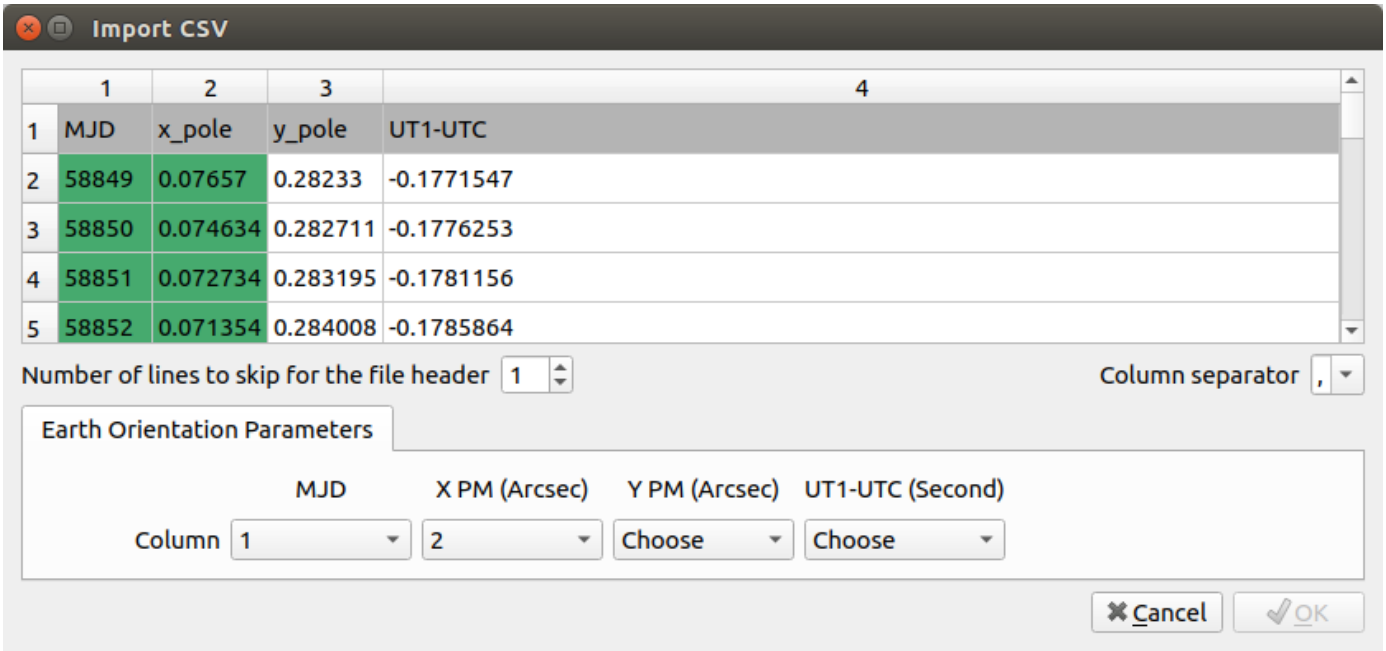
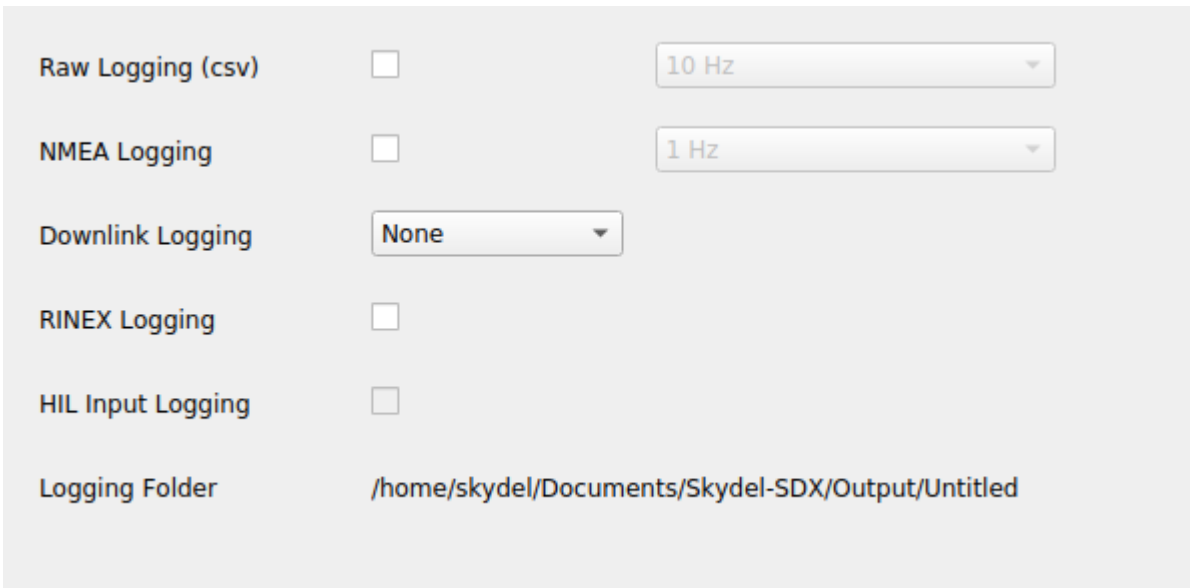


