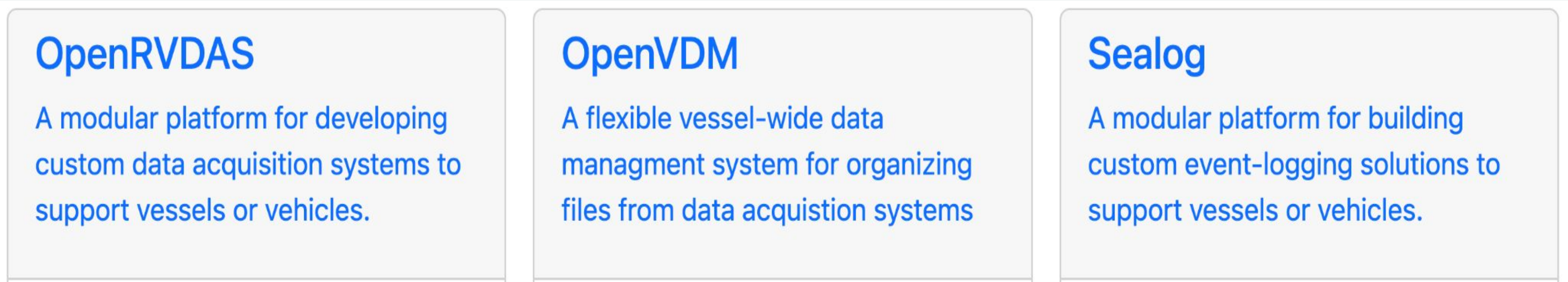
Ocean Data Tools

https://www.oceandatatools.org

RVTEC 2024 Tutorial



OpenRVDAS

A modular platform for developing custom data acquisition systems to support vessels or vehicles.

OpenVDM

A flexible vessel-wide data managment system for organizing files from data acquistion systems

Sealog

A modular platform for building custom event-logging solutions to support vessels or vehicles.

Sealog

- Introduction
- Lingo 101
- System overview
- Backend Services
- Best practices
- Contributing
- Where to from here?

Sealog

- **Introduction**
- Lingo 101
- System overview
- Backend Services
- Best practices
- Contributing
- Where to from here?

Sealog

- **What is it?**
- What's special about it?

Sealog is a **general purpose event logging framework** built to support research vessels and underwater vehicles.

It provides vessel/vehicle operators with an event-logging solution that can be **customized to support** the operator's unique needs and provide a **science party** with a tool that allows them to design and **enforce standardized** documenting procedures and **vocabularies.**

Sealog

- **What is it?**
- What's special about it?

Sealog uses a **server/client architecture** with the server's functionality remaining small and concise.

Ancillary data (sensor, position, imagery) is **stored independently** from event data allowing it to be added at any time (realtime or post)

Data is added, queried and exported via the **server's API allowing multiple data pathways**

Sealog

- What is it?
- **What's special about it?**

Flexible - the tool doesn't tell the user how to log, can be used with any type of platform.

Define your own event schemes/vocabularies

Decide what data to associate with events

Use one of the provided web-ui clients or write your own.

