Rolling Deck To Repository (R2R)

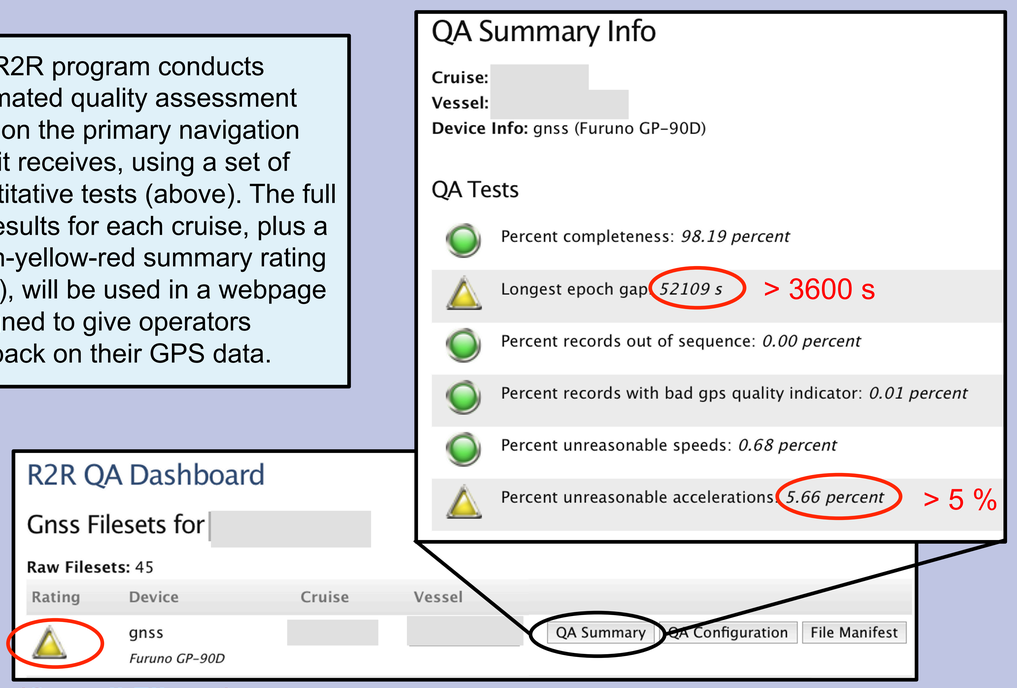
Aaron Sweeney (asweeney@ucsd.edu) and the R2R Team

Thresholds for Navigation Quality Assessment & Best Practices for Navigation Data Collection

Are these thresholds for Green/Yellow/Red appropriate?

Quality Test	Green	Yellow	Red
% completeness	>95%	75 - 95%	≤75%
Longest Gap	< 1 hr	1 - 24 hrs	≥ 24 hrs
% out of sequence	<5%	5 - 10%	≥10%
% with bad quality of fix	<5%	5 - 10%	≥10%
% unreasonable speeds	<5%	5 - 10%	≥10%
% unreasonable accelerations	<5%	5 - 10%	≥10%
Overall Fileset	If all results Green	Everything else	If one or more results Red

The R2R program conducts automated quality assessment (QA) on the primary navigation data it receives, using a set of quantitative tests (above). The full QA results for each cruise, plus a green-yellow-red summary rating (right), will be used in a webpage designed to give operators feedback on their GPS data.



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. Currently, out of 22 vessels evaluated thus far, 15 record GPS data in navigation-specific files, 10 record at the best time resolution of the GPS receiver, and 15 record raw GGA strings.

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.