Coastal & Global Scale Nodes (CGSN) Operational Status

May 13, 2020

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CGSN Status: Pioneer

COVID-19 impacts in red

Operations: Moorings

- **ISSM**: MFN power conservation due to wind turbine damage.
- **OSSM**: MFN shutdown following electrical short in riser.
- **CNSM**: Initial MFN shutdown due to power controller (PSC) issues, now resolved and MFN functional.
- All CSM telemetry swapped over to commercial Iridium service.
- All profiler moorings have halted collection of data due to a vendor firmware issue. Remote intervention is not possible. Firmware solutions have been provided by vendor for next turn.
- Up to date on ingestion of available telemetered & recovered data.

Operations: Mobile Assets

- 4 of 5 planned gliders in the field, healthy and on track lines
- Glider data gaps possible due to delays in refurb operations and delayed or canceled cruises.
- AUV cruises on hold due to COVID-19.

Refurbishment

- All moorings completed refurbishment for Pioneer 14.
- Integration and burn-in delayed due to COVID-19.

Cruise

- Planning for limited Pioneer-14 cruise, 7-17 June.
- Ongoing risk assessment and cruise planning activities.
- Focus on Profiler Moorings only.

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CGSN Status: Irminger Sea
COVID-19 impacts in red

**Operations: Moorings**
- GSM: One wind turbine damaged; VELPT, plus IMM PHSENs and PCO2s have failed.
- HYPM, FLMA, FLMB fully operational.
- GSM telemetry swapped over to commercial Iridium service.
- Up to date on ingestion of available telemetered and recovered data

**Operations: Mobile Assets**
- 2 of 3 planned gliders in the field, includes Biological Carbon Pump (BCP: Nicholsen/Pavelsky) glider
- BCP Glider went adrift due to bladder issue, recovered May 7th.
- Glider 560 lost, experienced battery depletion, potentially due to faulty harness.
- Glider data gaps possible due to delays in refurb operations and delayed or canceled cruises.

**Refurbishment**
- All material and instrumentation available for Irminger 7
- Integration delayed, planned start: May 18, 2020.

**Cruise**
- Ports revised to WHOI-WHOI
- Ongoing risk assessment to determine:
  - Re-start of mooring integration and burn-in
  - Recommendation on conducting the cruise

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**CGSN Status: Station Papa**

**COVID-19 impacts in red**

### Operations: Moorings
- All subsurface moorings in operation
- Upper WFP on HYPM failed to inductive comms failed; data will be recovered next turn.
- Up to date on ingestion of available telemetered and recovered data
- Expect data gaps starting Sept/Oct 2020 from HYPM, and in mid to late 2021 from FLMs

### Operations: Mobile Assets
- 2 of 3 planned gliders in the field
- Glider 537, 575 transiting to US West Coast along Line P for recovery.
- Glider data gaps due to delays in refurb operations and cruise cancelation.

### Refurbishment
- Refurbishment halted due to COVID-19.
- Available instrumentation re-assigned to Irminger to mitigate vendor delays.

### Cruise
- Recommendation to cancel 2020 Papa 8 cruise on RV Sikuliaq. Considered highest risk to personnel and lowest risk to infrastructure.
## CGSN Status: Southern Ocean

### Operations
- Successfully completed final recovery of Southern Ocean surface mooring Jan 2020.
- No planned deployments going forward.
- Up to date on ingestion of available telemetered and recovered data.

### Refurbishment
- Received approval for southern hemisphere sparing plan.
- Southern Ocean and Argentine Basin moorings and vehicles will be used to supplement Papa, Irminger and Coastal arrays.

### Cruise
- OOI operations were Surface mooring recovery only.
- Final shipments from Punta Arenas received in April 2020.
Infrastructure & Instrumentation: Last 6 Months

- Six-month surface (SM) & profiler mooring (PM) status
- Actively managing moorings based on regular data checks and weekly review of all operational data
- Implemented incident tracking document
- Includes:
  - Instrument assessment
  - Infrastructure health
  - Risks to infrastructure such as storm events
  - Actions and potential interventions
Technical Developments & Reviews

• **Stretch hose design and production:**
  • New stretch hose termination
    • Eliminate urethane potting, revise conductor bundle, decrease refurb costs
  • Alternate stretch hose manufacturer
    • Modern facility with ISO standards should increase build quality
    • Successfully completed test build of stretch hoses in April

• **Telemetry Service changes:**
  • Successfully swapped over from Fleet Broadband telemetry to commercial Iridium service for all deployed moorings April 1st
  • Commercial Iridium service will be replaced by DISA cards during next mooring turn.
  • Inability to conduct Pioneer (possibly Irminger) CSM turn due to COVID-19 will result in increased cost.
Technical Developments & Reviews

