

Overview

- 1. Team Structure & Responsibilities
- 2. Data Flow & Products
- 3. Data Review
- 4. Communications
- 5. Improvements
- 6. Conclusions









First in Class Reviews: Jan-Aug 2016

- One example of each stream (ingestion completed by Systems team)
- Data Review of 1207 (467 science) streams completed in August
- Tested parsers, algorithms, ingestion, asset management and data product creation

	WBS	Task Name	%	Duration	Start	Finish
	•	•	.omplet(*	•	•	*
299	1.5.1	Data Ingestion	62%	130 days	Wed 1/20/16	Tue 7/19/16
300	1.5.1.1	First In Class for Cassandra Team	88%	62 days	Mon 1/25/16	Tue 4/19/16
301	1.5.1.1.1	Pioneer Coastal Glider, CP05MOAS-GL388	100%	8 days	Mon 1/25/16	Wed 2/3/16
308	1.5.1.1.2	Pioneer Central Inshore Profiler Mooring, CP02PMCI	100%	8 days	Thu 1/28/16	Mon 2/8/16
315	1.5.1.1.3	Endurance OR Offshore Surface Mooring - CE09OSSM	100%	30 days	Fri 1/29/16	Thu 3/10/16
322	1.5.1.1.4		84%	46 days	Thu 1/28/16	Thu 3/31/16
329	1.5.1.1.5	€ Cabled Slope Base Shallow Profiler Mooring - RS01SBPS	100%	43 days	Thu 1/28/16	Mon 3/28/16
336	1.5.1.1.6	Cabled Slope Base Deep Profiler Mooring - SRS01SBPD	100%	31 days	Fri 1/29/16	Fri 3/11/16
343	1.5.1.1.7	Irminger Sea Apex Surface Mooring, GI01SUMO	100%	36.95 days	Tue 2/2/16	Wed 3/23/16
350	1.5.1.1.8	Irminger Sea Apex Profiler Mooring (GI02HYPM)	100%	33.5 days	Tue 2/2/16	Fri 3/18/16
357	1.5.1.1.9	֎ Irminger Sea Flanking Subsurface Mooring A (GI03FLMA)	63%	33 days	Wed 2/3/16	Fri 3/18/16
364	1.5.1.1.10	֎ Irminger Global Open Ocean Glider (GIO5MOAS-GL)	100%	19.33 days	Wed 2/3/16	Tue 3/1/16
371	1.5.1.1.11	Irminger Global Profiling Gliders (GI05MOAS-PG)	100%	31.5 days	Thu 2/4/16	Fri 3/18/16
378	1.5.1.1.12	Coastal Endurance OR Inshore Surface Piercing Profiler Mooring (CE01ISSP)	100%	30.5 days	Fri 2/5/16	Fri 3/18/16
385	1.5.1.1.13	Coastal Endurance OR offshore BEP - CE04OSBP	31%	30 days	Wed 2/10/16	Tue 3/22/16
392	1.5.1.1.14	Cabled Seafloor Instruments	0%	12 days	Mon 4/4/16	Tue 4/19/16

