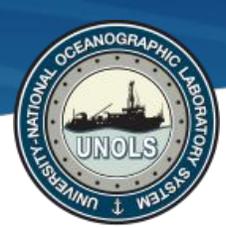# RCRV Program: CORIOLIX / Datapresence

2020 UNOLS Meeting Webinar Series: Instrumentation & Data Facilities
Monday October 19th, 2020

Introduction

This presentation will provide background on the datapresence components of the RCRV project.

I intend to convey, with examples from the **Instrumentation & Data Facilities** problem space, that the RCRV project is:

1. **Delivering –** a robust research platform with a <u>comprehensive</u> suite of instrumentation
2. **Forward looking –** in key areas like <u>remote access</u> and participation, & <u>shoreside support</u>
3. **Working toward consistent outcomes** – through <u>engagement/alignment</u> with:
   - ARF support partners (R2R, SAMOS, MAC, HSN, UHDAS)
   - Regional data providers & operators of research infrastructure (OOI)
   - others (NASA, NOAA)
4. **Continuously improving** – working with our Operating Institution partners
   - live deployments: *Oceanus, Endeavor*, and *Point Sur*

The Regional Class Research Vessel Project
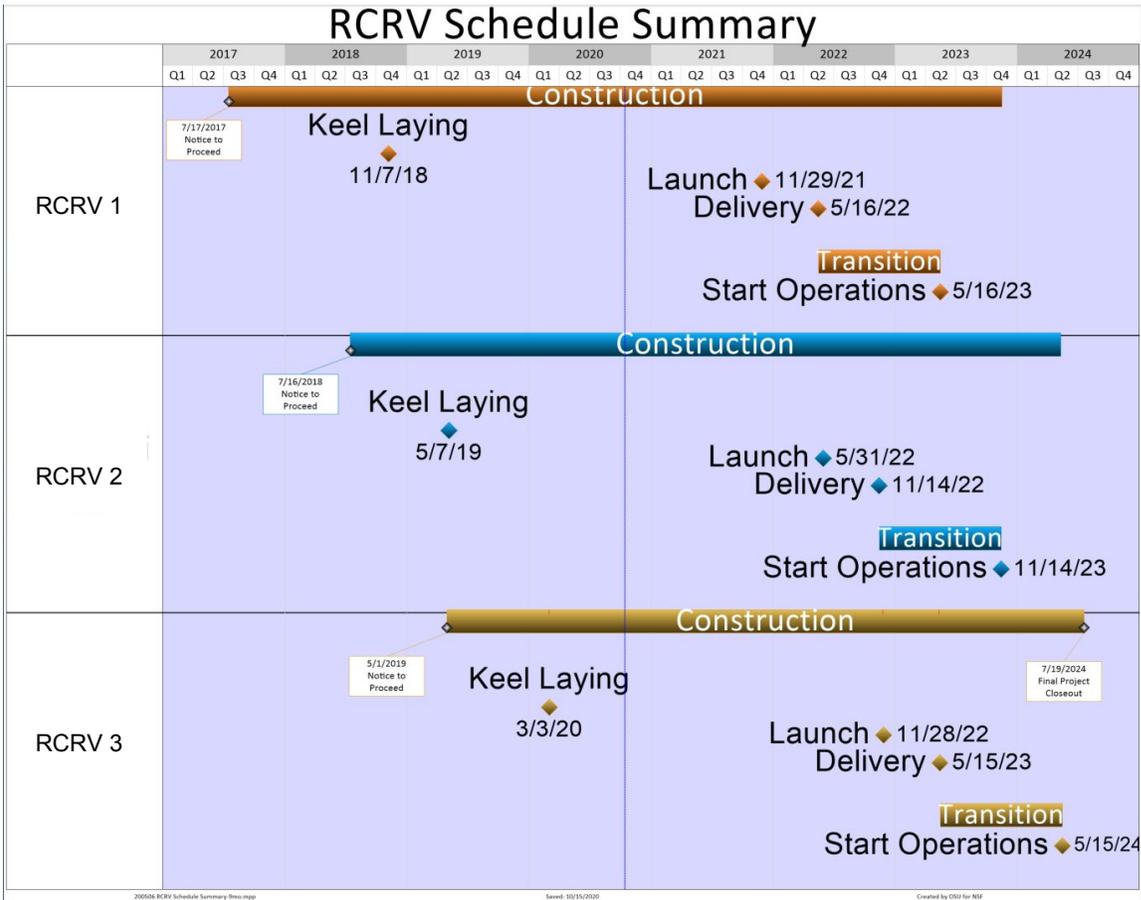
RCRV Transition to Ops Coordinator, Daryl Swensen will provide a thorough update on the RCRV project on 11/4/20

