Recent Improvement to the NOAA *i*Quam2 System

www.star.nesdis.noaa.gov/sod/sst/iquam/v2

Xinjia Zhou[1,2], Alexander Ignatov[1], Feng Xu[1,3,4] , Kai He[1,3]
[1]NOAA STAR [2]Colorado State University/CIRA [3]GST Inc. [4]Fudan University, China
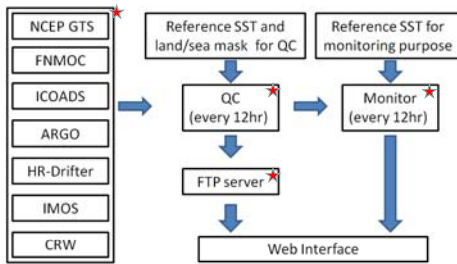
iQUAM2

Motivation and Objective

❑ NOAA is responsible for a wide range of satellite (polar and geo) and blended SST products, including swath (L2), gridded (L3) and L4 SSTs

❑ As a service to GHRSST, we evaluate various community SST products in the NOAA SQUAM www.star.nesdis.noaa.gov/sod/sst/squam/

❑ For consistent Cal/Val, common "*in situ* standard" is required which
- Covers full satellite era (from ~1981 – on)
- Includes all available high-quality *in situ* SSTs suitable for satellite Cal/Val (drifters, moorings, ARGO floats, ships)
- Uniformly processes all *in situ* data using state-of-the-art QC, consistent with wider communities such as UK MO, NCEP, ICOADS
- Provide data in community consensus, user friendly format, via web interface with minimal latency, to support NRT Cal/Val applications

❑ The *i*Quam was developed to initially support NOAA SST applications, but has evolved into a community GHRSST resource

Functionality and Data Flow

The *i*Quam is a web-based near-real time system. It performs 3 major functions
- Ingests various *in situ* SSTs, and performs a uniform Quality Control (QC)
- Monitors QCed *in situ* SSTs online
- Serves reformatted *in situ* SST data with quality flags appended

Enhancements in iQuam2 Beta2

❑ FNMOC dataset containing drifting and fixed buoy and ship SST reports in real-time has been added to improve stability of *i*Quam.

❑ 5-digit WMO IDs (call signs) have been uniformly converted to 7-digit IDs following www.wmo.int/pages/prog/amp/mmop/wmo-number-rules.html

❑ "Deployed ID" from NOAA AOML has been added. Note that in contrast with WMO ID, which continues to be reported in *i*Quam2b2 and which can be reused by WMO, the deployed ID (also termed at AOML "buoy identification number" or "Pkey") is unique for each buoy and not reused.

❑ Buoy manufacturer and drogue on/off information is added.

❑ In addition to monthly statistics available in iQuam1, and daily statistics added in *i*Quam2b1, the iQuam2b2 webpage now additionally displays hourly distribution, to help check for data gaps on a sub-diurnal time scale. Hourly density of *in situ* data is particularly important for creating match-ups with high temporal resolution geo SST data.

❑ **Output files in iQuam2b2 will slightly change compared to iQuam2b1**

Quality Control

| Category	Check	Type of error handled	Physical basis
Preprocessing	Duplicate Removal	Duplicates arise from multiple transmission or data set merging	Identical space/time/ID
Plausibility	Geo-location checks	Unreasonable Geolocation	Range of single fields & Relationships among them
Internal consistency	Tracking	Points falling out of track	Travel speed exceeds limit
	Spike check	Discontinuities in SST time series along track	SST gradient exceeds limit
External consistency	Reference Check	Measurements deviating far away from reference	Bayesian approach (Ref. SST: daily OI SST v2 and CMC 0.2)
Mutual consistency	Cross-platform Check	Mutual verification with nearby measurements ("buddies check")	Bayesian approach based on space/time correlation of SST field
Performance consistency	Performance history check	Bad performance of single platform ID	Outlier rate exceeds limit (50%) in single platform
Heritage quality flags	All the heritage QFs are preserved in iQuam2 output files, including ICOADS, ARGO Floats, HR-Drifters, IMOS Ship and CMS blacklist.		

Interface

Data missing on 1 May 2017 is captured in *i*Quam2b2
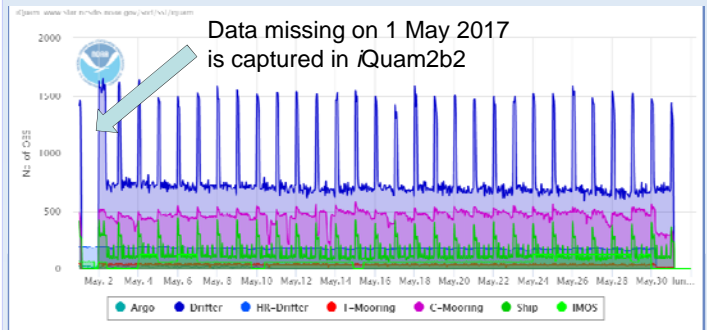
Fig. 1: Hourly distribution of number of observation.

NCEP GTS started losing part of 7 digits WMO IDs
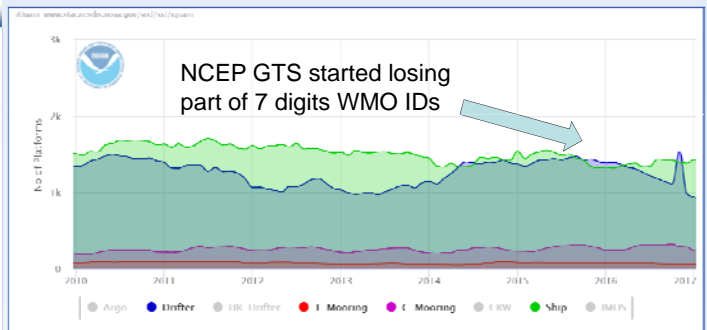
Fig. 2: Monthly *in situ* number of unique platform IDs from iQuam2 Beta1

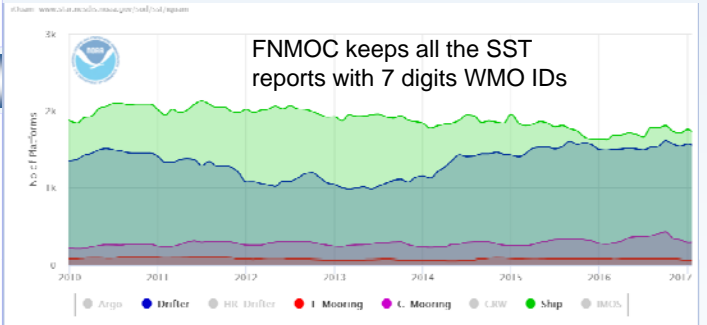FNMOC keeps all the SST reports with 7 digits WMO IDs

Fig. 3: Monthly *in situ* number of unique platform IDs in *i*Quam2 Beta2

Current Status and Future Work

❑ *i*Quam2 release has been delayed due to WMO's migration from Traditional Alphanumeric Code (TAC) to BUFR in Nov 2016, which resulted in a significant (order of magnitude) drop in number of NCEP GTS observations.

❑ Corrective measure has been taken by additionally ingesting FNMOC data

❑ Full data record of *i*Quam2b2 will be re-processed and released as "*i*Quam2" later in 2017.

❑ In the meantime, the *i*Quam2b1 will continue to run in parallel for users who are satisfied with GTS reports only.

❑ *i*Quam1 will have to be discontinued, due to the NOAA Reynolds analysis SST product migration.