Build your own custom export scripts

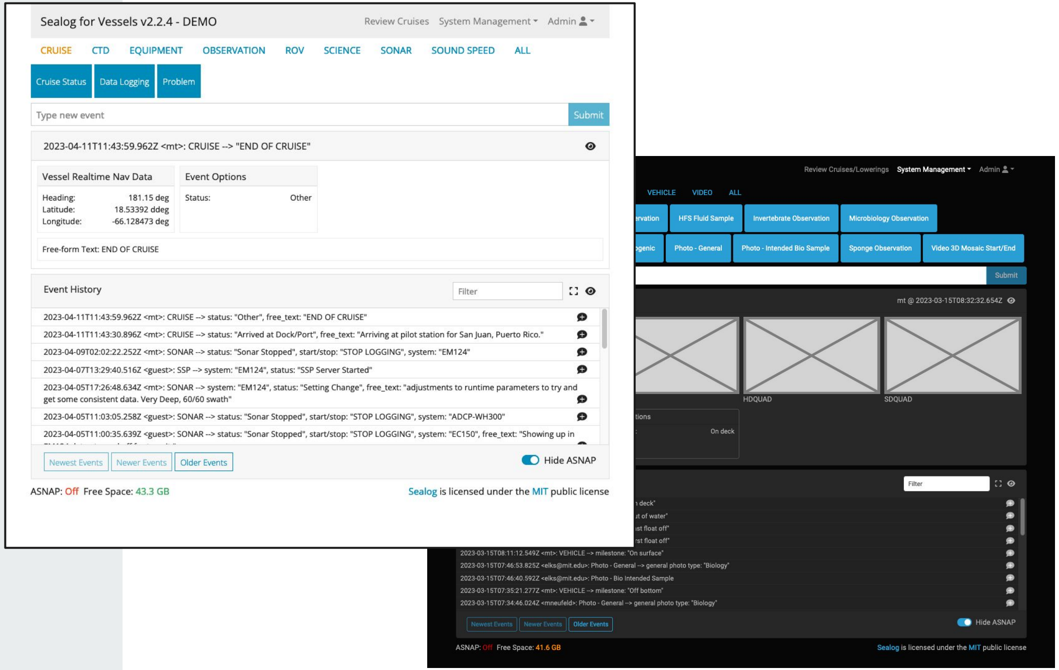
Sealog

- What is it?

- **What's special about it?**

Two client types available:

- Vessel focused
- Vehicle focused



2023-04-11T11:43:59.962Z <mt>: CRUISE --> "END OF CRUISE"

Vessel Realtime Nav Data

Heading:	181.15 deg
Latitude:	18.53392 ddeg
Longitude:	-66.128473 deg

Event Options

Status: Other

Free-form Text: END OF CRUISE

Event History

```
2023-04-11T11:43:59.962Z <mt>: CRUISE --> status: "Other", free_text: "END OF CRUISE"
2023-04-11T11:43:30.896Z <mt>: CRUISE --> status: "Arrived at Dock/Port", free_text: "Arriving at pilot station for San Juan, Puerto Rico."
2023-04-09T02:02:22.252Z <mt>: SONAR --> status: "Sonar Stopped", start/stop: "STOP LOGGING", system: "EM124"
2023-04-07T13:29:40.516Z <guest>: SSP --> system: "EM124", status: "SSP Server Started"
2023-04-05T17:26:48.634Z <mt>: SONAR --> system: "EM124", status: "Setting Change", free_text: "adjustments to runtime parameters to try and get some consistent data. Very Deep, 60/60 swath"
2023-04-05T11:03:05.258Z <guest>: SONAR --> status: "Sonar Stopped", start/stop: "STOP LOGGING", system: "ADCP-WH300"
2023-04-05T11:00:35.639Z <guest>: SONAR --> status: "Sonar Stopped", start/stop: "STOP LOGGING", system: "EC150", free_text: "Showing up in
```

ASNAP: Off Free Space: 43.3 GB

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mt @ 2023-03-15T08:32:32.654Z

: On deck

```
n deck"
ut of water"
ist float off"
rst float off"
2023-03-15T08:11:12.549Z <mt>: VEHICLE --> milestone: "On surface"
2023-03-15T07:46:53.825Z <elks@mit.edu>: Photo - General --> general photo type: "Biology"
2023-03-15T07:46:40.592Z <elks@mit.edu>: Photo - Bio Intended Sample
2023-03-15T07:35:21.277Z <mt>: VEHICLE --> milestone: "Off bottom"
2023-03-15T07:34:46.024Z <mneufeld>: Photo - General --> general photo type: "Biology"
```

