

Quality Control of Real-Time Ocean Data (QARTOD)

Ref www.ioos.noaa.gov/qartod/

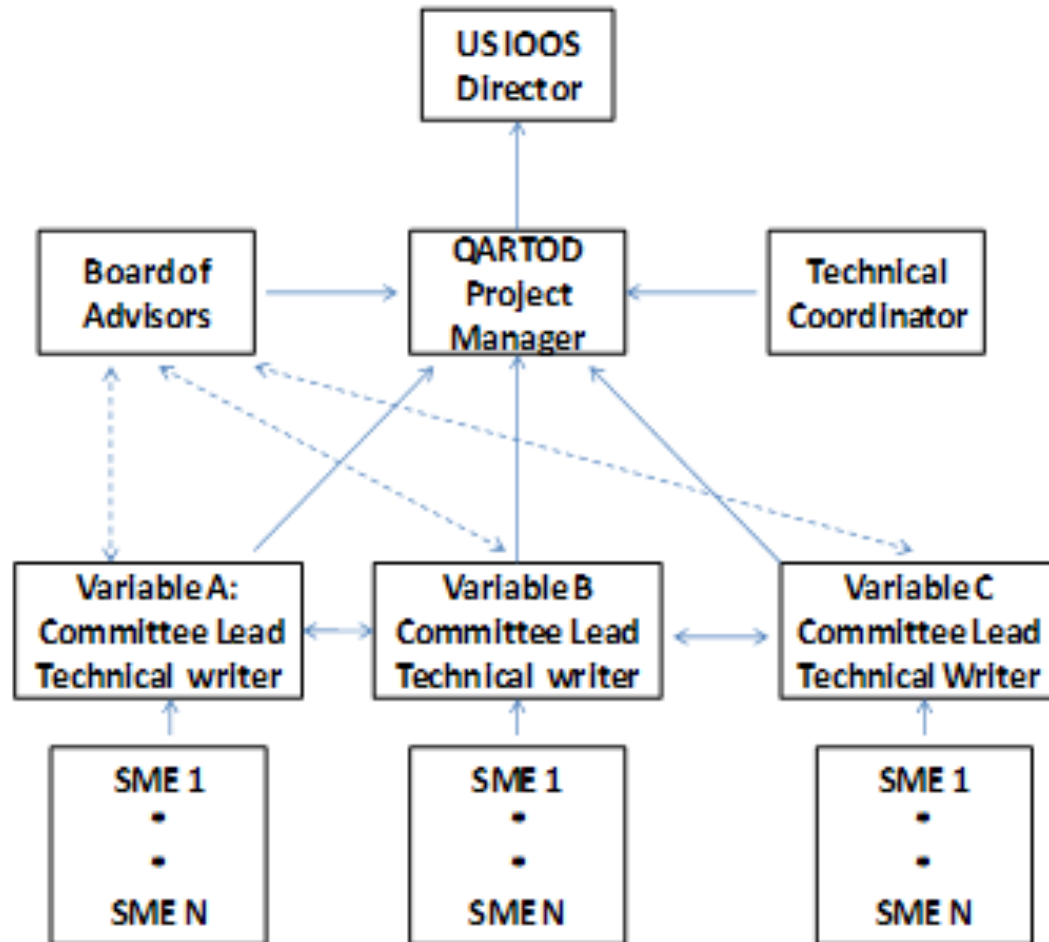
Presentation to the Ocean Optics
Protocols Workshop

10-25-2014

History

- 2003 -2009: an adhoc, grassroots effort; minutes but no deliverables
- Restarted in April, 2012 under US IOOS sponsorship
- Project plan and 26 US IOOS variable matrix and schedule posted at www.ioos.noaa.gov/qartod

Structure of QARTOD — Ref Feb 2012 Project Plan



QARTOD POCs

- Project Coordinator – Joe Swaykos, NDBC
- Technical Coordinator – Ray Toll, Old Dominion University
- Committee Lead – Mark Bushnell, retired NOAA CO-OPS
- Technical Writer – Helen Worthington (REMSA)

QARTOD Definitions

- Quality Control - focuses on the data stream that comes off the sensor.
- Quality Assurance - focuses on the hardware that provides the data stream.
- Real time - data are delivered without latency for immediate use; time series extends only backwards in time, where the next data point is not available; and there may be delays ranging from a few seconds to a few hours or even days, depending upon the data delivery capabilities

