OCEAN OBSERVATORIES INITIATIVE

Coastal & Global Scale Nodes (CGSN) Data & QA/QC Activities

October 13, 2020

Sheri N. White, Al Plueddemann, Andrew Reed, Peter Brickley, Stephanie Petillo

Jennifer Batryn, Dan Bogorff, Collin Dobson, James Kuo, John Lund, Allen Smith, Rebecca Travis

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CGSN Data Team

Data Team Leads

- **Sheri N. White** – Data Team Lead
- **Al Plueddemann** – PI/PS
- **Andrew Reed** – Data Science Manager QA/QC*

*** Full-Time Data Team members**

~2 ¼ FTE effort on Data Activities in PYII

Data Team Support

- **Peter Brickley** – Operations
- **Stephanie Petillo** – Software
- **Jennifer Batryn** – Instrumentation
- **Allen Smith** – Instrumentation
- **Collin Dobson** – Operations, gliders
- **James Kuo** – Subsurface Moorings
- **John Lund** – Subsurface Moorings
- **Dan Bogorff** – Subsurface Moorings
- **Rebecca Travis** – Config. Management

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NSF

CGSN Data Team Responsibilities

- **Asset/Metadata Management**
  - Entering required metadata (calibration, deployment info) into OOINet
  - Organizing, cataloging and posting shipboard and water sampling data
- **Data Ingestion/Availability**
  - Ingesting/re-ingesting data into OOINet
  - Ensuring data flow from platform to shore to science users
  - Supporting OOI data distribution to other data providers
- **Data QC**
  - Identifying/resolving issues with instruments/data
  - Implementing automated and HITL (Human In The Loop) data QC
- **Annotation/Communications**
  - Annotating data in OOINet for instrument/data issues, metadata changes

CGSN Asset Management

- Continuing to use our improved asset management processes
  - Double-review all updates/additions in WHOIGit/ooicgsn-asset-management fork
    - Using automated code when possible to generate calibration CSVs
  - Push to OceanObservatories/asset-management repository

- In PYII of OOI 2.0 – **891** files added or updated
  - New instrument calibrations
  - Metadata updates
  - Cruises – Pioneer 13, 13a, 13b; Southern Ocean 6; Irminger 7; Pioneer 14, 14a, 14b, 14c; Papa 7a and other glider recoveries

Roundabout Asset & Metadata Tracking

CGSN supported development of **RDB** as Asset & Metadata Tracking Tool

- **Roundabout CI** Status:

  In PYII

  - Completed definition of requirements, supported by CI and all MIOs.
  - 42% of overall development tasks completed as planned.

  In PYIII

  - ECR-489, approved by NSF, re-allocated PYII underruns to Roundabout CI PYIII budget.
  - Remaining 58% of development tasks to be completed by end of Mar 2021, followed by final implementation support.

CGSN Metadata Review

Calibration CSVs

- **2802** calibration files reviewed (over **30,000** individual coefficients)
- **14%** data affecting changes

Deploy CSVs

- **151** Mooring deployments (over **3,000** lines of instruments/components)
- **178** Glider/AUV deployments
- **7%** were data affecting changes

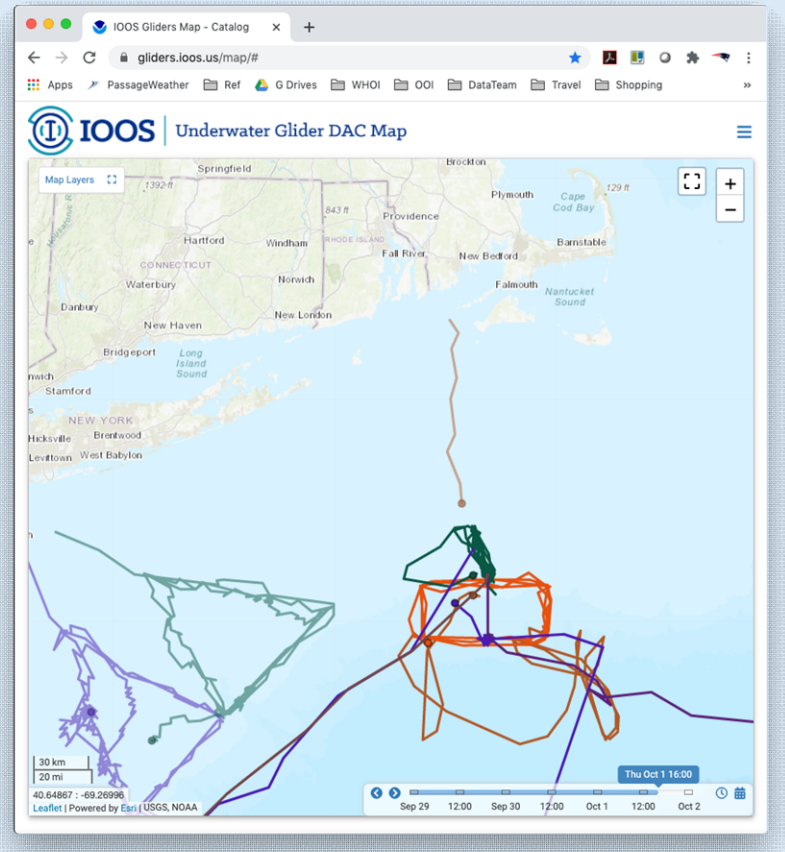
- All data reviewed and updated
- Data effecting changes presented in the OOI Metadata Widget