ASNAP: Off Free Space: 41.6 GB

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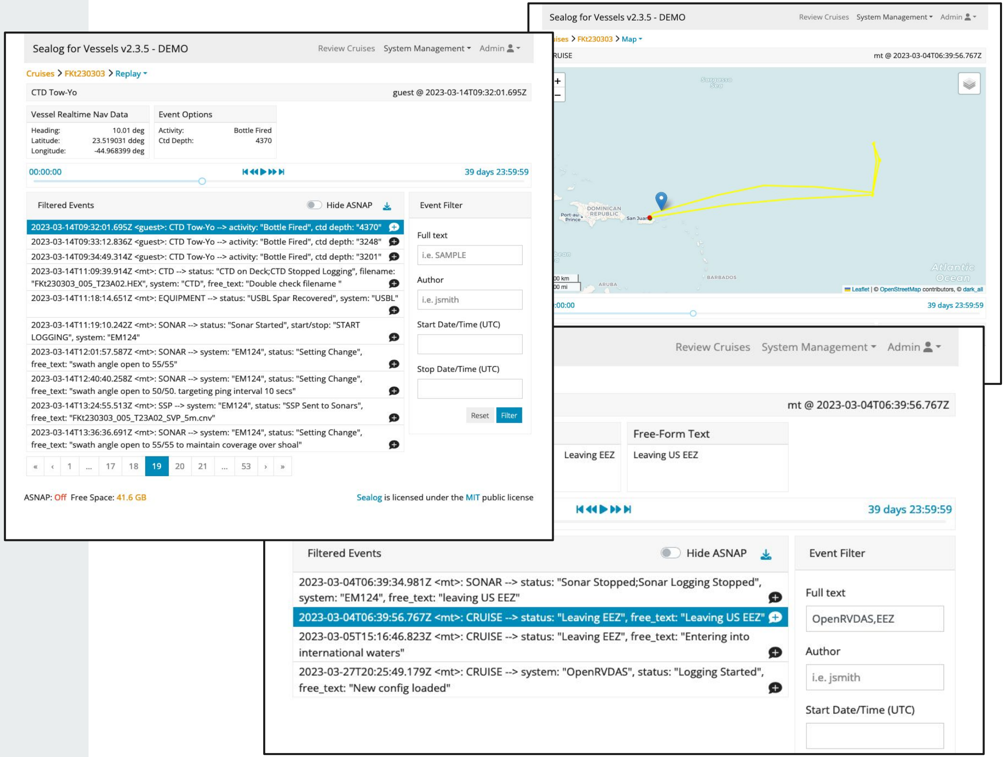
Sealog

- What is it?
- **What's special about it?**

Replay and Search events:



Sealog for Vessels v2.3.5 - DEMO
Review Cruises
System Management
Admin
Cruises > FKt230303 > Replay

CTD Tow-Yo — guest @ 2023-03-14T09:32:01.695Z

Vessel Realtime Nav Data	
Heading:	10.01 deg
Latitude:	23.519031 ddeg
Longitude:	-44.968399 deg

Event Options	
Activity:	Bottle Fired
Ctd Depth:	4370

00:00:00 … 39 days 23:59:59

```
2023-03-14T09:32:01.695Z <guest>: CTD Tow-Yo --> activity: "Bottle Fired", ctd depth: "4370"
2023-03-14T09:33:12.836Z <guest>: CTD Tow-Yo --> activity: "Bottle Fired", ctd depth: "3248"
2023-03-14T09:34:49.314Z <guest>: CTD Tow-Yo --> activity: "Bottle Fired", ctd depth: "3201"
2023-03-14T11:09:39.914Z <mt>: CTD --> status: "CTD on Deck;CTD Stopped Logging", filename:
"FKt230303_005_T23A02.HEX", system: "CTD", free_text: "Double check filename "
2023-03-14T11:18:14.651Z <mt>: EQUIPMENT --> status: "USBL Spar Recovered", system: "USBL"
2023-03-14T11:19:10.242Z <mt>: SONAR --> status: "Sonar Started", start/stop: "START
LOGGING", system: "EM124"
2023-03-14T12:01:57.587Z <mt>: SONAR --> system: "EM124", status: "Setting Change",
free_text: "swath angle open to 55/55"
2023-03-14T12:40:40.258Z <mt>: SONAR --> system: "EM124", status: "Setting Change",
free_text: "swath angle open to 50/50. targeting ping interval 10 secs"
2023-03-14T13:24:55.513Z <mt>: SSP --> system: "EM124", status: "SSP Sent to Sonars",
free_text: "FKt230303_005_T23A02_SVP_5m.cnv"
2023-03-14T13:36:36.691Z <mt>: SONAR --> system: "EM124", status: "Setting Change",
free_text: "swath angle open to 55/55 to maintain coverage over shoal"
```

Full text: i.e. SAMPLE
Author: i.e. jsmith
Start Date/Time (UTC):
Stop Date/Time (UTC):

ASNAP: Off Free Space: 41.6 GB

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RUISE — mt @ 2023-03-04T06:39:56.767Z