• **Ongoing power systems review and actions:**
  • Sourced higher reliability boards for Power System Controller (PSC)

• Obtained and tested higher efficiency solar panels for Pioneer and EA.
  • New panels generate more power in shaded conditions
  • Test panels were previously deployed on Pioneer and Endurance (one mooring each)
  • Planned full deployment on next Endurance cruise

• Investigation of increased battery capacity
  • Surface Moorings: Increase number of AGM (absorbent glass mat) lead acid batteries within existing well.
    • Reviewing well design, hydrogen risk and mitigations for surface moorings
  • Profiler Moorings: Engaging vendor on Lithium rechargeable batteries for buoys
    • Reviewing mechanical/electrical changes needed to accommodate
Technical Developments & Reviews

• Ongoing Tech Refresh activities for Instruments:

  • FDCHP: Ongoing evaluation and improvements
    • Recent deployments (Irminger in 2019, Fall Pioneer 2019) updated to correct on-board calculations so that the telemetered flux data are useable.

  • METBK: Implementing upgrade to new CPU board
    • Tested on Pioneer, being implemented for PRC modules

  • ZPLSC: New transducer
    • Should mitigate failures experienced in prior deployments
    • Phased implementation plan; initial purchases during PY2
Technical Developments & Reviews

• **Glider Review, Feb 2020:**
  • Overview of glider operations & performance since 2017 review.
  • Presented options for expanding glider fleet to meet data delivery expectations.
  • Waiting on panel report and recommendations.

• **MFN Review, June 2020:**
  • Currently preparing operations and performance review.
  • To include mechanical and electrical design, failure modes, and overall performance.
  • Will include recommendations for path forward.
Summary COVID-19 impacts

• Cruise impacts:
  • Pioneer spring turn: reduced scope, profiler moorings only
  • Irminger annual turn: planning underway for full turn, priority is surface mooring
  • Papa annual turn: recommended cancelation

• Data delivery impacts:
  • Pioneer CPMs offline April-June; Pioneer CSMs limited through the summer
  • Pioneer Spring AUV missions canceled
  • Papa HYPM and FLM data gaps expected (starting Sep/Oct 2020)
  • Papa gliders diverted from Array in April 2020
  • Pioneer, Irminger and Papa glider data gaps due to refurb delays and cruise delays

• Financial impacts:
  • Re-allocating cruise-related budget to other activities/impacts through ECR process
  • Additional costs for cruises not canceled: quarantine, cleaning, testing, transits
  • Additional costs for non-DISA Iridium data telemetry
  • Potential for additional vehicle recovery costs and/or lost vehicles
Community Engagement

• Over 40 specific activities listed in Q1 and Q2 reports

• Ocean Sciences 2020:
  • Talk in Sustained Observing session; contributions to other talks and posters
  • Assisted with OOI Booth and OOIFB Town Hall

• Engagement with Researchers:
  • Assisted researchers with data access and interpretation
  • Assisted researchers with proposal preparation
  • Engaged SME researchers in data evaluation (PC02A, ZPLSC, FDCHP, OPTAA)
Community Engagement

• **Data Distribution:**
  - IOOS Glider DAC – active Pioneer gliders now available, will continue to populate
  - NDBC – preparing for delivery of Pioneer surface buoy data
  - Water sample analyses – ongoing effort to standardize protocols and reporting

• **Other Activities:**
  - Talks on OOI program and tours of OOI facilities
  - Facilitated ancillary activities on cruises (eliminated due to COVID-19)
  - Reviewed and edited website and social media content
  - Assisted WHOI with Burke Innovation Awards for OOI data analysis
Community Engagement

• **Pioneer relocation assessment:**
  - Next formal step is NSF sponsored workshop in Spring 2021
  - CGSN working towards TDP to support the workshop, target Feb 2021

• **Science highlights:**
  - Recent publications from Pioneer and Southern Ocean highlighted in quarterly reports
  - Pioneer: Community responding to changes in storm tracks, marine heat waves, Gulf Stream ring population, salinity intrusions.
  - Irminger: Continuing engagement with OSNAP PIs, interest in surface flux time series and water column profiling provided by OOI.
  - Papa: Interest in the Pacific Warm Blob, subsurface profile data available from OOI in conjunction with surface forcing from NOAA buoy.
Questions?
CGSN Operations

- **Refurb/Mechanical:** Kris Newhall
- **Electrical:** John Reine
- **Software:** Stephanie Petillo
- **Instruments:** Jennifer Batryn
- **System Engineering & Data Team Lead:** Sheri White
- **Data QA/QC:** Andrew Reed
- **Documentation/Config. Management:** Rebecca Travis
- **Platform Operations:** Peter Brickley
- **Logistics:** Dee Emrich