

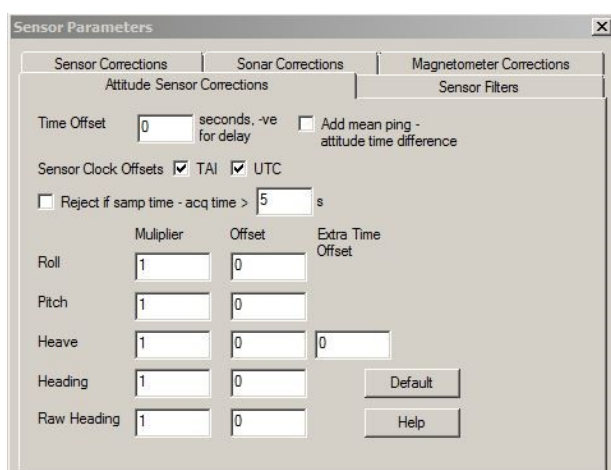


Technical Information

How to deal with the different clock systems in SWATH software?

Solution

Different motion sensors provide their time stamps in different clock systems such as GPS time, UTC [Coordinated Universal Time also called GMT (Greenwich Mean Time) or Zulu time] and TIA [Temps Atomique International]. You can set the time system that is used in Swath using "Configuration > Sensor Parameters > Attitude Sensor Corrections".



Offsets for TIA and UTC can be selected separately.

Those offsets are nearly fixed, and are defined in the swathproconfig.txt file:

- Aux TAItoUTCfixed -19 // The fixed difference between TAI and UTC,

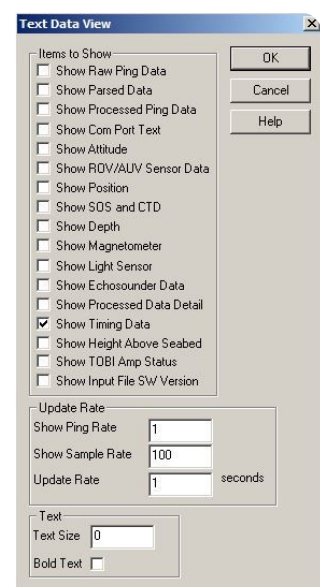
- Aux GPSleapSeconds -16 // Number of leap seconds between TAI and UTC (since 30 June 2012).

The GPS leap seconds value offset changes every few years (because the rotation of the Earth is slowing down, according to Wikipedia), and we update the swatproconfig.txt file when that happens. However, that offset might not be valid for re-processing old data, so you need to be careful with that, too.

You can check whether the offset is correct like this:

- Open a Text window: "Window > New Window > Text",

- Right click on the window to open its Properties dialog, and select Show Timing Data (Deselect the other data items, so that the timing data fits on the screen).



The time difference between the sonar ping time and the motion sensor attitude time is shown as "ping - att":

```

TIMING DATA
Time now      08:05:04.00800
Ping time     17:43:40.59700, now - ping 14:21:23.41100
Ping PC Time  17:43:40.59700
Ping Sonar time 17:43:40.59700, PC - Sonar 00:00:00.00000
Attitude time 17:43:40.74628, now - att 14:21:23.26172, ping - att -0.14928,
              mean -0.10368, after corr -0.14928
Attitude time - PC time -0.01272
Position time 17:43:40.74628, now - pos 14:21:23.26172, ping - pos -0.14928,
              mean -0.10368, after corr -0.14928
Position time - PC time -0.01272
Attitude time minus position time: 0.00000
    
```

The times used to calculate this difference are between the latest ping to be seen and the latest motion sensor data packet. So, we never expect to see a zero difference; if we are getting (for example) 10 pings a second and 50 attitude packets a second, then the time difference will be around $1/10 = 0.1$ seconds. If the UTC or TIA offsets are wrong, then you will see a difference of several seconds here. The example above was using an Applanix POS/MV sensor, which needs TIA but not UTC offsets applied to its time stamps. If UTC offset is applied to that data set, then the timing data in the text box is shown with an error close to 16s, the current UTC time offset:

```

TIMING DATA
Time now      08:05:04.00800
Ping time     17:43:40.59700, now - ping 14:21:23.41100
Ping PC Time  17:43:40.59700
Ping Sonar time 17:43:40.59700, PC - Sonar 00:00:00.00000
Attitude time 17:43:40.74628, now - att 14:21:23.26172, ping - att -0.14928,
              mean -0.10368, after corr -0.14928
Attitude time - PC time -0.01272
Position time 17:43:40.74628, now - pos 14:21:23.26172, ping - pos -0.14928,
              mean -0.10368, after corr -0.14928
Position time - PC time -0.01272
Attitude time minus position time: 0.00000
    
```

Conversely, if the TIA offset is disabled, then a time difference of 19s, the TIA offset, is seen:

```

TIMING DATA
Time now      08:11:44.00400
Ping time     17:43:54.81600, now - ping 14:27:49.18800
Ping PC Time  17:43:54.81600
Ping Sonar time 17:43:54.81600, PC - Sonar 00:00:00.00000
Attitude time 17:43:38.90622, now - att 14:28:05.09778, ping - att 15.90978,
              mean 15.88887, after corr 15.90978
Attitude time - PC time -5.99378
Position time 17:43:54.90622, now - pos 14:27:49.09777, ping - pos -0.09022,
              mean -0.11113, after corr -0.09022
    
```

For help on this subject, open the online help at the appropriate page by pressing the F1 key with the "Configuration > Sensor Parameters > Attitude Sensor Corrections" dialog open.

The motion sensor manufacturer may be able to give advice on the timing reference used.

You can also apply extra time offsets to the data in Swath:

- Motion sensor: "Configuration > Sensor Parameters > Attitude Sensor Corrections > Time Offset",
- SWATHplus: "Configuration > Sensor Parameters > Sonar Corrections > Time Offset".

In summary, different motion sensors use different time clocks, and TIA and/or UTC timing offsets may need to be applied.

The UTC timing offset changes as "leap seconds" are added; these can be entered into "swathproconfig.txt".

The motion sensor manufacturer may be able to advise on the timing offset that needs to be used, but it is often simpler to use the method above to work out what offset in seconds should be applied.

Remember that the time difference shown in the Text view is for the latest ping and attitude sensor to arrive, so we do not expect the difference to be zero. But it should be less than the time interval between pings, and much less than one second.

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