Project Sponsor: NSF
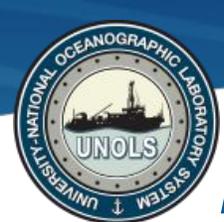**Project Management:** OSU
Design: Glosten
Shipyard: Gulf Island Shipyard, Houma, LA
OI1: Oregon State University
OI2: East Coast Oceanographic Consortium
OI3: Gulf Coast Oceanographic Consortium

RCRV – Datapresence & Engineering Support Center Staff

Your design, construction, transition, and operations support team

Katie Watkins-Brandt
Sensor Systems Engineer

Joined the project: 2011
Developed the underway sensor suite design, specification & procurement
Excels at instrument configuration, installation, maintenance, & procedures

Jasmine Nahorniak
Assistant Datapresence Systems Engineer

Joined the project: 2015
Lead CORIOLIX developer
Wide ranging skill set - from data management to UI design

Chris Romsos   Datapresence
Systems Engineer

Joined the project: 2015
Lead for Datapresence and RCRV Cyberinfrastructure
Background – marine geology, fisheries, geographic info systems

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Our Mission

Primary Responsibility: To develop **and** deliver datapresence capabilities for RCRV

Datapresence Defined: The suite of technologies that enable remote data interactions

 – **DATAPRESENCE** = **Data** (shipboard observations) + **Presence** (remote participation)

Datapresence Provides:

 – *Mitigation of resource limits* – remote participation mitigates berthing & computing limits

CORIOLIX Provides:

 – *Planning tools* - inherit from UNOLS pre-cruise planner, provide route & waypoint planning

 – *Situational awareness (from ship & shore)* - view current status of instrumentation, subscribe to receive conditional alerts, view cruise data in geospatial context

 – *Streamlined workflows* - integrate event logging, provide both data services & UI access

 – *Outreach pipeline* - provide contextual numeric information to the classroom

 – *Maintenance & Management* - sensor history, notification & tracking, data quality

Supporting Technology: Instrumentation

Present in the ARF & New RCRV instrumentation

Flowthrough
- TSG (SBE-45 w/SBE-38 remote temp.)
- Transmissometer (C-Star)
- Fluorometer (WETStar)
- pCO$_2$ (Apollo SciTech AS-P3)
- Dissolved Oxygen (SBE-43)
- Nitrate (SUNA V2)

MET/Atmospheric
- Weather Stations (PTU300 & WXT 536)
- 2D Anemometers x2
- Pyranometers x2 (SMP-21)
- Pyrgeometers x2 (SGR-4)
- PAR x2 (QSR and QCR)
- Rain Gauge (50202)
- Atmospheric Gases (G2401)

CTD
- CTD Profiler (911plus with dual temperature & conductivity cells)
- Fluorometer (ECO-FL-RTD)
- pH (SBE-18)
- Dissolved Oxygen (SBE-43)
- PAR x2 (QSP and QCP)
- Altimeter (VA-500)

- Hyperspectral Radiometer (HyperOCR)
- Custom CTD Frame

Acoustic & Other
- Wave Radar (WaMos)
- Fisheries Sonar Suite (EK-80)
- 12kHz x2 (Airmar/Knudsen)
- ADCP- 75kHz (Sentinel V)
- ADCP- 300kHz (Ocean Surveyor)
- Shallow Multibeam (EM2040)
- Deep Multibeam (EM304)
- Hydrophone x4 (DT-513F)
- Sound Velocity Probe (SVP-70)
- XBT (Sippican
- USBL (TBD)
- Sub-bottom p
- Inspection Cl