:00:00 … 39 days 23:59:59

mt @ 2023-03-04T06:39:56.767Z

	Free-Form Text
Leaving EEZ	Leaving US EEZ

39 days 23:59:59

```
2023-03-04T06:39:34.981Z <mt>: SONAR --> status: "Sonar Stopped;Sonar Logging Stopped",
system: "EM124", free_text: "leaving US EEZ"
2023-03-04T06:39:56.767Z <mt>: CRUISE --> status: "Leaving EEZ", free_text: "Leaving US EEZ"
2023-03-05T15:16:46.823Z <mt>: CRUISE --> status: "Leaving EEZ", free_text: "Entering into
international waters"
2023-03-27T20:25:49.179Z <mt>: CRUISE --> system: "OpenRVDAS", status: "Logging Started",
free_text: "New config loaded"
```

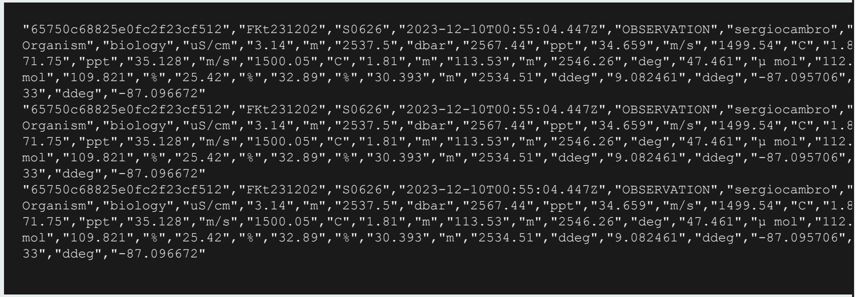
Full text: OpenRVDAS,EEZ
Author: i.e. jsmith
Start Date/Time (UTC):

Sealog

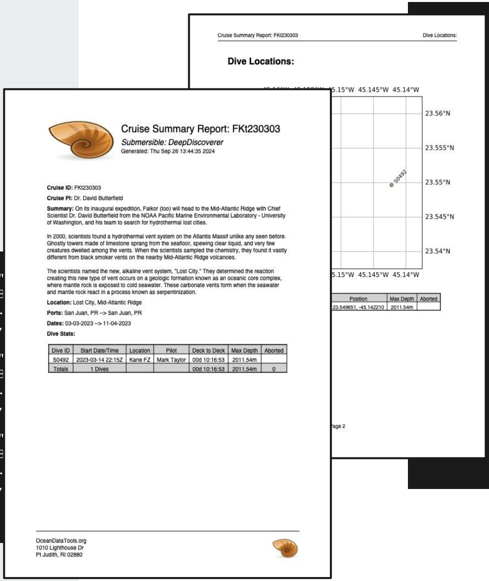
- What is it?
- **What's special about it?**

Custom Exports:

- Export to csv/json from the UI
- Add backend export script to automate and expand the export process.



```
"65750c68825e0fc2f23cf512","FKt231202","S0626","2023-12-10T00:55:04.447Z","OBSERVATION","sergiocambro","
Organism","biology","uS/cm","3.14","m","2537.5","dbar","2567.44","ppt","34.659","m/s","1499.54","C","1.8
71.75","ppt","35.128","m/s","1500.05","C","1.81","m","113.53","m","2546.26","deg","47.461","µ mol","112.
mol","109.821","%","25.42","%","32.89","%","30.393","m","2534.51","ddeg","9.082461","ddeg","-87.095706",
33","ddeg","-87.096672"
"65750c68825e0fc2f23cf512","FKt231202","S0626","2023-12-10T00:55:04.447Z","OBSERVATION","sergiocambro","
Organism","biology","uS/cm","3.14","m","2537.5","dbar","2567.44","ppt","34.659","m/s","1499.54","C","1.8
71.75","ppt","35.128","m/s","1500.05","C","1.81","m","113.53","m","2546.26","deg","47.461","µ mol","112.
mol","109.821","%","25.42","%","32.89","%","30.393","m","2534.51","ddeg","9.082461","ddeg","-87.095706",
33","ddeg","-87.096672"
"65750c68825e0fc2f23cf512","FKt231202","S0626","2023-12-10T00:55:04.447Z","OBSERVATION","sergiocambro","
Organism","biology","uS/cm","3.14","m","2537.5","dbar","2567.44","ppt","34.659","m/s","1499.54","C","1.8
71.75","ppt","35.128","m/s","1500.05","C","1.81","m","113.53","m","2546.26","deg","47.461","µ mol","112.
mol","109.821","%","25.42","%","32.89","%","30.393","m","2534.51","ddeg","9.082461","ddeg","-87.095706",
33","ddeg","-87.096672"
```



