
16 <!-- -->
17 <!-- -->
18 <!-- If you edit lines NOT preceded by ##### -->
19 <!-- the ingestion of this file in the Feasibility Checker might fail -->
20 <!-- (the order of the parameters/lines matters) -->
21 <!-- -->
22 <!-- -->
23 <!-- File prepared by CHEOPS SOC - UGE - NBI/ABE - Feb. 20, 2025 -->
24 <!-- -->
25 <!-- -->
26 <Earth_Explorer_File xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:noNamespaceSchemaLocation
   ="ext_app_observation_requests_schema.xsd">
27 <Earth_Explorer_Header>
28 <Fixed_Header>
29 <File_Name>CH_TU2025-03-01T10-00-00_EXT_APP_ObservationRequests_V0003</File_Name>
30 <File_Description>Observation requests file</File_Description>
31 <Notes>Template file for CHEOPS observation Request : FeasibilityChecker (phase-1) and PHT2 (phase-2)
   </Notes>
32 <Mission>CHEOPS</Mission>
33 <File_Class>TEST</File_Class>
  
```

Read in the observation request file in the Feasibility Checker

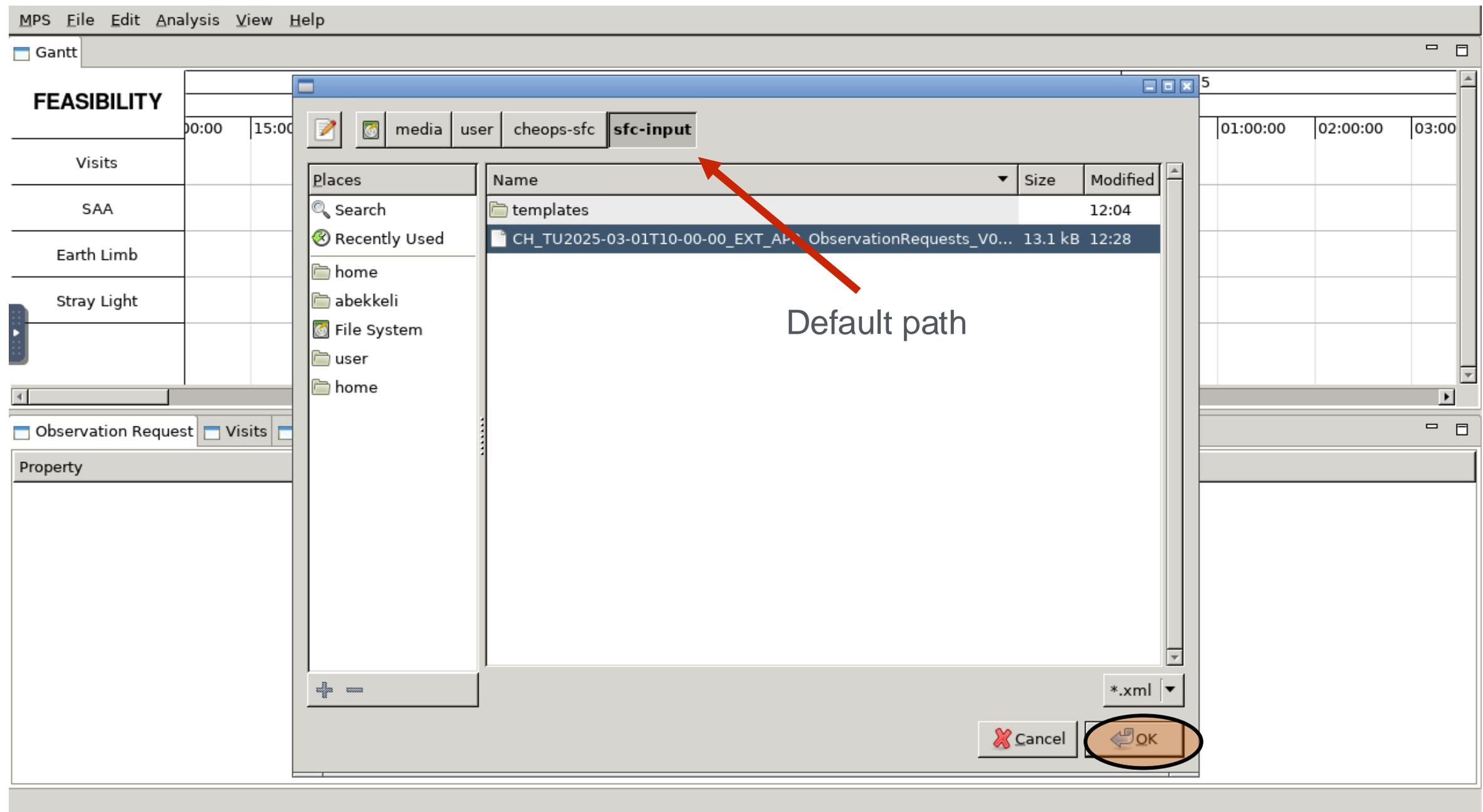
1. Go back to the CHEOPS-SFC datalab by hovering the mouse pointer over the flask icon in the Datalab menu and select your datalab.



2. Then, inside the datalab, select “File”, then “Ingest Observation Request...” from the SFC’s menu.

Read in the observation request file in the Feasibility Checker

Select you observation request file and press OK.



Read in the observation request file in the Feasibility Checker

Successful ingestion of the observation request file.

The screenshot displays the Feasibility Checker application window. At the top, there is a menu bar with 'MPS', 'File', 'Edit', 'Analysis', 'View', and 'Help'. Below the menu bar, there are several tabs: 'Gantt', 'Observation Request', 'Visits', and 'Feasibility P'. The 'Gantt' tab is active, showing a grid for the date '05-03-2025' with time slots from 00:00:00 to 03:00:00. The grid rows are labeled 'Visits', 'SAA', 'Earth Limb', and 'Stray Light'. A dialog box titled 'Ingestion' is overlaid on the grid, containing a lightbulb icon and the text 'Observation Request successfully ingested.' with an 'OK' button.