PS-18)
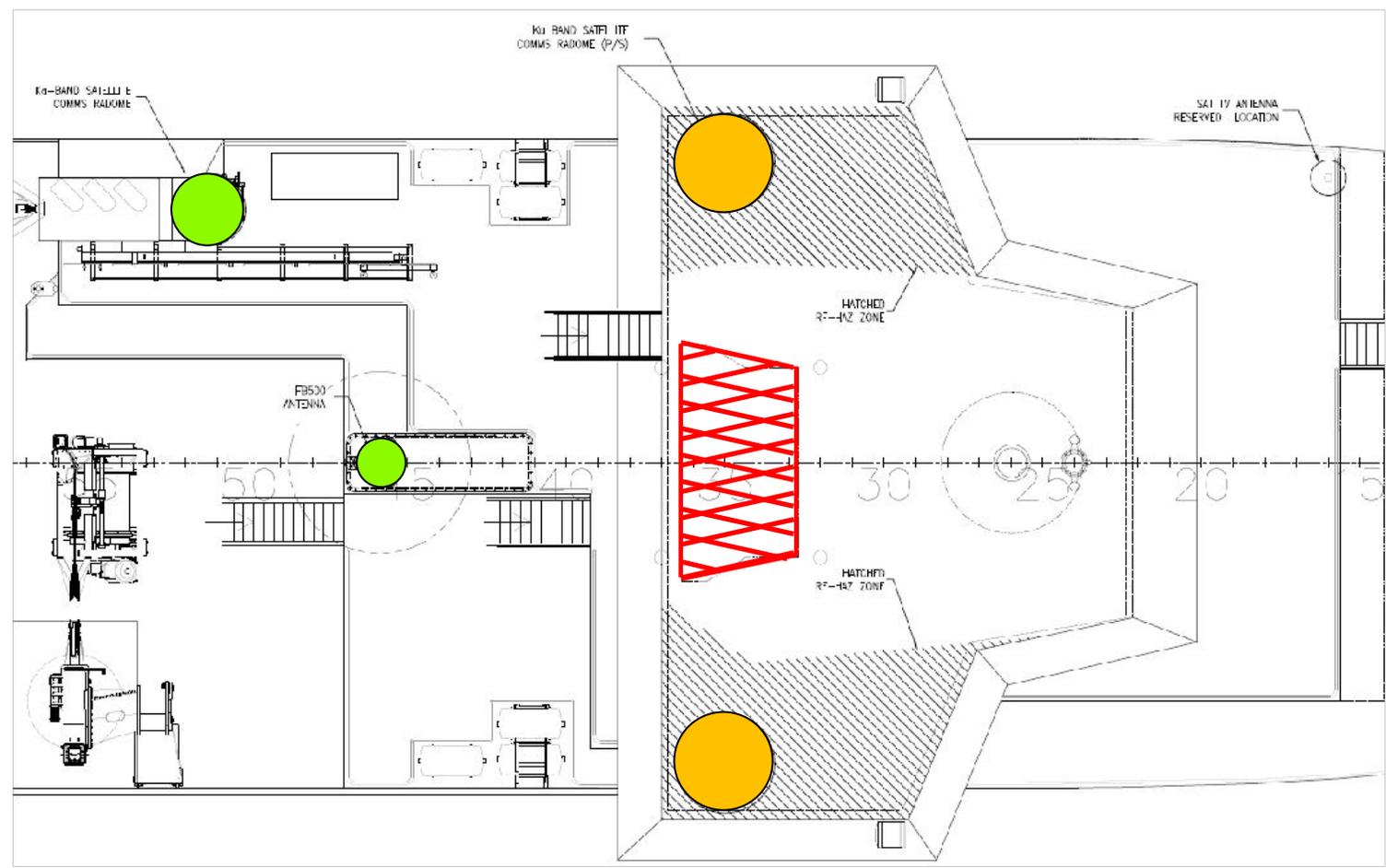
Figure 2 - Plan view showing antenna locations

Primary System (color: gold)
2 antenna system (port & starboard)
- Mitigates mast blockage

1.5m dual band Ku/Ka antennas
- Provides range of power & service options

Secondary System (color: green)
1 antenna system (+ 1 mgmt. antenna)
- 1m Ka band (+ FBB500)

2 standalone SatCom systems provide a range of options for application specific or failover config. requirements.

