Marine Data Wrangling with OpenRVDAS and CORIOLIX
Part 2: CORIOLIX

- Introduction
  - What is it?
  - What does it do?
  - Why do we need it?
- How does it work?
  - Architecture / Workflow / Requirements
- How does the OpenRVDAS<-> CORIOLIX part work?
  - Managing Logging Configuration
  - Performing Real-Time Transformations
  - Public CORIOLIX Resources (Repositories):
    - Message Parsing Expressions
    - Parameters
    - Parameter Transformations
    - Flagging Routines

CORIOLIX: The OSU support team

Chris Romsos
Datapresence Systems Engineer
Lead for Datapresence and RCRV Cyberinfrastructure
Background – Marine Geology, Fisheries, Geographic Info Systems

Jasmine Nahorniak
Assistant Datapresence Systems Engineer
Lead CORIOLIX developer
Background – Ocean Optics, Data Processing & Management, UI design

Tristan King
Data Systems Specialist
Development + Manage CORIOLIX installations on vessels
Background – 3D Visualization and Web Development

CORIOLIX Installations

Currently:

- Point Sur
- Sikuliaq
- Savannah
- Roger Revelle (in progress)
- Okeanos Explorer (in progress)

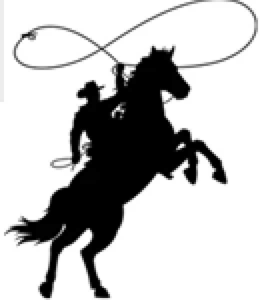
Next Up (Fall/Winter 25/26):

- Bell Shimada
- Pelican

Retired:

- Oceanus
- Endeavor

What Is CORIOLIX?



OpenRVDAS: Part of suite of open source tools for data acquisition/management under the “Ocean Data Tools” collaboration.

CORIOLIX, In one line -

- A distributed software system, connecting shipboard and shoreside nodes, for live situational awareness.

Expanding on above, CORIOLIX -

- Is designed around real-time/near-real-time mission support: not just data logging but live visualization, alerts, remote monitoring.
- Bridges ship-to-shore in a unified way: same interface for both, which helps coordination. Moves real-time observational data to shore and near real-time products to ship (bi-directional)
- Built with operations in mind (sensor health monitoring, event logs, remote alerts) — adds operational value beyond just science data capture.

What Is CORIOLIX?

Jargon translator

A ***distributed software system***, connecting shipboard and shoreside ***nodes***, for ***live situational awareness***.

Translations:

Distributed software system: collection of independent computers, or nodes, working together over a network toward a common goal and appearing to the end user as a single, coherent system.

Nodes: independent computers, see above.

Live: real-time (or near real-time).

Situational Awareness: Describes an ability to perceive, understand, and predict the environment and it’s elements to make informed decisions.

Feature Comparison:

Category	OpenRVDAS	CORIOLIX
Main Function	Collects & logs sensor data	Displays, monitors & shares data ship/shore
Primary Users	Techs configuring sensors & systems	Techs, scientists, and shore observers
Architecture	Modular pipeline: Reader → Transform → Writer	Web app: dashboards, charts, maps, logs
Setup & Maintenance	Requires tech config; YAML/scripts	Mostly web-based; setup takes effort
Data Inputs	Serial, network, NMEA, binary sensors	Pulls from DB/API (e.g., OpenRVDAS output)
Data Outputs	Log files, InfluxDB, Grafana feeds	Dashboards, data services, event & sensor logs
Real-Time Visualization	Via Grafana (custom setup)	Built-in, ready-to-use interface for ship & shore
Ship-to-Shore	Add-on via sync tools	Native feature; shore access built-in
Event Logging	Limited (system logs)	Integrated cruise/event logbook

What Does It Do?

Data Acquisition:

- Manages your logging configuration and logging state across the full system.

Data Processing:

- Performs both real-time and delayed/batch processing (transformations, flagging, binning)

Data Storage & Management:

- Annotates data, logs system configuration, performs data replication between ship and shore

Data Access:

- Offers multiple modes (file download, real-time streaming, API polling)
- Provides varied output formats (ascii, JSON, OpenDAP, netCDF, OGC, MQTT)
- Data visualization (Timeseries maps, charts, and graphs)
- Supports role-based user access

Does it do all that on its own?

Heck No!

CORIOLIX integrates several open source software tools. A few of the major ones include:

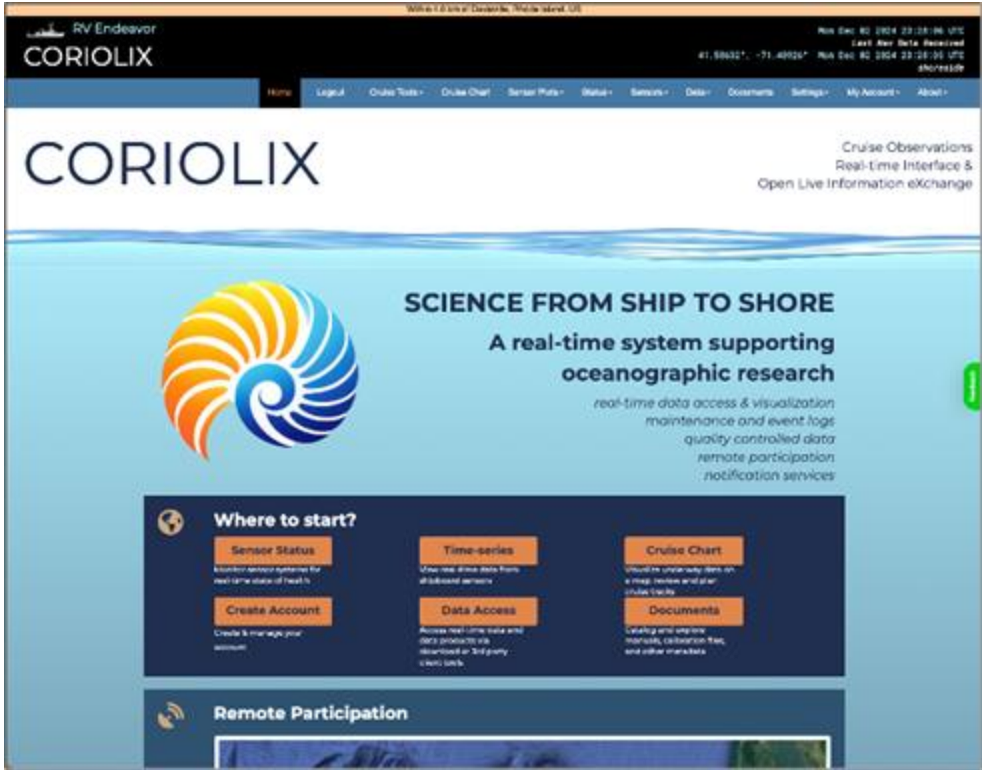
- Data Acquisition: OpenRVDAS or SCS (w/limited functionality)
- Scientific Data Server: ERDDAP (query, subset, format translate, OGC services)
- Database: PostgreSQL w/PostGIS & Timescale extensions
- Database Replication: SymmetricDS
- Mapping: Leaflet
- Charting: Apache ECharts (new!, replaces Highcharts)

OpenRVDAS and CORIOLIX: Two Tools, One Workflow

- *OpenRVDAS:* Data acquisition, processing, and logging
- *CORIOLIX:* Visualization, monitoring, and ship-to-shore access

Together: *End-to-end data visibility from sensors to shore*

CORIOLIX Front End Tour



SCIENCE FROM SHIP TO SHORE

A real-time system supporting oceanographic research

real-time data access & visualization
maintenance and event logs
quality controlled data
remote participation
notification services

Where to start?

Monitor sensor systems for real-time state of health

View real-time data from shipboard sensors

Visualize underway data on a map, review and plan cruise tracks

Create & manage your account

Access real-time data and data products via download or 3rd party client tools

Catalog and explore manuals, calibration files, and other metadata

Remote Participation

Public access:

- Visualize and Download Data
- View Sensor Metadata
- View Event and Sensor Logs

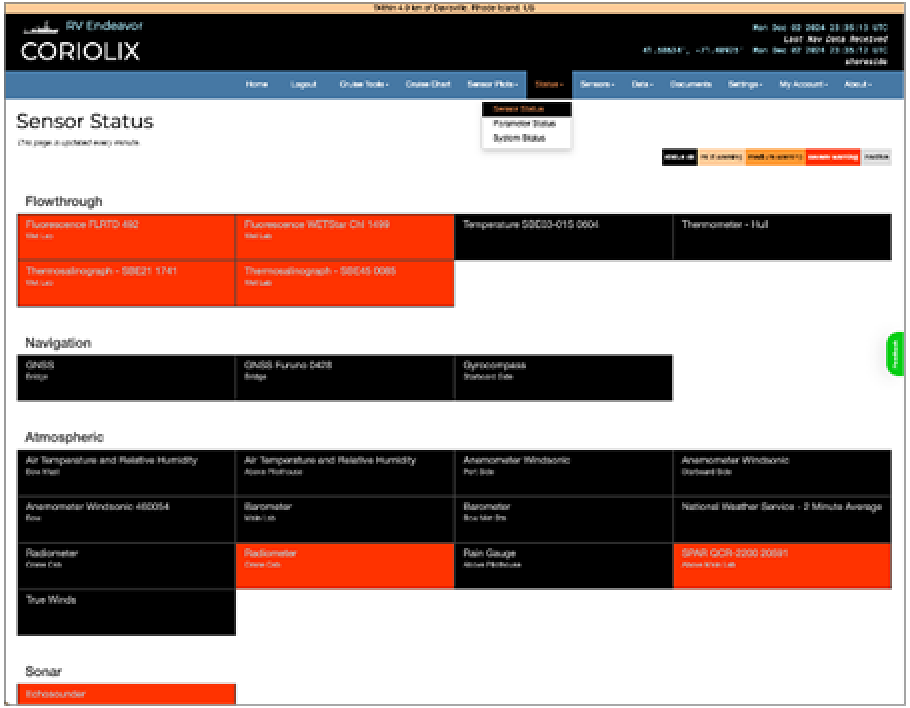
Scientist account access:

- Visualize and Download Data
- View Sensor Metadata
- View Sensor Logs
- Create Event Logs
- Set Personal Notifications

Technician account access:

- Visualize and Download Data
- Create/Edit Sensor Metadata
- Create/Edit Event and Sensor Logs
- Change System Configuration
- Set Personal Notifications

What’s the status of my system?



Within 4.9 km of Danielson, Rhode Island, US

RV Endeavor
CORIOLIX

Mon Dec 02 2024 23:35:13 UTC
Last Nav Data Received
41.58634°, -71.40923° Mon Dec 02 2024 23:35:12 UTC
shoreside

Sensor Status

This page is updated every minute.

Flowthrough

Fluorescence FLRTD 492 Wet Lab	Fluorescence WETStar Chl 1499 Wet Lab	Temperature SBE03-01S 0604	Thermometer - Hull
Thermosalinograph - SBE21 1741 Wet Lab	Thermosalinograph - SBE45 0085 Wet Lab		

Navigation

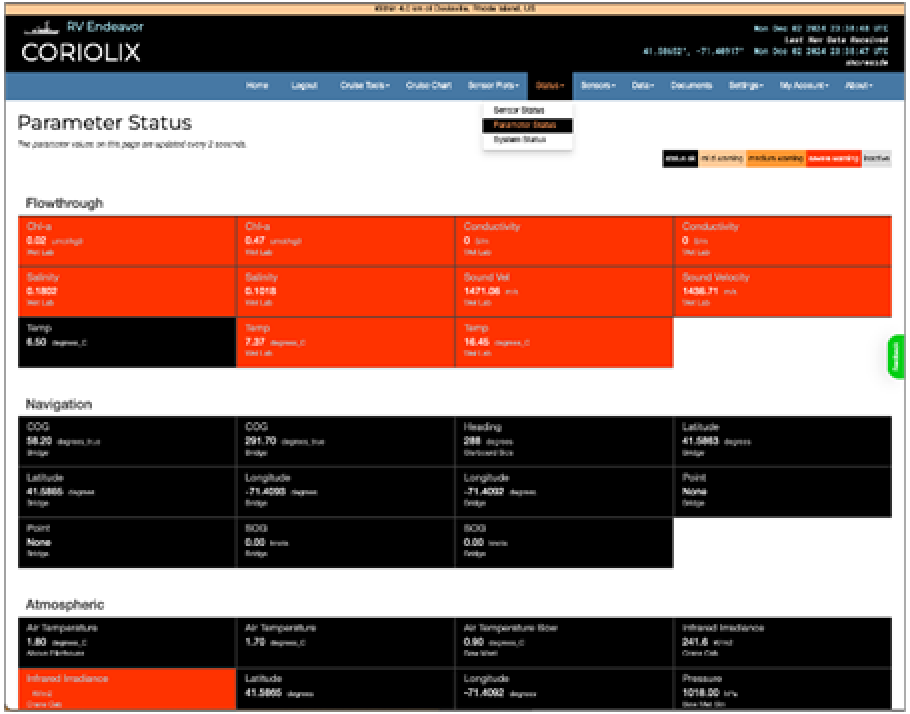
GNSS Bridge	GNSS Furuno 0428 Bridge	Gyrocompass Starboard Side

Atmospheric

Air Temperature and Relative Humidity Bow Mast	Air Temperature and Relative Humidity Above Pilothouse	Anemometer Windsonic Port Side	Anemometer Windsonic Starboard Side
Anemometer Windsonic 460054 Bow	Barometer Wet Lab	Barometer Bow Met Stn	National Weather Service - 2 Minute Average
Radiometer Crane Cab	Radiometer Crane Cab	Rain Gauge Above Pilothouse	SPAR QCR-2200 20091 Above Wet Lab
True Winds			

Sonar

Echosounder



Within 4.0 nm of Danielson, Rhode Island, US

RV Endeavor
CORIOLIX

Mon Dec 02 2024 23:38:48 UTC
Last Nav Data Received
41.58652°, -71.40917° Mon Dec 02 2024 23:38:47 UTC
shoreside

Parameter Status

The parameter values on this page are updated every 2 seconds.