Comments

- Quality Control is the focus
- Offered Quality Assurance best practices in Appendix
 - Good QC requires good QA
- Objective is to provide implementable, codeable results
 - Note: threshold values in tests determined by data providers
- Try not to be overly prescriptive to enable Regional Expertise

QARTOD Manuals

- Focus on Coastal, Real Time
 - QC (with supported QA) down to the sensor
 - Excluded deep ocean deployments/post-processing
 - Community effort – best practices
- Chapter 3 – QC Tests; tables of implementable, codeable instructions – thresholds identified but values not assigned – regionally/seasonally dependent
- Appendix A – QA of sensors
- Each manual is considered dynamic and will be refreshed as technologies, community and science dictates

Process

(involves RA reps throughout)

- Board of Advisors meets quarterly to review progress and identifies next variables
- Each manual takes about 6-8 months
- Three full reviews w/ adjudication matrix
 - Month 1/2: standup committee – formal kickoff
 - Month 2/3: first draft with committee input and review
 - Month 3-5: Regional Association review/update manual
 - Month 5/6: NOAA/International/IOOC review
 - Month 7/8: Post manual: publish articles in MTS and affiliated society journals

QARTOD status

- Manuals posted
 - Dissolved Oxygen
 - Waves
 - Currents
 - Temperature and Salinity
 - Special report on Flags
 - Water level
 - Wind Speed & Direction
- Next manual: (Ocean Optics kickoff in Oct 2014)
- Nutrients scheduled for first quarter of April 2015
- LinkedIn: <http://www.linkedin.com/groups/QARTOD-2521409/about>

QARTOD Flags

Adopted IOC 54:V3 UNESCO 2013

1 Good Passed

2 Not evaluated (discouraged)

3 Questionable/suspect

4 Bad Failed

9 Missing data

1st QARTOD Data Management Law

“every real-time observation must be accompanied by a quality descriptor”

QARTOD and Certification

- QARTOD supports and informs certification to a degree
- QARTOD focuses on the data provider
- Certification focuses on the Regional Associations
- QARTOD recommends a framework that is not overly prescriptive but enables Regional expertise

Next Steps for Ocean Optics

- Form committee
- Identify extent of QC manual - what's included or excluded?
- Consider existing QC manual format, proposed alternative, others?
- Identify appropriate tests, provide threshold examples, draft QC manual
- Committee review, draft adjudication matrix

Next Steps for Ocean Optics (cont.)

- Submit manual for RA review
- Compile & address comments, edit manual
- Submit manual for international community review
- Compile & address comments, edit manual
- Submit final QC manual to IOOS for posting

Straw man

- Include optical characteristics, exclude causes of those characteristics

Technologies Included
<ul style="list-style-type: none">▪ In-Water Radiance▪ Above-Water Radiance▪ Beam attenuation▪ ?▪ ?

Technologies Excluded
<ul style="list-style-type: none">▪ Chlorophyll▪ CDOM▪ Phytoplankton species▪ Zooplankton abundance▪ Turbidity▪ PAR▪ Total suspended matter

- Platforms to include (moorings, gliders), exclude (satellites, planes)?
- Technologies to include? Vendor make & model descriptions

Straw man (cont.)

- Tests to include?

Group 1 <i>Required</i>	Test 1	Timing/Gap Test
	Test 2	Syntax Test
	Test 3	Location Test
	Test 4	Gross Range Test
	Test 5	Climatology Test
Group 2 <i>Strongly Recommended</i>	Test 6	Spike Test
	Test 7	Rate of Change Test
	Test 8	Flat Line Test
Group 3 <i>Suggested</i>	Test 9	Multi-Variate Test
	Test 10	Attenuated Signal Test
	Test 11	Neighbor Test

Straw man (cont.)

New for Ocean Optics?

- Different test groupings?
- Statement on policy re. data uncertainty?

Questions & discussion

Seven Data Management Laws

1. Every real-time observation distributed to the ocean community must be accompanied by a quality descriptor.
2. All observations should be subject to some level of automated real-time quality test.
3. Quality flags and quality test descriptions must be sufficiently described in the accompanying metadata.
4. Observers should independently verify or calibrate a sensor before deployment.
5. Observers should describe their method/calibration accuracy in the real-time metadata.
6. Observers should quantify the level of calibration accuracy and the associated expected error bounds.
7. Manual checks on the automated procedures, the real-time data collected and the status of the observing system must be provided by the observer on a time scale appropriate to ensure the integrity of the observing system.