	WBS	Task Name	%	Duration	Start	Finish
	-	•	Complet(*	*	-	-
418	1.5.2	Data Verification & Validation	28%	255 davs	Wed 2/10/16	Tue 1/31/17
419	1.5.2.1	First in Class	39%	123 days	Tue 3/1/16	Thu 8/18/16
420	1.5.2.1.1	Pioneer Coastal Glider, CP05MOAS-GL388	95%	34 days	Tue 3/1/16	Fri 4/15/16
421	1.5.2.1.2	Endurance OR Offshore Surface Mooring - CE09OSSM	70%	30 days	Fri 3/4/16	Thu 4/14/16
422	1.5.2.1.3	Pioneer Upstream Inshore Profiler Mooring, CP02PN	42%	31.8 days	Fri 3/18/16	Mon 5/2/16
423	1.5.2.1.4	Cabled Slope Base Deep Profiler Mooring - RS01SBPI	0%	20 days	Tue 6/7/16	Mon 7/4/16
424	1.5.2.1.5	Cabled Slope Base Low Power Jbox - RS01SLBS-LJ01A	0%	27 days	Fri 4/29/16	Mon 6/6/16
425	1.5.2.1.6	Cabled Slope Base Shallow Profiler Mooring - RS01SI	75%	33 days	Tue 3/15/16	Thu 4/28/16
426	1.5.2.1.7	Irminger Sea Apex Profiler Mooring (GI02HYPM)	100%	20 days	Fri 3/25/16	Thu 4/21/16
427	1.5.2.1.8	Irminger Global Open Ocean Glider (GIO5MOAS-GL)	0%	3 days	Fri 4/22/16	Tue 4/26/16
428	1.5.2.1.9	Irminger Sea Flanking Subsurface Mooring A (GI03FL	0%	18 days	Wed 4/27/16	Fri 5/20/16
429	1.5.2.1.10	Irminger Global Profiling Gliders (GI05MOAS-PG)	0%	5 days	Mon 5/23/16	Fri 5/27/16
430	1.5.2.1.11	Irminger (Or other global) Sea Apex Surface Mooring	40%	74 days	Mon 3/14/16	Thu 6/23/16
431	1.5.2.1.12	Coastal Endurance OR Inshore Surface Piercing Profi	0%	8 days	Fri 6/24/16	Tue 7/5/16
432	1.5.2.1.13	Coastal Endurance OR offshore BEP - CE04OSBP	0%	22 days	Fri 7/8/16	Mon 8/8/16
433	1.5.2.1.14	Cabled Axial Seamount Central Caldera Med Power J	0%	10 days	Fri 7/8/16	Thu 7/21/16
434	1.5.2.1.15	Cabled Seafloor Instruments	0%	20 days	Fri 7/22/16	Thu 8/18/16
435	1.5.2.1.16	AUVs	0%	6 days	Tue 8/9/16	Tue 8/16/16
436	1.5.2.2	HAGU Oceans Data Prep (THREDDS & GUI) - Reasonability	100%	30 days	Wed 2/10/16	Tue 3/22/16







Raw Data Status: Cabled & Endurance

100



Cabled

Endurance



CE05MOAS Gliders

delivered



*Small subset of instruments are recovered only, need to be loaded

100

100

May 2017 OOIFB Meeting



QC Database: Higher Resolution Statistics



Data availability*:	T/S	<u>R</u>
Cabled	67	21
Endurance	64	53
Globals	47	56
Pioneer	77	50

Total: 57% T/S, 50% R

*Some products are not expected due to platform loss, some recent deployments need ingestion





Data Annotation

- Annotations are the primary means of communication between data team and users
- Annotations can be directly entered via the GUI for specified data streams
- Annotation text appears in a tab on the data catalog/plotting page
- Annotation time ranges can be shown on plots (via "Options" interface)
- Annotations also included in downloaded data

Data Navigation	Plotting		Events		Annotations	
w Additional Parameters						
ed Axial Seamount Axial Base Seafloor - Low-Power JBox (LJ0	3A) - CTD strea	med-ctdpf-optode-sample	ХҮ	🛗 August 22, 201	4 - November 30, 2016 -	
ə, UTC		•				
nity Corrected Dissolved Oxygen Concentration, Umol/Kg		•		Plot Type:	X-Y -	
				Plot Style:	Scatter -	
ck To Add Another Parameter Input				Orientation:	Horizontal	
				Options:	Show Annotations	
				QAQC:	Global Range	í í
	Plot		•		Data are decimated. Maximum of 10	000 points sh
Ca	Piot bled Axial Seamount Axial Bas	GRAPH e Seafloor – Low-Power _ CTD	JBox (LJ03A)	- CTD	Data are decimated. Maximum of 10	00 points sh
Ca	Piot bled Axial Seamount Axial Bas	GRAPH e Seafloor – Low-Power CTD	JBox (LJO3A)	- CTD	Data are decimated. Maximum of 10	00 points sh
Ca 150	Piot bled Axial Seamount Axial Bas	graph e Seafloor – Low-Power CTD	JBox (LJO3A)	- CTD	Data are decimated. Maximum of 10	000 points sh
Ca 750	Piet bled Axial Seamount Axial Bas	GRAPH e Seafloor - Low-Power CTD	JBox (LJO3A)	- CTD	Data are declimated. Maximum of 10	000 points sh
Ca 750	Piot bled Axial Seamount Axial Bas	GRAPH e Seafloor – Low-Power CTD	jBox (LJO3A)	- CTD	Data are decimated. Maximum of 10	00 points shi
Ca 750 150	Piot bled Axial Seamount Axial Bas	GRAPH e Seafloor – Low-Power CTD	(Box (LJO3A)	- CTD	Data are decimated. Maximum of 10	000 points she