Flowthrough

Chl-a 0.02 ug/l Wet Lab	Chl-a 0.47 ug/l Wet Lab	Conductivity 0 S/m Wet Lab	Conductivity 0 S/m Wet Lab
Salinity 0.1802 Wet Lab	Salinity 0.1018 Wet Lab	Sound Vel 1471.06 m/s Wet Lab	Sound Velocity 1436.71 m/s Wet Lab
Temp 6.50 degrees_C	Temp 7.37 degrees_C Wet Lab	Temp 16.45 degrees_C Wet Lab	

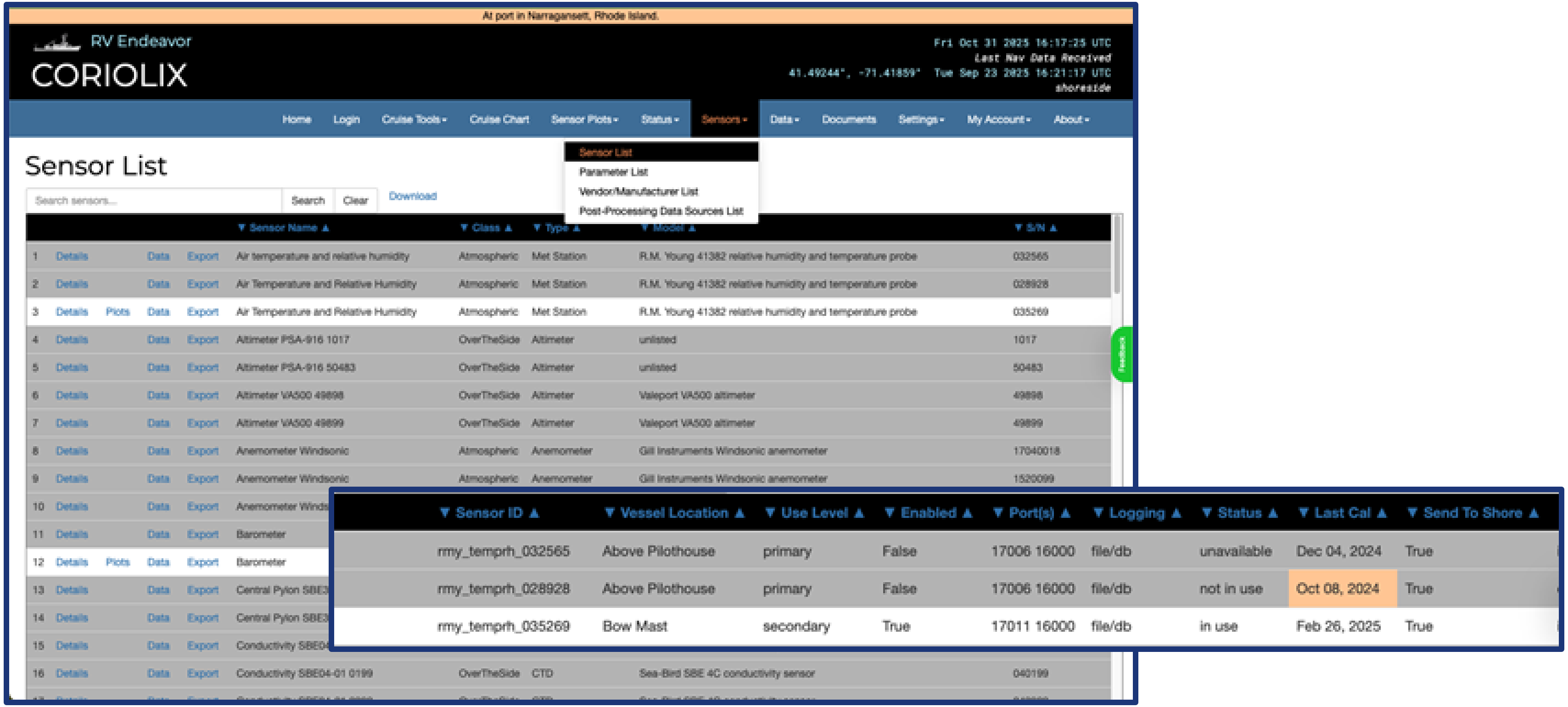
Navigation

COG 58.20 degrees_true Bridge	COG 291.70 degrees_true Bridge	Heading 288 degrees Starboard Side	Latitude 41.5863 degrees Bridge
Latitude 41.5865 degrees Bridge	Longitude -71.4093 degrees Bridge	Longitude -71.4092 degrees Bridge	Point None Bridge
Point None Bridge	SOG 0.00 knots Bridge	SOG 0.00 knots Bridge	

Atmospheric

Air Temperature 1.80 degrees_C Above Pilothouse	Air Temperature 1.79 degrees_C	Air Temperature Bow 0.90 degrees_C Bow Mast	Infrared Irradiance 241.6 W/m2 Crane Cab
Infrared Irradiance W/m2 Crane Cab	Latitude 41.5865 degrees	Longitude -71.4092 degrees	Pressure 1018.00 hPa Bow Met Stn

Sensors Inventory



At port in Narragansett, Rhode Island.

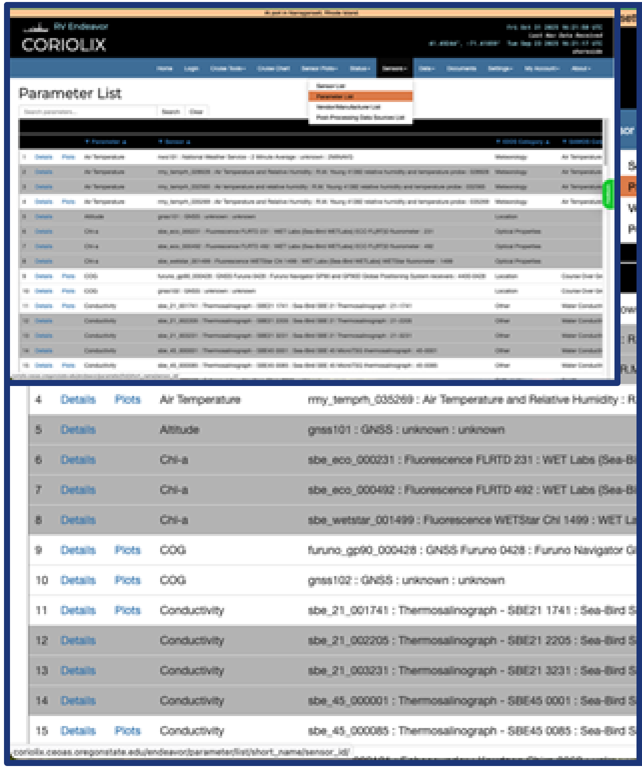
```
Fri Oct 31 2025 16:17:25 UTC
Last Nav Data Received
41.49244°, -71.41859°  Tue Sep 23 2025 16:21:17 UTC
shoreside
```

Sensor List

					▼ Sensor Name ▲	▼ Class ▲	▼ Type ▲	▼ Model ▲	▼ S/N ▲
1	Details		Data	Export	Air temperature and relative humidity	Atmospheric	Met Station	R.M. Young 41382 relative humidity and temperature probe	032565
2	Details		Data	Export	Air Temperature and Relative Humidity	Atmospheric	Met Station	R.M. Young 41382 relative humidity and temperature probe	028928
3	Details	Plots	Data	Export	Air Temperature and Relative Humidity	Atmospheric	Met Station	R.M. Young 41382 relative humidity and temperature probe	035269
4	Details		Data	Export	Altimeter PSA-916 1017	OverTheSide	Altimeter	unlisted	1017
5	Details		Data	Export	Altimeter PSA-916 50483	OverTheSide	Altimeter	unlisted	50483
6	Details		Data	Export	Altimeter VA500 49898	OverTheSide	Altimeter	Valeport VA500 altimeter	49898
7	Details		Data	Export	Altimeter VA500 49899	OverTheSide	Altimeter	Valeport VA500 altimeter	49899
8	Details		Data	Export	Anemometer Windsonic	Atmospheric	Anemometer	Gill Instruments Windsonic anemometer	17040018
9	Details		Data	Export	Anemometer Windsonic	Atmospheric	Anemometer	Gill Instruments Windsonic anemometer	1520099
10	Details		Data	Export	Anemometer Winds				
11	Details		Data	Export	Barometer				
12	Details	Plots	Data	Export	Barometer				
13	Details		Data	Export	Central Pylon SBE3				
14	Details		Data	Export	Central Pylon SBE3				
15	Details		Data	Export	Conductivity SBE04				
16	Details		Data	Export	Conductivity SBE04-01 0199	OverTheSide	CTD	Sea-Bird SBE 4C conductivity sensor	040199

▼ Sensor ID ▲	▼ Vessel Location ▲	▼ Use Level ▲	▼ Enabled ▲	▼ Port(s) ▲	▼ Logging ▲	▼ Status ▲	▼ Last Cal ▲	▼ Send To Shore ▲
rmy_temprh_032565	Above Pilothouse	primary	False	17006 16000	file/db	unavailable	Dec 04, 2024	True
rmy_temprh_028928	Above Pilothouse	primary	False	17006 16000	file/db	not in use	Oct 08, 2024	True
rmy_temprh_035269	Bow Mast	secondary	True	17011 16000	file/db	in use	Feb 26, 2025	True