Cruise Summary Report: FKt230303 Dive Locations:

Dive Locations:

Position	Max Depth	Aborted
23.549651, -45.142210	2011.54m	

Page 2

Cruise Summary Report: FKt230303

Submersible: DeepDiscoverer

Generated: Thu Sep 26 13:44:35 2024

Cruise ID: FKt230303

Cruise PI: Dr. David Butterfield

Summary: On its inaugural expedition, Falkor (too) will head to the Mid-Atlantic Ridge with Chief Scientist Dr. David Butterfield from the NOAA Pacific Marine Environmental Laboratory - University of Washington, and his team to search for hydrothermal lost cities.

In 2000, scientists found a hydrothermal vent system on the Atlantis Massif unlike any seen before. Ghostly towers made of limestone sprang from the seafloor, spewing clear liquid, and very few creatures dwelled among the vents. When the scientists sampled the chemistry, they found it vastly different from black smoker vents on the nearby Mid-Atlantic Ridge volcanoes.

The scientists named the new, alkaline vent system, "Lost City." They determined the reaction creating this new type of vent occurs on a geologic formation known as an oceanic core complex, where mantle rock is exposed to cold seawater. These carbonate vents form when the seawater and mantle rock react in a process known as serpentinization.

Location: Lost City, Mid-Atlantic Ridge

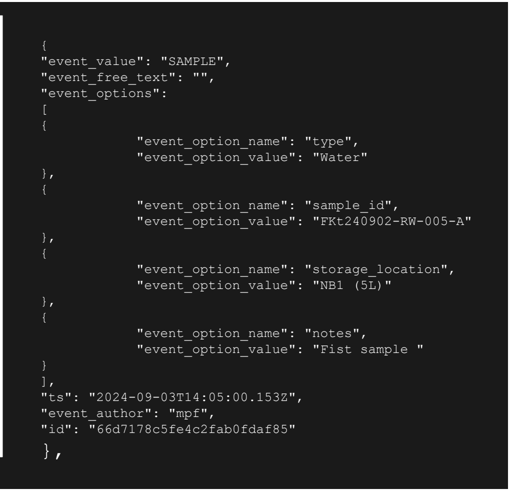
Ports: San Juan, PR --> San Juan, PR

Dates: 03-03-2023 --> 11-04-2023

Dive Stats:

Dive ID	Start Date/Time	Location	Pilot	Deck to Deck	Max Depth	Aborted
S0492	2023-03-14 22:15Z	Kane FZ	Mark Taylor	00d 10:16:53	2011.54m	
Totals	1 Dives			00d 10:16:53	2011.54m	0

OceanDataTools.org
1010 Lighthouse Dr
Pt Judith, RI 02880



```
{
"event_value": "SAMPLE",
"event_free_text": "",
"event_options":
[
{
            "event_option_name": "type",
            "event_option_value": "Water"
},
{
            "event_option_name": "sample_id",
            "event_option_value": "FKt240902-RW-005-A"
},
{
            "event_option_name": "storage_location",
            "event_option_value": "NB1 (5L)"
},
{
            "event_option_name": "notes",
            "event_option_value": "Fist sample "
}
],
"ts": "2024-09-03T14:05:00.153Z",
"event_author": "mpf",
"id": "66d7178c5fe4c2fab0fdaf85"
},
```

Sealog

- What is it?

- **What's special about it?**

3rd Party integration:

Allow other systems to add ancillary data or events:

- Frame grabbers
- InfluxDB
- UDP feeds

Allows Sealog to control other systems:

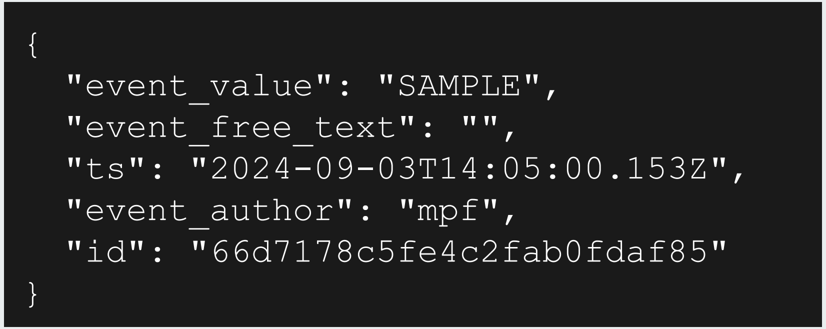
- Video loggers
- Data acquisition systems
- Social media feeds

Sealog Installations

Sealog

- Introduction
- **Lingo 101**
- System overview
- Backend Services
- Best practices
- Contributing
- Where to from here?