Annotation ID	Annotation	Reference Designator	Stream Name	Start Date	End Date	Exclude Data?
0	These data are suspect, possibly due to incorrect vendor calibration values. Raw phase data should be correct, but the derived O2 products should not be used from 7/12/16 onwards.	RS03AXBS-LJ03A- 12-CTDPFB301	streamed_ctdpf- optode-sample	Tue, 12 Jul 2016 00:00:00 GMT	Thu, 01 Dec 2016 23:41:00 GMT	false





Current Rest in Class Reviews

Process:

- Check all deployments for presence & absence of all parameters
- Check science parameters for reasonableness
- Problem? Deep dive, report in Redmine, track, give feedback, check fixes, create annotations in QC Database

Challenge:

- Automated tools, Redmine questions, Cal sheets, raw data repository, modify ingest CSVs, testing UI fixes
- Upload and ingestion of data
- Delivery and archiving of Cruise Data
- Quality Assurance vs. Quality Control

Expediting the Solution:

 Populate QC database to automatically check for presence/ absence, gaps > 1 day, NaNs, negative values

- 1. Asset Management (MIOs & Data Team)
- Complete?
- Correct?
- 2. Data Delivery & Ingestion (MIOs, Systems, Data Team)
- Includes Cruise Data
- 3. Data Review
- Availability
- Quality

4. Investigate Gaps and QC failures

5. Communicate Issues (Annotation)





Rest in Class Data Review Workflow







Automated Scripting Tools

• parse_spring_files:

Used to parse data into an easy to use lookup table that routes each spring file to its proper uframe_route and driver

• check_ooi_nc:

This toolbox is used by the OOI Data Review Team at Rutgers University in order to check netCDF files for accuracy

• plot-nc-ooi:

Python script used to plot OOI netCDF datasets

ooi-parameters-dict:

A repository containing a dictionary of streams and corresponding science parameters

• list_omc:

Used to check updates to Raw Data directory (data team only; password protected)









OOI Automated QC Procedures

- 6 automated QC algorithms can produce 7 flags (including logical "or" which combines flags) which are plottable and are included in downloaded files
- Coded based on specifications written by OOI Project Scientists, derived from QARTOD manuals and other observatory experiences
- Algorithms refer to "lookup tables" assembled by OOI Project Scientists with input from subject matter experts: <u>https://github.com/ooi-integration/qc-lookup</u>
- 1. Global Range Test
- 2. Local Range Test
- 3. Spike Test
- 4. Stuck Value Test
- 5. Trend Test
- 6. Temporal Gradient Test
- 7. Spatial Gradient Test (Profile)







QARTOD/OOI QC Comparison

OOI Test	OOI Description	QARTOD Equivalent	QARTOD Recommendation (from manuals)	Notes
Global Range Test	Data are flagged unless they fall within valid world ocean ranges or instrument limits	Gross Range	Only considers manufacturer-defined sensor and calibration limits	Different tests, different names. Currently operational.
Spike Test	Deviation from mean compared to 2*N neighboring points	Spike	N=1, default threshold is based on the rate of change distribution from previous data sets	Roughly identical, same nomenclature. Currently operational.
Stuck Value Test	If 2 neighboring values differ by less than the resolution of the sensor for more than N repetitions, data are flagged	Stuck Sensor	Manual suggests 3 consecutive points for a stuck sensor suspect flag and 5 for a fail flag.	QARTOD manual suggestion may be too low for well-mixed portions of the water column. Under evaluation.
Local Range Test	Data are flagged unless they fall within locally valid site-specific or depth ranges. Interpolates thresholds between depth and season intervals	Local Range	Starts with constant limits for each depth/ season interval	Roughly identical, same nomenclature. OOI Local ranges are still being established.
Gradient Test	If d(data)/d(t) > a set threshold, following points fail until one falls within limit (TOLDAT). First data point assumed good unless "good" starting data (STARTDAT) point is defined.	Rate of Change	QARTOD recommends two neighboring points and does not incorporate TOLDAT or STARTDAT values.	Different tests, different names. Under Evaluation, not operational
Trend Test	Data flagged as having trend if the SD of the residuals to a polynomial curve < original data, multiplied by a factor. Test for sensor drift	N/A	No QARTOD equivalent	OOI only. Under Evaluation, not operational





