CHEOPS

CHARACTERISING EXOPLANET SATELLITE

CHEOPS Feasibility Checker Guidelines

(v_1.10, 15 September 2023)

CHEOPS GO and DT Programmes - cycle 1+ (SFC 11.12.1)

*Prepared by Nicolas BILLOT and Anja BEKKELIEN on behalf of the CHEOPS **S**cience **O**perations **C**enter*

Feasibility Checker Guidelines

Assumptions:

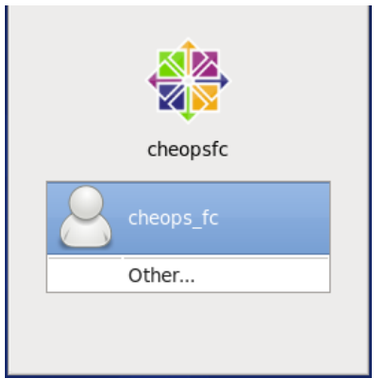
- **the Scheduling Feasibility Checker tool (SFC) is installed on your machine**

(if not, see installation guide at https://docs.google.com/document/d/15jERpf5VpLxWxPPT0awtPe5FkpAwtynFTAW9IQUMGic)

Open VirtualBox and Launch the Virtual Machine *cheopsfcvm09*

Feasibility Checker Guidelines

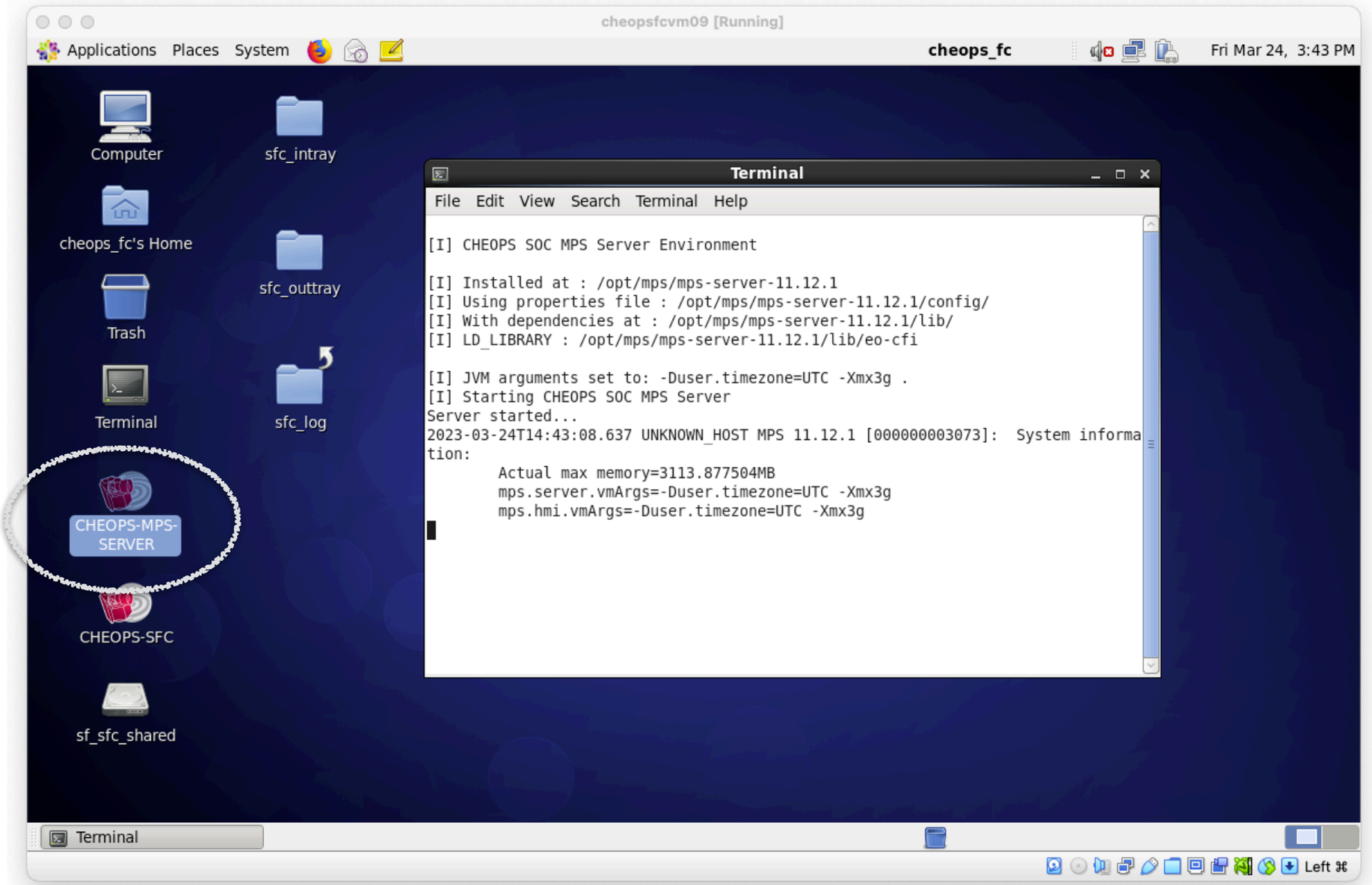
The following window opens



Password:
cheopsfc01

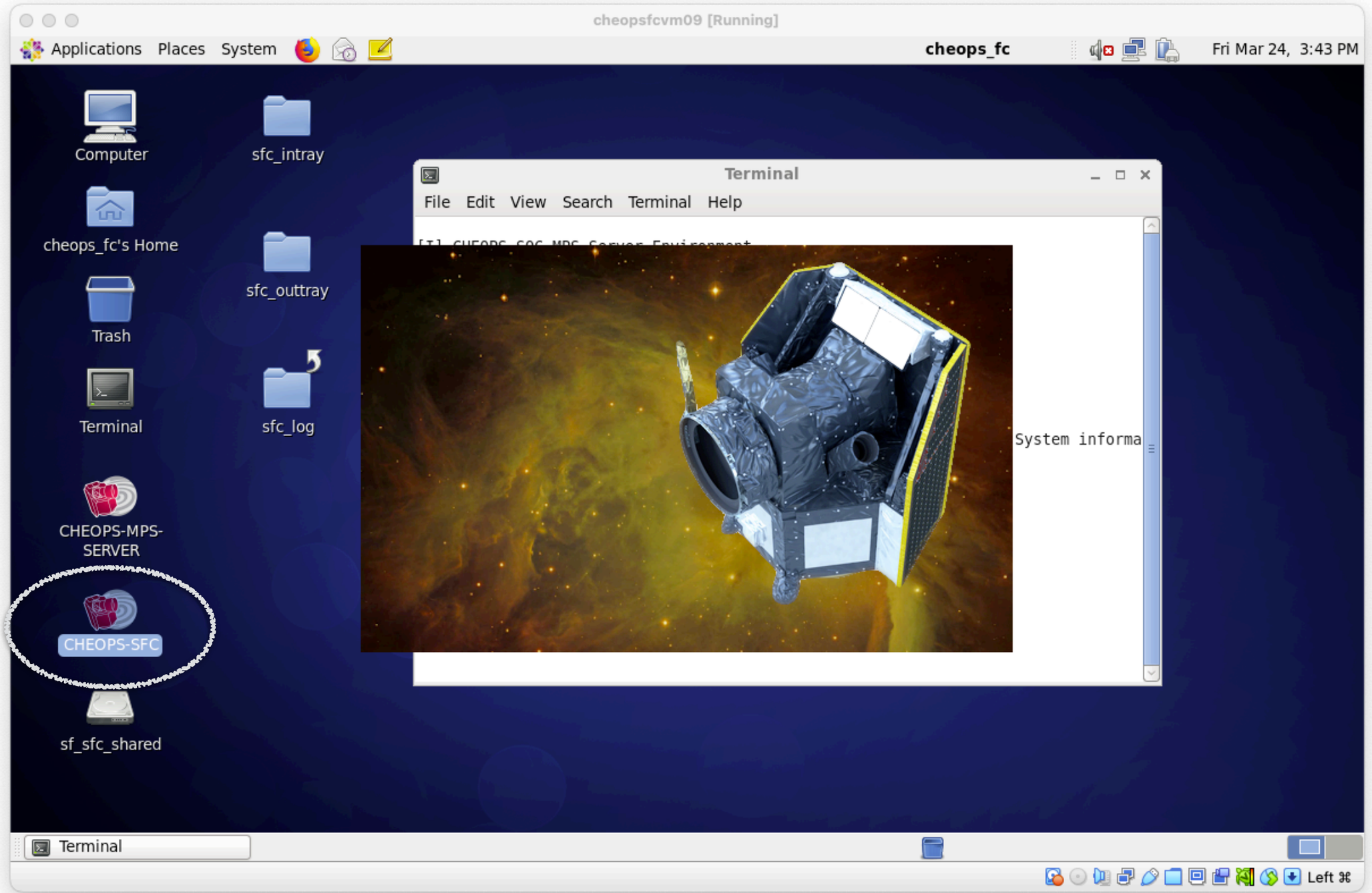
Launch the MPS server by double-clicking the *CHEOPS-MPS-SERVER* icon. This will open a terminal window.

Note that closing the window will stop the server.



