ships4sst

shipborne radiometers for sea surface temperature

Standards and Protocols

Tim Nightingale

Introduction

- The ships4SST website contains two important documents to aid the collection and dissemination of *in situ* radiometric data
  - A data collection protocol
  - A data format

Protocols

- In situ radiometers generate fiducial skin SST datasets
- There are no “better” SST datasets to which the radiometer measurements can be tied, so radiometer users need to pay attention to all aspects of the measurement process to ensure traceability
- The protocols capture the practical steps necessary to implement traceable measurements
- Developed by members of the *in situ* radiometer community over the last several years to aid good practice in the collection of SST data, so that data users can be sure of its provenance and quality
- Available in several places including:
  - Donlon *et al*, 2014: Optical Radiometry for Ocean Climate Measurements, Academic Press, 47, 557 – 603.
  - “Protocols to maintain the SI traceability of shipborne radiometers” on the ships4SST website ships4sst.org

Summary of protocols

1. Document your SST measurement methodology
2. Document your calibration and verification methodology
3. Verify your instrument calibration ***before*** every deployment
4. Verify your instrument calibration ***after*** every deployment
5. Develop an uncertainty budget for your instrument
6. Verify the uncertainty budget, particularly by intercomparison with other instruments
7. Ensure that your documentation is accessible
8. Archive your data, following good data stewardship practices
9. Consolidate and update your methodologies as needed, based on your experience and that of others

An *in situ* SST data format

- Why specify a common data format for *in situ* radiometer SSTs (and possibly other *in situ* SSTs too)?
  - Unified access for users
  - Guaranteed presence of basic data fields
  - Can implement standards
  - Encourages best practice (e.g. QA4EO recommendations)
- Are there any relevant existing *in situ* product specifications?
  - Some, e.g. SAMOS (samos.coaps.fsu.edu), but limited flexibility and lack relevant data and metadata fields

The L2R format

- Borrows the structure of GHRSST SST products
  - NetCDF4
  - Follows Climate Forecast (CF) conventions
  - Implements the Attribute Convention for Data Discovery (ACDD)
  - Provides *in situ* radiometer data in a consistent format familiar to the GHRSST community

The Recommended ISRN L2R Data Specification

Version 1.1 Revision 0

Document Management			
Reference:	The Recommended ISRN L2R Data Specification v1.1 rev0.doc		
Version:	1.1	**Document Revision:**	0
Date of issue:	Monday, 02 October 2017		
Document type:	Microsoft Word [Compatibility Mode]		
BookCaptain:	Tim Nightingale		
Author:	International Shipborne Radiometer Network		
Master File Location:	**Approved on-line version:** TBD **Development versions in:** TBD		

Dataset content

- Global header containing summary metadata
  - Uses GDS v2.0 header (almost) without modification
  - One additional field to comply with the CF convention for trajectories
- Coordinate variable systems for measurement time series at a single location, along tracks, profiles…
  - Latitude, longitude, (depth), time
- Station variables
- Mandatory variables
  - SSTs, ***SST uncertainties***, quality indicators…
- Optional variables
  - Wind speed, platform speed, course, bearing…
- Experimental variables
  - Outline format and guidance

Mandatory Variables

time, lat, lon (, depth)

platform_name, platform_id

sea_surface_temperature

sst_total_uncertainty

sst_flags

quality_level

view_nadir_angle

Optional variables

```
sst_random_uncertainty
sst_systematic_uncertainty
julian_day
speed_over_ground
course_over_ground
speed_through_water
true_bearing
view_azimuth_angle
wind_speed
wind_direction
wind_speed_dtime_from_sst
sources_of_wind_speed
relative_wind_speed
relative_wind_direction
```

sst_flags

Bit	Common flags
0	0 if thermometric, 1 if radiometric
1	0 if night, 1 if day
2	Set if cloudy
3	Set if rain or spray detected
4	Set for an instrument exception
5	Set for a processing exception
6	Set if the platform speed is low
7	Set if the wind speed is low
8	Land proximity
9	(reserved)

Join us!

- Three instrument types now produce data in the L2R format:
  - ISAR
  - M-AERI
  - SISTeR (L3R)
- We’re also interested in historical records. Werenfrid may be able to help out with format translation if needed.