Property	Value
Observation Category	Time Critical
Target	
Target Name	55 Cnc
Target Magnitude (mag)	5.95000
Right Ascension (deg)	133.14920
Declination (deg)	28.33083
Visit Duration (sec)	59260
Earliest Start (JD)	2460735.494459398
Requested Efficiency (%)	50%
Transit Time (BJD TT)	2457063.2096
Transit Period (days)	0.736546

Read in the observation request file in the Feasibility Checker

If you obtain a similar error message, it means that you have made an error when modifying the observation request file. Restart from the original observation request file following instructions found in the file to solve this issue.

The screenshot shows the Feasibility Checker software interface. The main window displays a Gantt chart for the date 05-03-2025, with a time grid from 00:00 to 03:00. The left sidebar lists various observation categories: Visits, SAA, Earth Limb, and Stray Light. Below the Gantt chart, there are tabs for 'Observation Request', 'Visits', and 'Feasibility'. The 'Observation Request' tab is active, showing a table of properties for a target.

Property	Value
Observation Category	Time Critical
Target	
Target Name	55 Cnc
Target Magnitude (mag)	5.95000
Right Ascension (deg)	133.14920
Declination (deg)	28.33083
Visit Duration (sec)	59260
Earliest Start (JD)	2460735.494459398
Requested Efficiency (%)	50%
Transit Time (BJD TT)	2457063.2096
Transit Period (days)	0.736516

An error dialog box titled "Error running operation" is overlaid on the interface. The error message reads: "Error while extracting entities of type {ObservationRequest} from file {/media/user/cheops-sfc/sfc-input/CH_TU2025-03-01T10-00-00_EXT_APP_ObservationRequests_V0003.xml}. Unable to extract data from the given input content. (Caused by: Error parsing XML contents provided (Caused by: null (Caused by: cvc-complex-type.2.4.a: Invalid content was found starting with element 'Observation_Category'. One of '{Observation_Request_ID}' is expected.)))". An "OK" button is visible at the bottom right of the dialog box.

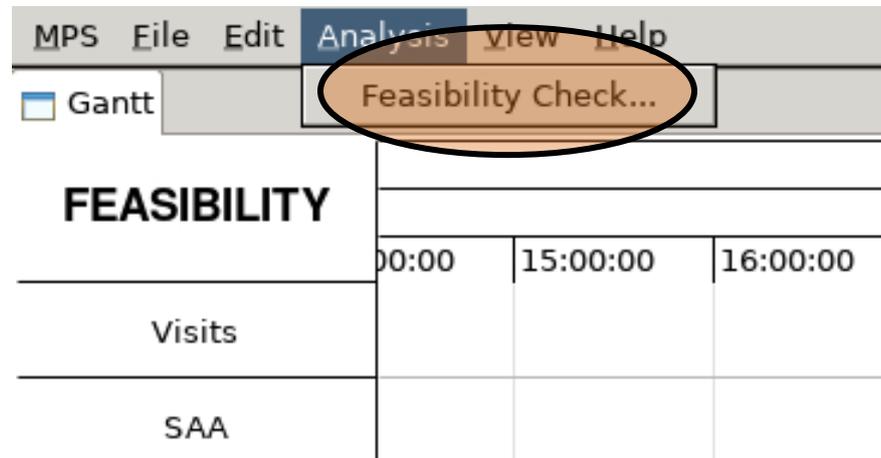
Read in the observation request file in the Feasibility Checker

This tab contains the information of your observation request.

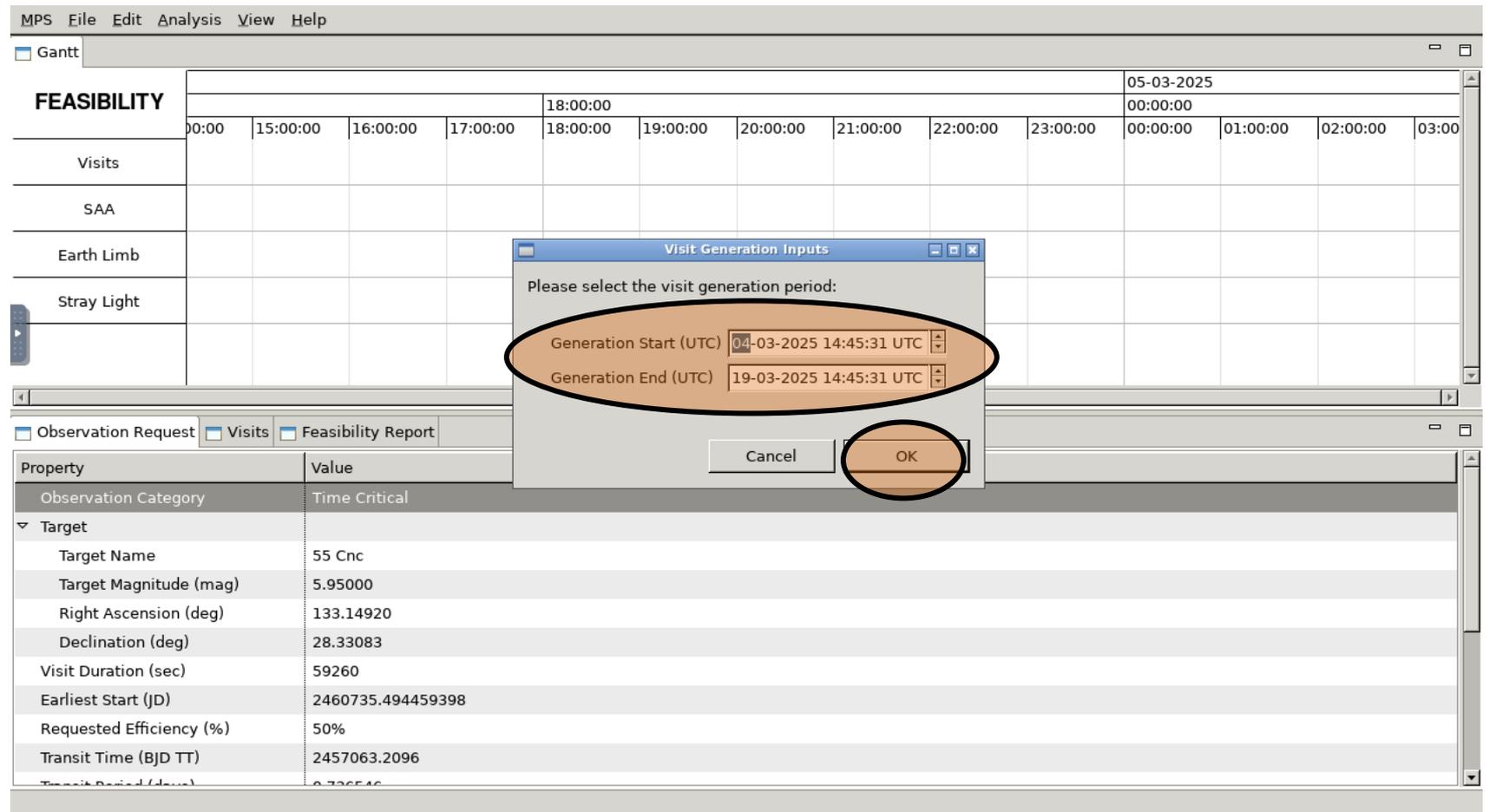
Property	Value
Observation Category	Time Critical
Target	
Target Name	55 Cnc
Target Magnitude (mag)	5.95000
Right Ascension (deg)	133.14920
Declination (deg)	28.33083
Visit Duration (sec)	59260
Earliest Start (JD)	2460735.494459398
Requested Efficiency (%)	50%
Transit Time (BJD TT)	2457063.2096
Transit Period (days)	0.736546

Run the Feasibility Checker