QC Challenges & Solutions

- Local range values need statistical analysis of environmental data for each platform
 - Need to work with SOC to analyze and apply ranges and test algorithm
- Trend test may not work as designed, because it requires the system to compare data prior to the user request date – *analysis ongoing*
- Gradient test is complicated to apply, requires 2D dataset *analysis ongoing*
- Spike test is currently very simple needs tweaking to avoid false positives/negatives (especially in biological data) and to work with certain data types
- Not all QC algorithms apply to all data products *ongoing review with SOC*
- The QC algorithms do NOT trigger alerts in the system *Alerts/alarms only trigger when new data is telemetered/streamed*
 - Can set alerts on L1/L2 data streams based on Global/Local range values





Rest in Class Data Status Categories

Status	Description	QARTOD Code	QARTOD Description	Color
NOT_OPERATIONAL	Instrument not functional (no data expected)		Not operational	
NOT_AVAILABLE	Instrument functional, data lost in transmission	9	Missing data	
PENDING_INGEST	Instrument functional, data exists, Awaiting ingest			
NOT_EVALUATED	Instrument functional, data exists, Awaiting evaluation	2	Not evaluated, not available or unknown	
SUSPECT	Instrument functional, data exists and either failed a QC test or does not reflect environmental conditions	3	Questionable/suspect	
FAIL	Instrument functional, data exists but is known to be bad due to known instrument or calibration error	4	Bad	
PASS	Instrument functional, data exists, passed QC tests, is complete and looks reasonable	1	Good	
GOOD	Instrument functional, data exists, passed QC tests, is complete and has undergone validation with shipboard datasets and reached the highest level of QC that the OOI can provide			





