How can I plot the atmospheric transmission, opacity or sky temperature for ALMA?

Sarah Wood - 2022-03-23 - Project Planning

At the ALMA site on Llano de Chajnantor the amount of precipitable water vapour (PWV) is typically 1.0 mm and falls below 0.5 mm up to 25% of the time. The image below shows the atmospheric transmission between 70 and 960 GHz for a range of common PWV values.

You can find a similar plot as Figure 4.1 in the ALMA Technical Handbook. This plot shows the ten ALMA receiver bands along with atmospheric transmission. The receiver coverage is shown shaded, superimposed on a zenith atmospheric transparency plot at the Array Operation Site (AOS) for the first seven octiles of observing conditions at ALMA.

If you would like to create your own plot of the atmospheric transmission, opacity or sky temperature as a function of frequency for the specified observatory and/or weather conditions, there is a tool in the Analysis Utilities package for CASA. Installation instructions can be found here:

https://casaguides.nrao.edu/index.php/Analysis_Utilities
The tool needed is called plotAtmosphere, and the information for it can be found here: https://safe.nrao.edu/wiki/bin/view/ALMA/PlotAtmosphere

An example in CASA 6.2.1.7:
CASA <4> : au.plotAtmosphere(frequency=660, bandwidth=3.75, telescope='ALMA', pwv=.472, plotfile='alma.660.png')
Built atmospheric profile with 32 layers for altitude 5059 m.
Mean transmission: 52.532393 percent
Wrote alma.660.png

CASA <15> : au.plotAtmosphere(frequency=[200,660], bandwidth=3.75, telescope='ALMA', pwv=.472, plotfile='alma.200_660.png', showgrid=True)
Built atmospheric profile with 32 layers for altitude 5059 m.
Mean transmission: 55.595188 percent
Wrote alma.200_660.png
Please submit a helpdesk ticket if you have any issues with the tool.

Tags
atmosphere
transmission