Parameters measured



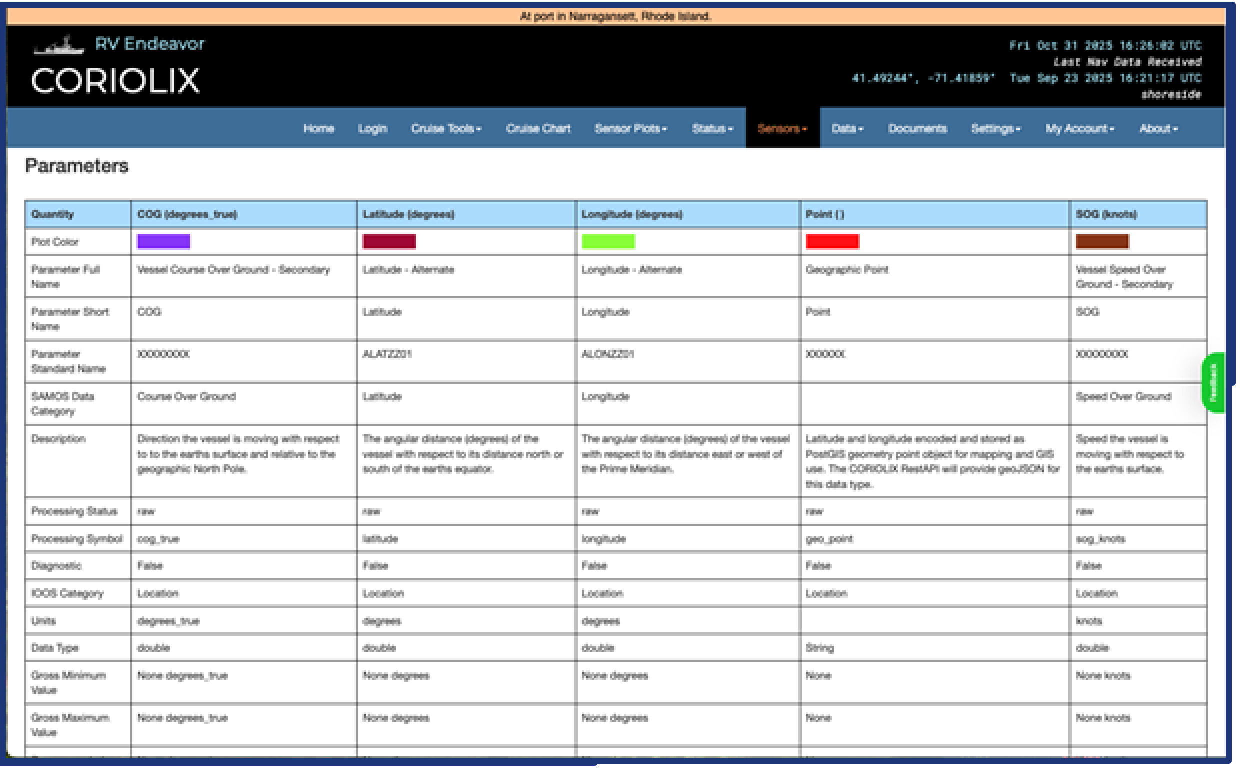
RV Endeavor

CORIOLIX

Parameter List

4	Details	Plots	Air Temperature	rmy_temprh_035269 : Air Temperature and Relative Humidity : R
5	Details		Altitude	gnss101 : GNSS : unknown : unknown
6	Details		Chl-a	sbe_eco_000231 : Fluorescence FLRTD 231 : WET Labs (Sea-Bi
7	Details		Chl-a	sbe_eco_000492 : Fluorescence FLRTD 492 : WET Labs (Sea-Bi
8	Details		Chl-a	sbe_wetstar_001499 : Fluorescence WETStar Chl 1499 : WET La
9	Details	Plots	COG	furuno_gp90_000428 : GNSS Furuno 0428 : Furuno Navigator G
10	Details	Plots	COG	gnss102 : GNSS : unknown : unknown
11	Details	Plots	Conductivity	sbe_21_001741 : Thermosalinograph - SBE21 1741 : Sea-Bird S
12	Details		Conductivity	sbe_21_002205 : Thermosalinograph - SBE21 2205 : Sea-Bird S
13	Details		Conductivity	sbe_21_003231 : Thermosalinograph - SBE21 3231 : Sea-Bird S
14	Details		Conductivity	sbe_45_000001 : Thermosalinograph - SBE45 0001 : Sea-Bird S
15	Details	Plots	Conductivity	sbe_45_000085 : Thermosalinograph - SBE45 0085 : Sea-Bird S

coriolix.ceoas.oregonstate.edu/endeavor/parameter/list/short_name/sensor_id/



At port in Narragansett, Rhode Island.

RV Endeavor

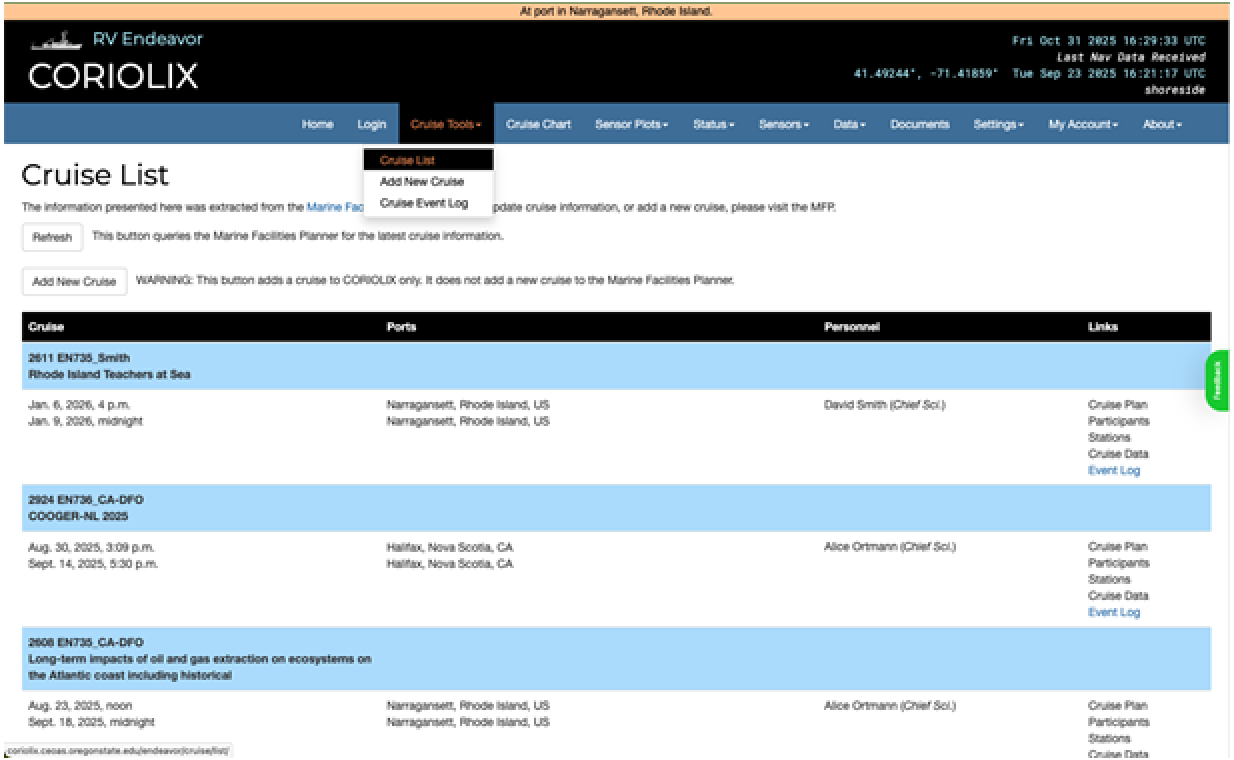
CORIOLIX

Fri Oct 31 2025 16:26:02 UTC
Last Nav Data Received
41.49244°, -71.41859° Tue Sep 23 2025 16:21:17 UTC
shoreside

Parameters

Quantity	COG (degrees_true)	Latitude (degrees)	Longitude (degrees)	Point ()	SOG (knots)
Plot Color	🟪	🟥	🟩	🟥	🟫
Parameter Full Name	Vessel Course Over Ground - Secondary	Latitude - Alternate	Longitude - Alternate	Geographic Point	Vessel Speed Over Ground - Secondary
Parameter Short Name	COG	Latitude	Longitude	Point	SOG
Parameter Standard Name	XXXXXXXX	ALATZZ01	ALONZZ01	XXXXXX	XXXXXXXX
SAMOS Data Category	Course Over Ground	Latitude	Longitude		Speed Over Ground
Description	Direction the vessel is moving with respect to to the earths surface and relative to the geographic North Pole.	The angular distance (degrees) of the vessel with respect to its distance north or south of the earths equator.	The angular distance (degrees) of the vessel with respect to its distance east or west of the Prime Meridian.	Latitude and longitude encoded and stored as PostGIS geometry point object for mapping and GIS use. The CORIOLIX RestAPI will provide geoJSON for this data type.	Speed the vessel is moving with respect to the earths surface.
Processing Status	raw	raw	raw	raw	raw
Processing Symbol	cog_true	latitude	longitude	geo_point	sog_knots
Diagnostic	False	False	False	False	False
IOOS Category	Location	Location	Location	Location	Location
Units	degrees_true	degrees	degrees		knots
Data Type	double	double	double	String	double
Gross Minimum Value	None degrees_true	None degrees	None degrees	None	None knots
Gross Maximum Value	None degrees_true	None degrees	None degrees	None	None knots

MFP & MOMS: Pulls from source of truth



At port in Narragansett, Rhode Island.

RV Endeavor
CORIOLIX

Fri Oct 31 2025 16:29:33 UTC
Last Nav Data Received
41.49244°, -71.41859° Tue Sep 23 2025 16:21:17 UTC
shoreside

Cruise List

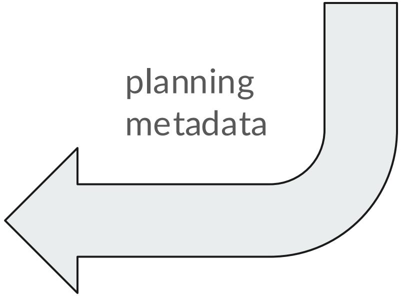
The information presented here was extracted from the Marine Fac[...] update cruise information, or add a new cruise, please visit the MFP.

Refresh This button queries the Marine Facilities Planner for the latest cruise information.

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

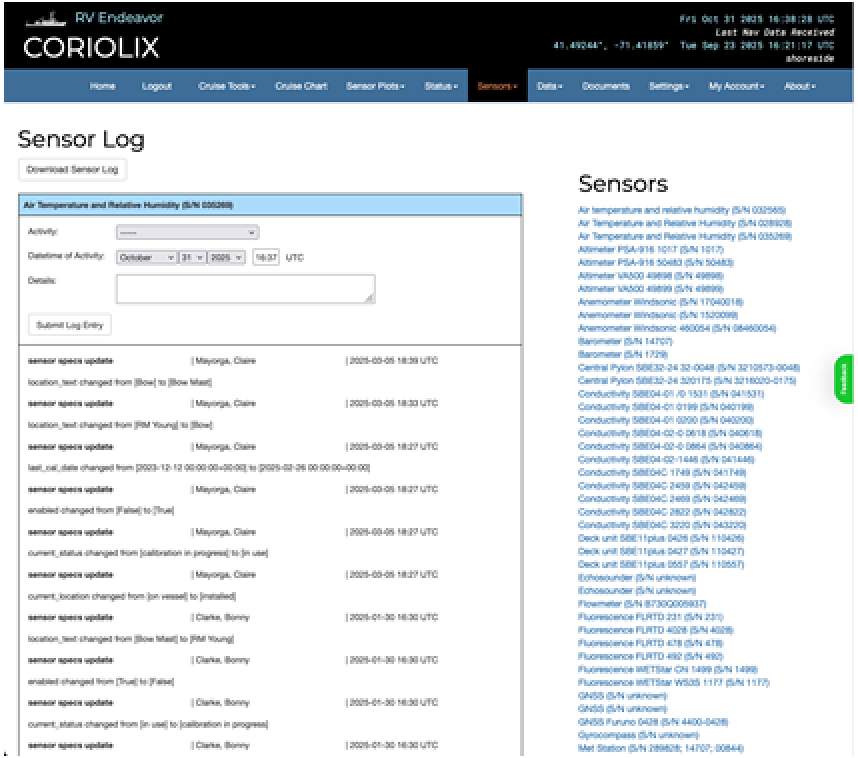
Cruise	Ports	Personnel	Links
2611 EN735_Smith **Rhode Island Teachers at Sea**			
Jan. 6, 2026, 4 p.m. Jan. 9, 2026, midnight	Narragansett, Rhode Island, US Narragansett, Rhode Island, US	David Smith (Chief Sci.)	Cruise Plan Participants Stations Cruise Data Event Log
2924 EN736_CA-DFO **COOGER-NL 2025**			
Aug. 30, 2025, 3:09 p.m. Sept. 14, 2025, 5:30 p.m.	Halifax, Nova Scotia, CA Halifax, Nova Scotia, CA	Alice Ortmann (Chief Sci.)	Cruise Plan Participants Stations Cruise Data Event Log
2608 EN735_CA-DFO **Long-term impacts of oil and gas extraction on ecosystems on the Atlantic coast including historical**			
Aug. 23, 2025, noon Sept. 18, 2025, midnight	Narragansett, Rhode Island, US Narragansett, Rhode Island, US	Alice Ortmann (Chief Sci.)	Cruise Plan Participants Stations Cruise Data

coriolix.ceoas.oregonstate.edu/endeavor/cruise/list/



planning
metadata

Sensor & Event Logs.