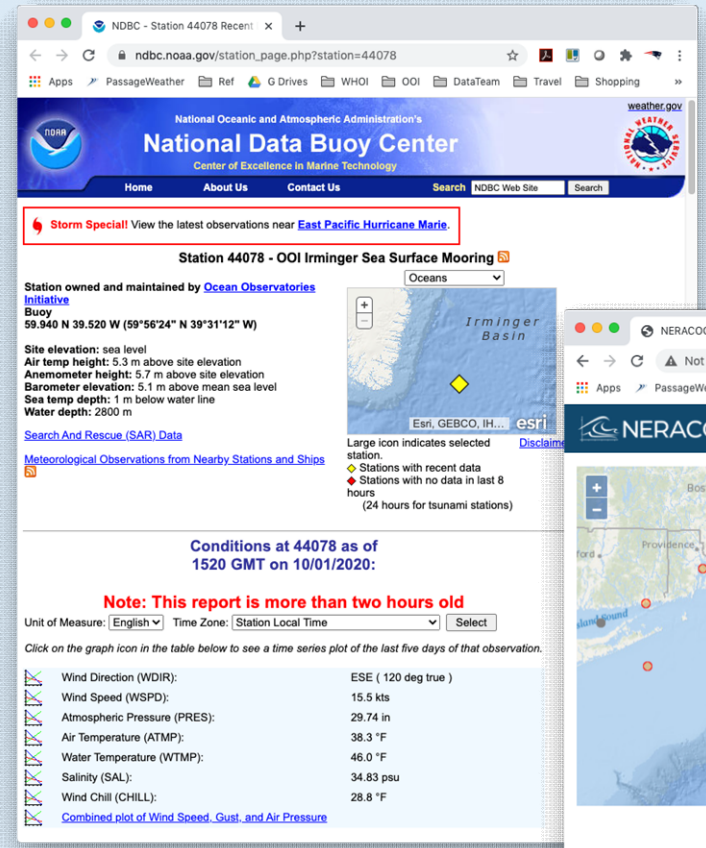
- Final step is clean up of bulk load and CruiseInformation CSVs