Lingo 101



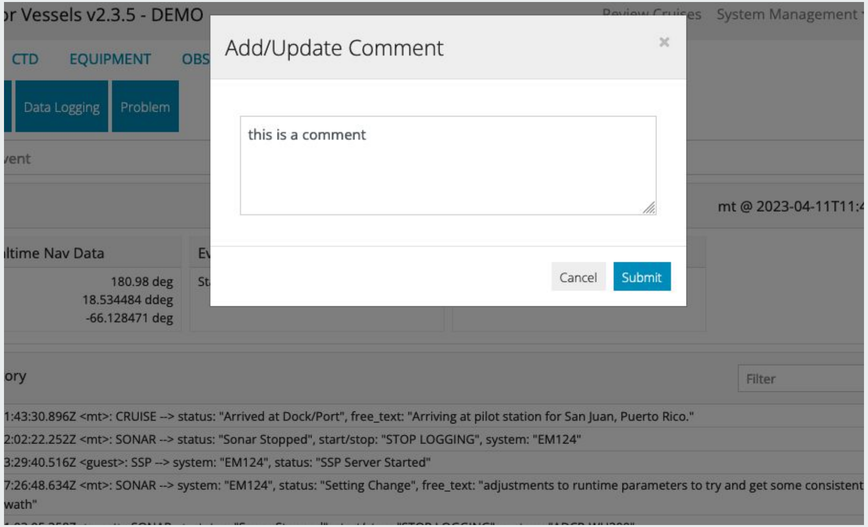
```
{
  "event_value": "SAMPLE",
  "event_free_text": "",
  "ts": "2024-09-03T14:05:00.153Z",
  "event_author": "mpf",
  "id": "66d7178c5fe4c2fab0fdaf85"
}
```

Events

An ‘event’ is any scientific or operational observation not already directly captured by other data logging systems.

Sealog events are comprised of a timestamp, author, a high-level value, optional free-form text and an optional list of related observational information.

Lingo 101



this is a comment

```
1:43:30.896Z <mt>: CRUISE --> status: "Arrived at Dock/Port", free_text: "Arriving at pilot station for San Juan, Puerto Rico."
2:02:22.252Z <mt>: SONAR --> status: "Sonar Stopped", start/stop: "STOP LOGGING", system: "EM124"
3:29:40.516Z <guest>: SSP --> system: "EM124", status: "SSP Server Started"
7:26:48.634Z <mt>: SONAR --> system: "EM124", status: "Setting Change", free_text: "adjustments to runtime parameters to try and get some consistent
wath"
```

Event Comments

Event comments are special case of observational information.

Added to all event records as a space for users to add additional information after the event is submitted.

Event comments can be used for:

- Recording that an observation is incorrect
- Additional observations not included in the original event submission
- Preliminary notes on the importance of an event

Lingo 101

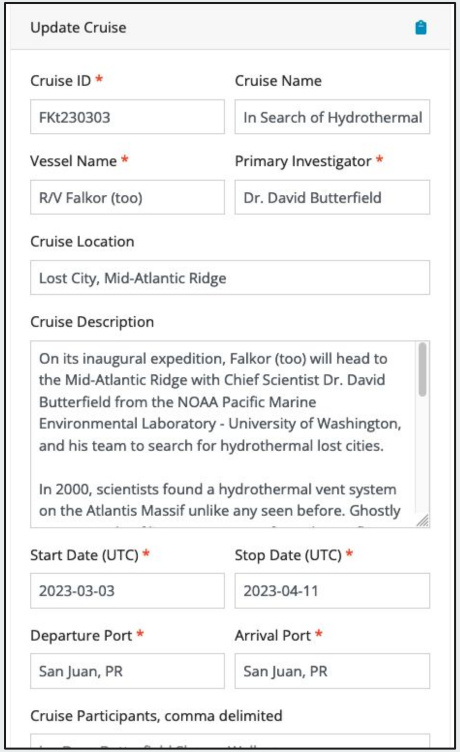
```
{
    "id": "5a7341898c1553258f703ce0",
    “event_id": "5981f167212b348aed7fa9f6",
    "data_source": "datagrabber",
    "data_array":
    [
        {
            "data_name": "latitude",
            "data_value": "41.342981",
            "data_uom": "ddeg"
        },
        {
            "data_name": "longitude",
            “data_value": "-170.236345",
            "data_uom": "ddeg"
         },
         {
            "data_name": "depth",
            "data_value": "943.2",
            "data_uom": "meters"
         },
         {
            "data_name": "heading",
            "data_value": "75.2",
            "data_uom": "deg"
         }
     ]
}
```