Sensor Log

Air Temperature and Relative Humidity (S/N 035269)

Activity: ------

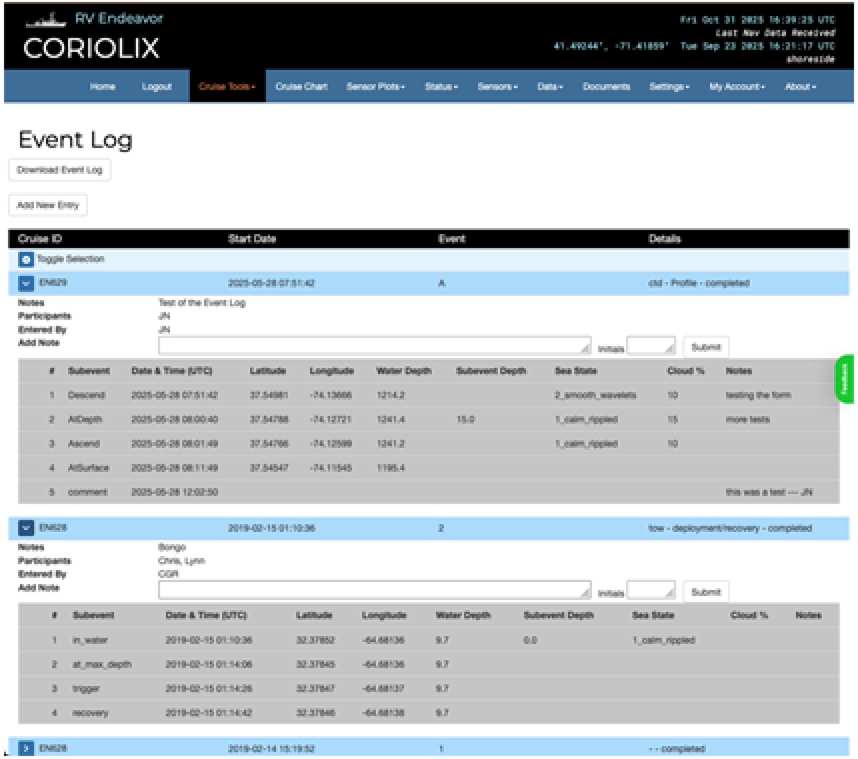
Datetime of Activity: October 31 2025 16:37 UTC

Details:

```
sensor specs update          | Mayorga, Claire          | 2025-03-05 18:39 UTC
location_text changed from [Bow] to [Bow Mast]
sensor specs update          | Mayorga, Claire          | 2025-03-05 18:30 UTC
location_text changed from [RM Young] to [Bow]
sensor specs update          | Mayorga, Claire          | 2025-03-05 18:27 UTC
last_cal_date changed from [2023-12-12 00:00:00+00:00] to [2025-02-26 00:00:00+00:00]
sensor specs update          | Mayorga, Claire          | 2025-03-05 18:27 UTC
enabled changed from [False] to [True]
sensor specs update          | Mayorga, Claire          | 2025-03-05 18:27 UTC
current_status changed from [calibration in progress] to [in use]
sensor specs update          | Mayorga, Claire          | 2025-03-05 18:27 UTC
current_location changed from [on vessel] to [installed]
sensor specs update          | Clarke, Bonny            | 2025-01-30 16:30 UTC
location_text changed from [Bow Mast] to [RM Young]
sensor specs update          | Clarke, Bonny            | 2025-01-30 16:30 UTC
enabled changed from [True] to [False]
sensor specs update          | Clarke, Bonny            | 2025-01-30 16:30 UTC
current_status changed from [in use] to [calibration in progress]
sensor specs update          | Clarke, Bonny            | 2025-01-30 16:30 UTC
```

Sensors

Air temperature and relative humidity (S/N 032565)
Air Temperature and Relative Humidity (S/N 028928)
Air Temperature and Relative Humidity (S/N 035269)
Altimeter PSA-916 1017 (S/N 1017)
Altimeter PSA-916 50483 (S/N 50483)
Altimeter VA500 49898 (S/N 49898)
Altimeter VA500 49899 (S/N 49899)
Anemometer Windsonic (S/N 17040018)
Anemometer Windsonic (S/N 1520099)
Anemometer Windsonic 460054 (S/N 08460054)
Barometer (S/N 14707)
Barometer (S/N 1729)
Central Pylon SBE32-24 32-0048 (S/N 3210573-0048)
Central Pylon SBE32-24 320175 (S/N 3216020-0175)
Conductivity SBE04-01 /0 1531 (S/N 041531)
Conductivity SBE04-01 0199 (S/N 040199)
Conductivity SBE04-01 0200 (S/N 040200)
Conductivity SBE04-02-0 0618 (S/N 040618)
Conductivity SBE04-02-0 0864 (S/N 040864)
Conductivity SBE04-02-1446 (S/N 041446)
Conductivity SBE04C 1749 (S/N 041749)
Conductivity SBE04C 2459 (S/N 042459)
Conductivity SBE04C 2469 (S/N 042469)
Conductivity SBE04C 2822 (S/N 042822)
Conductivity SBE04C 3220 (S/N 043220)
Deck unit SBE11plus 0426 (S/N 110426)
Deck unit SBE11plus 0427 (S/N 110427)
Deck unit SBE11plus 0557 (S/N 110557)
Echosounder (S/N unknown)
Echosounder (S/N unknown)
Flowmeter (S/N B730Q005937)
Fluorescence FLRTD 231 (S/N 231)
Fluorescence FLRTD 4028 (S/N 4028)
Fluorescence FLRTD 478 (S/N 478)
Fluorescence FLRTD 492 (S/N 492)
Fluorescence WETStar CN 1499 (S/N 1499)
Fluorescence WETStar WS3S 1177 (S/N 1177)
GNSS (S/N unknown)
GNSS (S/N unknown)
GNSS Furuno 0428 (S/N 4400-0428)
Gyrocompass (S/N unknown)
Met Station (S/N 289828; 14707; 00844)



Event Log

Cruise ID	Start Date	Event	Details
EN629	2025-05-28 07:51:42	A	ctd - Profile - completed

Notes: Test of the Event Log
Participants: JN
Entered By: JN
Add Note

#	Subevent	Date & Time (UTC)	Latitude	Longitude	Water Depth	Subevent Depth	Sea State	Cloud %	Notes
1	Descend	2025-05-28 07:51:42	37.54981	-74.13666	1214.2		2_smooth_wavelets	10	testing the form
2	AtDepth	2025-05-28 08:00:40	37.54788	-74.12721	1241.4	15.0	1_calm_rippled	15	more tests
3	Ascend	2025-05-28 08:01:49	37.54766	-74.12599	1241.2		1_calm_rippled	10	
4	AtSurface	2025-05-28 08:11:49	37.54547	-74.11545	1195.4				
5	comment	2025-05-28 12:02:50							this was a test --- JN

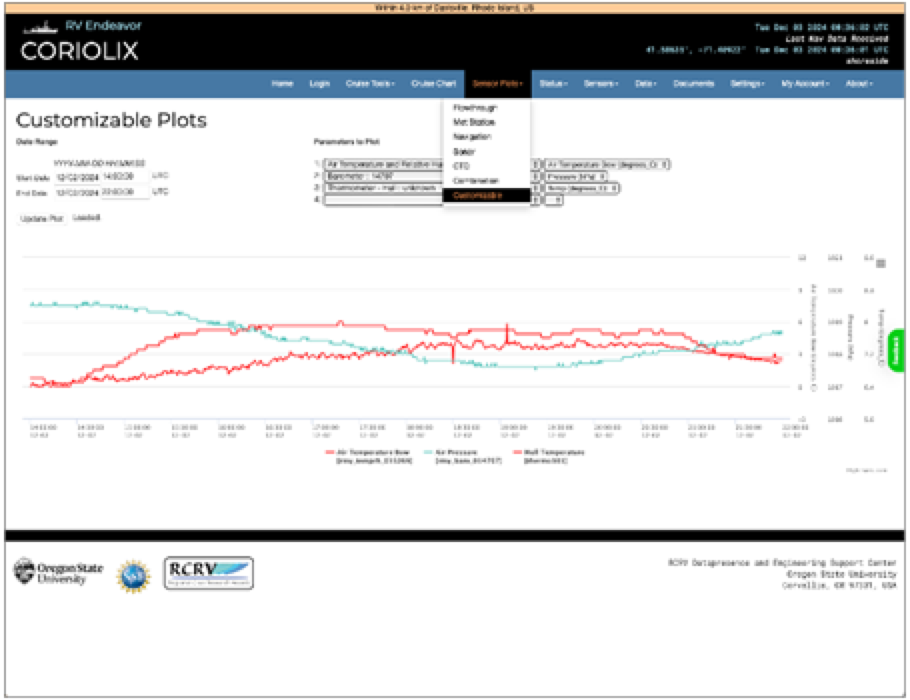
Cruise ID	Start Date	Event	Details
EN628	2019-02-15 01:10:36	2	tow - deployment/recovery - completed

Notes: Bongo
Participants: Chris, Lynn
Entered By: CGR
Add Note

#	Subevent	Date & Time (UTC)	Latitude	Longitude	Water Depth	Subevent Depth	Sea State	Cloud %	Notes
1	in_water	2019-02-15 01:10:36	32.37852	-64.68136	9.7	0.0	1_calm_rippled		
2	at_max_depth	2019-02-15 01:14:06	32.37845	-64.68136	9.7				
3	trigger	2019-02-15 01:14:26	32.37847	-64.68137	9.7				
4	recovery	2019-02-15 01:14:42	32.37846	-64.68138	9.7				

Cruise ID	Start Date	Event	Details
EN628	2019-02-14 15:19:52	1	- - completed

Data Visualization



Customizable Plots

Date Range

YYYY-MM-DD HH:MM:SS

Start Date 12/02/2024 14:00:00 UTC

End Date 12/02/2024 22:00:00 UTC

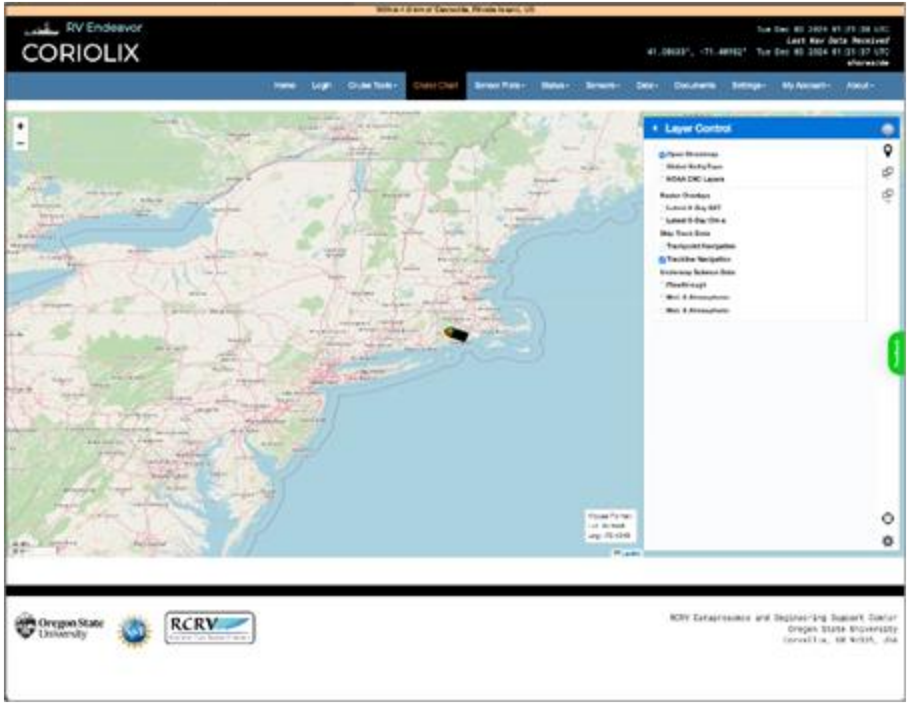
Update Plot   Loaded

Parameters to Plot

1. Air Temperature and Relative Hu… | Air Temperature Bow (degrees_C)
2. Barometer - 14797 | Pressure (hPa)
3. Thermometer - Hull - unknown | Temp (degrees_C)
4.

Tue Dec 03 2024 00:36:02 UTC
Last Nav Data Received
41.50620°, -71.40922° Tue Dec 03 2024 00:36:01 UTC
shoreside

RCRV Cyberinfrastructure and Engineering Support Center
Oregon State University
Corvallis, OR 97331, USA



RCRV Cyberinfrastructure and Engineering Support Center
Oregon State University
Corvallis, OR 97331, USA

System Requirements

Assumes you can obtain, create, or have:

- SatComs
- Signed Server Certificates
- DNS Records
- Firewall rules to allow traffic to flow

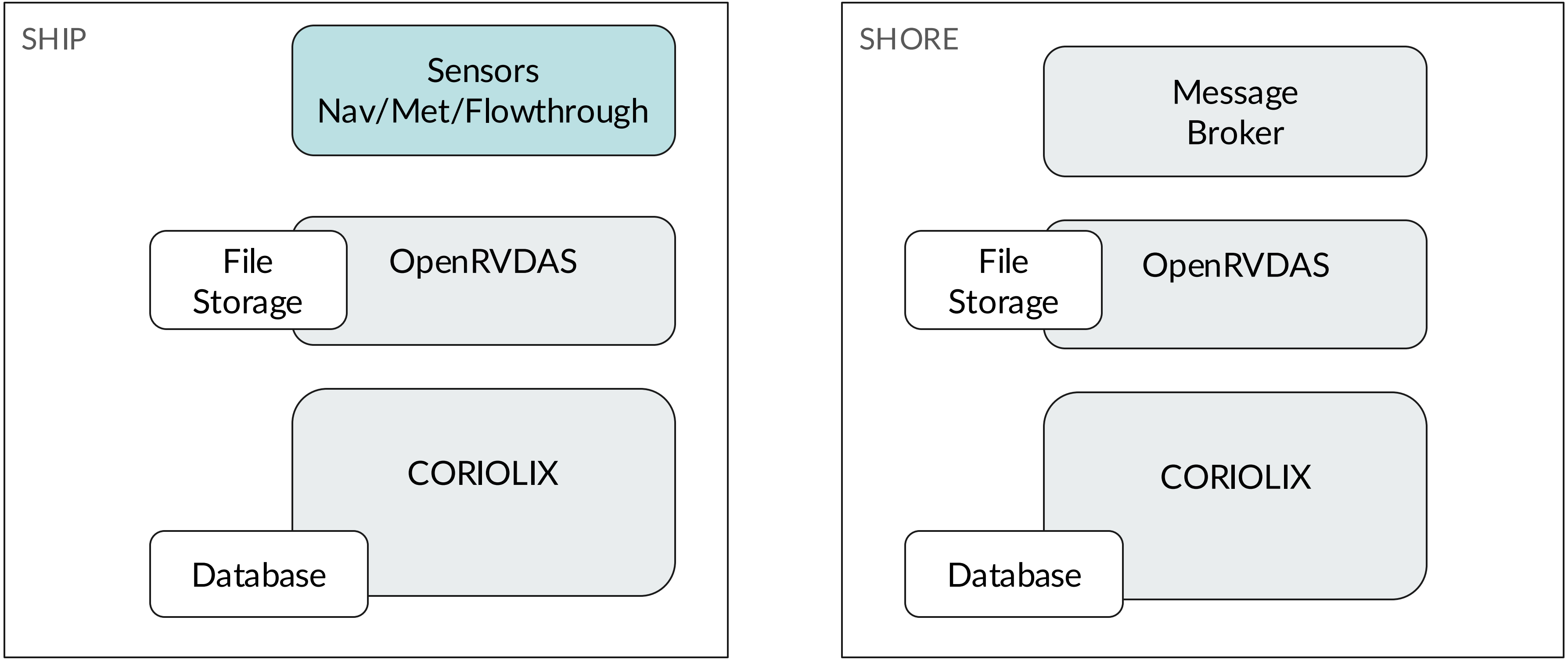
Site & Hardware:

- Site Count = 2 (1 ship, 1 shore)
- Servers/Site = 2 (1 OpenRVDAS, 1 CORIOLIX)
- Total Servers = 4 (2x2)

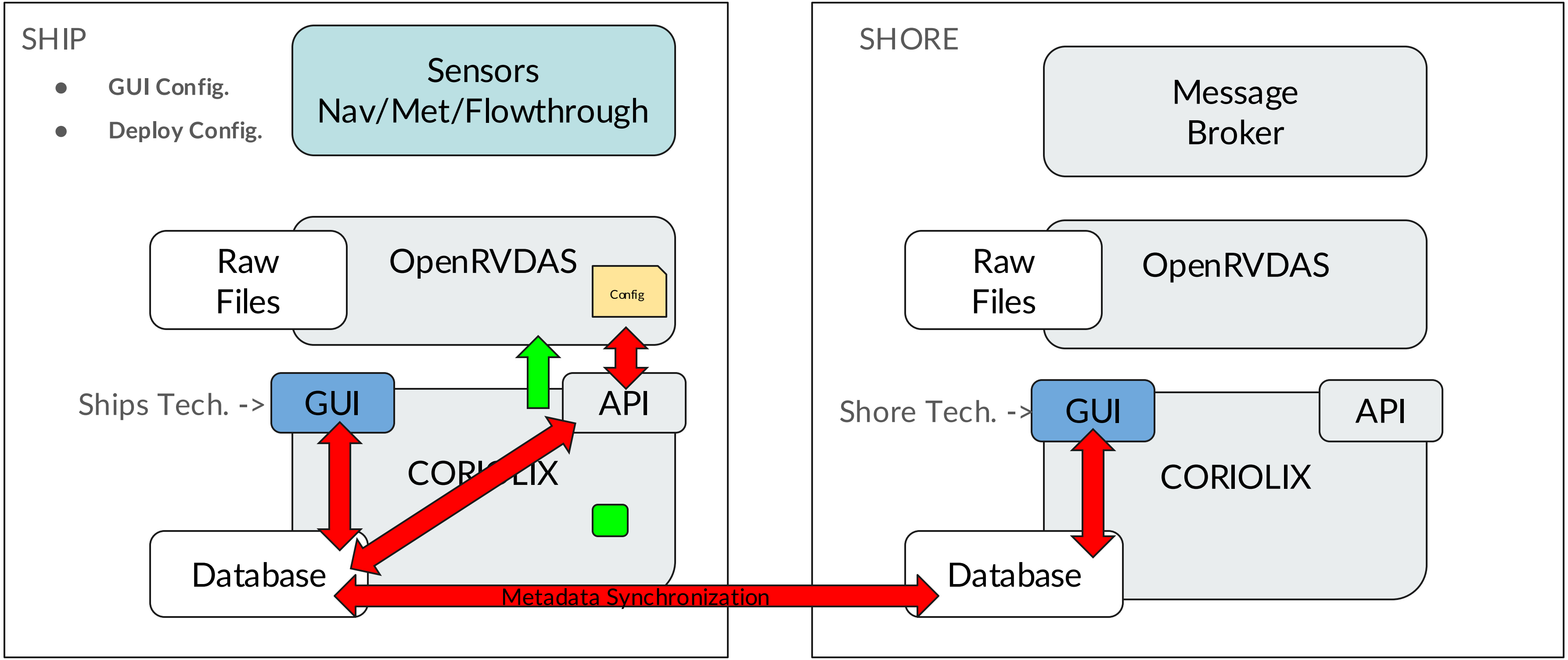
- OpenRVDAS Server Spec.
  - OS: Linux (many, most?)
  - CPU: 6 (range = 1-24)
  - RAM: 8 (range =8-12GB)
  - DISK: 200GB (range=100 - 500GB)

- CORIOLIX Server Spec.
  - OS: Linux (Debian, Ubuntu, Alma)
  - CPU: 12 (range = 1-24)
  - RAM: 24 (range = 12-60GB)
  - DISK: 1TB (range = 250-2TB)

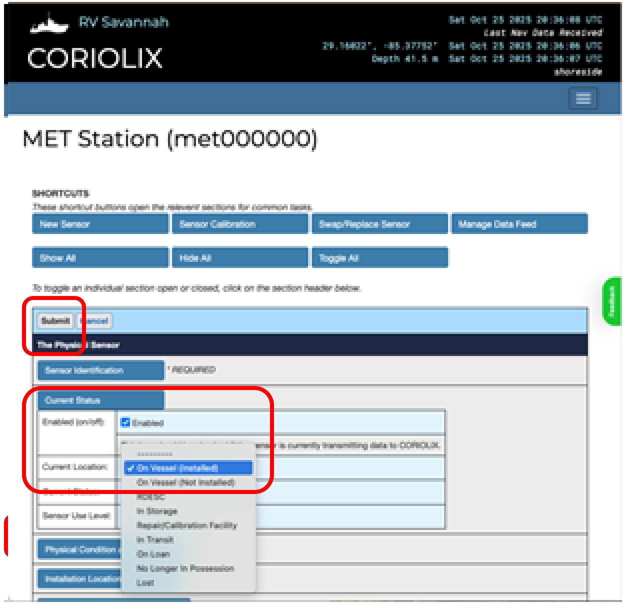
How does it work?
System Components



How does it work?
Logging Configuration Management



Logging Configuration Management: Part 1



RV Savannah

CORIOLIX

Sat Oct 25 2025 20:36:08 UTC
Last Nav Data Received
29.16022°, -85.37752° Sat Oct 25 2025 20:36:06 UTC
Depth 41.5 m Sat Oct 25 2025 20:36:07 UTC
shoreside

MET Station (met000000)

SHORTCUTS

These shortcut buttons open the relevant sections for common tasks.

To toggle an individual section open or closed, click on the section header below.

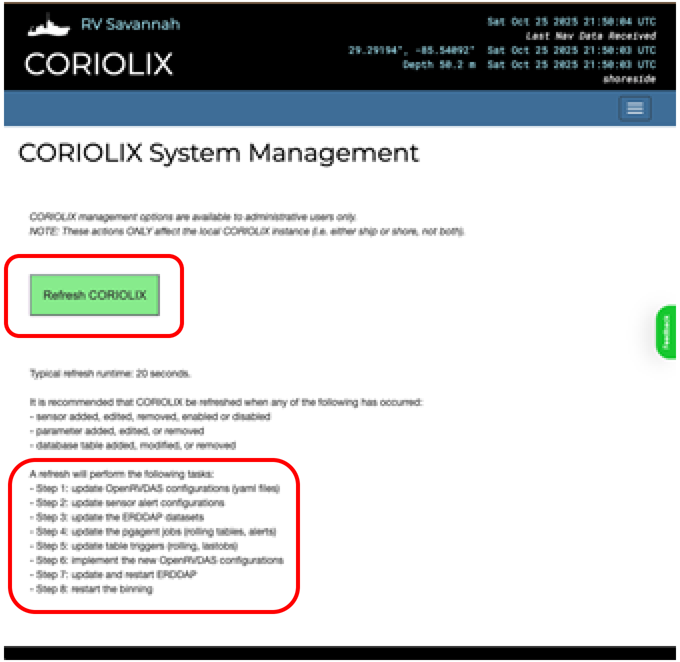
Enabled (on/off): ☑ Enabled

[illegible] sensor is currently transmitting data to CORIOLIX.

Current Location: ✓ On Vessel (Installed)

- Edit from ship or shore through the web user interface.
- Login, only technicians can edit & all edits logged.
- Select sensor to edit from your inventory.
- Update the configuration setting.
- Submit to save configuration change locally and update remote.

Logging Configuration Management: Part 2



```
Sat Oct 25 2025 21:50:04 UTC
Last Nav Data Received
29.29194°, -85.54092°  Sat Oct 25 2025 21:50:03 UTC
Depth 50.2 m  Sat Oct 25 2025 21:50:03 UTC
shoreside
```

CORIOLIX System Management

CORIOLIX management options are available to administrative users only.
NOTE: These actions ONLY affect the local CORIOLIX instance (i.e. either ship or shore, not both).

Typical refresh runtime: 20 seconds.

It is recommended that CORIOLIX be refreshed when any of the following has occurred:
- sensor added, edited, removed, enabled or disabled
- parameter added, edited, or removed
- database table added, modified, or removed

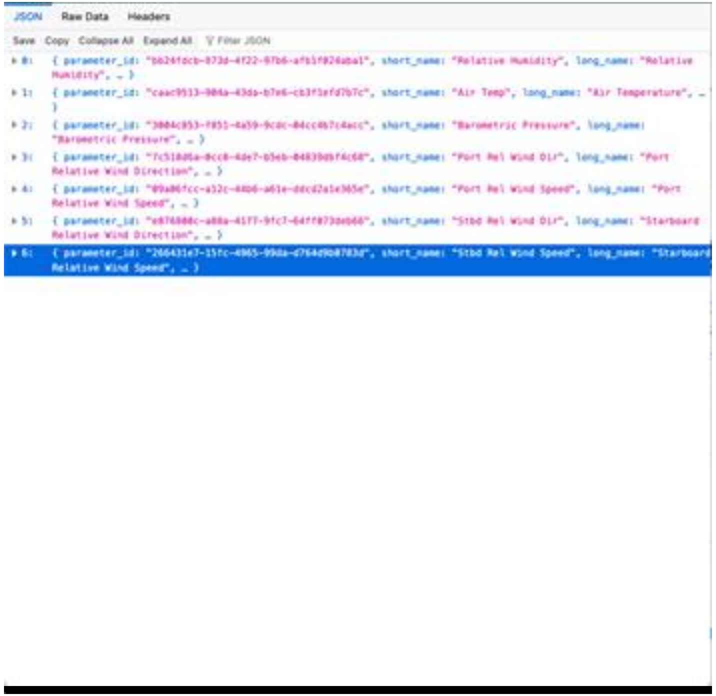
A refresh will perform the following tasks:
- Step 1: update OpenRVDAS configurations (yaml files)
- Step 2: update sensor alert configurations
- Step 3: update the ERDDAP datasets
- Step 4: update the pgagent jobs (rolling tables, alerts)
- Step 5: update table triggers (rolling, lastobs)
- Step 6: implement the new OpenRVDAS configurations
- Step 7: update and restart ERDDAP
- Step 8: restart the binning

Deployment Demonstration

- Technician (priv. user) uses system configuration page.
- Depress the BGB
- This kicks off a series of processes:
  - Create OpenRVDAS config.
  - Update alerts
  - Update ERDDAP
  - Update jobs
  - Update triggers
  - Implement OpenRVDAS config.
  - Restarts

Logging Configuration Management: Part 3

API GET REQUEST: https://coriolix.savannah.skio.uga.edu/api/sensor/?enabled=true&format=json
API GET REQUEST: https://coriolix.savannah.skio.uga.edu/api/parameter/?sensor_id=met000000&format=json