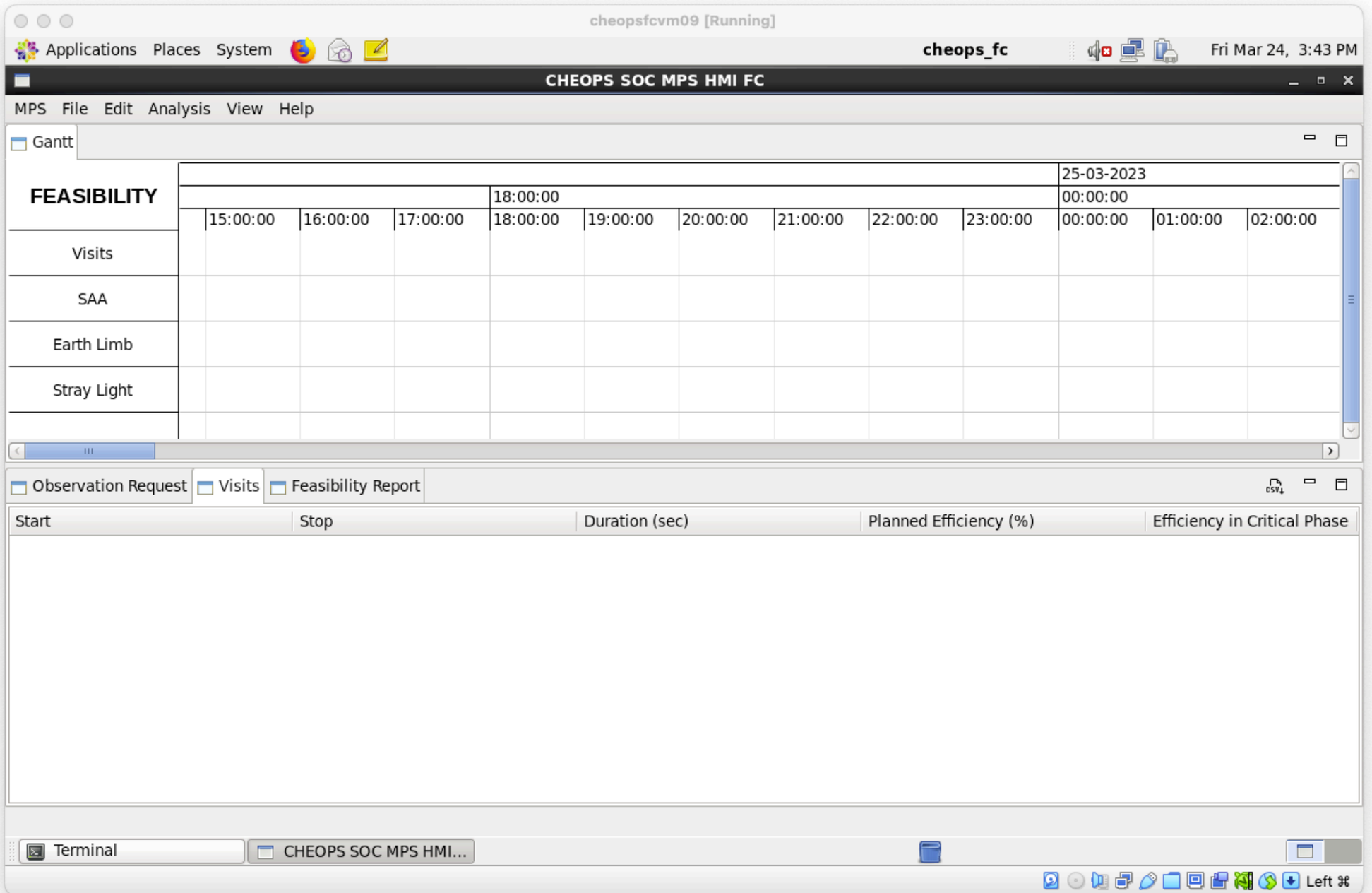
Feasibility Checker Guidelines

Launch the SFC by double-clicking the *CHEOPS-SFC* icon



Feasibility Checker Guidelines

The SFC window opens within the virtual machine



Feasibility Checker Guidelines

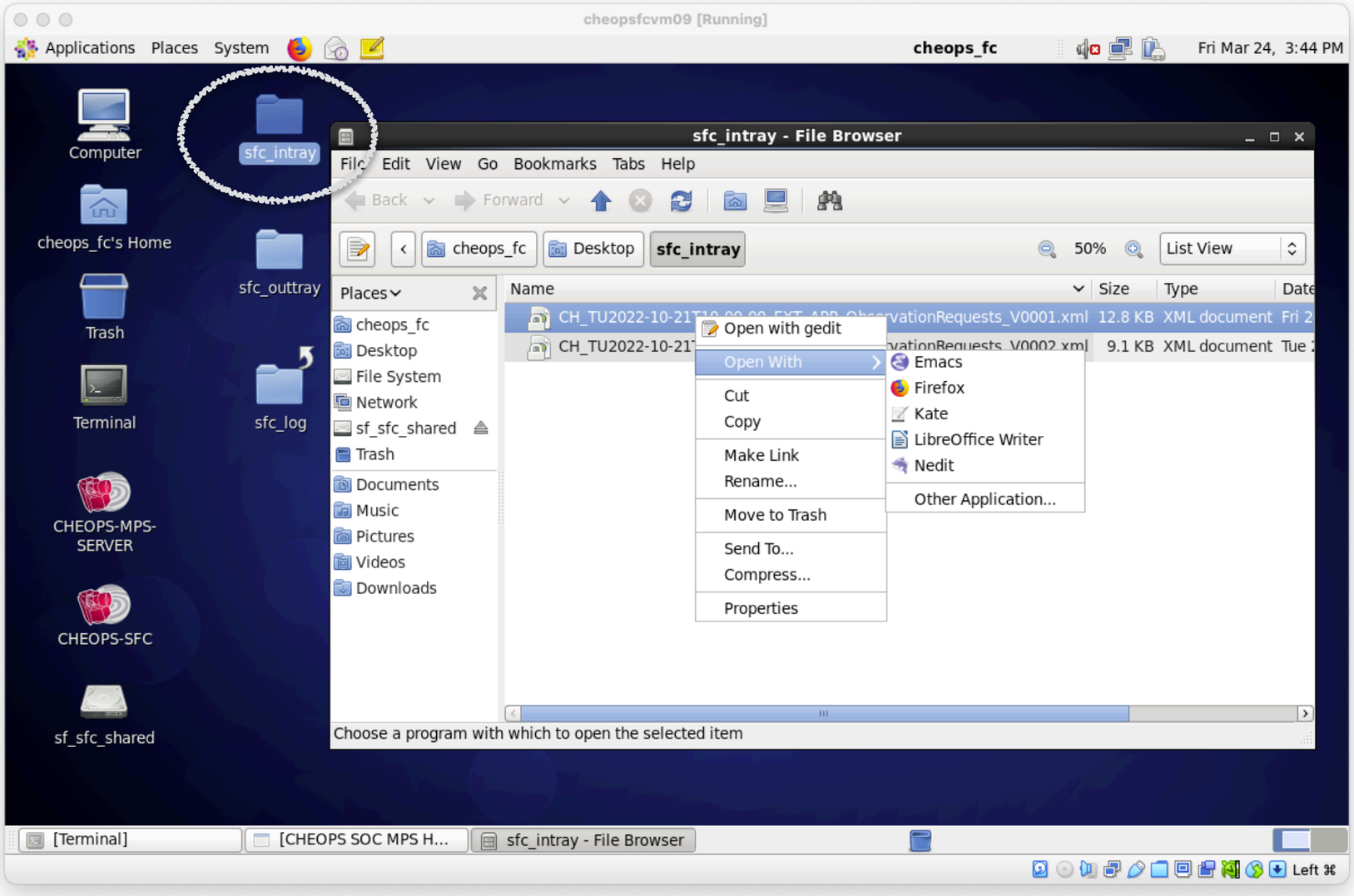
Edit the observationRequest file to define technical details of your desired observation:

Template input observationRequest files are located in directory Desktop/sfc_intray/:

CH_TU2022-10-21T10-00-00_EXT_APP_ObservationRequests_V0001.xml (time critical observations)

CH_TU2022-10-21T10-00-00_EXT_APP_ObservationRequests_V0002.xml (non-time critical observations)

Duplicate first the file (keep original copy) and then edit with text editor of your choice



Feasibility Checker Guidelines

Edit the observationRequest file to define technical details of your desired observation:

Template input observationRequest file located at:

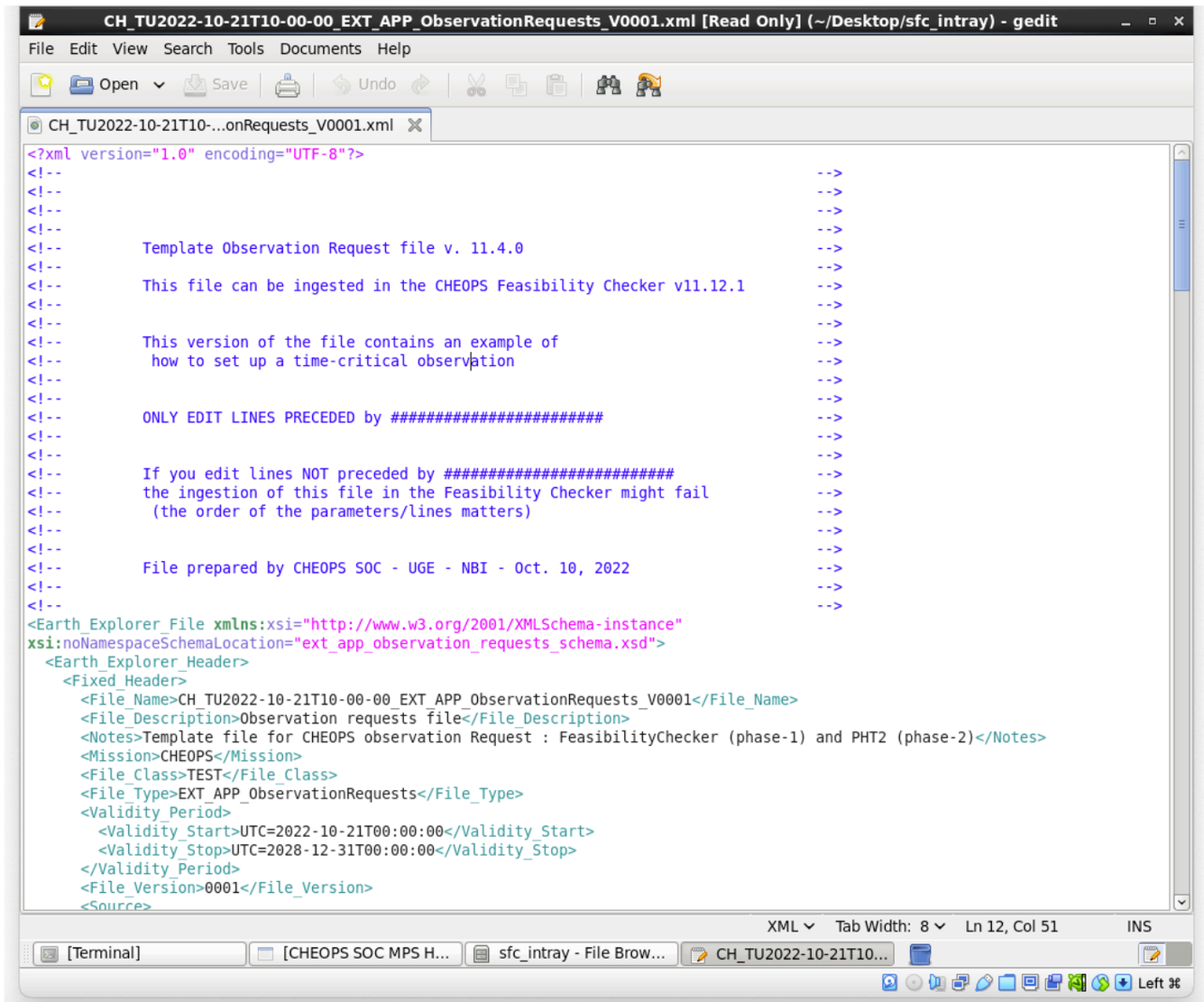
Desktop/sfc_intray/CH_TU2022-10-21T10-00-00_EXT_APP_ObservationRequests_V0001.xml

Duplicate first the file (keep original copy) and then edit with text editor of your choice

Follow instructions from file header.
—> Only edit relevant parameters:

- ***Target_Name***
- ***Target_Magnitude*** (parameter renamed, see next slide)
- ***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



WARNINGS:

- This file must contain only one request (fail otherwise)
- 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!

Feasibility Checker Guidelines

Edit the observationRequest file to define technical details of your desired observation:

Please note that the two parameters formerly called Target_Vmagnitude and Target_Vmagnitude_Error have been renamed starting from SFC 11.12.1 and are now called Target_Magnitude and Target_Magnitude_Error.

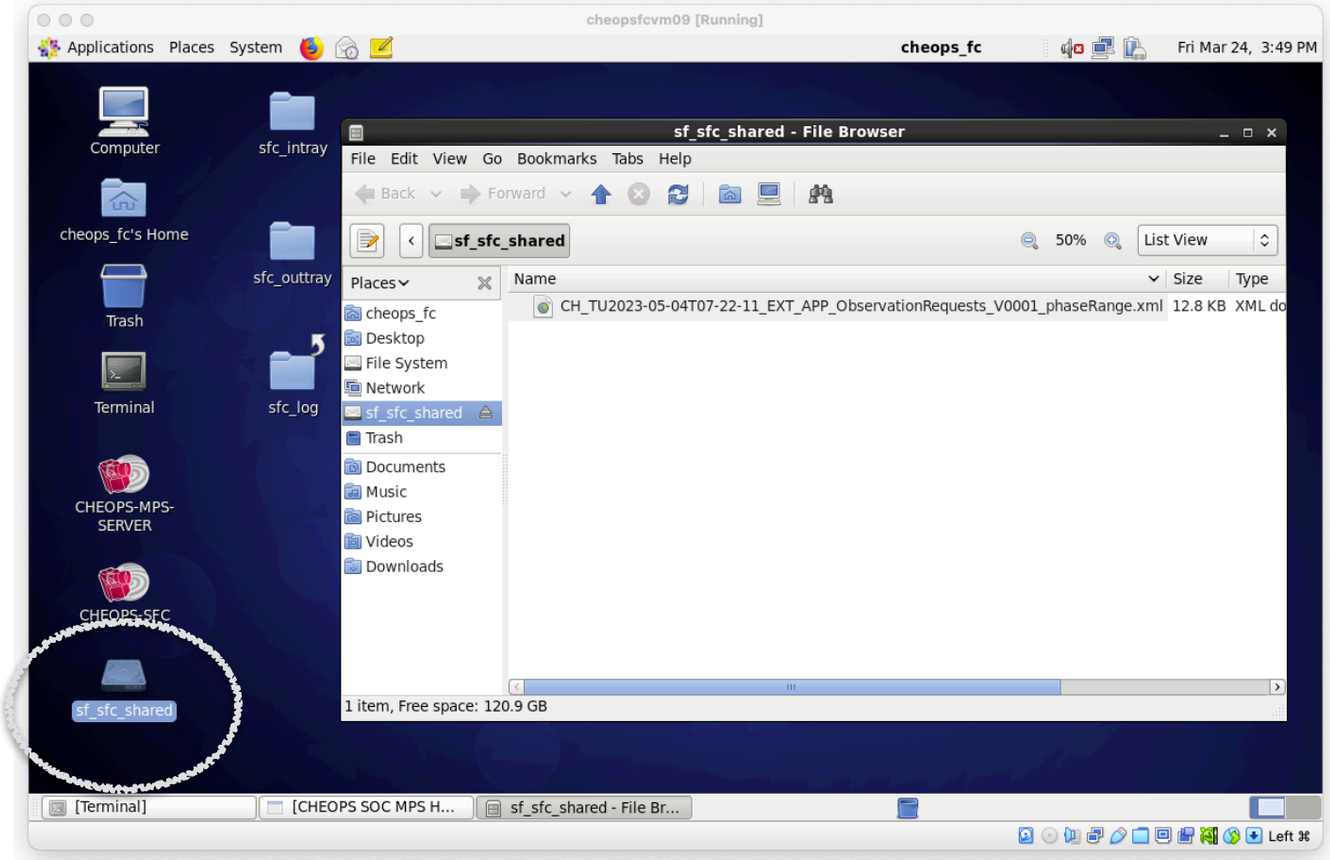
If using pre-existing observationRequest files from earlier versions of the SFC, these parameters must be renamed accordingly. Otherwise, the ingestion into the SFC will fail.

