

## **Recommended Best Practices for Navigation Data Collection:**

Apart from any multiplexing or merging one might do between position time-series and other sensor data, ***GPS data should also be recorded in navigation-specific files.*** The GGA, ZDA, and DTM strings are the minimum required sentences specified by the International Electrotechnical Commission in IEC Publication 61162-1. For NMEA details, see <http://gpsd.berlios.de/NMEA.html>.

### **The following NMEA strings should be recorded *in the same file*:**

At least once per file, preferably at the start:

**DTM (geodetic reference datum)**

***At once-per-second or better resolution:***

**GGA (position and quality)** – has important quality info

**ZDA (date-time)** – holds date info

**VTG (course and speed)** – used to correct gravity

Optional – daily:

RMC (date-time/position) – for UNOLS/R2R Vessel Tracker

***Why standardize navigation data collection practices?*** Standardization makes it easier for others to re-use data, including R2R. Another goal is to ensure that navigation data quality is recorded.

***Why navigation-specific files?*** Saving navigation to a separate fileset preserves the original raw navigation data and avoids interpolation artifacts. Multiplexed or merged-data acquisition files follow no convention on how to record data: date-time formats, data order, and column delimiters all differ. Furthermore, if multiplexed or merged-data acquisition files are not being created, then there will be no record of navigation (the ship track), unless it is saved to a separate fileset.

***Why once-per-second or better?*** During the quality control process, bad positions are flagged. If positions are only recorded once-per-minute, one bad position results in a gap of two minutes. Interpolation errors will be minimized if navigation data is collected at the best available rate.