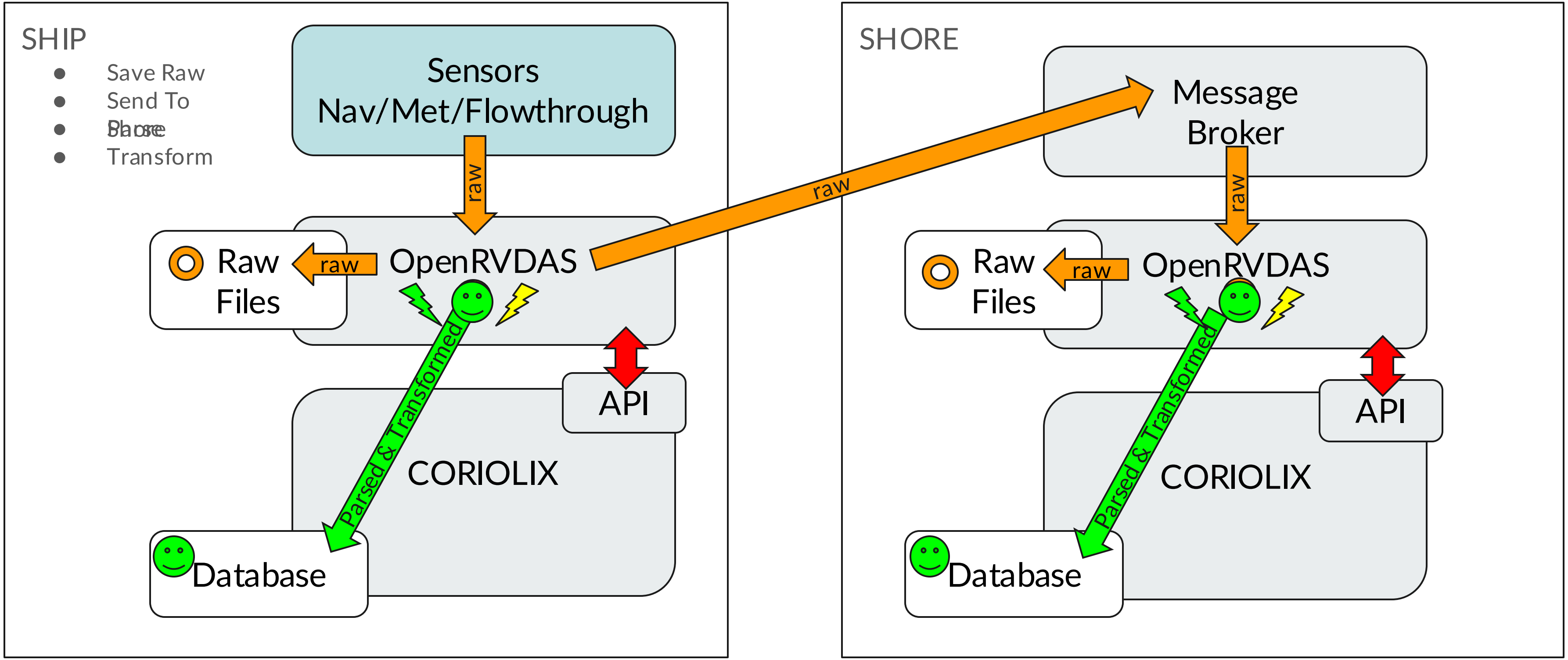


```
▸ 0:  { parameter_id: "bb24fdcb-873d-4f22-97b6-afb1f026aba1", short_name: "Relative Humidity", long_name: "Relative
      Humidity", … }
▸ 1:  { parameter_id: "caac9513-904a-43da-b7e6-cb3f1efd7b7c", short_name: "Air Temp", long_name: "Air Temperature", …
      }
▸ 2:  { parameter_id: "3004c853-f851-4a59-9cdc-04cc4b7c4acc", short_name: "Barometric Pressure", long_name:
      "Barometric Pressure", … }
▸ 3:  { parameter_id: "7c518d6a-0cc8-4de7-b5eb-04839dbf4c68", short_name: "Port Rel Wind Dir", long_name: "Port
      Relative Wind Direction", … }
▸ 4:  { parameter_id: "09a06fcc-a52c-44b6-a61e-ddcd2a1e365e", short_name: "Port Rel Wind Speed", long_name: "Port
      Relative Wind Speed", … }
▸ 5:  { parameter_id: "e876808c-a88a-4177-9fc7-64ff0730e068", short_name: "Stbd Rel Wind Dir", long_name: "Starboard
      Relative Wind Direction", … }
▸ 6:  { parameter_id: "266431e7-15fc-4965-99da-d764d9b0783d", short_name: "Stbd Rel Wind Speed", long_name: "Starboard
      Relative Wind Speed", … }
```

Create OpenRVDAS Config

- BGB Signals OpenRVDAS
- OpenRVDAS queries CORIOLIX API for:
  - Complete set of “enabled” sensors
  - And for each sensor, metadata to:
    - Configure a reader (com. settings)
    - Configure desired transforms
      - Parse sensor messages
      - Ancillary sources
      - Calibration coefficients & transform code
    - Configure desired writers
- OpenRVDAS processes query response using template to produce an OpenRVDAS configuration.yaml file.

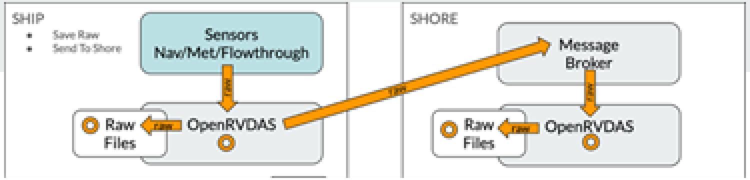
How does it work?
Data Flow

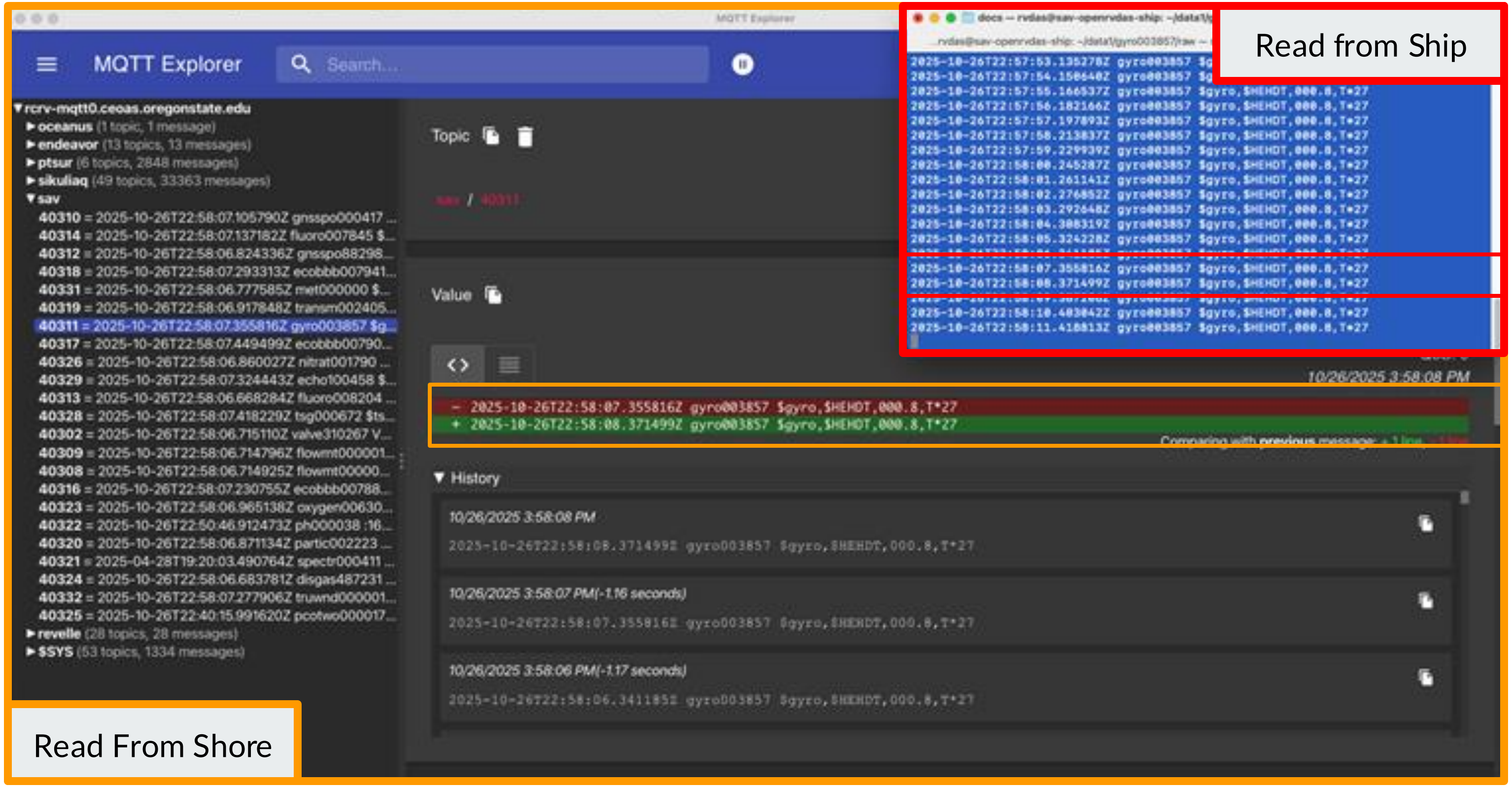


SHIP

- Save Raw
- Send To Shore
- Parse
- Transform

DataFlow Part 1: Save & Send





```
▼ rcrv-mqtt0.ceoas.oregonstate.edu
  ▶ oceanus (1 topic, 1 message)
  ▶ endeavor (13 topics, 13 messages)
  ▶ ptsur (6 topics, 2848 messages)
  ▶ sikuliaq (49 topics, 33363 messages)
  ▼ sav
    40310 = 2025-10-26T22:58:07.105790Z gnsspo000417 ...
    40314 = 2025-10-26T22:58:07.137182Z fluoro007845 $...
    40312 = 2025-10-26T22:58:06.824336Z gnsspo88298...
    40318 = 2025-10-26T22:58:07.293313Z ecobbb007941...
    40331 = 2025-10-26T22:58:06.777585Z met000000 $...
    40319 = 2025-10-26T22:58:06.917848Z transm002405...
    40311 = 2025-10-26T22:58:07.355816Z gyro003857 $g...
    40317 = 2025-10-26T22:58:07.449499Z ecobbb00790...
    40326 = 2025-10-26T22:58:06.860027Z nitrat001790 ...
    40329 = 2025-10-26T22:58:07.324443Z echo100458 $...
    40313 = 2025-10-26T22:58:06.668284Z fluoro008204 ...
    40328 = 2025-10-26T22:58:07.418229Z tsg000672 $ts...
    40302 = 2025-10-26T22:58:06.715110Z valve310267 V...
    40309 = 2025-10-26T22:58:06.714796Z flowmt000001...
    40308 = 2025-10-26T22:58:06.714925Z flowmt00000...
    40316 = 2025-10-26T22:58:07.230755Z ecobbb00788...
    40323 = 2025-10-26T22:58:06.965138Z oxygen00630...
    40322 = 2025-10-26T22:50:46.912473Z ph000038 :16...
    40320 = 2025-10-26T22:58:06.871134Z partic002223 ...
    40321 = 2025-04-28T19:20:03.490764Z spectr000411 ...
    40324 = 2025-10-26T22:58:06.683781Z disgas487231 ...
    40332 = 2025-10-26T22:58:07.277906Z truwnd000001...
    40325 = 2025-10-26T22:40:15.991620Z pco2wo000017...
  ▶ revelle (28 topics, 28 messages)
  ▶ $SYS (53 topics, 1334 messages)
```

Topic: sav / 40311

10/26/2025 3:58:08 PM

```
- 2025-10-26T22:58:07.355816Z gyro003857 $gyro,$HEHDT,000.8,T*27
+ 2025-10-26T22:58:08.371499Z gyro003857 $gyro,$HEHDT,000.8,T*27
```

Comparing with previous message: + 1 line, - 1 line

▼ History

10/26/2025 3:58:08 PM

```
2025-10-26T22:58:08.371499Z gyro003857 $gyro,$HEHDT,000.8,T*27
```

10/26/2025 3:58:07 PM(-1.16 seconds)

```
2025-10-26T22:58:07.355816Z gyro003857 $gyro,$HEHDT,000.8,T*27
```

10/26/2025 3:58:06 PM(-1.17 seconds)

```
2025-10-26T22:58:06.341185Z gyro003857 $gyro,$HEHDT,000.8,T*27
```