Feasibility Checker Guidelines

Import ObservationRequest files from local machine to virtual machine:

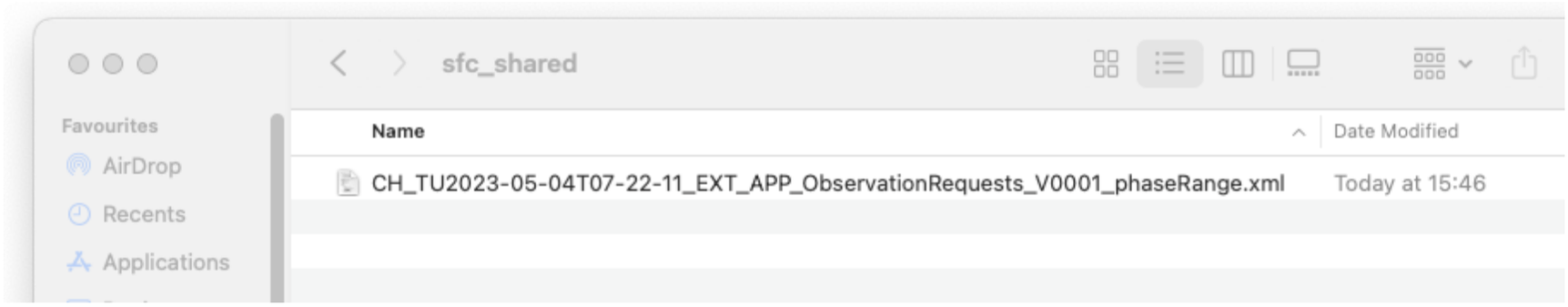
Alternatively, you may import observationRequest files from your local computer to the virtual machine via the shared folder created when installing the virtual machine

(see https://docs.google.com/document/d/15jERpf5VpLxWxPPT0awtPe5FkpAwtynFTAW9IQUMGic)



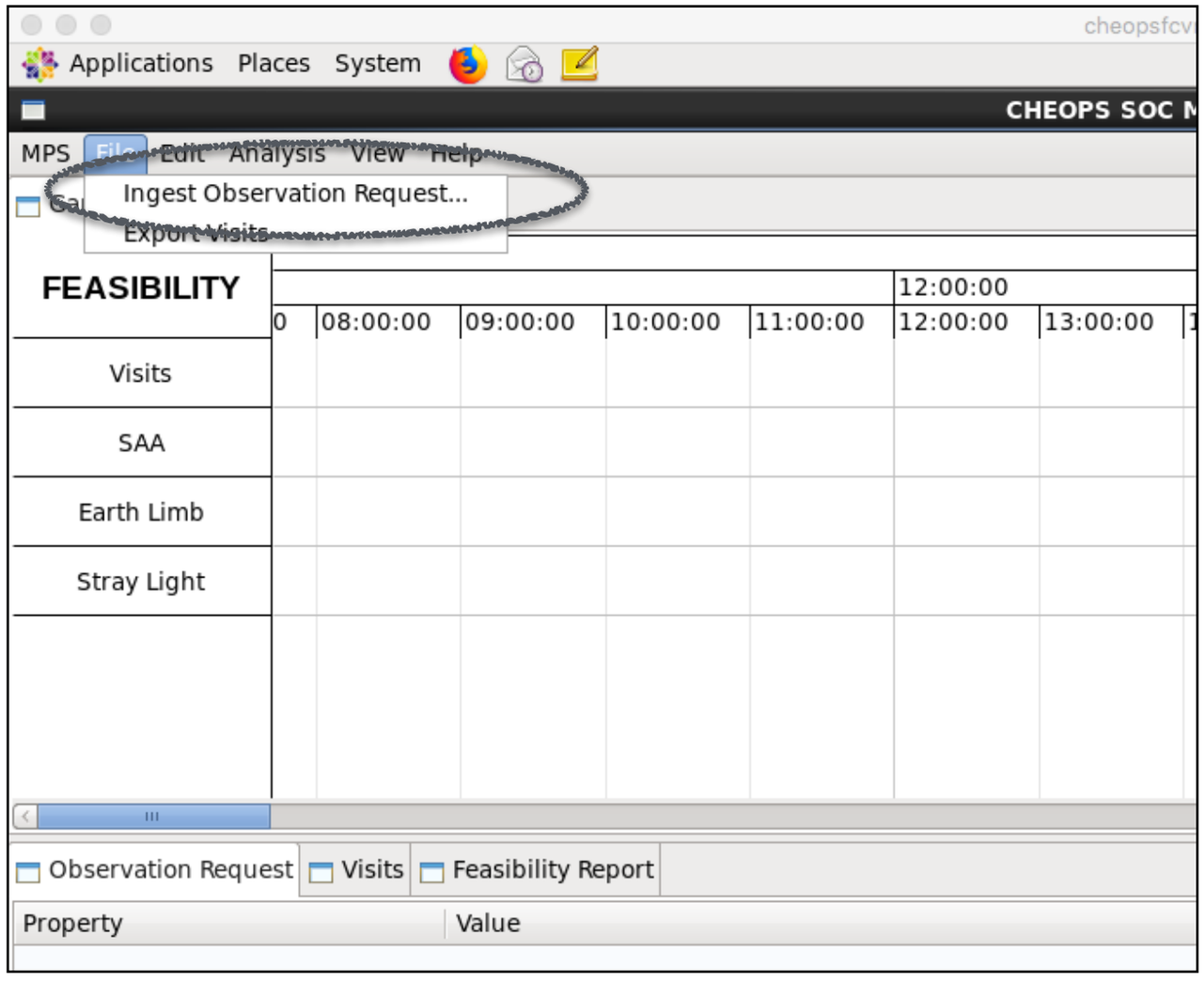
On virtual machine (guest machine)

On local computer (host machine)



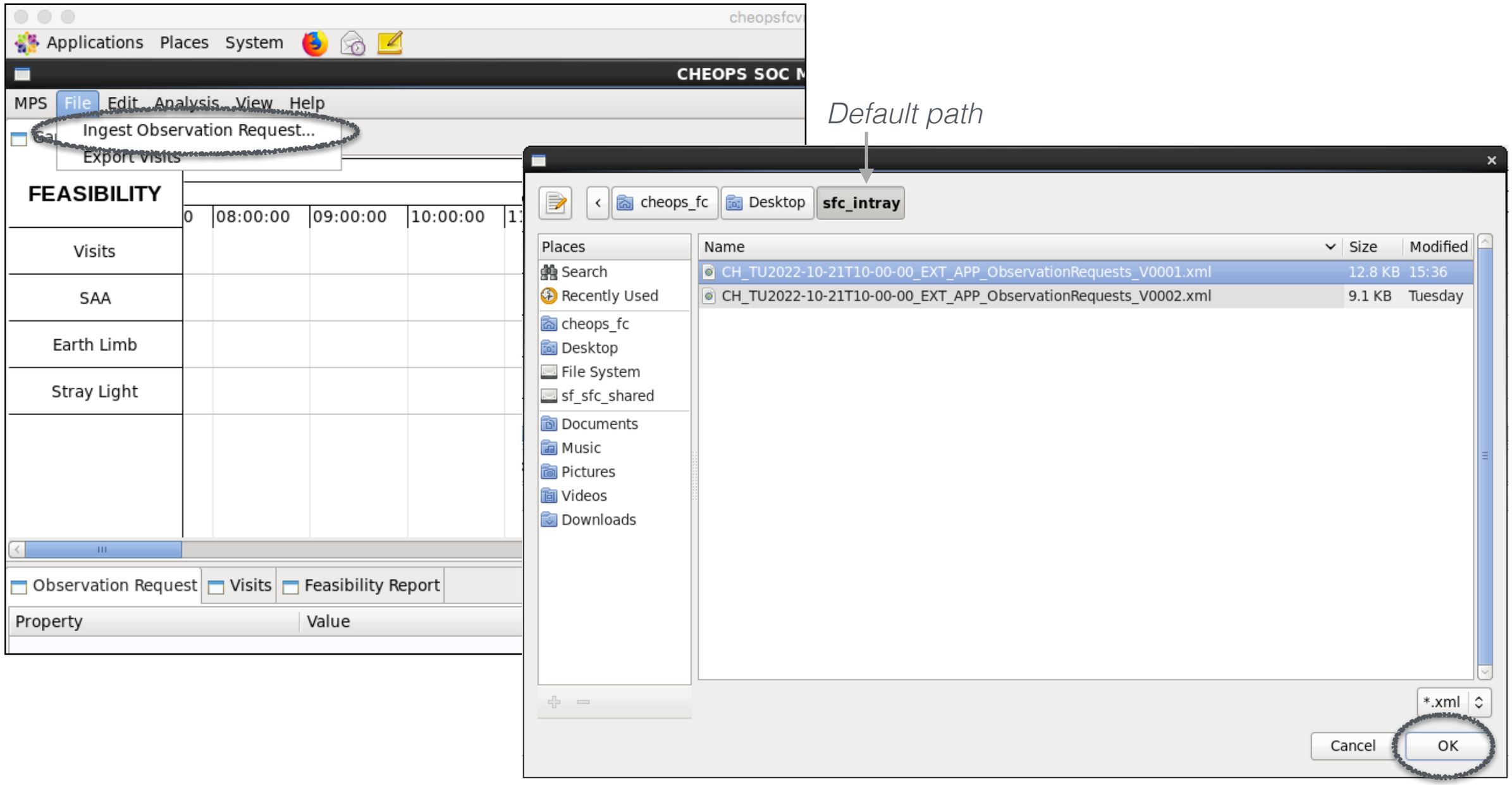
Feasibility Checker Guidelines

Read in the observationRequest file in the Feasibility Checker:



Feasibility Checker Guidelines

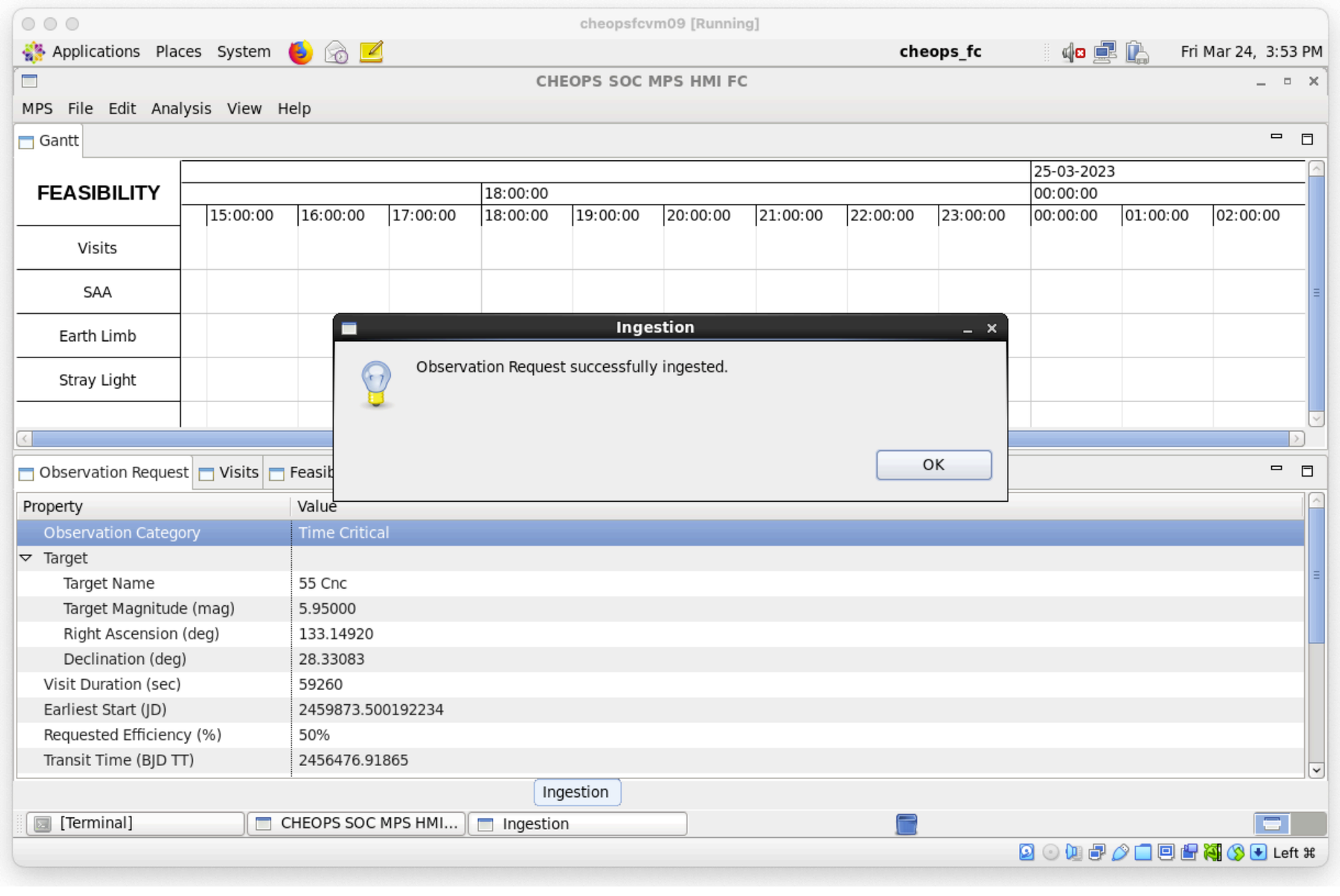
Read in the observationRequest file in the Feasibility Checker:



Feasibility Checker Guidelines

Read in the observationRequest file in the Feasibility Checker:

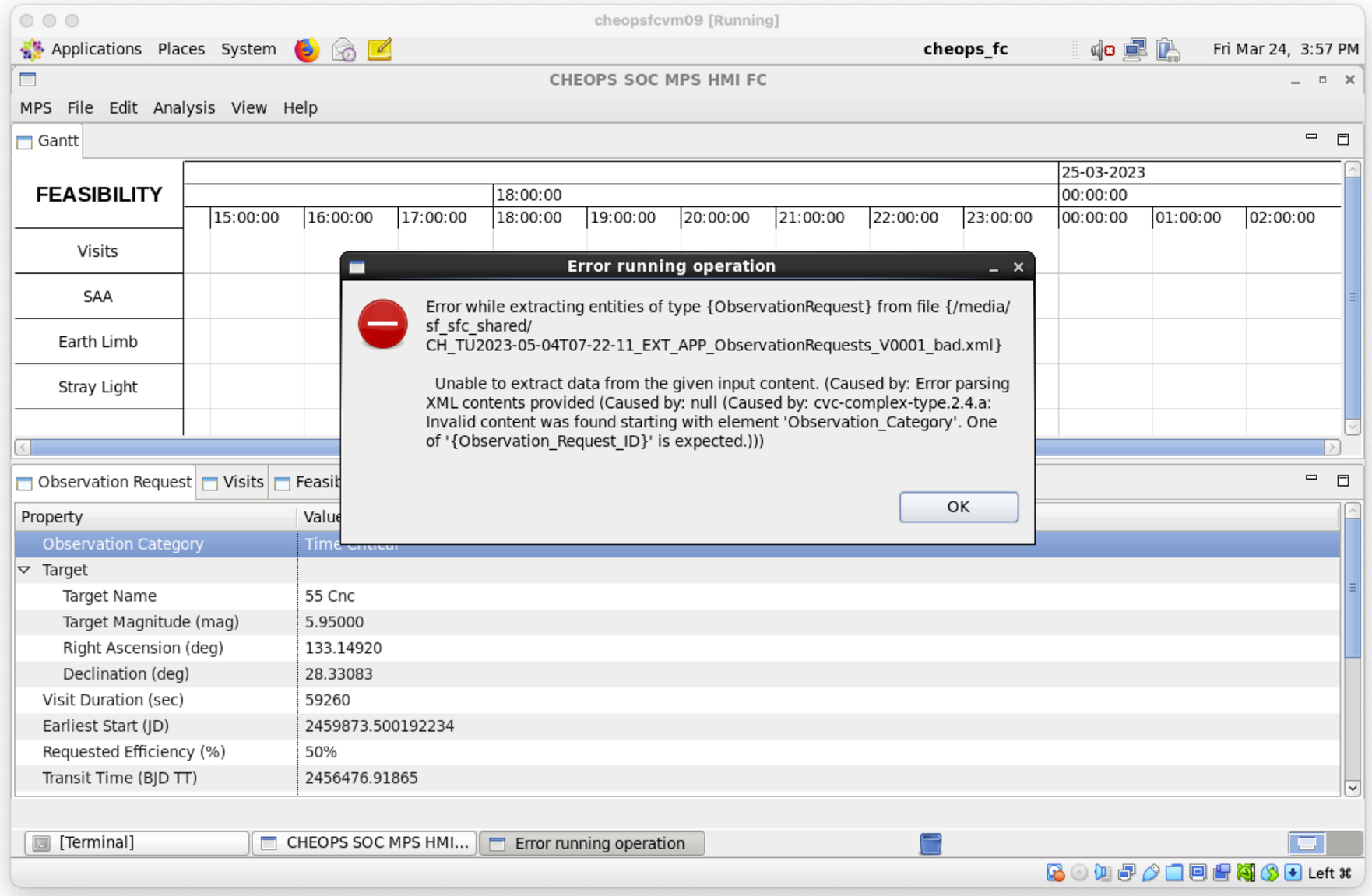
Successful ingestion of the observation request file



Feasibility Checker Guidelines

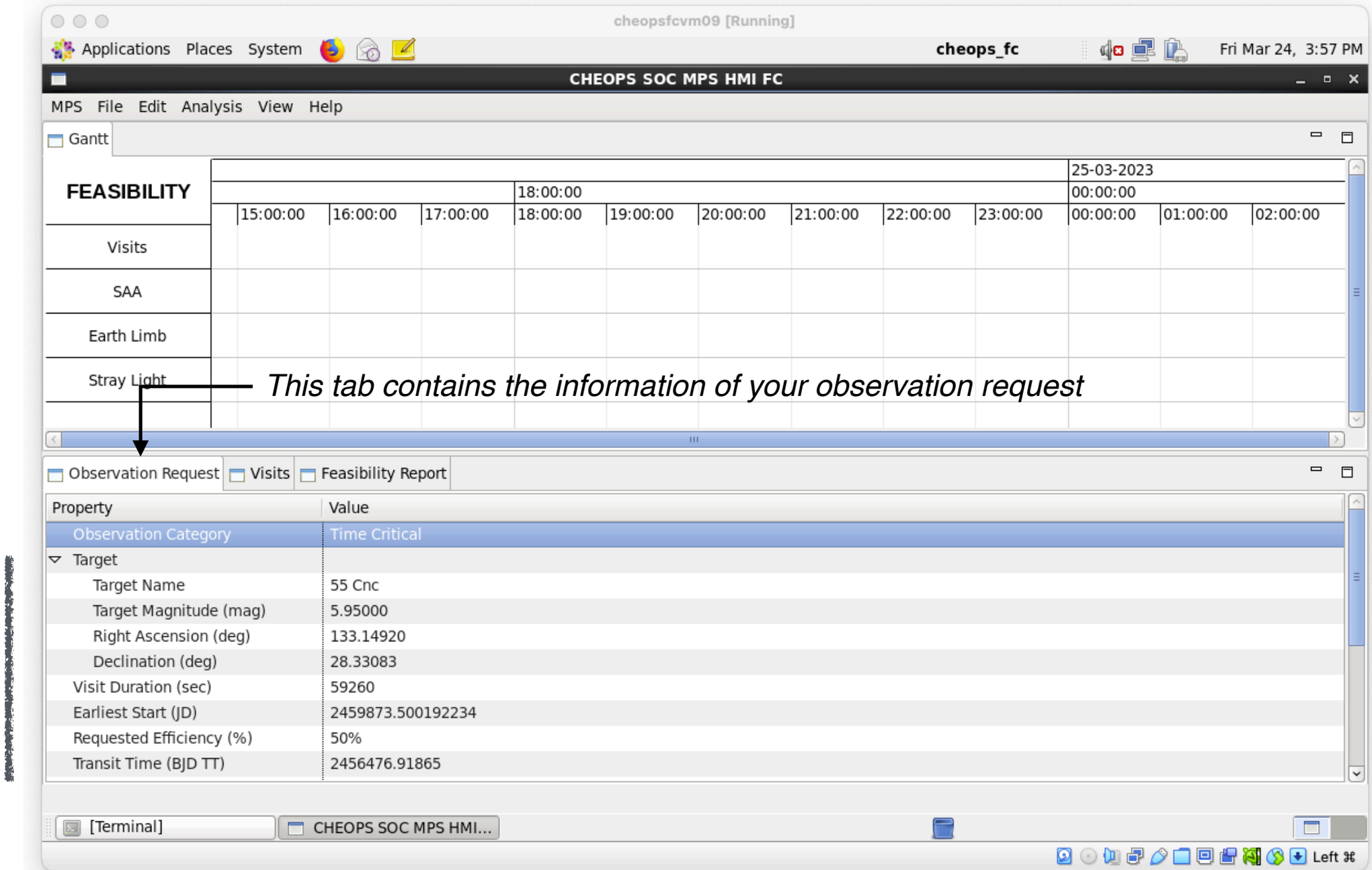
Read in the observationRequest file in the Feasibility Checker:

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



Feasibility Checker Guidelines

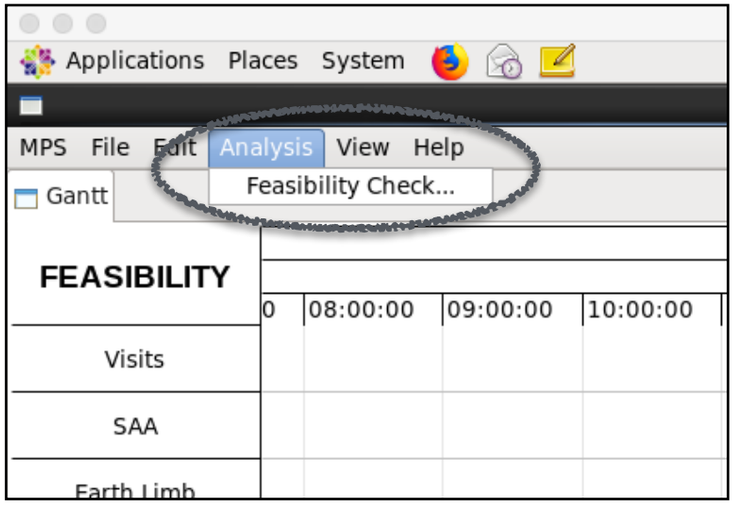
Read in the observationRequest file in the Feasibility Checker:



Feasibility Checker Guidelines

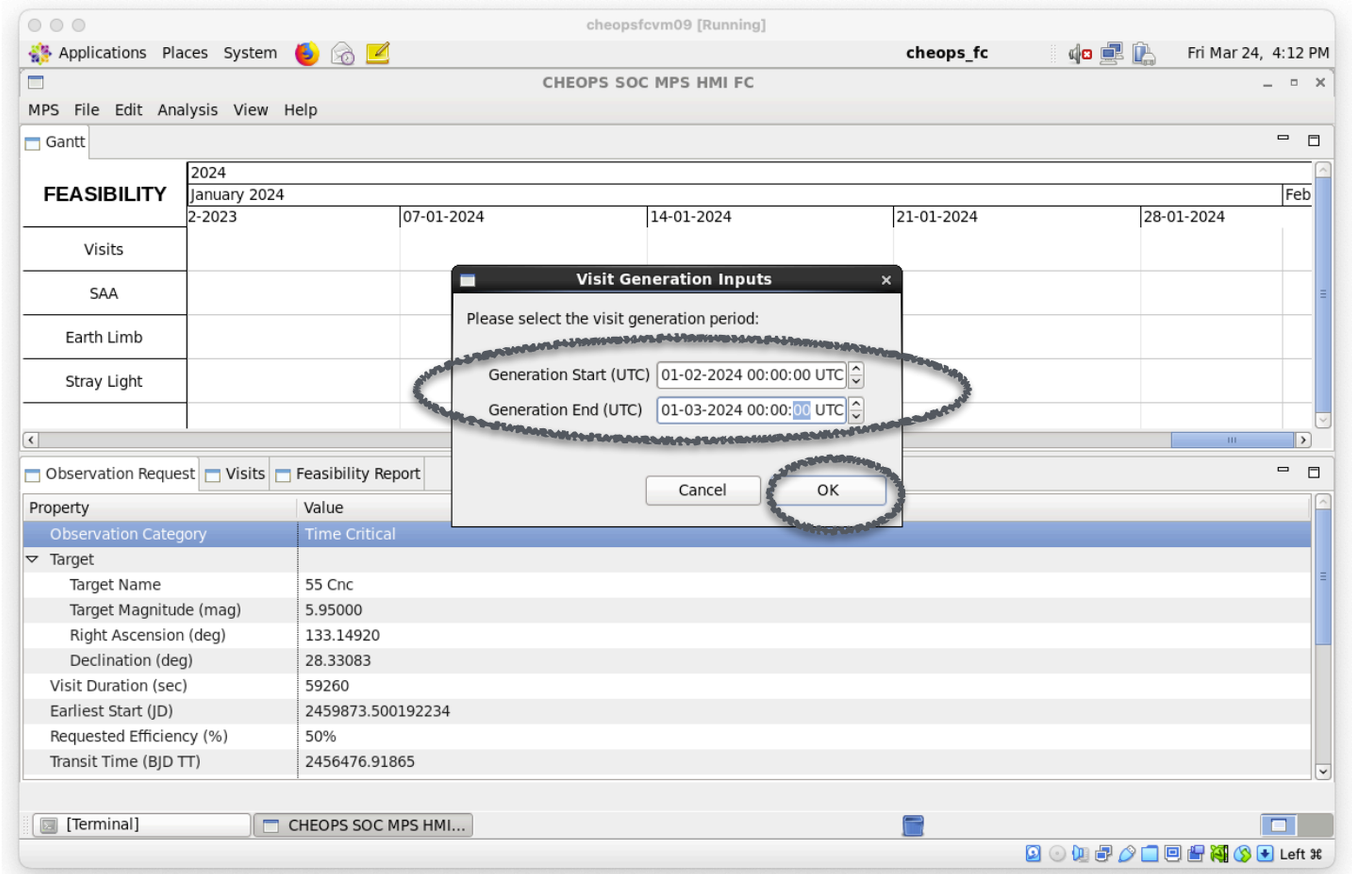
Run the Feasibility Checker

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).

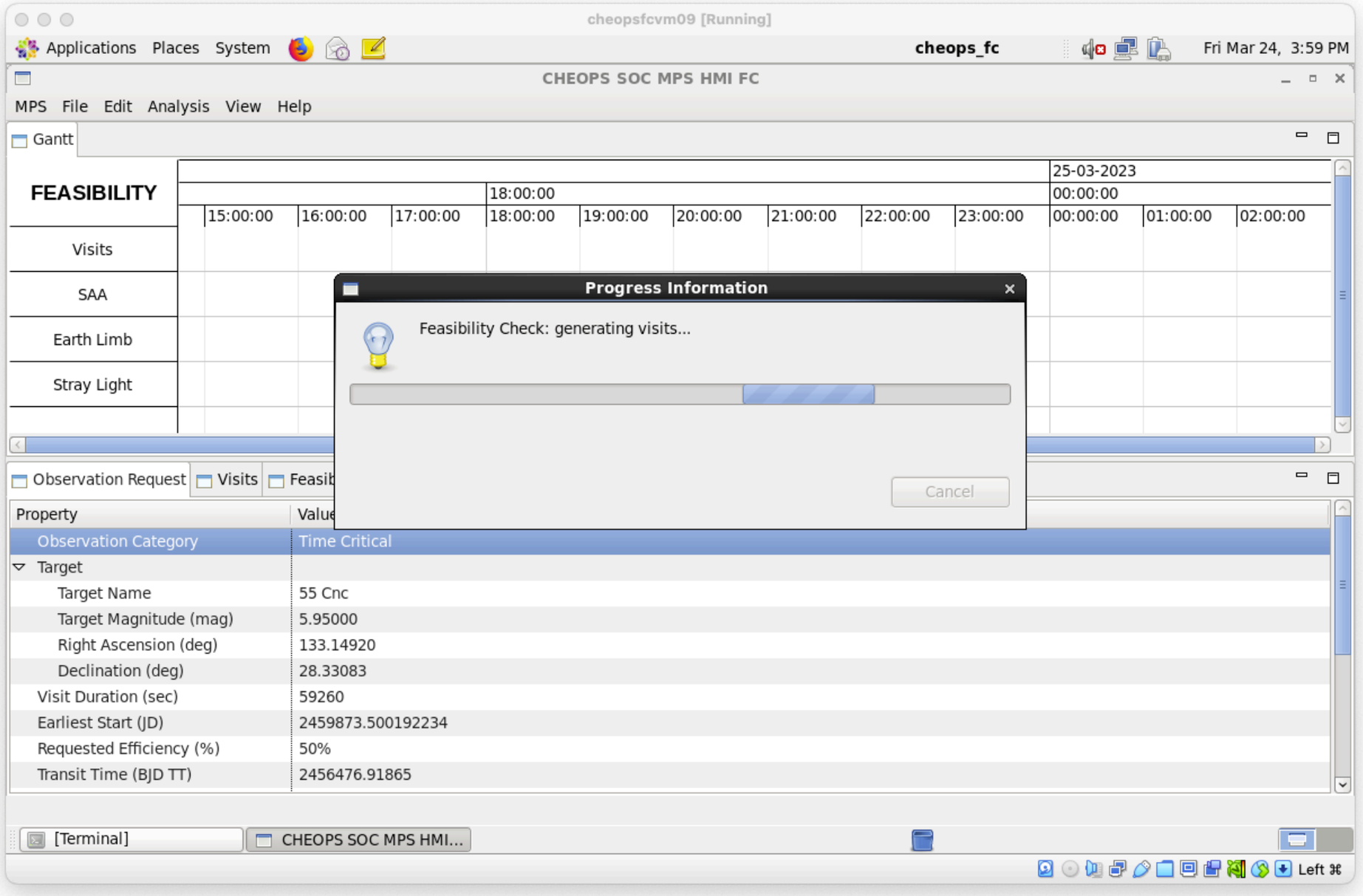
3) Hit "*OK*"



Feasibility Checker Guidelines

Run the Feasibility Checker

Depending on requested period, computation time may take a few minutes

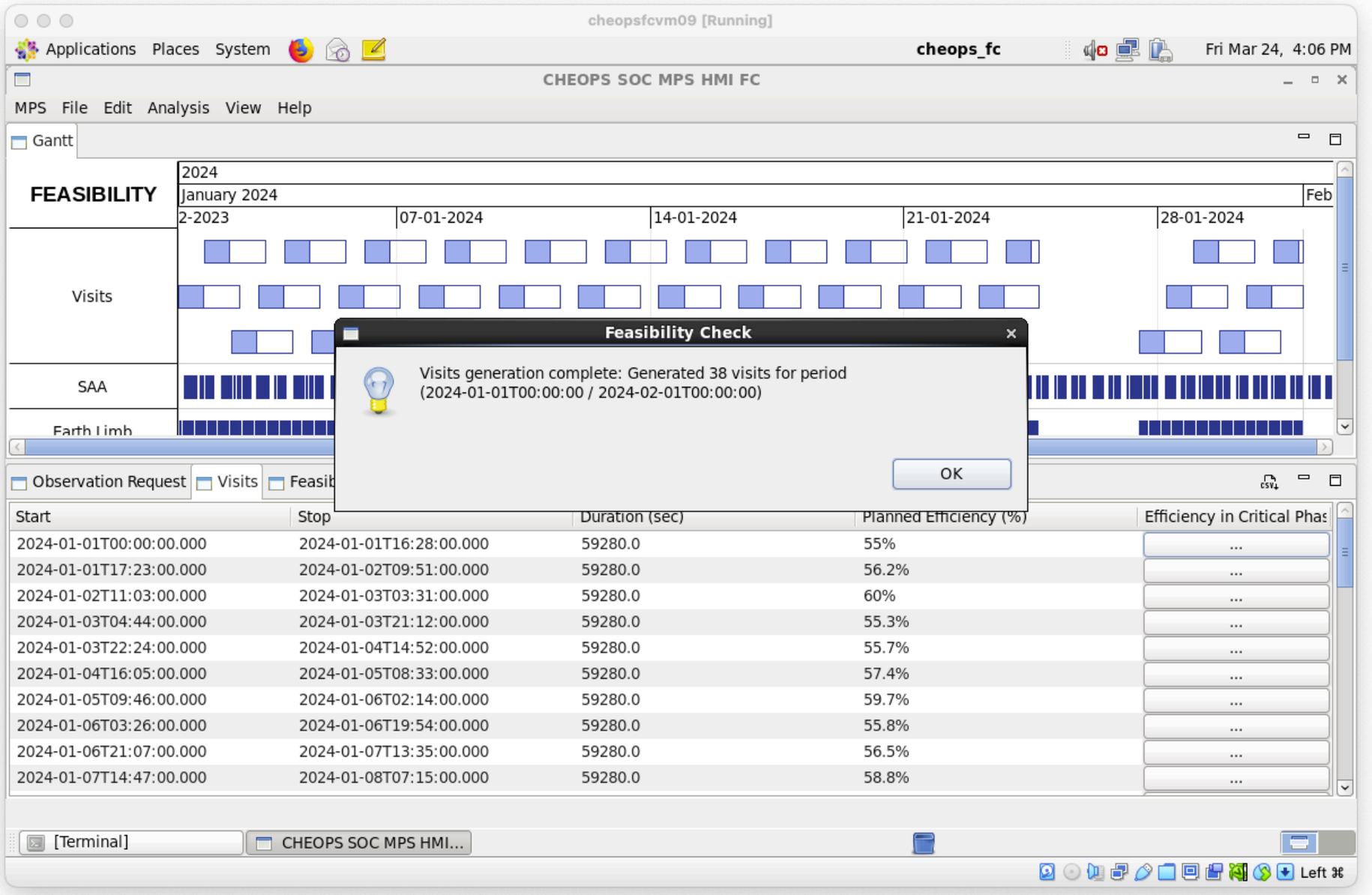


Feasibility Checker Guidelines

Run the Feasibility Checker

Successful generation of the possible visits

Note: Computation is done locally on your computer

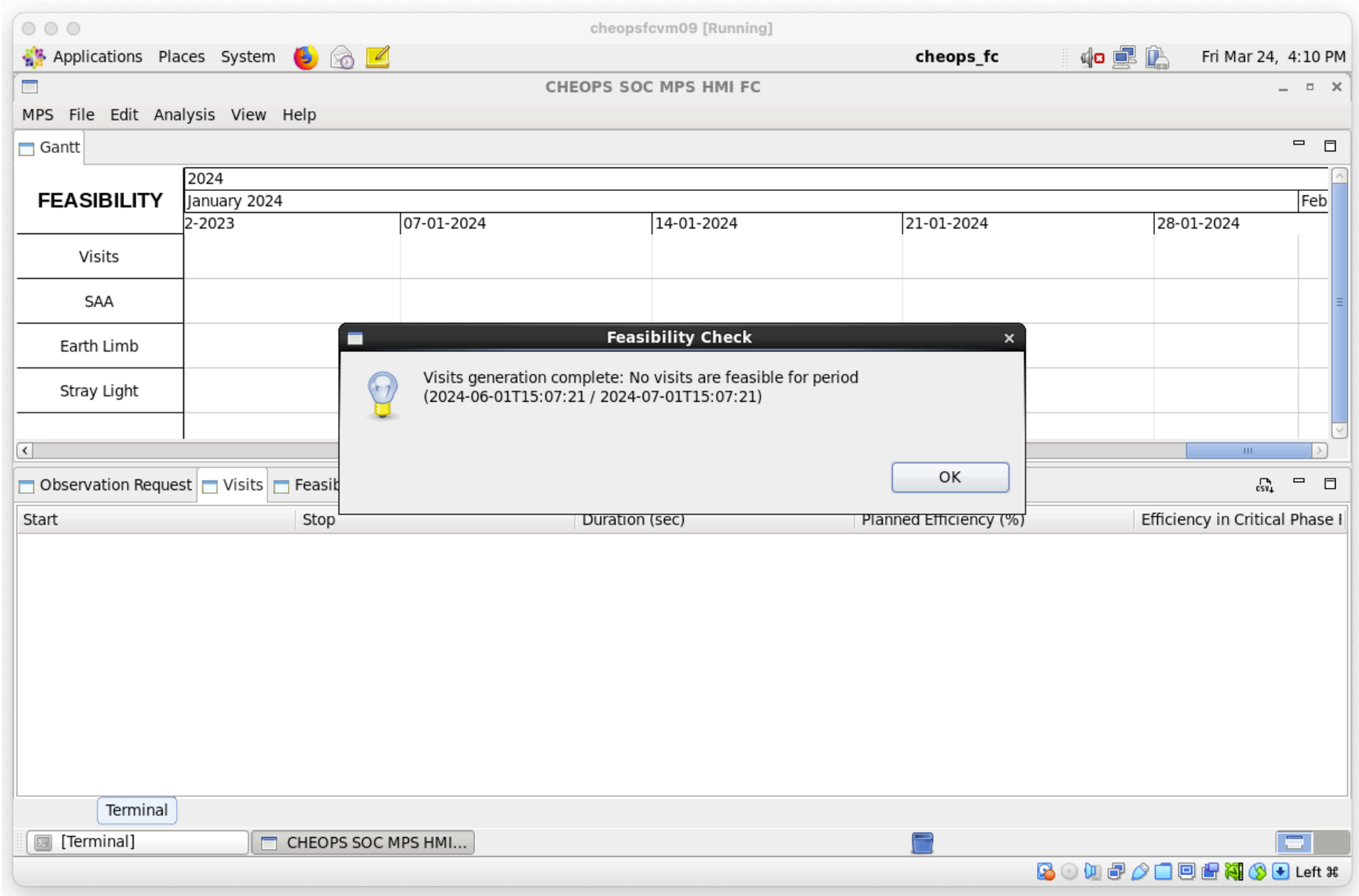


Feasibility Checker Guidelines

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 (see next couple of slides), or**
- **You may want to relax the "*Earliest Start*" / "*Latest End*" parameters in the observation request file.**



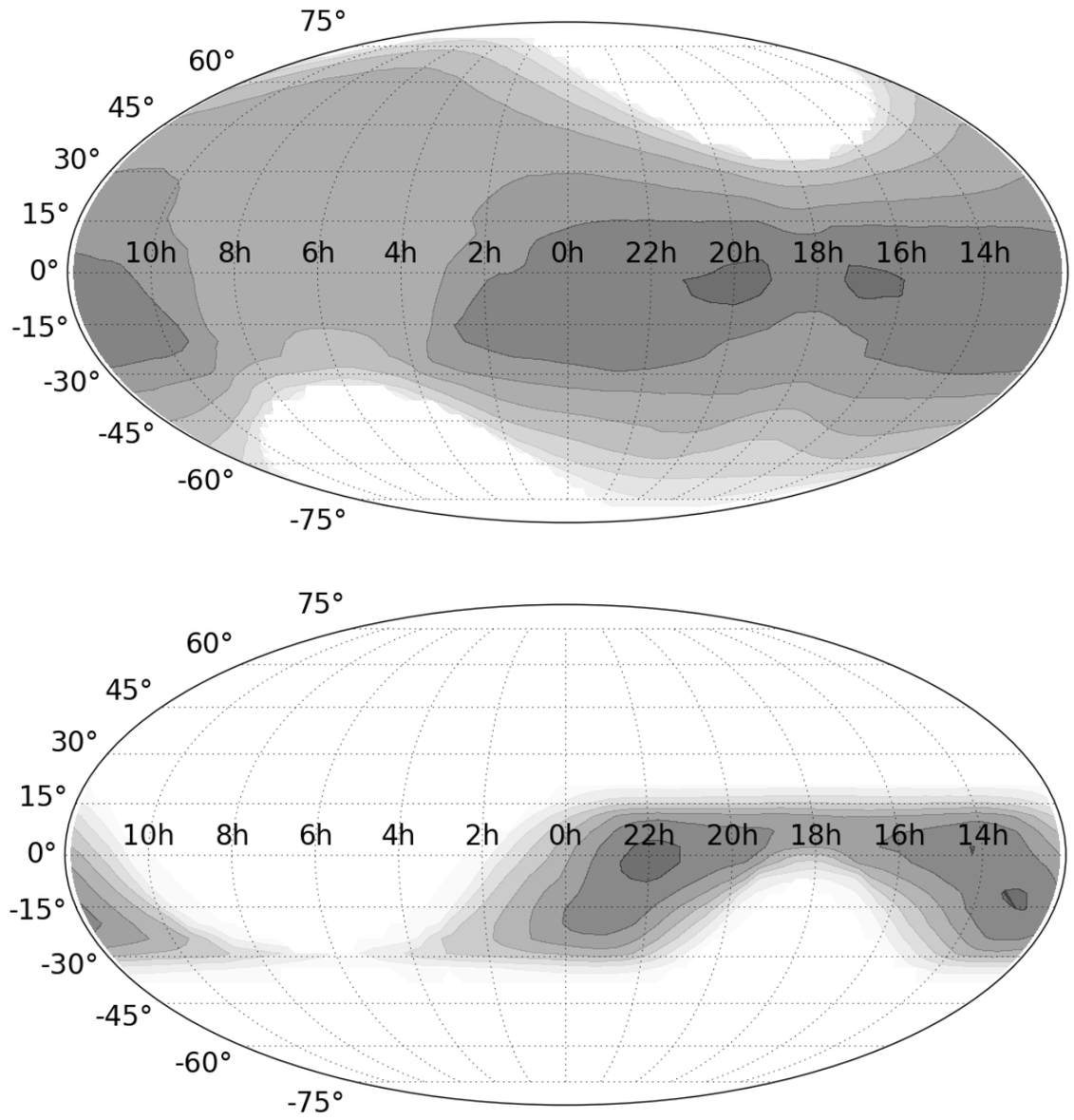
Feasibility Checker Guidelines

Is my target visible at all with CHEOPS?