Datapresence Technology Integration

CORIOLIX: **C**ruise **O**bservations **R**eal-time **I**nterface & **O**pen **L**ive **I**nformation e**X**change

A software implementation for datapresence.

Datapresence Provides:

– ***Mitigation of resource limits*** – remote participation mitigates berthing & computing limits

CORIOLIX Provides:

– ***Planning tools*** - inherit from RVDAS pre-cruise planner, provide route & waypoint planning
– ***Situational awareness (from ship & shore)*** - view current views of information, subscribe to receive conditional alerts, view cruise data in spatial context
– ***Streamlined workflows*** - integrate event logging, provide both data services & UI access
– ***Outreach pipeline -*** provide contextual numeric information to the classroom
– ***Maintenance & Management -*** sensor history, notification & tracking, data quality
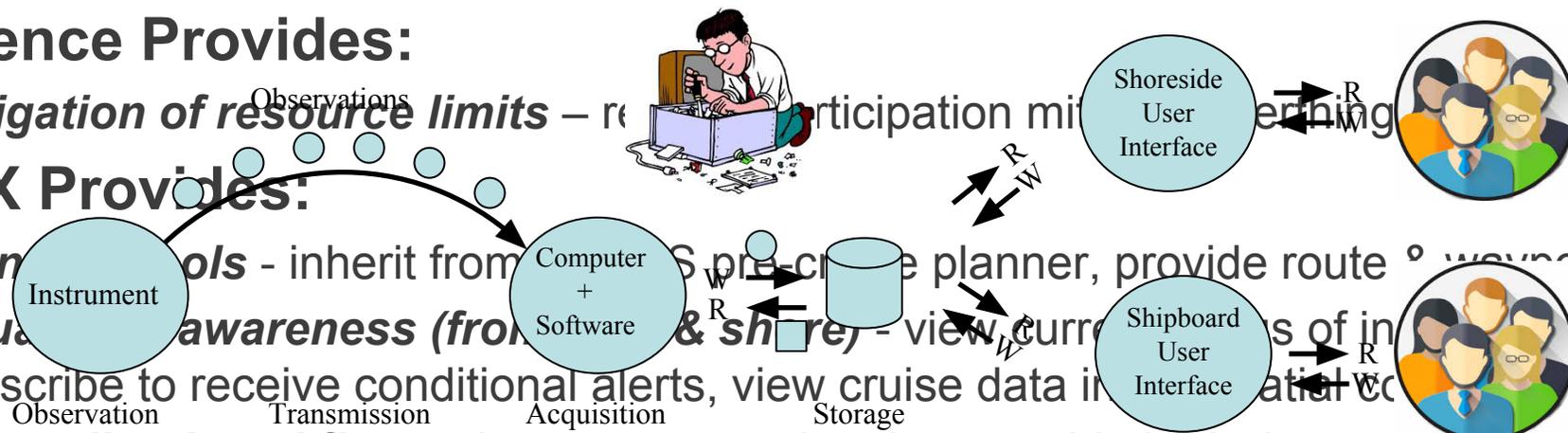
CORIOLIX examples: Planning tools

Cruise Charts | Sensor Plots ▾ | Status ▾ | Sensors ▾ | Data ▾ | Documents | **Cruises ▾** | My Account ▾ | About ▾

Depth is less than 40 m. ..... At port in Newport, Oregon.

CORIOLIX *RV Oceanus - shore*

~ ATTENTION: YOU ARE VIEWING A DEMONSTRATION SITE FOR THE RCRV CORIOLIX SYSTEM ~
more info

Current Time
Fri Oct 16 2020 23:46:43 UTC

Last Data Received
Fri Oct 16 2020 23:46:41 UTC
44.62568° N, -124.04481° E
Depth 0.0 m

This integration is important because:
- Removes duplication of onboarding effort
- Reduces introduction of errors/conflict
- Metadata is required and used for other system functionality

Cruise List

The information presented here was extracted from the UNOLS Cruise Planner. To update cruise information, or add a new cruise, please visit the Cruise Planner.

[Refresh]   This button queries the UNOLS Cruise Planner for the latest cruise and participants information.