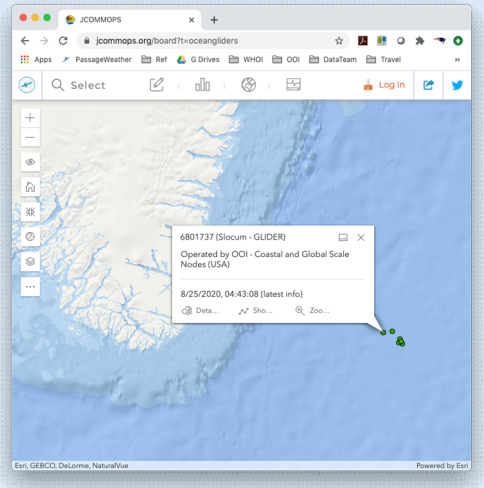
CGSN Data Ingestions/Availability

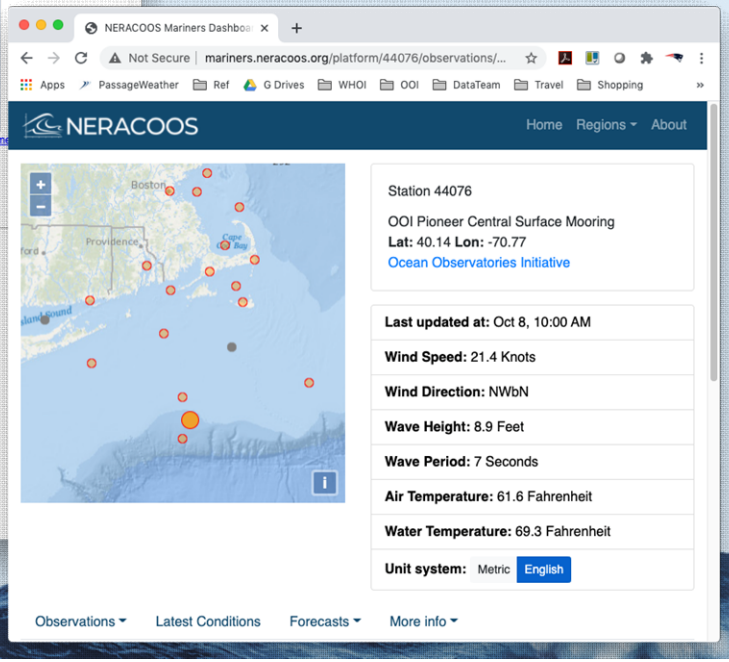
- **Data ingestions**
  - OOI 2.0 PYII data ingestions:
    - **~1,500** new ingestions and **~3,000** re-ingestions to address issues and missing data
- **Data availability/distribution**
  - Continuous operational review of data within OOINet, OMS++
  - Distributing glider data to **IOOS Glider DAC**
    - **165** Pioneer and Global deployments identified for the Glider DAC
    - Active deployments have been pushed since May 2020
    - Working backwards for older deployments (**~20** submitted to date)
    - Also in **OceanOPS** (formerly **JCOMMOPS**) part of **GOOS**
  - Distributing Surface Mooring METBK and WAVSS data to **NDBC**
    - Also in **NERACOOS**

CGSN Data Ingestions/Availability









CGSN Data QC

Operations and Data Monitoring

- Continuing formal weekly CGSN operations review & CGSN Data Team meetings
- Implemented CGSN Incident Tracking document
  - Track infrastructure & instrument issues to closure, generate statistics on types/sources of issues

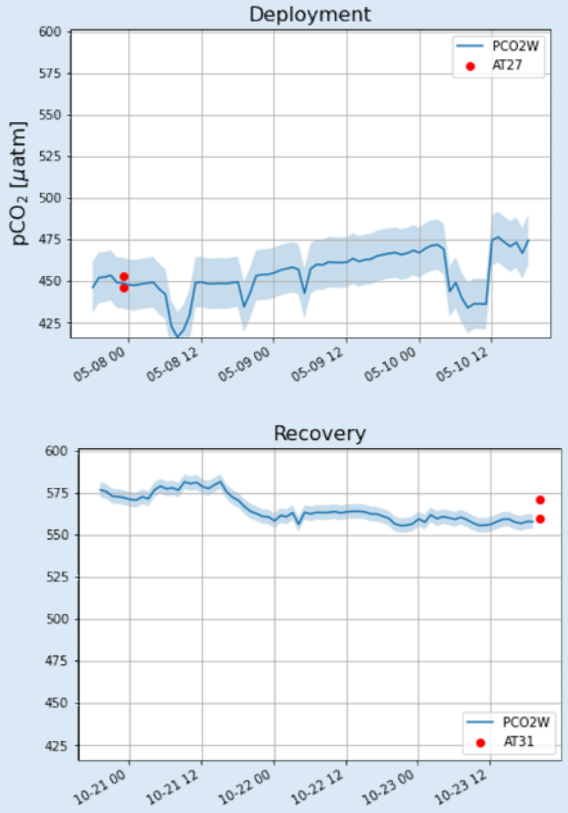
- Working high-nail issues – common failures, Redmine tickets assigned to CGSN:
  - Helpdesk tickets from Science Users (**41** CG Redmine tickets closed out in PYII)
  - Operations & Hardware tickets generated internally (**62** CG tickets closed out in PYII)

- Implemented regular CGSN Data QC meetings for discussing tasking and prioritization of deeper data dive efforts

CGSN Data QC

- Assessing data quality to support Instrument Tech Refresh Efforts
  - Supported PHSEN analysis (started by EA)
    - Evaluated data quality via gross range test and noisiness
    - Identified instrument failure modes and vendor issues
    - Conducted a deep dive and bottle data comparison at Irminger
  - Begun implementation of same analysis for PCO2W
    - Deep dive and bottle data comparison
    - Downloaded all PCO2W data to identify data gaps and evaluate data quality

CP01CNSM MFN PCO2W
Deployment 3



CGSN Data QC

QARTOD

- **CTD instrument-class** – supporting implementation by QARTOD Working Group
  - **Gross Range Test (GRT): 100% of tasks complete**, In production.
  - **Climatology Test (CT): 100% of tasks complete**, In production. MIOs will perform one final test to ensure all actions were completed during handover from Raytheon.
  - **Timing & Gap Tests:** Agreed on OOI specific philosophy for Timing & Gap tests. Software development on hold pending completion of priority CI tasks.
    - **Timing Test** would be applied on an instrument level to provide operator with indication of functioning instruments; verifies receipt of data at expected intervals.
    - **Gap Test** would be applied to telemetered & recovered data to locate gaps in data, test sampling rate.