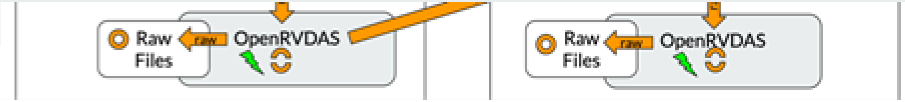
docs — rvdas@sav-openrvdas-ship: ~/data1/g

rvdas@sav-openrvdas-ship: ~/data1/gyro003857/raw —

```
2025-10-26T22:57:53.135278Z gyro003857 $g
2025-10-26T22:57:54.150640Z gyro003857 $g
2025-10-26T22:57:55.166537Z gyro003857 $gyro,$HEHDT,000.8,T*27
2025-10-26T22:57:56.182166Z gyro003857 $gyro,$HEHDT,000.8,T*27
2025-10-26T22:57:57.197893Z gyro003857 $gyro,$HEHDT,000.8,T*27
2025-10-26T22:57:58.213837Z gyro003857 $gyro,$HEHDT,000.8,T*27
2025-10-26T22:57:59.229939Z gyro003857 $gyro,$HEHDT,000.8,T*27
2025-10-26T22:58:00.245287Z gyro003857 $gyro,$HEHDT,000.8,T*27
2025-10-26T22:58:01.261141Z gyro003857 $gyro,$HEHDT,000.8,T*27
2025-10-26T22:58:02.276852Z gyro003857 $gyro,$HEHDT,000.8,T*27
2025-10-26T22:58:03.292648Z gyro003857 $gyro,$HEHDT,000.8,T*27
2025-10-26T22:58:04.308319Z gyro003857 $gyro,$HEHDT,000.8,T*27
2025-10-26T22:58:05.324228Z gyro003857 $gyro,$HEHDT,000.8,T*27
2025-10-26T22:58:07.355816Z gyro003857 $gyro,$HEHDT,000.8,T*27
2025-10-26T22:58:08.371499Z gyro003857 $gyro,$HEHDT,000.8,T*27
2025-10-26T22:58:10.403042Z gyro003857 $gyro,$HEHDT,000.8,T*27
2025-10-26T22:58:11.418813Z gyro003857 $gyro,$HEHDT,000.8,T*27
```

Read from Ship

Read From Shore



Data Flow Part 2: Parsing

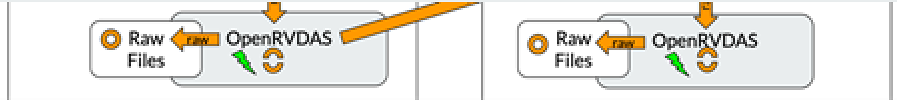
Sensor message parsing is a key step in the data flow, implemented with regular expressions.

What is RegEx? *A regular expression, or regex, is a special text string used to describe a search pattern for matching and manipulating text. Using metacharacters and operators, it can match patterns instead of just literal text, allowing for powerful and flexible text processing.*

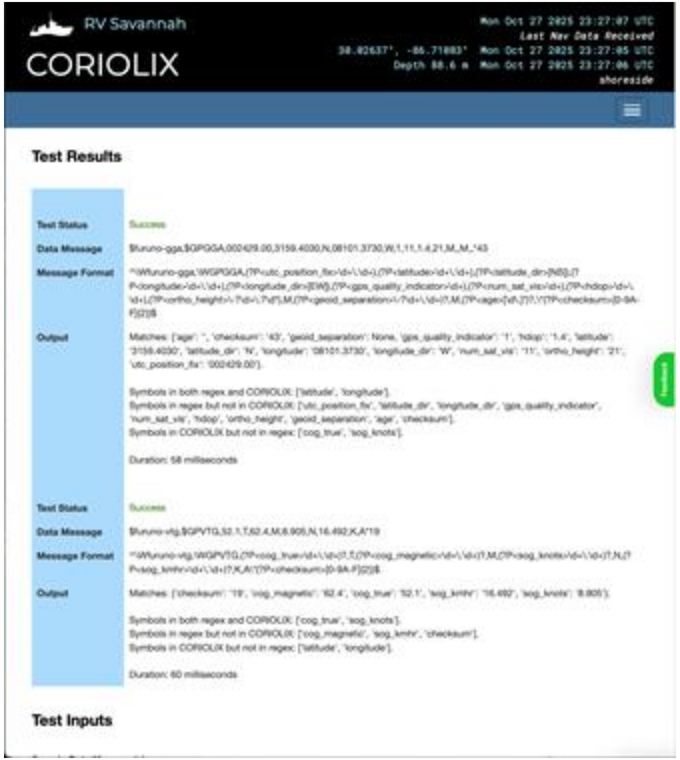
Message: $furuno-gga,$GPGGA,002429.00,3159.4030,N,08101.3730,W,1,11,1.4,21,M,,M,,*43

Utc_position_fix:	‘002429.00’
Latitude:	‘3159.4030’
Latitude_dir:	‘N’
Longitude:	‘08101.3730’
Longitude_dir:	‘W’
Gps_quality_indicator:	‘1’
Num_sat_vis:	‘11’
Hdop:	‘1.4’
Ortho_height:	‘21’
Geoid_separation:	None
age:	‘’
checksum:	‘43’

```
^\Wfuruno-gga,
\WGPGGA,
(?P<utc_position_fix>\d+\.\d+),
(?P<latitude>\d+\.\d+),
(?P<latitude_dir>[NS]),
(?P<longitude>\d+\.\d+),
(?P<longitude_dir>[EW]),
(?P<gps_quality_indicator>\d+),
(?P<num_sat_vis>\d+),
(?P<hdop>\d+\.\d+),
(?P<ortho_height>\-?\d+\.?\d*),
M,
(?P<geoid_separation>\-?\d+\.\d+)?,
M,
(?P<age>[\d\.]*)?,
\*(?P<checksum>[0-9A-F]{2})$'
```



Data Flow Part 2: Parsing



```
Mon Oct 27 2025 23:27:07 UTC
Last Nav Data Received
30.02637°, -86.71003°  Mon Oct 27 2025 23:27:05 UTC
Depth 88.6 m  Mon Oct 27 2025 23:27:06 UTC
shoreside
```

Test Results

Test Status Success

Data Message $furuno-gga,$GPGGA,002429.00,3159.4030,N,08101.3730,W,1,11,1.4,21,M,,M,,*43

Message Format ^\Wfuruno-gga,\WGPGGA,(?P<utc_position_fix>\d+\.\d+),(?P<latitude>\d+\.\d+),(?P<latitude_dir>[NS]),(?P<longitude>\d+\.\d+),(?P<longitude_dir>[EW]),(?P<gps_quality_indicator>\d+),(?P<num_sat_vis>\d+),(?P<hdop>\d+\.\d+),(?P<ortho_height>-?\d+\.?\d*),M,(?P<geoid_separation>-?\d+\.\d+)?,M,(?P<age>[\d\.]*)?,*(?P<checksum>[0-9A-F]{2})$

Output Matches: {'age': '', 'checksum': '43', 'geoid_separation': None, 'gps_quality_indicator': '1', 'hdop': '1.4', 'latitude': '3159.4030', 'latitude_dir': 'N', 'longitude': '08101.3730', 'longitude_dir': 'W', 'num_sat_vis': '11', 'ortho_height': '21', 'utc_position_fix': '002429.00'}.

Symbols in both regex and CORIOLIX: ['latitude', 'longitude'].
Symbols in regex but not in CORIOLIX: ['utc_position_fix', 'latitude_dir', 'longitude_dir', 'gps_quality_indicator', 'num_sat_vis', 'hdop', 'ortho_height', 'geoid_separation', 'age', 'checksum'].
Symbols in CORIOLIX but not in regex: ['cog_true', 'sog_knots'].

Duration: 58 milliseconds

Test Status Success

Data Message $furuno-vtg,$GPVTG,52.1,T,62.4,M,8.905,N,16.492,K,A*19

Message Format ^\Wfuruno-vtg,\WGPVTG,(?P<cog_true>\d+\.\d+)?,T,(?P<cog_magnetic>\d+\.\d+)?,M,(?P<sog_knots>\d+\.\d+)?,N,(?P<sog_kmhr>\d+\.\d+)?,K,A*(?P<checksum>[0-9A-F]{2})$

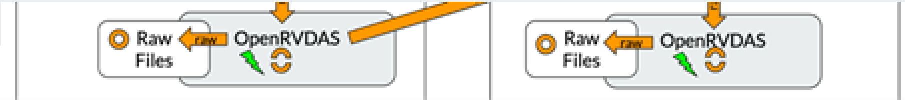
Output Matches: {'checksum': '19', 'cog_magnetic': '62.4', 'cog_true': '52.1', 'sog_kmhr': '16.492', 'sog_knots': '8.905'}.

Symbols in both regex and CORIOLIX: ['cog_true', 'sog_knots'].
Symbols in regex but not in CORIOLIX: ['cog_magnetic', 'sog_kmhr', 'checksum'].
Symbols in CORIOLIX but not in regex: ['latitude', 'longitude'].

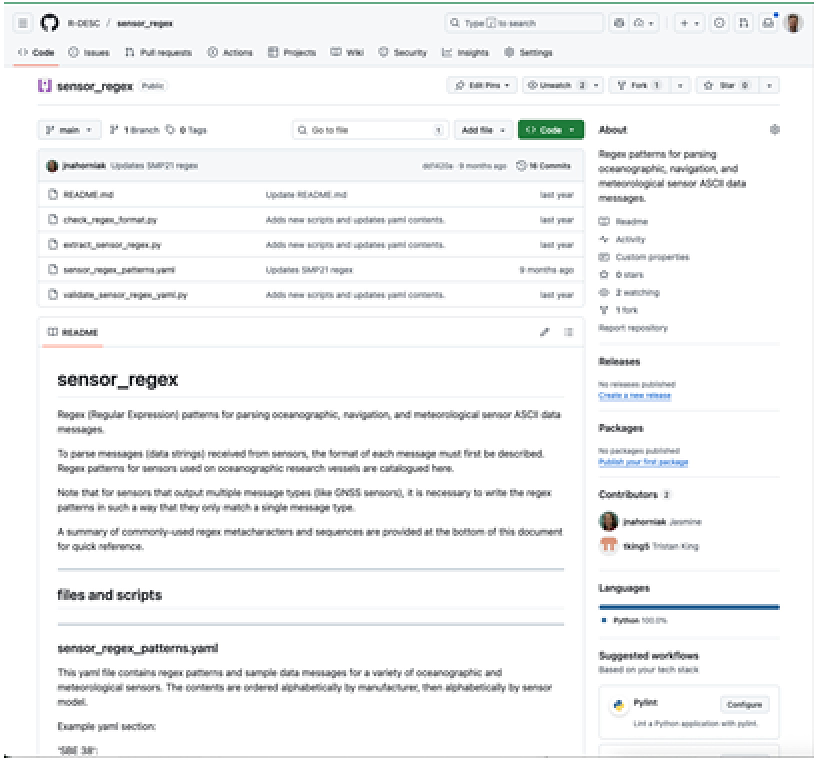
Duration: 60 milliseconds

Test Inputs

Show CRUISE.yaml here



Data Flow Part 2: CORIOLIX RegEx Repo!



sensor_regex

jnahorniak Updates SMP21 regex · a6f420a · 9 months ago · 16 Commits

README.md	Update README.md	last year
check_regex_format.py	Adds new scripts and updates yaml contents.	last year
extract_sensor_regex.py	Adds new scripts and updates yaml contents.	last year
sensor_regex_patterns.yaml	Updates SMP21 regex	9 months ago
validate_sensor_regex_yaml.py	Adds new scripts and updates yaml contents.	last year

README

sensor_regex

Regex (Regular Expression) patterns for parsing oceanographic, navigation, and meteorological sensor ASCII data messages.

To parse messages (data strings) received from sensors, the format of each message must first be described. Regex patterns for sensors used on oceanographic research vessels are catalogued here.

Note that for sensors that output multiple message types (like GNSS sensors), it is necessary to write the regex patterns in such a way that they only match a single message type.

A summary of commonly-used regex metacharacters and sequences are provided at the bottom of this document for quick reference.

files and scripts

sensor_regex_patterns.yaml

This yaml file contains regex patterns and sample data messages for a variety of oceanographic and meteorological sensors. The contents are ordered alphabetically by manufacturer, then alphabetically by sensor model.

Example yaml section:

'SBE 38':

About

Regex patterns for parsing oceanographic, navigation, and meteorological sensor ASCII data messages.