Reviews and Reporting

Quality Timeline



Annotation Text

Level	Deployment	StartTime	EndTime	Annotation	Status	Redmine#
ctdbp_no_sample	D00001	2014-08-15T00:12:00Z	2014-08-25T18:50:41Z		NOT_AVAILABLE	
ctdbp_no_sample	D00001	2014-08-31T19:13:27Z	2014-09-22T22:42:44Z		NOT_AVAILABLE	
ctdbp_no_sample	D00001	2014-11-04T16:05:51Z	2014-11-05T18:56:20Z		NOT_AVAILABLE	
ctdbp_no_sample	D00001	2014-11-14T18:36:38Z	2014-11-17T18:03:22Z		NOT_AVAILABLE	
CE04OSBP		2014-12-07T19:45:00Z	2014-12-16T00:00:00Z	PFE down. HVPS1 MOV explosion, 800A breaker tripped, investigation and restoration		12264
ctdbp_no_sample	D00001	2014-12-07T20:59:40Z	2014-12-16T22:29:37Z		NOT_AVAILABLE	
ctdbp_no_sample	D00001	2014-12-16T23:44:08Z	2014-12-29T20:30:01Z		NOT_AVAILABLE	
CE04OSBP		2015-01-07T07:32:00Z	2015-01-07T08:06:00Z	PNWGP Portland <-> Seattle outage		12264
CE04OSBP		2015-01-31T00:00:00Z	2015-02-04T00:00:00Z	Intermittent partial data loss due to storage drive problems at OTB		12264
ctdbp_no_sample	D00001	2015-01-31T23:59:59Z	2015-02-03T09:56:15Z		NOT_AVAILABLE	
ctdbp_no_sample	D00001	2015-03-03T02:16:22Z	2015-03-06T19:57:13Z		NOT_AVAILABLE	
ctdbp_no_sample	D00001	2015-03-06T19:58:48Z	2015-08-02T00:00:00Z		NOT_AVAILABLE	
CE04OSBP		2015-03-21T14:10:00Z	2015-03-22T04:20:00Z	PNWGP outage due to City of Seattle fiber cable work		12264
CE04OSBP		2015-06-13T00:00:00Z	2015-06-15T16:30:00Z	Network issues due to fire that damaged fibers between Portland and Seattle		12264
practical_salinity	D00002	2015-08-12T01:00:00Z	2015-08-14T02:00:00Z	Unusual drop in conductivity values.	SUSPECT	
density	D00002	2015-08-12T01:00:00Z	2015-08-14T02:00:00Z	Unusual drop in conductivity values.	SUSPECT	
ctdbp_no_seawater_conductivity	D00002	2015-08-12T01:00:00Z	2015-08-14T02:00:00Z	Unusual drop in conductivity values.	SUSPECT	
dissolved_oxygen	D00002	2015-08-12T01:00:00Z	2015-08-14T02:00:00Z	Unusual drop in conductivity values.	SUSPECT	
conductivity	D00002	2015-08-12T01:00:00Z	2015-08-14T02:00:00Z	Unusual drop in conductivity values.	SUSPECT	
CE04OSBP		2015-08-29T00:00:00Z	2015-08-29T00:30:00Z	Outage during major utility power failure in Seattle		12264
CE04OSBP		2016-01-07T06:10:00Z	2016-01-07T06:52:00Z	Four 1-minute outages between Portland and Seattle due to maintenance		12264
CE04OSBP		2016-03-10T23:06:00Z	2016-03-11T09:30:00Z	Fiber break between Portland and Seattle		12264
CE04OSBP		2016-05-20T16:33:00Z	2016-05-20T18:04:00Z	Fiber break between Portland and Pacific City		12264
CE04OSBP		2016-07-12T02:53:00Z	2016-07-12T03:51:00Z	Unexplained loss of power at Pittock Building in Portland		12264
ctdbp_no_sample	D00002	2016-07-18T00:42:58Z	2016-07-19T21:06:56Z		NOT_AVAILABLE	
ctdbp_no_sample	D00003	2016-07-22T22:50:00Z	2016-07-25T19:51:39Z		NOT_AVAILABLE	
CE04OSBP		2016-12-17T18:00:00Z	2016-12-17T19:00:00Z	Corvalis data center lost power		12264
CE04OSBP		2016-12-22T01:50:00Z	2016-12-23T12:44:00Z	Fiber break in Portland due to train crash		12264
CE04OSBP		2017-01-08T19:58:00Z	2017-01-08T21:41:00Z	Network outage during major Seattle utility power failure		12264
ctdbp_no_sample	D00003	2017-01-09T18:30:53Z	2017-01-11T01:16:53Z		NOT_AVAILABLE	
CE04OSBP		2017-01-09T18:32:00Z	2017-01-09T21:30:00Z	Lightning strike in Pacific City led to data interruption through isolation of both cable lines from shore station equipment.	NOT_OPERATIONAL	11776
CE04OSBP		2017-02-07T13:00:00Z	2017-02-07T15:00:00Z	Outage during PNWGP 1-hour router-maintenance		12264
ctdbp_no_sample	D00003	2017-02-15T14:43:05Z	2017-02-16T22:27:12Z		NOT_AVAILABLE	
CE04OSBP		2017-02-15T14:43:06Z	2017-02-15T17:16:00Z	On Wednesday, February 15, power to the North and South cable	NOT_OPERATIONAL	11998





QC Database Tool

- Used for reference & statistics
- Includes status information
- Includes testing/review capability
- Annotation
- http://ooi.visualocean.net

	Data Tear	n					Arrays	Instruments	classes	Cruises	Reference -	Sign Ir
Arrays / / C	E02SHBP-L	_J01D-06-CTE	DBPN106 / stream	med / ctdbp_no_	sample							
Data Strea	m Repo	ort								001	Site Page 🗗 Da	ata Portal 🗹
Instrument Reference Desig N S	Name C gnator Cl Method str Stream ct	TD E02SHBP-LJC reamed dbp_no_samp)1D-06-CTDBPN1	06	Ufram	ne Route Driver Parser ent Type	seabir Sciene	rd.sbe16plus_v	2.ctdbp_no.driv	er		
Data Availabi from 9/10/2014 3:	ility Plot :43:00 PM to 5	5/11/2017 5:15:	30 PM									
(October	2015 /	April July	October	2016 Apr	ril	luly	October	2017 Apr	il		
Deployments												
Cassandra												
Annotations 30 Annotations Metadata	Param S Start Date	End Date	Comment									
X CE02SHBP-	9/10/14,	9/25/14,	Exact cause of c	lata gap at begin	nning of deploym	ent currer	tly unkn	own. Most likely	due to testing	as the instru	ument was comi	ng online.
LJ01D-06- CTDBPN106 Status: NOT_AVAILABLE Deployment: 1 Method: streamed Stream: ctdbp_no_sample	3:43 PM	6:17 PM	Todo: check: dif By friedrich, on 3/2	ference between 9/17	n data begin and	deployme	nt begin	date is: 15 day	s 02:34:58			
CE02SHBP-	9/25/14, 6:17 PM	11/4/14, 4 [.] 05 PM	Todo: check: ev	aluate paramete	rs							