1. Go to “Analysis”, and “Feasibility Check...”



2. Set the time interval to be explored for generating the possible visits (valid until 31 Dec 2028).



3. Hit “OK”.

Run the Feasibility Checker

Depending on the requested period, the computation may take a few minutes.

The screenshot shows the MPS software interface. At the top, there is a menu bar with 'MPS', 'File', 'Edit', 'Analysis', 'View', and 'Help'. Below the menu bar, there is a 'Gantt' tab. The main window displays a Gantt chart with a grid of time slots. The columns represent time intervals from 00:00 to 03:00 on 05-03-2025. The rows represent different observation categories: 'Visits', 'SAA', 'Earth Limb', and 'Stray Light'. A 'Progress Information' dialog box is overlaid on the Gantt chart, showing a progress bar and the text 'Feasibility Check: generating visits...'. Below the Gantt chart, there is a table of observation request properties.

Property	Value
Observation Category	Time Critical
Target	
Target Name	55 Cnc
Target Magnitude (mag)	5.95000
Right Ascension (deg)	133.14920
Declination (deg)	28.33083
Visit Duration (sec)	59260
Earliest Start (JD)	2460735.494459398
Requested Efficiency (%)	50%
Transit Time (BJD TT)	2457063.2096
Transit Period (days)	0.736546

Run the Feasibility Checker

Successful generation of the possible visits.

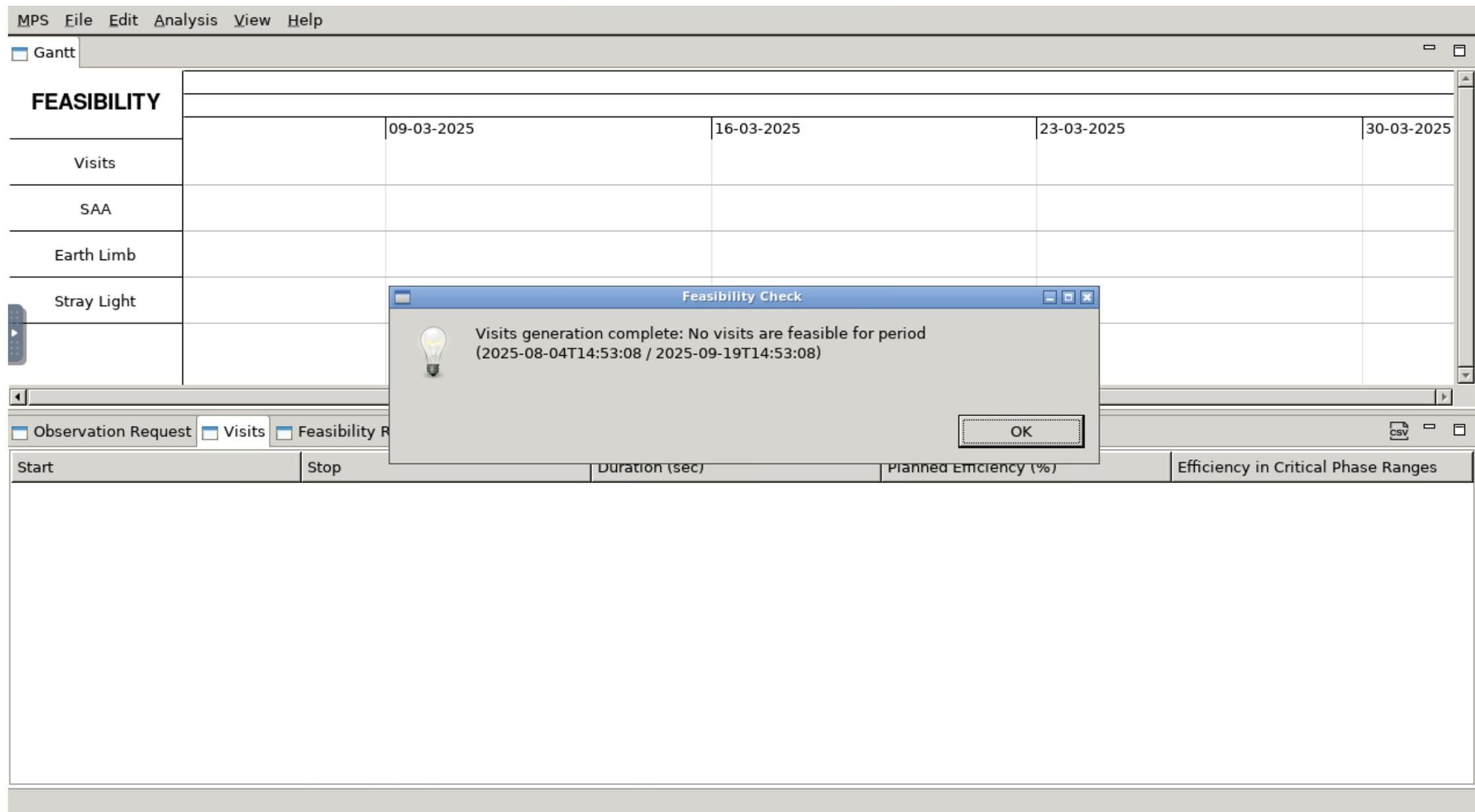
The screenshot shows the MPS software interface. At the top, there is a menu bar with 'MPS', 'File', 'Edit', 'Analysis', 'View', and 'Help'. Below the menu bar, there is a 'Gantt' tab. The main area is divided into two sections: 'FEASIBILITY' and 'SAA'. The 'FEASIBILITY' section displays a Gantt chart with a timeline from 09-03-2025 to 30-03-2025. The chart shows several blue bars representing visits. The 'SAA' section displays a series of vertical bars representing observation requests. A dialog box titled 'Feasibility Check' is open in the center, displaying a lightbulb icon and the text: 'Visits generation complete: Generated 32 visits for period (2025-03-04T14:45:31 / 2025-10-19T14:45:31)'. Below the dialog box, there is a table with the following columns: 'Start', 'Stop', 'Duration (sec)', 'Planned Emcency (%)', and 'Efficiency in Critical Phase Ranges'.

Start	Stop	Duration (sec)	Planned Emcency (%)	Efficiency in Critical Phase Ranges
2025-03-04T15:48:00.000	2025-03-05T08:16:00.000	59280.0	58%	...
2025-03-05T09:28:00.000	2025-03-06T01:56:00.000	59280.0	58%	...
2025-03-06T03:09:00.000	2025-03-06T19:37:00.000	59280.0	60.7%	...
2025-03-06T20:50:00.000	2025-03-07T13:18:00.000	59280.0	59.4%	...
2025-03-07T14:30:00.000	2025-03-08T06:58:00.000	59280.0	57.9%	...
2025-03-08T08:11:00.000	2025-03-09T00:39:00.000	59280.0	57.5%	...
2025-03-12T00:34:00.000	2025-03-12T17:02:00.000	59280.0	61%	...
2025-03-12T18:15:00.000	2025-03-13T10:43:00.000	59280.0	57.8%	...
2025-03-13T11:56:00.000	2025-03-14T04:24:00.000	59280.0	57.1%	...
2025-03-14T05:37:00.000	2025-03-14T22:05:00.000	59280.0	58.2%	...

Run the Feasibility Checker

Sometimes, no possible visits are found in the requested period. You will then see this error message.

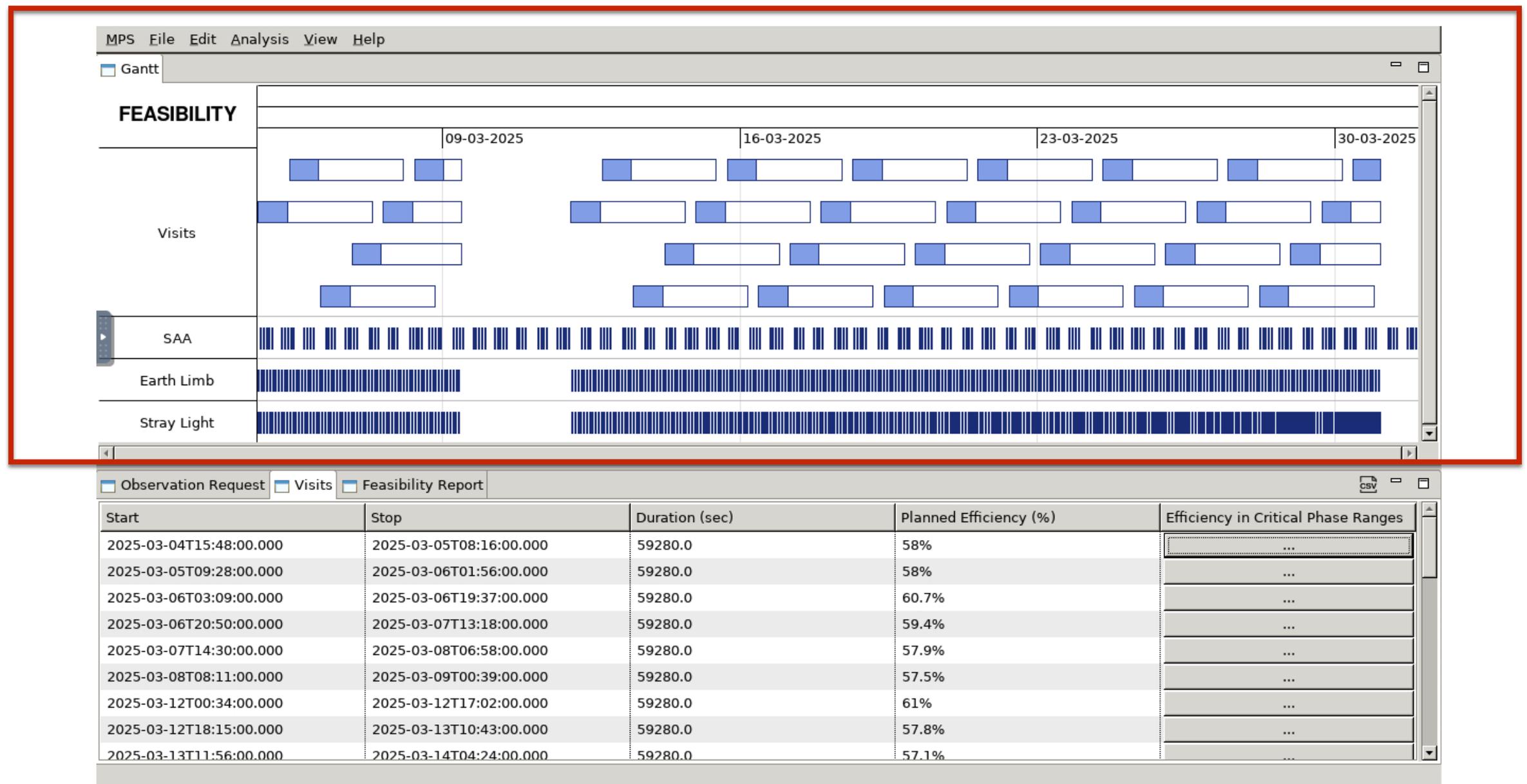
- Your target might not be visible (you can use CHEOPS visibility tool to check, see first slide), or
- You may want to relax the “*Earliest Start*” / “*Latest End*” parameters in the observation request file.