If yes, when?

Sky visibility maps

(darker shades indicate fewer interruptions)



Most relaxed / least constrained case

Allows for high levels of stray light
(adequate for bright stars)
Over 50% of uninterrupted observation per orbit

Most restrictive / more constrained case

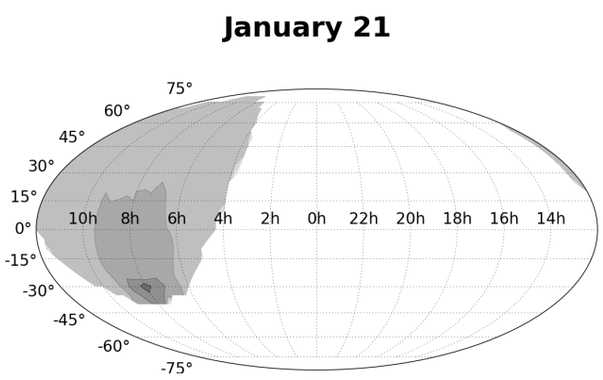
Allows for lower levels of stray light
(required for faint stars)
Over 80% of uninterrupted observation per orbit

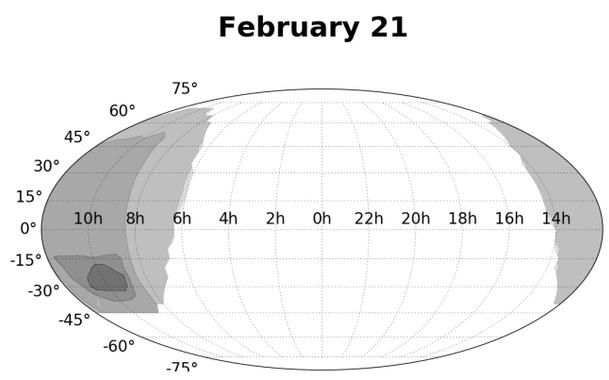
Feasibility Checker Guidelines

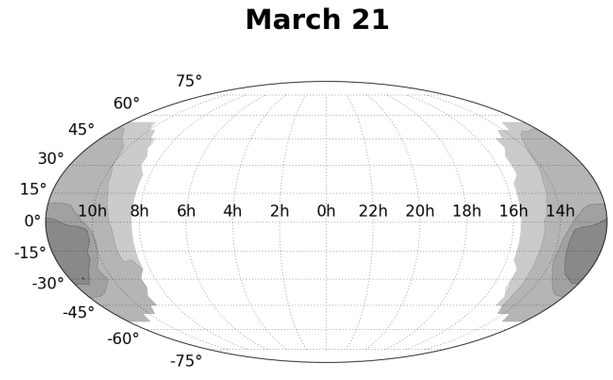
Monthly sky visibility maps

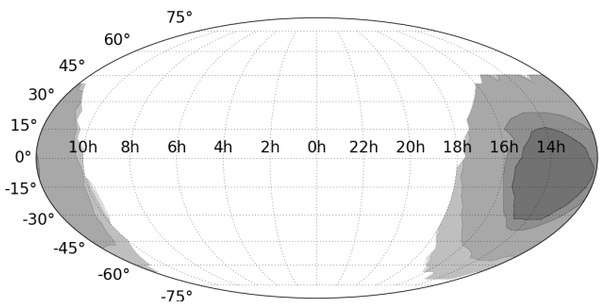
When can a source be observed with CHEOPS?

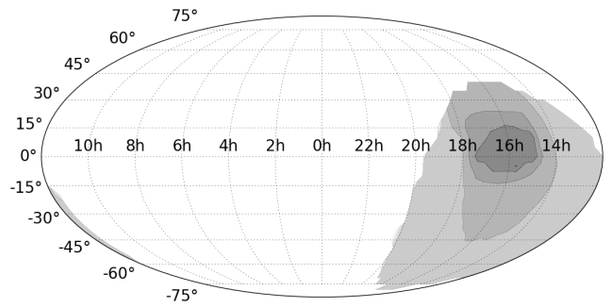
Assuming most relaxed case from previous slide (see Observers Manual for details)