Below are the column descriptions for each Earth Orientation Parameter.

Column	Description
MJD	Modified Julian Date.
X PM, Y PM	Coordinates or the pole.
UT1-UTC	Difference between the Universal Time and Coordinated Universal Time.

4.7.3.3. Logging

The Logging settings are located in the **Settings - Global - Logging** menu.



Use the Logging settings to control how Skydel logs data during a simulation.

4.7.3.3.1. Raw

Turn on the Raw Logging option to log simulation data such as satellite trajectories, receiver trajectories, and signal power levels. You may also specify the desired update rate at which data is logged.

If you need only raw data without RF signals, set your output to None and Skydel will generate the raw log files much faster than real time.

Raw logging at higher rates can interfere with the simulator's real-time engine on a slower computer. If you experience underrun problems with a radio, either reduce the logging rate or do not log at all while generating RF.

The logging data can be imported into other tools for analysis purposes. For example, you can use Skydel to generate satellite trajectory data. You can then use this data to model and test the satellite component of your receiver software. This enables you to test your software easily and quickly without the need to use hardware to generate RF signals.

When raw logging is enabled, Skydel will generate:

- one file for each signal type per Skydel SV ID
- one file for each multipath echo
- one file for each visible dynamic transmitter (if using Advanced Jammer)
- one file for the receiver

Below are the column descriptions for each raw logging files. Column descriptions for a **satellite**:

Column	Description
Elapsed Time	The elapsed time of the simulation in milliseconds.
ECEF X, Y, Z	ECEF coordinates (meters) of the origin of the transmitted signal (satellite's antenna phase center plus errors).
ECEF Error X, Y, Z	ECEF coordinates errors (offset in meters) from the satellite's antenna phase center.
Body Azimuth	Satellite's azimuth, in radians, from the receiver's body position relative to North.
Body Elevation	Satellite elevation, in radians, from the receiver's body position relative to the horizon.
Range	Geometrical distance, in meters, between the satellite's and receiver's antennas.
PSR	Pseudorange, in meters, between the satellite's and receiver's antennas.
ADR	Accumulated Doppler range, in number of cycles, between the satellite and receiver.
Clock Correction	Satellite's clock correction, in seconds.
Clock Noise	Additional clock error, in meters, not accounted for in navigation message.
Delta Af0	Clock offset in seconds.
Delta Af1	Clock drift in seconds per seconds.
Iono Correction	Ionospheric corrections, in meters.
Tropo Correction	Tropospheric corrections, in meters.
PSR Offset	Pseudorange offset, in meters.