The screenshot displays the MPS software interface. At the top, there is a menu bar with 'MPS', 'File', 'Edit', 'Analysis', 'View', and 'Help'. Below the menu bar, there are several tabs: 'Gantt', 'Observation Request', 'Visits', and 'Feasibility R'. The 'Gantt' tab is active, showing a Gantt chart with a table below it. The table has columns for 'Start', 'Stop', 'Duration (sec)', 'Planned Efficiency (%)', and 'Efficiency in Critical Phase Ranges'. The 'Start' column contains dates: '09-03-2025', '16-03-2025', '23-03-2025', and '30-03-2025'. The rows are labeled 'Visits', 'SAA', 'Earth Limb', and 'Stray Light'. A dialog box titled 'Feasibility Check' is overlaid on the interface, containing a lightbulb icon and the text: 'Visits generation complete: No visits are feasible for period (2025-08-04T14:53:08 / 2025-09-19T14:53:08)'. An 'OK' button is visible at the bottom right of the dialog box.

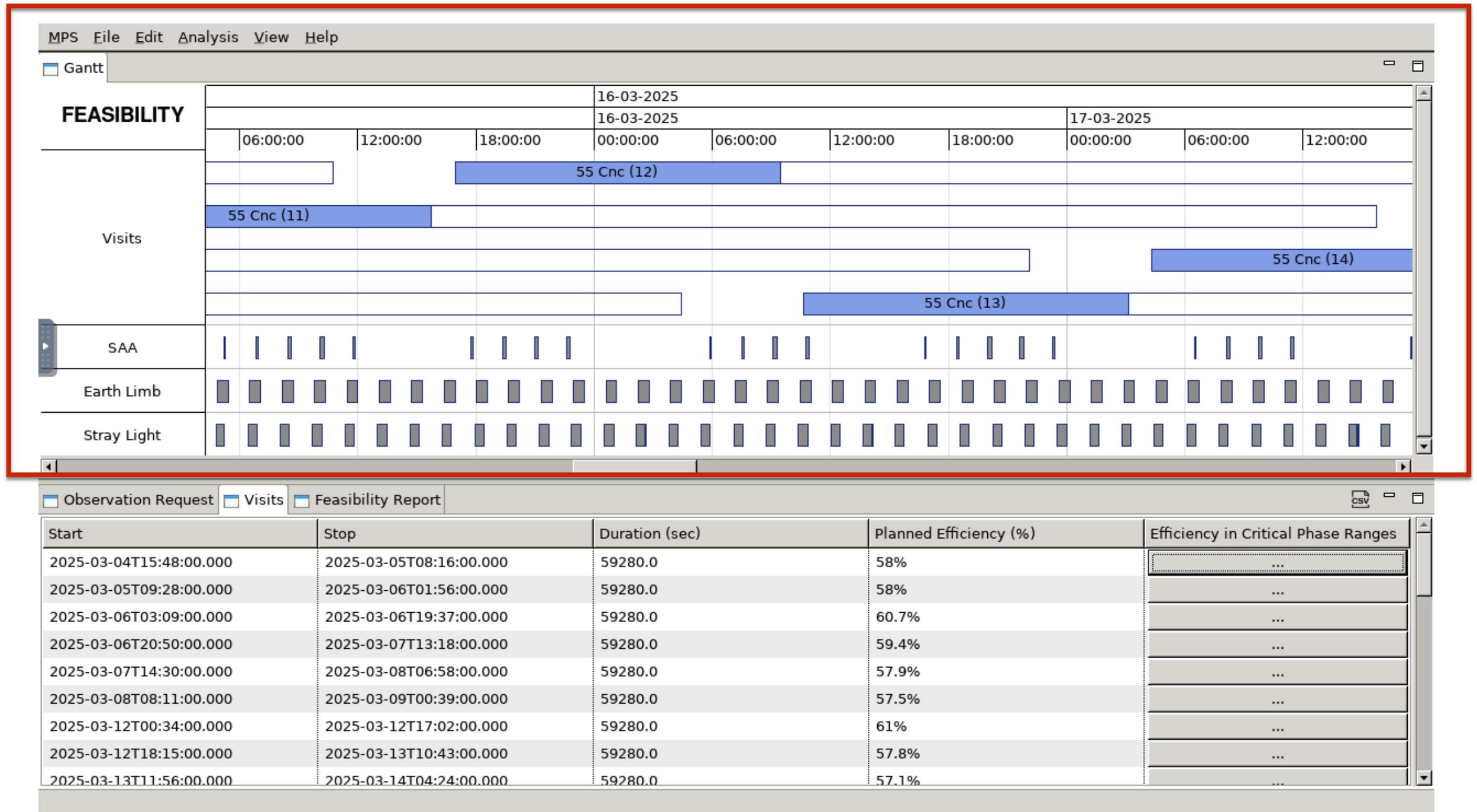
Explore the result

The Gantt chart shows the possible visits over the requested period, along with associated interruptions due to Earth occultations (Earth Limb in HMI), South Atlantic Anomaly crossings, and unacceptable levels of stray light. *The timing of interruptions is not accurate but only indicative!*



Explore the result

You can zoom in/out using “Control” + “Mouse wheel” (two-finger scroll on touchpads).



Explore the result

You can consult the details of generated visits: Start / Stop time and (effective) duration.

The screenshot shows the 'Feasibility' tab of the software. The top part is a Gantt chart with a timeline from 06:00:00 to 12:00:00 on 16-03-2025, and 00:00:00 to 12:00:00 on 17-03-2025. It displays several visits for '55 Cnc' with durations of 11, 12, 13, and 14 hours. Below the Gantt chart are tracks for SAA, Earth Limb, and Stray Light. A red arrow points to the 'Stray Light' track with the text 'This tab contains the information on the generated possible visits'.

The bottom part of the screenshot shows a table with the following columns: Start, Stop, Duration (sec), Planned Efficiency (%), and Efficiency in Critical Phase Ranges. The table contains 10 rows of visit data. A red arrow points to the first row with the text 'Visits details'. Another red arrow points to the 'Efficiency in Critical Phase Ranges' column with the text 'Invalid visits are marked in red with an [X]'. A third red arrow points to the 'Efficiency in Critical Phase Ranges' column with the text 'Only relevant if you have provided phase ranges'.