- Next focus is on increasing the number of instruments available for GRT and CT testing. Proposed prioritization of instruments, to be reviewed by PI/PS, will mirror the Tech Refresh priority list.

CGSN Data QC

OOI 1.0 Data Review

- **1497** issues identified with CGSN platforms
- All issues to be categorized as:
  - **Known – Fixed**
    - A number of issues were already resolved by the Critical Metadata Review and other ongoing work of the data team
  - **Known – In Progress**
    - A number of issues have been identified in Redmine and are in the process of being addressed (e.g., pressure issues and glider data issues)
  - **Unknown – To Be Addressed**
    - Some items were not yet identified and will be addressed
- We are addressing these issues as we come to them through the course of our work, and as we have time to delve in to new issues.

CGSN Annotations/Communications

- Annotations are generated as a result of Data Team efforts
  - Monitoring operations of platforms, and data quality of instruments
  - Redmine tickets and 1.0 Data Review

- Number of annotations created or updated in OOI 2.0 PYII
  - **146** operational annotations created/updated
  - **227** data annotations created/updated

- Communicate data changes via various other methods as well
  - Notices on the Ocean Observatories Initiative website
  - Data-affecting changes are added to the **OOI Metadata Widget**
  - Raw Data Repository is annotated using `00ReadMe.txt` files

CGSN PYII Accomplishments

- Attended OOI Data Team Workshop at WHOI in January 2020
- Supported OOI booth at Ocean Sciences 2020 in February 2020

- Successful Asset Management updates and Data Ingestion for:
  - Pioneer 13, 13a, 13b; Southern Ocean 6; Irminger 7; Pioneer 14, 14a, 14b, 14c; Papa 7a and other glider recoveries
- Completed Critical Metadata Review for all data affecting issues
  - Consolidated CGSN metadata changes for implementation of the OOI Metadata Widget

- Distributed data to other repositories
  - Submitting CGSN Glider data to IOOS Glider DAC
  - Submitting CGSN Surface Mooring data to NDBC

CGSN PYII Accomplishments, cont.

- Participated in cross-MIO Working Groups to address specific issues
  - **QARTOD** – Supported implementation of QARTOD tests for CTDs
  - **Keryx** – Supported implementation OOI Data Explorer by Axiom
  - **RDB** – Generated cross-MIO requirements and began implementation of RDB as the OOI Asset & Metadata Tracking system
  - **Pre-Load** – Supported review and update of parameter units, definitions and terminology
  - **Raw Data Repo Re-organization** – Determined the scope of work and mechanism to track progress
  - **Ticketing Re-organization** – Restructuring Redmine for use throughout OOI
  - **DPS** – Supported updates to Data Product Specifications (PCO2W, ADCP, PAR)
  - **ADCP** – Supported development and implementation of new calibration CSV format for inductive ADCPs, and addressed other issues [Work completed and WG disbanded]
  - **ZPLSC/G** – Supporting development of ZPLSC/G echogram generation code and other data issues
  - **Pressure** – Supporting solution to Profiler and other pressure issues

CGSN PYII Accomplishments, cont.

- Reviewed all shipboard and water sampling data, and updated for standard filenames
  - Identified and posted missing data/files; reviewed/corrected digitized CTD logs
  - Discrete Sampling Summary Spreadsheets completed for Irminger 1-6

- Redmine Issues
  - **125** CGSN-related Redmine tickets closed out in PYII across all Redmine projects
  - Supported efforts to correct Lat/Lon issues with Glider data

- Supported re-organization of OOI GitHub repositories into a common organization

CGSN Path Forward

- Continue weekly OOI & CGSN meetings to identify work and prioritize tasking
- Contribute to the evolution of OMS++ system to improve mooring and data monitoring (alerts & alarms, data visualization)
- Support Roundabout development for Asset & Metadata Tracking
- Increase number of historical Glider deployments in the IOOS Glider DAC
- Expand Surface Mooring data delivery to NDBC (more variables)
- Support implementation of QARTOD for prioritized instruments
- Continue to address science user Helpdesk questions
- Deliver an initial set of discrete water sampling Summary Spreadsheets per the approved common format to science users
- Support Tech Refresh with data analysis for prioritized instruments
- Add 1 FTE to support data operations/monitoring and OMS++

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Questions?

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