- Readme
- Activity
- Custom properties
- 0 stars
- 2 watching
- 1 fork

Report repository

Releases

No releases published
Create a new release

Packages

No packages published
Publish your first package

Contributors 2

- jnahorniak Jasmine
- tking5 Tristan King

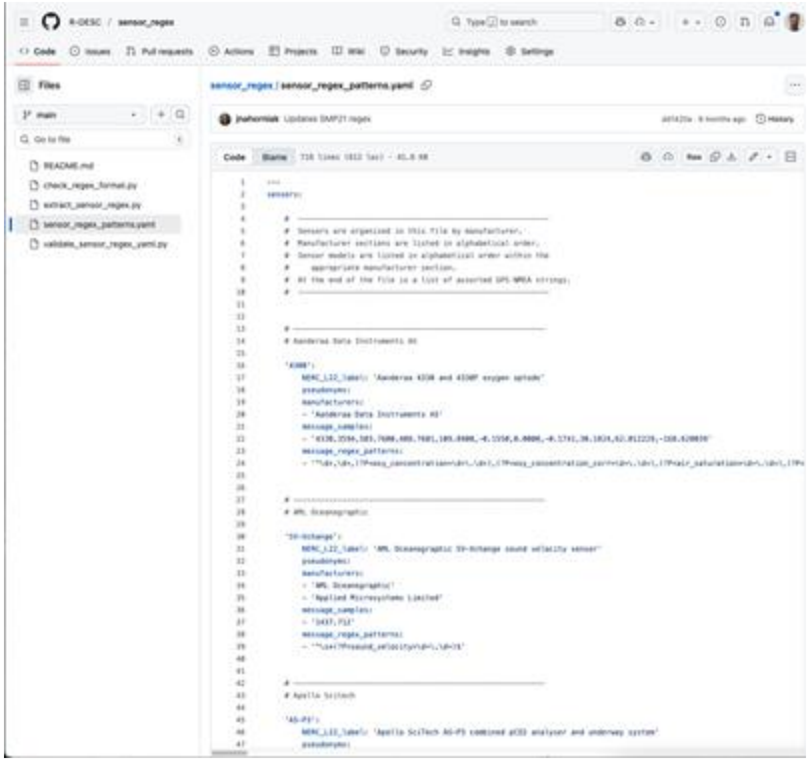
Languages

- Python 100.0%

Suggested workflows

Based on your tech stack

Pylint · Configure
Lint a Python application with pylint.



- README.md
- check_regex_format.py
- extract_sensor_regex.py
- sensor_regex_patterns.yaml
- validate_sensor_regex_yaml.py

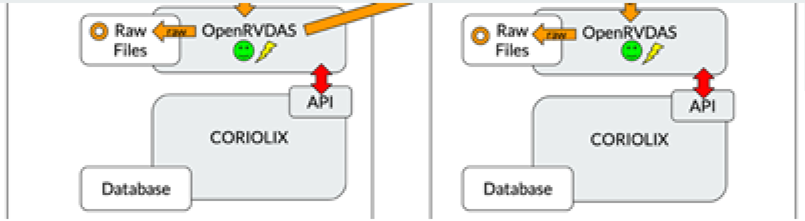
sensor_regex / sensor_regex_patterns.yaml

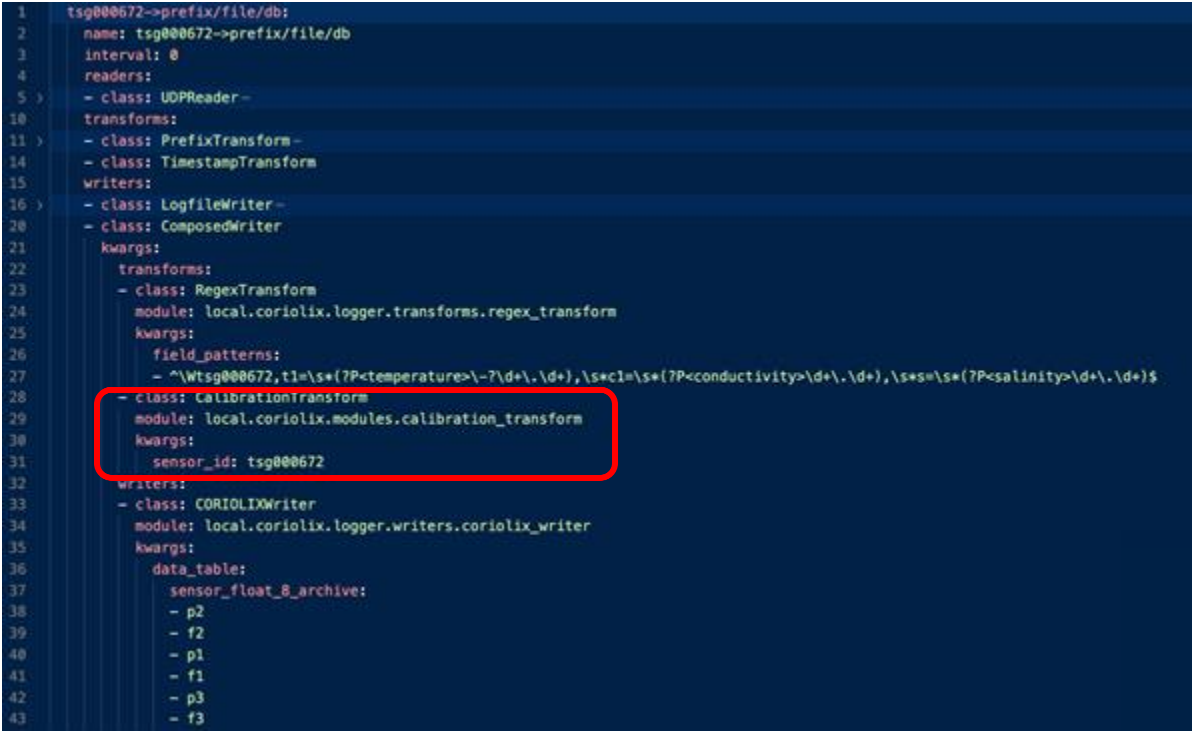
jnahorniak Updates SMP21 regex · a6f420a · 9 months ago

718 lines (612 loc) · 41.6 KB

```
---
sensors:

    # ----------------------------------------------------------
    # Sensors are organized in this file by manufacturer.
    # Manufacturer sections are listed in alphabetical order.
    # Sensor models are listed in alphabetical order within the
    #    appropriate manufacturer section.
    # At the end of the file is a list of assorted GPS-NMEA strings.
    # ----------------------------------------------------------


    # ----------------------------------------------------------
    # Aanderaa Data Instruments AS

    '4330':
        NERC_L22_label: 'Aanderaa 4330 and 4330F oxygen optode'
        pseudonyms:
        manufacturers:
        - 'Aanderaa Data Instruments AS'
        message_samples:
        - '4330,3594,585.7600,485.7601,105.0000,-4.1550,0.0000,-0.1741,30.1024,62.012220,-158.620030'
        message_regex_patterns:
        - '^\d+,\d+,(?P<oxy_concentration>\d+\.\d+),(?P<oxy_concentration_corr>\d+\.\d+),(?P<air_saturation>\d+\.\d+),(?P


    # ----------------------------------------------------------
    # AML Oceanographic

    'SV-Xchange':
        NERC_L22_label: 'AML Oceanographic SV-Xchange sound velocity sensor'
        pseudonyms:
        manufacturers:
        - 'AML Oceanographic'
        - 'Applied Microsystems Limited'
        message_samples:
        - ' 1437.712'
        message_regex_patterns:
        - '^\s+(?P<sound_velocity>\d+\.\d+)$'


    # ----------------------------------------------------------
    # Apollo SciTech

    'AS-P3':
        NERC_L22_label: 'Apollo SciTech AS-P3 combined pCO2 analyser and underway system'
        pseudonyms:
```

Data Flow Part 3: Transforms





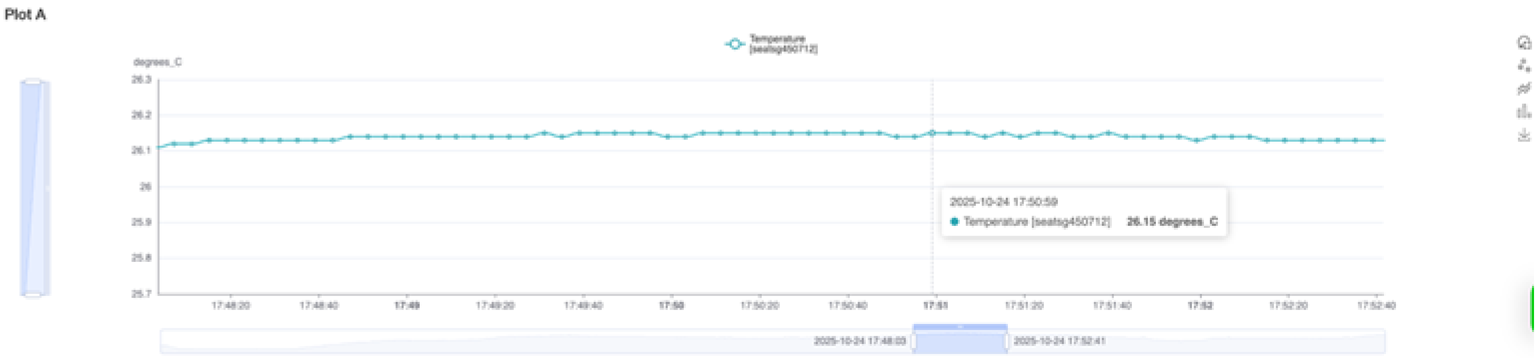
```
tsg000672->prefix/file/db:
  name: tsg000672->prefix/file/db
  interval: 0
  readers:
  - class: UDPReader
  transforms:
  - class: PrefixTransform
  - class: TimestampTransform
  writers:
  - class: LogfileWriter
  - class: ComposedWriter
    kwargs:
      transforms:
      - class: RegexTransform
        module: local.coriolix.logger.transforms.regex_transform
        kwargs:
          field_patterns:
          - ^\Wtsg000672,t1=\s*(?P<temperature>\-?\d+\.\d+),\s*c1=\s*(?P<conductivity>\d+\.\d+),\s*s=\s*(?P<salinity>\d+\.\d+)$
      - class: CalibrationTransform
        module: local.coriolix.modules.calibration_transform
        kwargs:
          sensor_id: tsg000672
      writers:
      - class: CORIOLIXWriter
        module: local.coriolix.logger.writers.coriolix_writer
        kwargs:
          data_table:
            sensor_float_8_archive:
            - p2
            - f2
            - p1
            - f1
            - p3
            - f3
```

calibration_transform.py

- metadata_utilities.py
  - Provides the logic to lookup calibration coefficients & other required metadata
- process.py
  - Imports sensor specific transformation routines

2025 Major Update

- What?
  - **API and Backend Overhaul**
  - Plotting Updates
  - Metadata Repository
  - Shipboard Message Broker & Websockets



Data Model Change

- Parameter Based Storage
  - **OLD - Sensor Tables**
    - sensor_mixlg_11

id	time	time_raw	sensor_id	p1	f1	p2	f2…
42	2025-11-4T04:01:34	2025-11-4T04:01:34	seapth000000	1.123	2212122	5.567	2222122

  - **NEW- Parameter Tables:**
    - latitude_degrees_seapth000000_fullres

id	time	time_raw	flag_summary	flag_string	value
42	2025-11-4T04:01:34	2025-11-4T04:01:34	1	2222122	5.567

Data Model Change

- Simplified Binned Data Structure
    - { "a": [359.017, 5.259, 0.1, 359.9, 120, 359.5, -999], "b": [358.982, 5.321, 1, 359.9, 117, 359.5, -999], "c": [358.982, 5.321, 1, 359.9, 117, 359.5, -999], "fa": "224122222222222222222222222222", "fb": "221122222222222222222222222222", "fc": "221122222222222222222222222222", "sa": "2021-05-06 22:12:59Z", "sb": "2021-05-06 22:12:59Z", "sc": "2021-05-06 22:12:59Z" }
    - { "id": 116331, "time": "2025-10-24T04:00:00Z", "latitude": 57.19606565, "longitude": -146.963442733333, "cog_degreestrue_seapth000000": 168.5911, "sog_kmperhr_seapth000000": 0.305, ...}
- Dedicated Bin Statistics Tables
    - {"id": 8800, "time": "2025-08-04T04:00:00Z", "flag_summary": 1, "flag_string": "222122222222222222222222222222", "spot_time": "2025-08-04T04:00:00Z", "spot_value": 58.0196863666667, "mean": 58.0196873725, "stddev": 8.3127426164e-7, "minimum": 58.0196859666667, "maximum": 58.0196893666667, "median": 58.0196872916667, "num_values": 60}

Data Model Change

- Descriptive Data Naming
  - sensor_mixlg_11
  - latitude_degrees
- Descriptive API Endpoints
  - https://coriolix.example.edu/api/**sensor_mixlg_11**/
  - https://coriolix.example.edu/api/data/**fullres/seapth000000/latitude_degrees**/
- CF Standard Naming
  - ALATSP01
  - Latitude_degrees
- Primary Parameter Designations
  - Adds “is_primary” field to flag parameter as primary data source
  - GUI Page for making and updating primary assignments

Resources:

- https://github.com/R-DESC/CORIOLIX_notebooks
- https://github.com/R-DESC/sensor_regex

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