Column	Description
Receiver Antenna Azimut	Satellite’s azimuth, in radians, from the receiver’s antenna position.
Receiver Antenna Elevation	Satellite’s elevation, in radians, from the receiver’s antenna position.
Receiver Antenna Gain	Receiver’s antenna gain, in dBi.
SV Antenna Azimut	Receiver’s azimuth, in radians, from the satellite’s antenna position.
SV Antenna Elevation	Receiver’s elevation, in radians, from the satellite’s antenna position.
Relative Power Level	Signal’s relative power level, in dB, corresponding to the sum of the global power offset, the user’s power offset, the receiver’s antenna gain and the satellite’s antenna gain.
Doppler Frequency	Doppler frequency, in Hertz, due to satellites' and receivers' antennas dynamics'.
PSR Change Rate	Pseudorange rate, in meters per second, due to satellites' and receivers' antennas dynamics'.
Receiver Carrier Phase Offset	Phase offset, in radians, caused by the receiver’s antenna phase pattern. This column does not appear in echo log files.
Satellite Carrier Phase Offset	Phase offset, in radians, caused by the satellite’s antenna phase pattern. This column does not appear in echo log files.
Echo Power Loss	Multipath power offset, in dB, relative to Line of Sight (LOS) signal. This column appears only in echo log file.
Echo Doppler Offset	Multipath frequency offset, in Hertz, relative to LOS signal. This column appears only in echo log file.
Echo Carrier Phase Offset	Initial phase offset, in radians, in multipath relative to LOS signal. This column appears only in echo log file.
Echo PSR Offset	Multipath pseudorange offset, in meters. This column appears only in echo log file.
GPS TOW	GPS time of week, in seconds.
GPS Week Number	GPS week number.
SBAS t0	SBAS time of the day, in seconds.
Calibration Offset	Offset, in meters, applied to the signal during Wavefront simulation. Used to compensate for hardware differences between elements.
PSR satellite time	The elapsed time of the simulation when the signal was emitted from the satellite, in milliseconds.

Column descriptions for **receiver**:

Column	Description
Elapsed Time	Elapsed time of the simulation, in milliseconds.
ECEF X, Y, Z	ECEF coordinates of the receiver’s antenna, in meters.
Yaw, Pitch, Roll	Sum of vehicle’s body and antenna’s rotation angles, in degrees.
Velocity X, Y, Z	Velocity of vehicle, in meters per second.
Accel. X, Y, Z	Acceleration of vehicle, in meter/seconds.
GPS TOW	GPS time of week, in seconds.

Column	Description
GPS Week Number	GPS week number.

Column descriptions for a **transmitter**:

Column	Description
Elapsed Time	Elapsed time of the simulation, in milliseconds.
ECEF X, Y, Z	ECEF coordinates of the transmitter's body, in meters.
Yaw, Pitch, Roll	Transmitter's body rotation angles, in degrees. Does not include antenna rotation.
Transmitter Antenna Gain	Transmitter antenna gain, in dB.
Propagation loss	Power loss, in dB, due to the distance between transmitter and receiver.
Receiver Antenna Gain	Receiver's antenna gain, in dBi.
Receiver Visibility	True if the transmitter is visible from the receiver, false otherwise.

4.7.3.3.2. NMEA

Skydel can also log NMEA-style data. This data will look like the output of a receiver that has tracked the simulation. This can be useful for testing your post-processing tools, or for connecting Skydel to another device that accepts NMEA data. You may also specify the desired update rate at which data is logged.

Skydel uses GPS time (not UTC) in its NMEA output. Also, the altitude in the GGA sentence is based on the ellipsoid model, not the mean sea level.

4.7.3.3.3. Downlink

It is also possible to log downlink data. The downlink can be logged before message encoding, after, or both. For a message to be logged, the transmitting satellite has to be present.

The downlink format changes depending on the signal type.

For **BeiDou D1 and D2**, the encoding uses interleaving. Each word uses the following format:

GLONASS encoding uses hamming code. The format is: