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A comparison between iQuam and “external” in situ SST quality controls

In situ sea surface temperature (SST) measurements play a key role in satellite SST calibration/validation (Cal/Val) and data assimilation. Although in situ SSTs are generally considered more accurate than satellite retrievals and treated as “ground truth”, their quality, nonetheless, varies across different types of platforms and sensors, or may even change in time/space for a specific instrument. Proper quality control (QC) is needed before in situ measurements can be used with confidence. Currently, the In Situ Quality Monitoring system (iQuam) developed by NOAA in 2009 (<https://www.star.nesdis.noaa.gov/sod/sst/iquam/>; Xu and Ignatov, 2014) is widely used in the GHRSST community. The iQuam gathers in situ SSTs from many available data sources and applies a uniform QC to different datasets, to generate QC’ed data with iQuam quality flags (QFs) appended. At the same time, many providers of the data ingested as input in iQuam, e.g. ICOADS (International Comprehensive Ocean-Atmosphere Data Set) and IMOS (Integrated Marine Observing System), perform their own QCs and append their QFs to their products. These “external” QFs are also reported in iQuam files, side-by-side with the iQuam QFs. Based on limited (and undocumented) analyses, NOAA recommends using uniform QFs produced by iQuam, rather than “external” QFs. This study aims to perform more systematic analyses of the relative performance of iQuam QFs versus data–providers’ supplied QFs. A “confusion matrix” analysis is employed for each data source, to quantify the commonalities and differences. Ultimate objectives of this study are to better understand various QC algorithms, document their relative performance and merits, better inform iQuam users, and potentially improve iQuam QC in the future releases of this NOAA product.