Start	Stop	Duration (sec)	Planned Efficiency (%)	Efficiency in Critical Phase Ranges
2025-03-04T15:48:00.000	2025-03-05T08:16:00.000	59280.0	58%	...
2025-03-05T09:28:00.000	2025-03-06T01:56:00.000	59280.0	58%	...
2025-03-06T03:09:00.000	2025-03-06T19:37:00.000	59280.0	60.7%	...
2025-03-06T20:50:00.000	2025-03-07T13:18:00.000	59280.0	59.4%	...
2025-03-07T14:19:00.000	2025-03-08T06:50:00.000	59280.0	57.9%	...
2025-03-08T08:11:00.000	2025-03-09T00:39:00.000	59280.0	57.5%	...
2025-03-12T00:34:00.000	2025-03-12T17:02:00.000	59280.0	61%	...
2025-03-12T18:15:00.000	2025-03-13T10:43:00.000	59280.0	57.8%	...
2025-03-13T11:56:00.000	2025-03-14T04:24:00.000	59280.0	57.1%	...

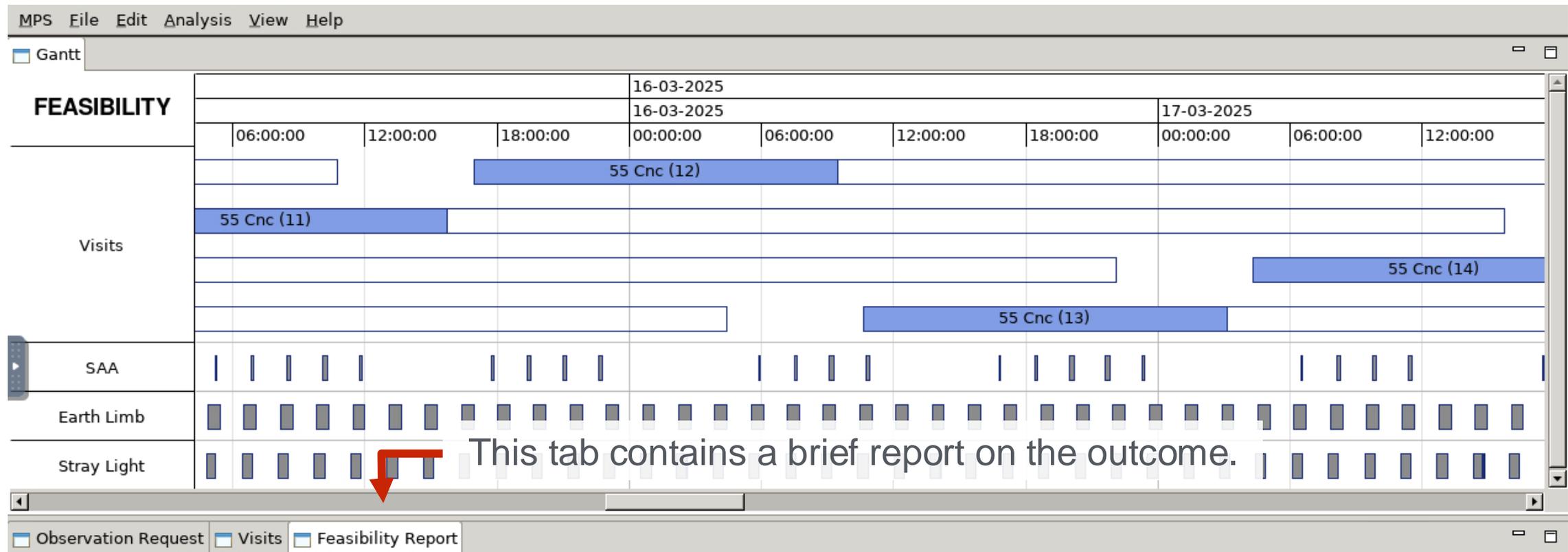
Visits details →

Invalid visits are marked in red with an [X]

Only relevant if you have provided phase ranges

Explore the result

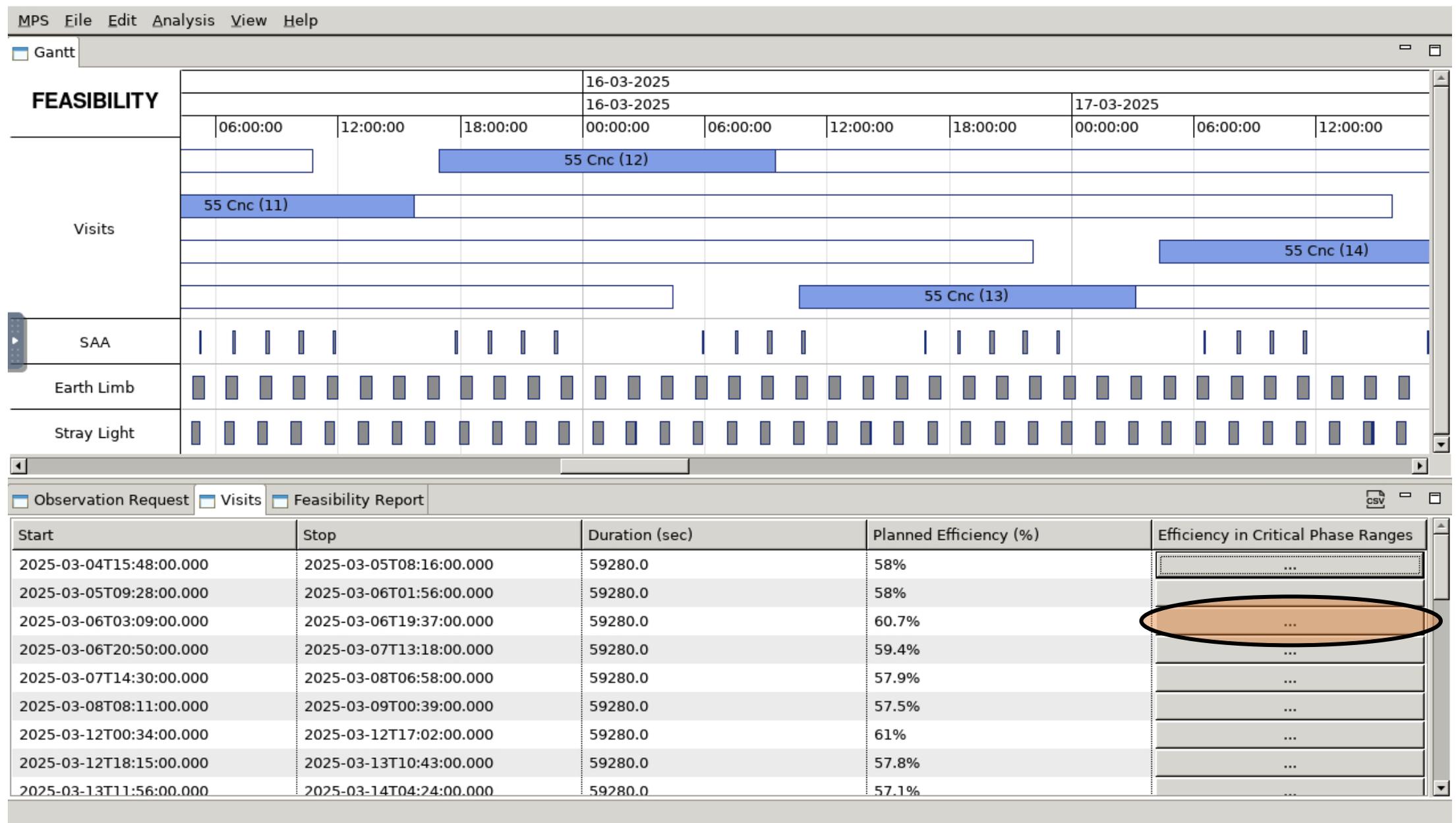
In this case, out of the 32 possible visits, 31 are declared valid as they have observing efficiencies higher than requested.