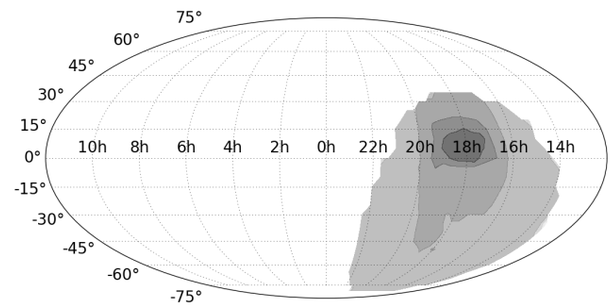


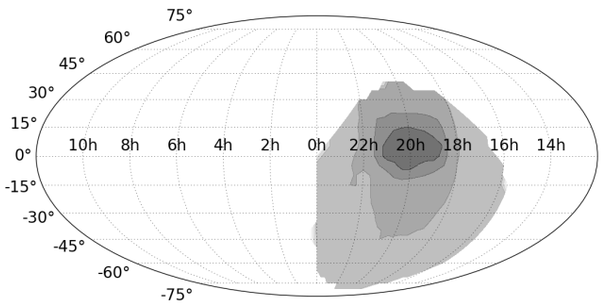


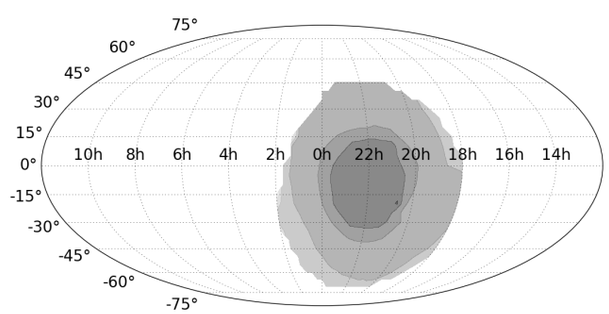


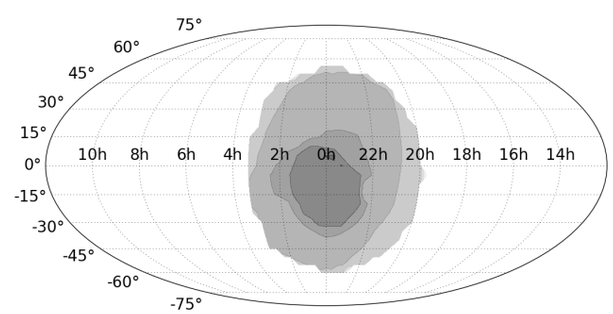


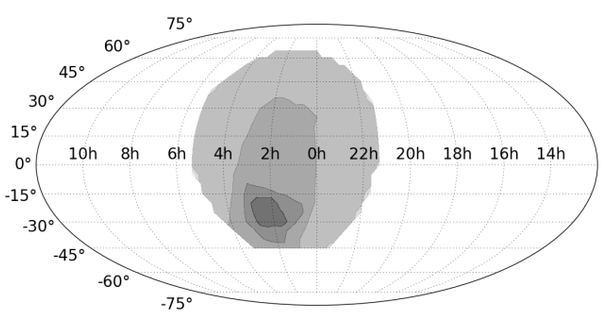


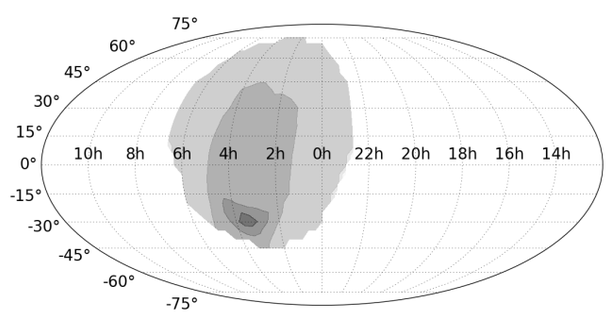


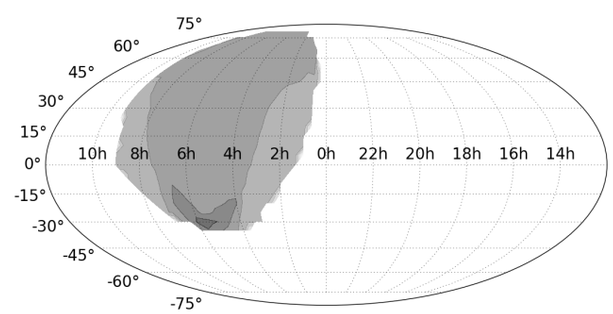








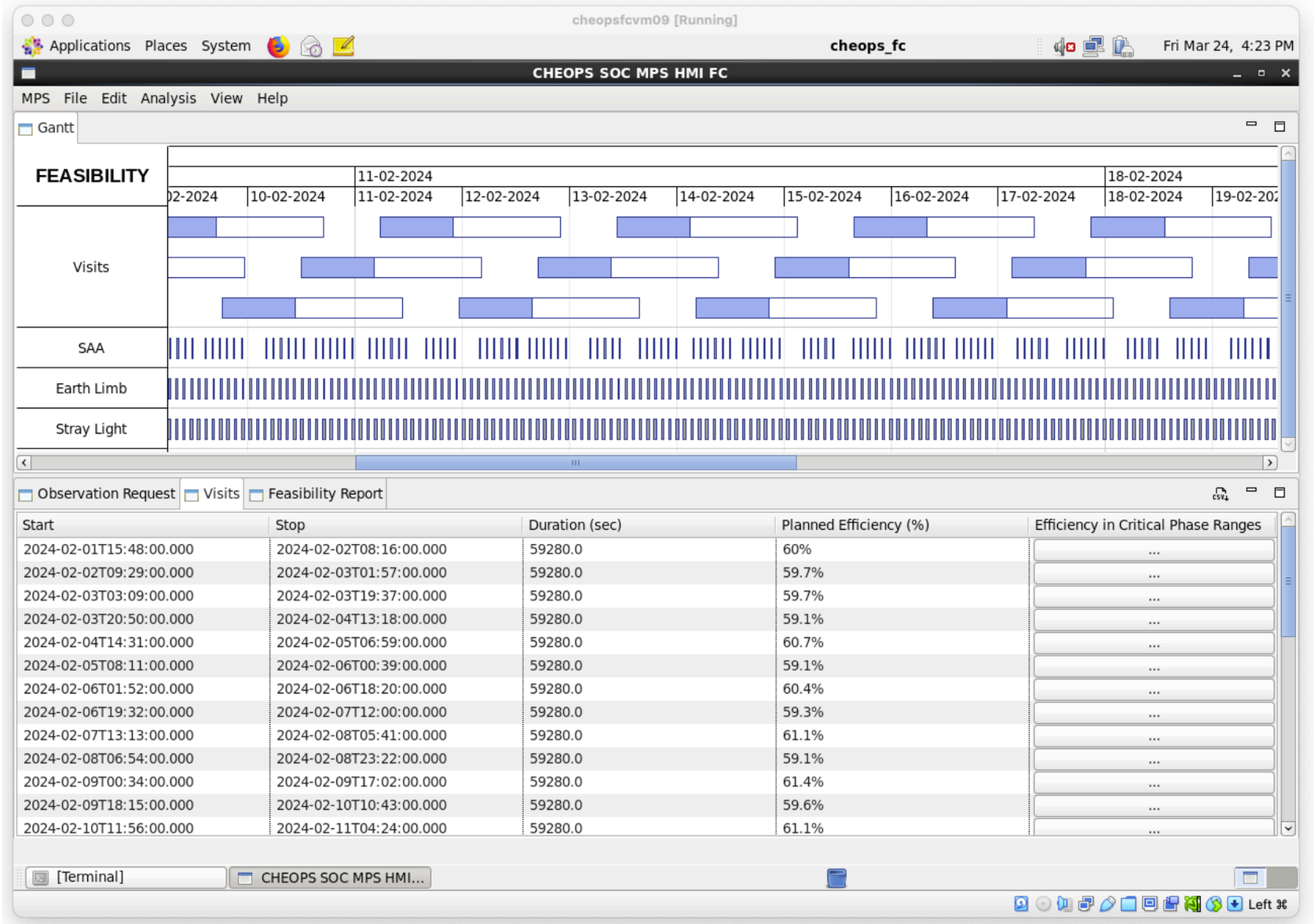




Feasibility Checker Guidelines

Explore the result

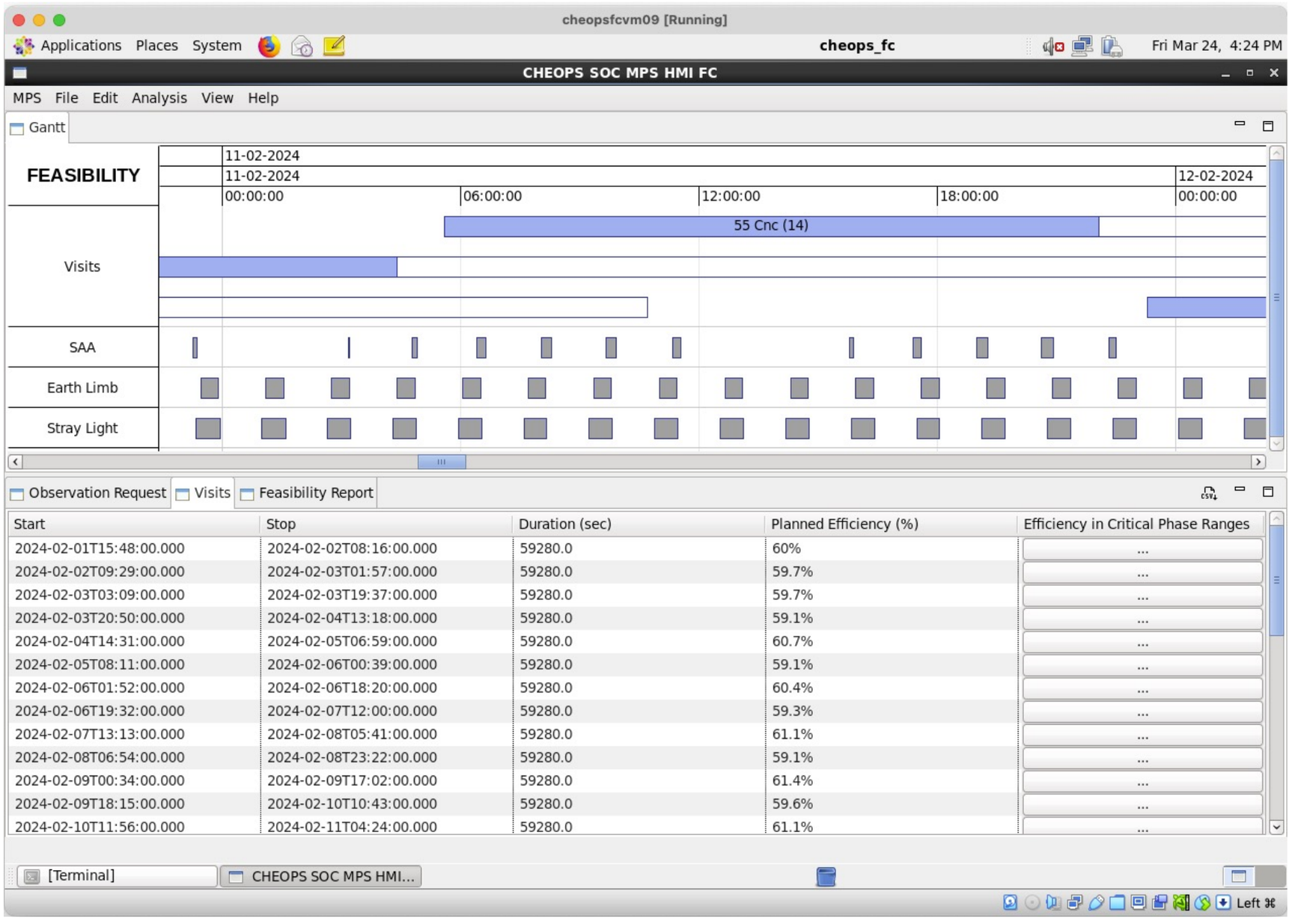
The Gantt chart shows the possible visits over the requested period, along with associated interruptions due to Earth occultations (Earth Limb in HMI), South Atlantic Anomaly crossings, and unacceptable levels of stray light.



Feasibility Checker Guidelines

Explore the result

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



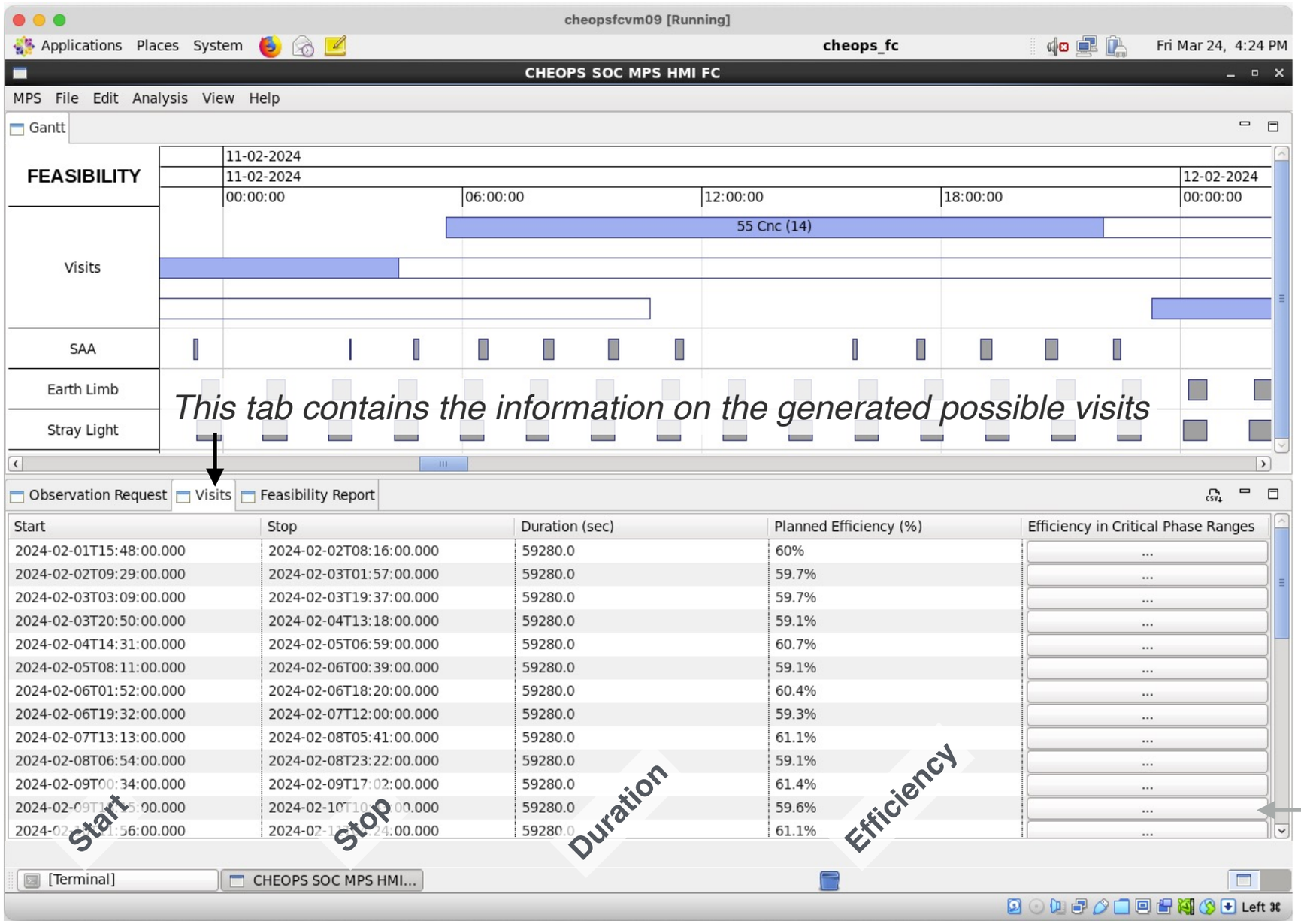
Feasibility Checker Guidelines

Explore the result

You can consult the details of generated visits:

Start / Stop time and (effective) duration

Invalid visits are marked in red with an [X]



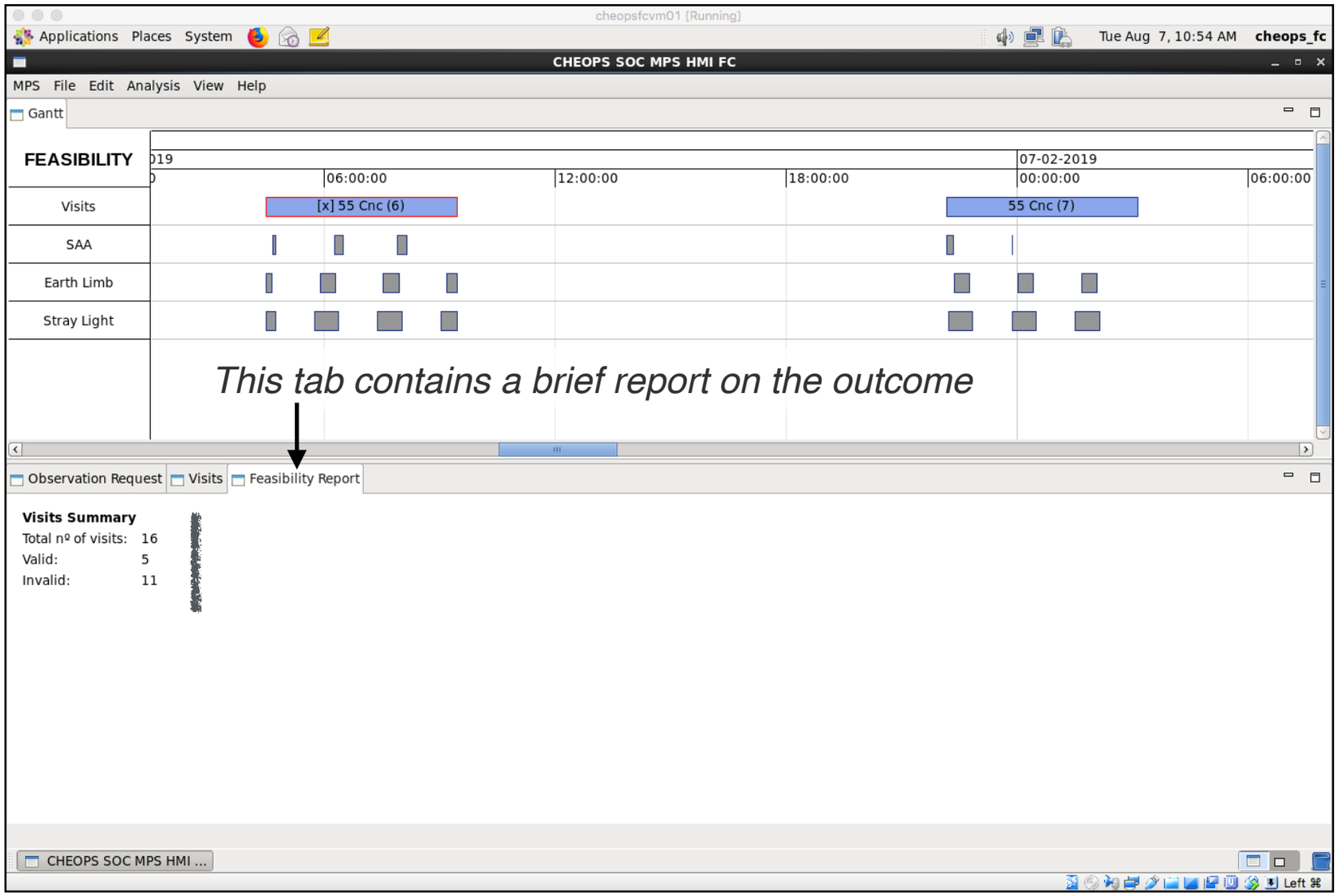
Visits details

Only relevant if you have provided phase ranges

Feasibility Checker Guidelines

Explore the result

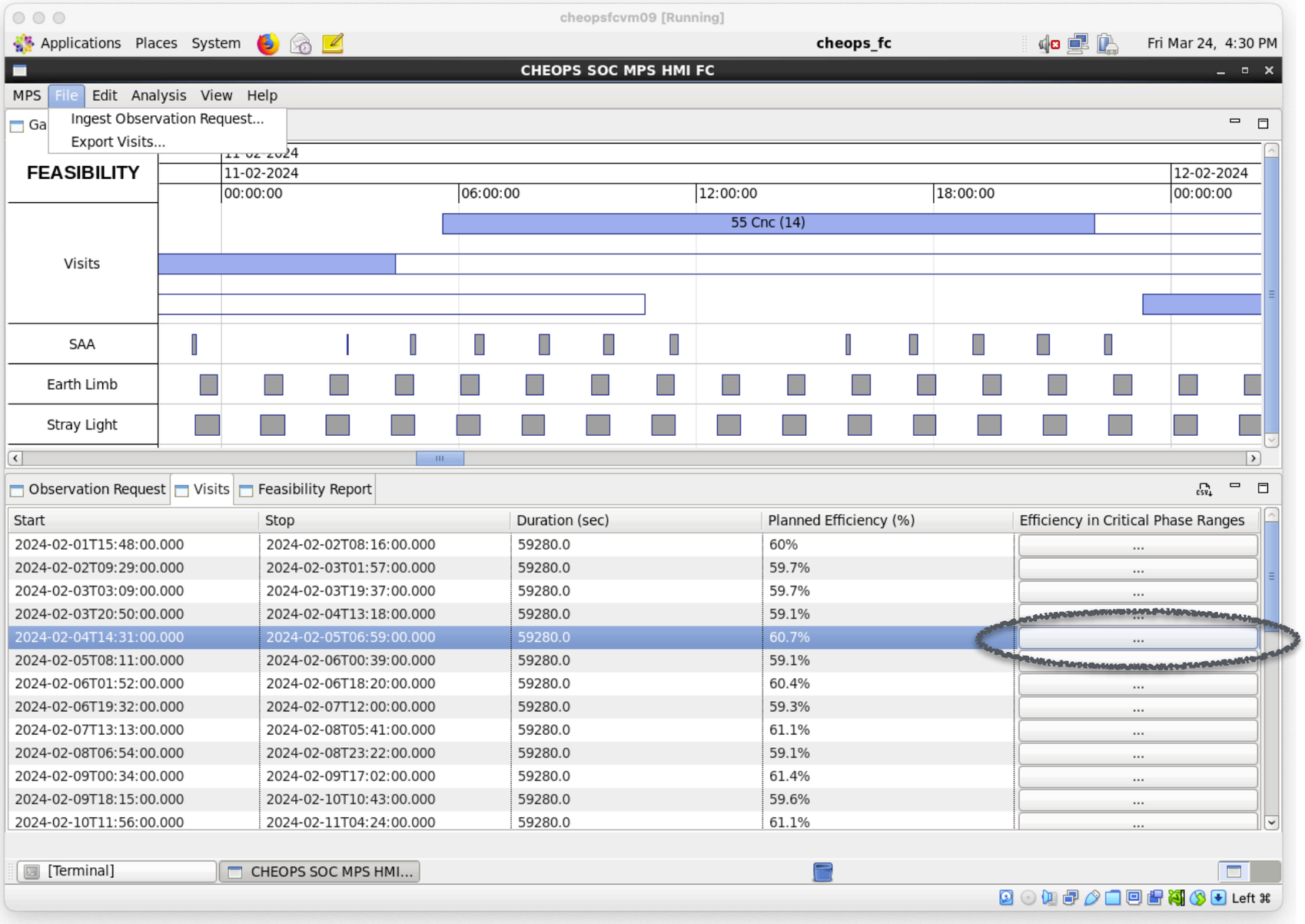
In that case, out of the 16 possible visits, only 5 are declared valid as they have observing efficiencies higher than requested.