Post-Cruise/Post-Deployment Checklist

- Part of Rest-in-Class review: vital annotation information, as well as data delivery to users
- Used as a pre-cruise and postcruise check on shipboard data and documentation
- Also useful to determine % completeness of data delivery
- Can enter notes or indicate whether completion is blocked by delivery of a dataset or document

Cruise Review for NBP16-10

Ship Name	R/V Nathaniel B. Palmer
Cruise Start Date	11/25/16, 12:00 AM
Cruise End Date	12/12/16, 12:00 AM
Notes	Southern Ocean 3 (rvdata) - need to update dates when
	Quick Look cruise report is available

 Reviewer
 Igarzio

 eview Status
 Blocked

 Modified
 2 weeks, 5 days ago

Cruise Information

Item	MIO Submission Date	Data Team Review Date
Cruise Plan	4/6/17	n/a
Bulk Load Sheets	11/16/16	12/13/16
Calibration Sheets	11/16/16	12/13/16
Deployment Sheets	11/16/16	12/13/16
Cruise Info Sheet	11/16/16	12/13/16
Quick Look Report		n/a
Cruise Report		n/a
Cruise Photos		n/a

Data Ingestion

Raw Data (telemetered/streamed)	1/1/17
Raw Data (recovered)	4/6/17
Ingest Sheets (telemetered/streamed)	2/2/17
Ingest Sheets (recovered)	4/6/17
Live Ingestion Started	4/10/17
Recovered Data Ingested	
Cruise Review Summary	
None	

Cruise Data

None

Water Sampling Data	
rater earlphilg bata	
Water Sampling Data - Carbon	
Water Sampling Data - Chl	
Water Sampling Data - Nutrients	
Water Sampling Data - Salt	
Water Sampling Data - Oxygen	



Deliverables

- Data Availability Reports
 - $_{\odot}$ (% completeness, streams/parameters reported, particles in the system)
- Data Quality Reports
- Redmine reporting

 Issues found, investigations, and Help Desk open/closed
- Deep dive investigation reports
- Annotations (to users)
- Download statistics
- Forum statistics (TBD)







Options for Data Review Acceleration

Option	Positive	Negative
MIO Operations Log at Rutgers	 Centralized log reduces time spent investigating issues All issues entered consistently 	Takes time to maintainSome development time
Speed up ingestion	Fewer gaps to investigate	Currently requires FTEAutomated process not yet delivered
Data Team works only on RIC	More data reviewed faster	 No new data in system No bug investigation No QA testing
Limit reviewed time period or stream type	 Data reviewed slightly faster, at high level 	 Review enhanced by looking at multiple deployments and trends Slows down future reviews
Limit thoroughness of reviews	Data reviewed faster, at high level	 Unclear why gaps exist Quality issues not fully annotated Slows down future reviews Limits crowdsourcing options
Crowdsourcing (enlist volunteer SMEs)	 Removes subset of datasets from review queue Assistance with complex data that requires expertise 	 Focus on specific interest, not whole of OOI Steep learning curve for advanced use of system (and knowledge of known issues) Pathway to triage and incorporate feedback
Add employees or Data Assembly Center (DAC)	Data reviewed faster, in depthSupport for expert analysis	Requires additional fundingSetup and maintenance time



Data Evaluation Daily Activities



- Review the end-to-end operational status of online instruments and investigate any outages (e.g. instrument, telemetry, parsing, or ingestion failures).
- Review the operational status of other data archives (raw, cruise, ERDDAP)
- Look into and resolve new system alerts
- Follow up on any issue requests from users (via Redmine)
- Add annotations to notify users of operational status changes





Daily Review Workflow







Periodic Data Team Activities

- Meet with MIOs to discuss operational issues and data quality
- Instrument, stream, parameter and deployment completeness
- Conduct deep dives on datasets to review availability and quality
- Review & annotate full deployment data to assess data quality
- Develop new scripts, plotting tools, and quality checks
- Produce reports on the availability and quality of datasets
- Review appropriateness of QC flags
- Ensure asset, deployment, calibration, and ingestion configurations have been updated, and reports posted following every cruise
- Prototype and test new user interface and visualization features







Data assurance/Data quality: *Pre and Post comparisons*