Visits Summary	
Total n° of visits:	32
Valid:	31
Invalid:	1

Explore the result (critical Phase Ranges)

If you have ingested an observation request with critical phase ranges you can explore the observing efficiencies within the pre-defined phase ranges.



Explore the result (critical Phase Ranges)

In this particular case, the requested efficiency in both phases is 50%. The observed efficiency in the first phase is only 28.4% but since $\langle Fulfil_all_Phase_Ranges \rangle = FALSE$ in the input file, the visit is still valid. *The efficiency in the critical phase ranges is not accurate but only indicative!*

Start	Stop	Phase Start	Phase Stop	Requested Efficiency (%)	Planned Efficiency (%)
06-03-2025 23:22:00	07-03-2025 00:20:00	0.94300	0.99900	50%	28.4%
07-03-2025 00:23:00	07-03-2025 01:22:00	0.00100	0.05700	50%	78%

Start	Stop	Duration (sec)	Planned Efficiency (%)	Efficiency in Critical Phase Ranges
2025-03-04T15:48:00.000	2025-03-05T08:16:00.000	59280.0	58%	...
2025-03-05T09:28:00.000	2025-03-06T01:56:00.000	59280.0	58%	...
2025-03-06T03:09:00.000	2025-03-06T19:37:00.000	59280.0	60.7%	...
2025-03-06T20:50:00.000	2025-03-07T13:18:00.000	59280.0	59.4%	...
2025-03-07T14:30:00.000	2025-03-08T06:58:00.000	59280.0	57.9%	...
2025-03-08T08:11:00.000	2025-03-09T00:39:00.000	59280.0	57.5%	...
2025-03-12T00:34:00.000	2025-03-12T17:02:00.000	59280.0	61%	...
2025-03-12T18:15:00.000	2025-03-13T10:43:00.000	59280.0	57.8%	...
2025-03-13T11:56:00.000	2025-03-14T04:24:00.000	59280.0	57.1%	...

Explore the result

Detailed list of visit can be exported to an ascii file for further analysis. Go to “File”, then “Export Visits...”.

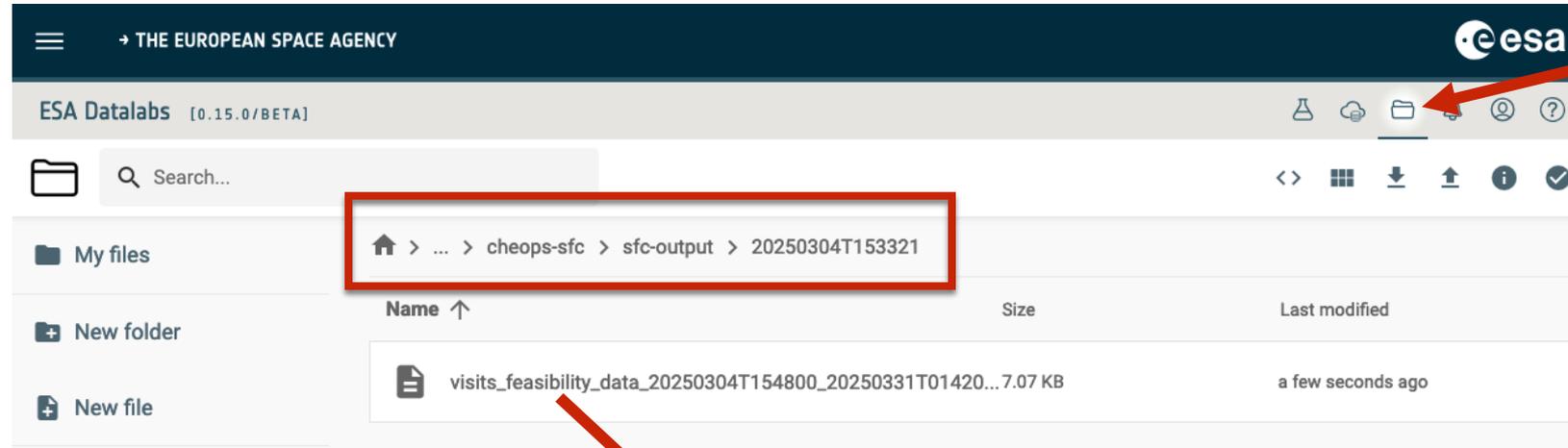
The screenshot shows the 'MPS' application window with the 'File' menu open. The 'Export Visits...' option is highlighted with a red oval. Below the menu, a 'FEASIBILITY' table is visible, showing a grid of time slots for various observation parameters.