Feasibility Checker Guidelines

Explore the result (critical Phase Ranges)

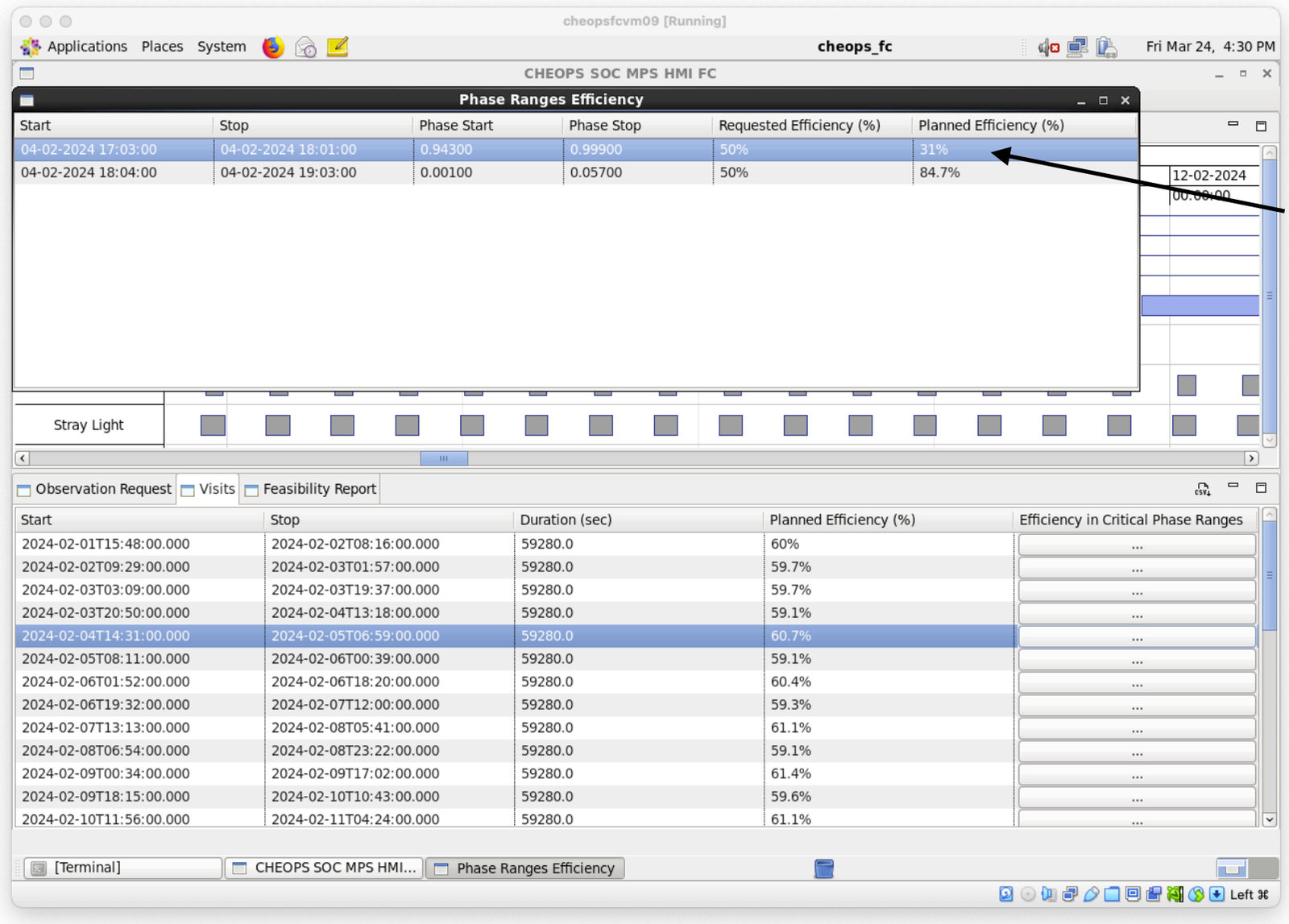
If you have ingested an observation request with critical phase ranges
you can explore the observing efficiencies within the pre-defined phase ranges



Feasibility Checker Guidelines

Explore the result

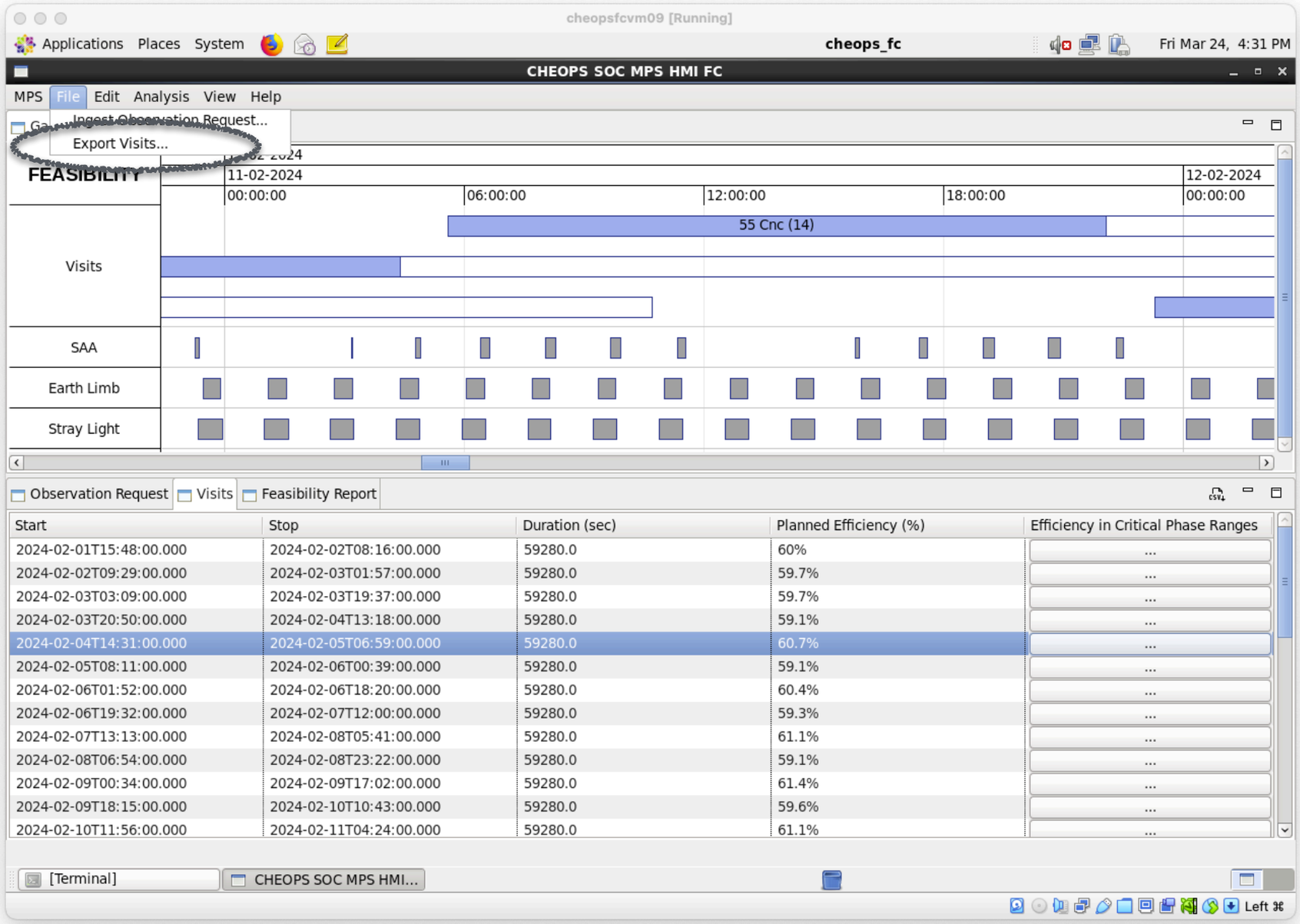
In that particular case, the requested efficiency in both phases is 50%. The observed efficiency in the first phase is only 31% but since *<Fulfil_all_Phase_Ranges> = FALSE* in the input file, the visit is still valid.



Feasibility Checker Guidelines

Explore the result

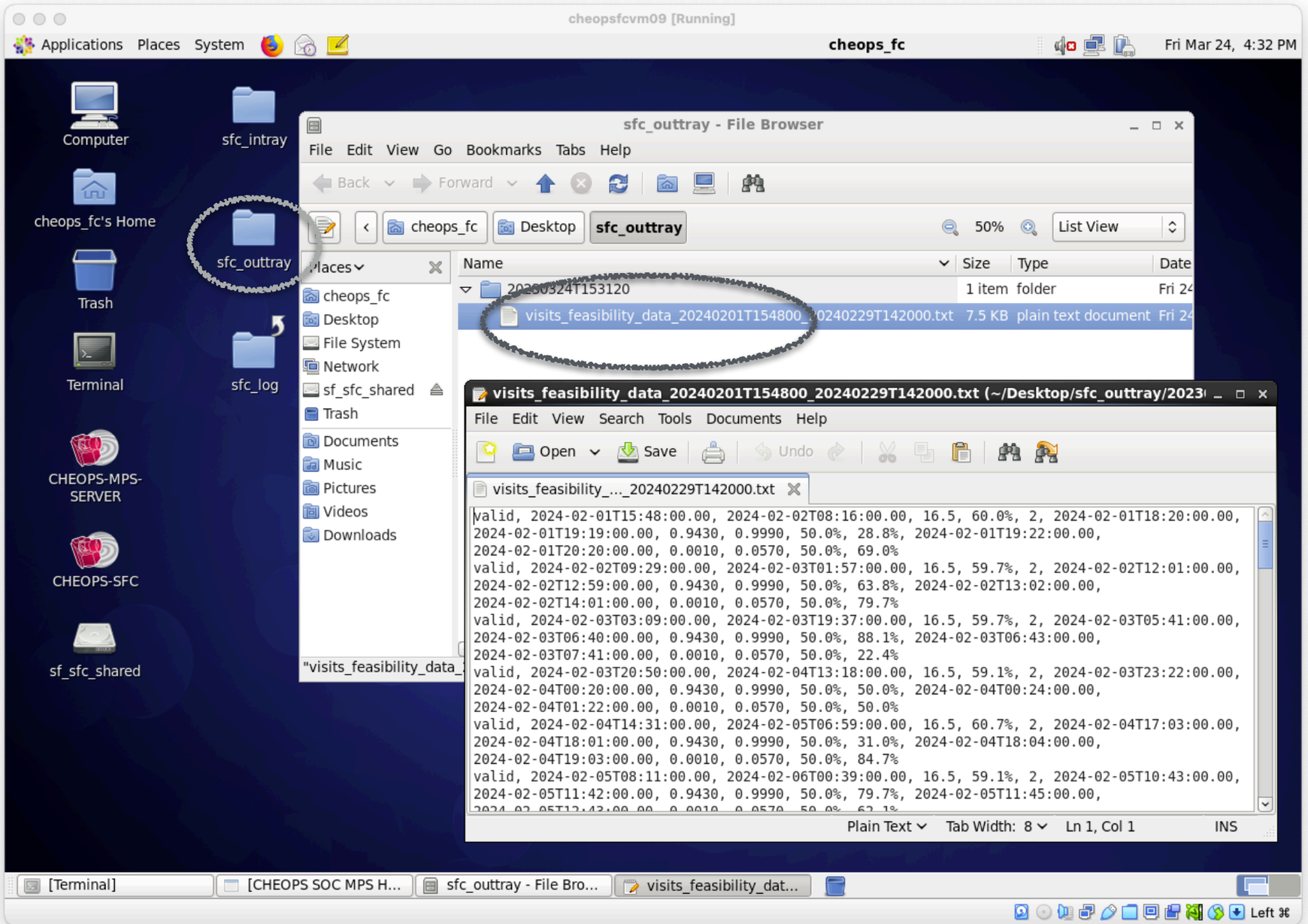
Detailed list of visit can be exported to an ascii file for further analysis



Feasibility Checker Guidelines

Explore the result

The output file is saved to Desktop/sfc_outtray/



Feasibility Checker Guidelines

Pycheops' function make_xml_files 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. You may use this tool at your own risk, with caveats and warnings detailed in the documentation linked at https://www.cosmos.esa.int/web/cheops-guest-observers-programme/scheduling-feasibility-checker.