[Add New Cruise]   WARNING: This button adds a cruise to CORIOLIX only. It does not add a new cruise to the UNOLS Cruise Planner.

Cruise	Ports	Personnel	Links
OC2009B **Collaborative Research: Persistent Presence in the Ocean Interior: Developing a Low-power,** **Autonomous System for Geo-referenced Navigation**	This project seeks to test a one-way travel time ultra-short baseline (OWTT-USBL) navigation system capable of providing accurate positioning at depths up to 6000m. The receiver will be installed ...		
Nov. 10, 2020 Nov. 21, 2020	Newport, OR, USA Newport, OR, USA	Jakuba, Michael (*Chief Sci.*)	Cruise Plan Participants Stations Cruise Data Event Log
CANCELLED - OC2004B **S-MODE: Submesoscale Ocean Dynamics**	UPDATE (C. Golden | 03.19.2020 | 1140) Due to 30 day UNOLS fleet stand down, R/V Oceanus will not conduct operations Mar-Apr, 2020. Cruise has been rescheduled for Oct-Nov, 2020. 9/10/2020 - Cru ...		
Oct. 23, 2020 Nov. 7, 2020	Alameda, CA, USA Newport, OR, USA	Farrar, John (*Chief Sci.*)	Cruise Plan Participants

CORIOLIX Example:
Situational Awareness - State of Systems

CORIOLIX Example: Situational Awareness

- Provide access to local cache of curated content (e.g GMRT)
- Identify & plot regional infrastructure (e.g. OOI)
- Plot cruise specific geospatial data identified pre-cruise
- Subscribe to remote sensing and other dynamic data types
- Include the right features to support planning

CORIOLIX Example: Scientific Data Workflows

CORIOLIX Example: Maintenance and Management

Working Toward Consistent Outcomes:

Engagement Activities & Outcomes:

Activities that help ensure smooth vessel transition to operations (for all parties)

Activity	Date	Outcome
Survey of Datapresence	2015	Planning and scoping document, identification of requirements
RVTEC	2016 ->	Presenting on technical approach to datapresence and progress
NOAA ERD	2017	Integration of NOAA ERDDAP product and remote sensing subscriptions
GMRT	2017 ->	Local hosting of curated geophysical content on CORIOLIX
OOI integration	2018	Demo of shipboard connection to regional infrastructure with CORIOLIX
R2R Workshop	2020	Virtual workshop on RCRV sensors, data workflow, QA/QC and more
UHDAS	ongoing	Consultation on centerboard deployment of ADCPs and hardware
URI Inner Space Center	ongoing	Mobile Telepresence Unit specification
HSN	ongoing	Consultation on SatCom equipment and commissioning
OBPS/R2R	ongoing	Development of shipboard Best Practice documents

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CORIOLIX Vessel Test Deployments

- *Oceanus* – 2016
- *Endeavor* – 2019
- *Point Sur* – 2020

- Tested synchronization and messaging technologies
- Prototyped UI and Event Log
- Collected performance data
- Worked through various setup and config. Issues

Science Seawater System Design

- *Diaphragm Pumps* - to maintain particle integrity
- *Automated Filtration System* - to allow for a filtered seawater signal to mon̲ note access/assist capabilities
- *Sensor manifold* – w/variable flow rate + cleanout (air/pickle)

Operational Opportunities

Shoreside Support

- Real-time Flagging
- Built-in alert system
- Management of metadata related to sensors

Acknowledgements & Thank You:

Datapresence Student Employees
Shivani Wanjara
Sean Marty
Matthew Zakrevsky

Datapresence Student partners
Hannah Hadi

Datapresence C
Steve Foley
Webb Pinner
David Pablo Coh

OSU CEOAS
OSU Ship Opera
Research Compu
Reimers Lab at C
Martechs:
 Jonah Winters
 Kristin Beem
 Brandon D'Andrea
 Alex Wick
 Emily Shimada
 Kate Kouba

Visit Us:

Scan the QR code at right –
Or, follow either url below –
https://datapresence.coas.oregonstate.edu/demo/
https://tinyurl.com/w794wga

Kyle Cole (SMILE)
Renee O'Neill (SMILE)

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