FEASIBILITY		18:00:00										05-03-2025			
		00:00	15:00:00	16:00:00	17:00:00	18:00:00	19:00:00	20:00:00	21:00:00	22:00:00	23:00:00	00:00:00	01:00:00	02:00:00	03:00
Visits															
SAA															
Earth Limb															
Stray Light															

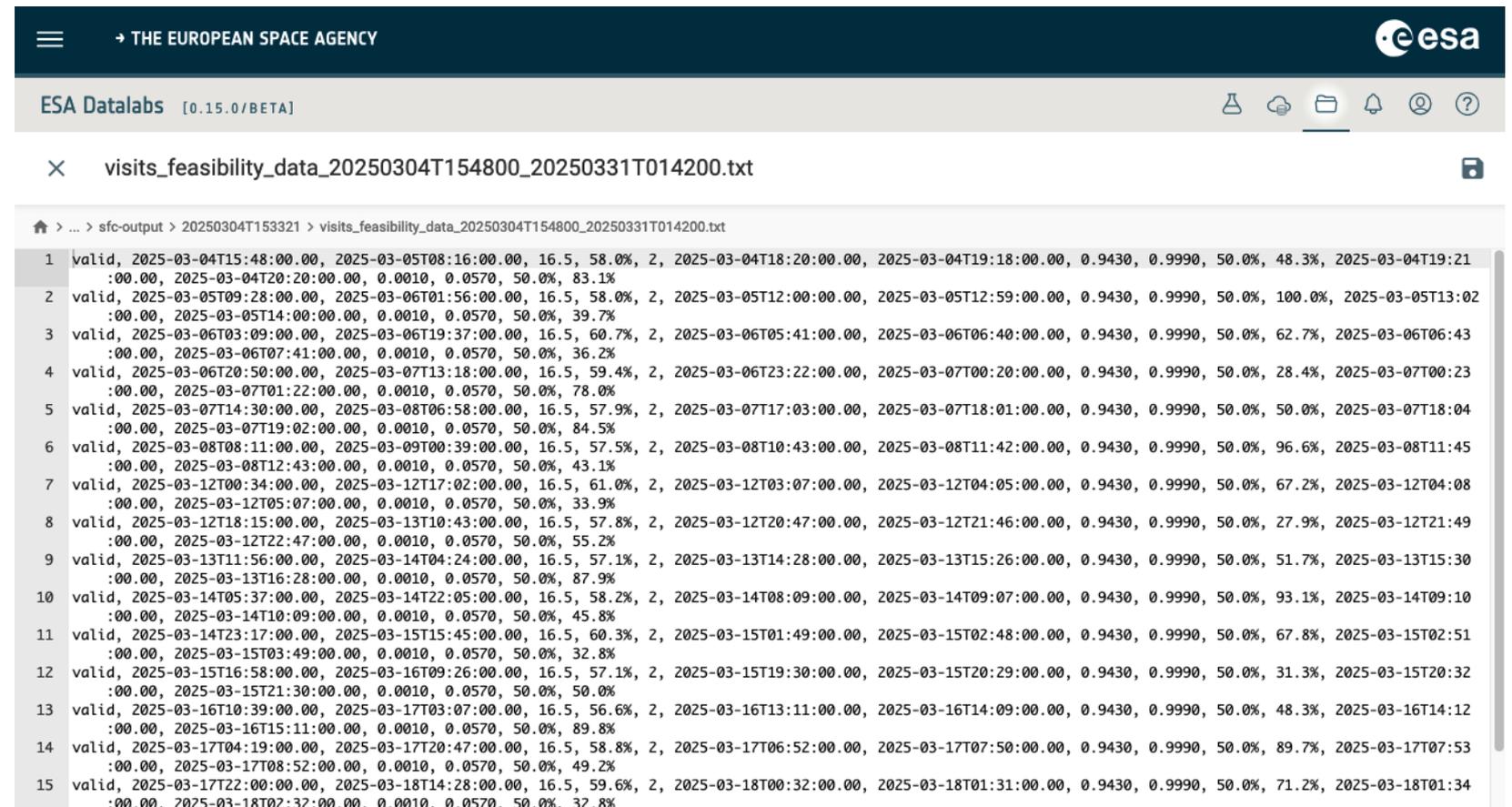
Below the table, there are tabs for 'Observation Request', 'Visits', and 'Feasibility Report'. At the bottom, there is a 'Property' and 'Value' table which is currently empty.

Explore the result

The output file is saved to my_workspace/cheops-sfc/sfc-output/ inside your Datalabs Workspace.



Double click on the file to open it.



Delete datalab

Delete the datalab by clicking on the 'flask' icon in the Datalabs menu, then press the 'Delete' button on the CHEOPS-SFC datalab. Deleting the datalab **will not affect** the files in your Datalabs Workspace.

The screenshot shows the ESA Datalabs interface. At the top, there is a navigation bar with the ESA logo and a set of icons including a flask, cloud, folder, bell, user, and help. A red arrow points to the flask icon. Below this is a window titled 'HMI FC' containing a table with time slots.

05-03-2025						
00:00:00						
22:00:00	23:00:00	00:00:00	01:00:00	02:00:00	03:00:00	04:00:00

The main interface shows 'ESA Datalabs [0.15.0/BETA]' with the same icon set. Below this is the 'Datalabs' section with the subtitle 'Manage your running datalabs' and a '+ Launch new' button. A card for the 'sfc cheops-sfc' datalab is displayed, featuring a power icon and a 'Delete' button. A red arrow points to this 'Delete' button.



Known bugs

- Attempting to minimize the SFC window in the **cheops-sfc** datalab yield a 1x1 pixel window that is unrecoverable. If this happens, restart the datalab.
- The slider plot in the **cheops-vis** datalab can freeze occasionally. Exit the plot and relaunch the command.

Additional tips

- The [PYCHEOPS](#) software (made for CHEOPS light curve analysis) has a function called 'make_xml_files'. This is a community-developed tool to generate XML files for input to the SFC, based on a data table for multiple observing requests provided by the user.
- The CHEOPS Visibility tool can also be accessed in our gitlab for users that wish to have it on their local work station: https://gitlab.unige.ch/cheops/CHEOPS_visibility_tool/-/tree/datalab-1.0.1