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## How can I use the 'Butler-JPL-Horizons 2010' or 'Butler-JPL-Horizons 2012' models to calibrate the absolute flux scale in my data?

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In datasets where the flux calibrator is a Solar System object, the expected calibrator flux is defined based both on brightness temperature spectra models and ephemeris information. The flux models are called by the 'standard' parameter in the setjy task (<http://casa.nrao.edu/docs/TaskRef/setjy-task.html>). Two sets of models are available in CASA 4.2, 'Butler-JPL-Horizons 2010' and 'Butler-JPL-Horizons 2012'. The details of these models are described in the ALMA Memo 594 ([https://science.nrao.edu/facilities/alma/aboutALMA/Technology/ALMA\\_Memo\\_Series/alma594/abs594](https://science.nrao.edu/facilities/alma/aboutALMA/Technology/ALMA_Memo_Series/alma594/abs594)). The resulting differences between 'Butler-JPL-Horizons 2010' and 'Butler-JPL-Horizons 2012' are reported on this Casaguide: [http://casaguides.nrao.edu/index.php?title=Solar\\_System\\_Models\\_in\\_CASA\\_4.0](http://casaguides.nrao.edu/index.php?title=Solar_System_Models_in_CASA_4.0).

In general, it is recommended to use the 'Butler-JPL-Horizons 2012' models, which have been updated based on the most recent observations, and better take into account atmospheric lines in the calibrators. Using setjy with standard='Butler-JPL-Horizons 2012' allows the user to write the calibrator's corresponding model in the 'model' column of a measurement set (.ms file).

Occasionally an user may want to use the 'Butler-JPL-Horizons 2010' models instead, for example if the user is more confident in that model for a particular source/frequency combination, or if the observations are performed at a frequency not covered by the 'Butler-JPL-Horizons 2012' model. For data obtained before 01/01/2014, using setjy with standard='Butler-JPL-Horizons 2010' is sufficient to load in the model. For data obtained on or after 01/01/2014, since the 2010 model does not include the adequate ephemeris, a small modification of the ephemeris file is needed. In your casa distribution directory go to /data/ephemerides/JPL-Horizons, and look for the file corresponding to your calibrator at the observing date. For example, the file Uranus\_55197-59214dUTC\_J2000.tab corresponds to Uranus between MJD 55197 and MJD 59214 (from 01-01-2010 to 12-31-2020). Copy this directory as a directory with the same name, minus the \_J2000 extension (e.g., cp -r

Uranus\_55197-59214dUTC\_J2000.tab Uranus\_55197-59214dUTC.tab). You can now call go back to your data reduction directory where your .ms file sits, and call setjy with standard='Butler-JPL-Horizons 2010'.

If no ephemeris file corresponding to your observing date is present, you can generate one yourself using these instructions

<https://safe.nrao.edu/wiki/bin/view/Software/CasaUpdatingEphemerisTables>.

If you have difficulties feel free to contact the CASA helpdesk

([http://casa.nrao.edu/help\\_desk\\_all.shtml](http://casa.nrao.edu/help_desk_all.shtml)).