Ancillary Data

Addition data that is not observational but is important to associate with the event: vessel position, sensors data, etc.

- Multiple ancillary data records can be associated with an event.
- Events are not required to have the same type/number of ancillary data records
- Ancillary data can be added at the time the event is created or as part of a post-processing workflow.

Lingo 101



Update Cruise

Cruise ID *	Cruise Name
FKt230303	In Search of Hydrothermal
Vessel Name *	Primary Investigator *
R/V Falkor (too)	Dr. David Butterfield

Cruise Location

Lost City, Mid-Atlantic Ridge

Cruise Description

On its inaugural expedition, Falkor (too) will head to the Mid-Atlantic Ridge with Chief Scientist Dr. David Butterfield from the NOAA Pacific Marine Environmental Laboratory - University of Washington, and his team to search for hydrothermal lost cities.

In 2000, scientists found a hydrothermal vent system on the Atlantis Massif unlike any seen before. Ghostly

Start Date (UTC) *	Stop Date (UTC) *
2023-03-03	2023-04-11
Departure Port *	Arrival Port *
San Juan, PR	San Juan, PR

Cruise Participants, comma delimited

Cruises/Lowerings

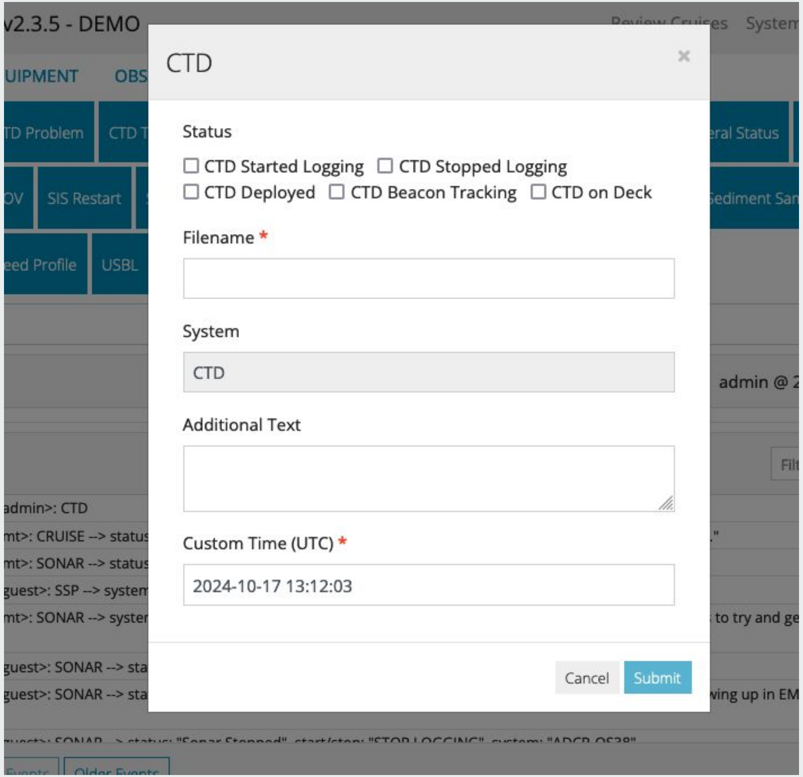
Sealog event data is not internally organized by cruise. Cruise information is stored as separate records.

These records include an ID, start time, stop time, and other metadata such as location and description.

These records are used when reviewing or exporting data to extract events based on event timestamps.

The same approach is used for lowerings

Lingo 101



CTD

Status

□ CTD Started Logging □ CTD Stopped Logging
□ CTD Deployed □ CTD Beacon Tracking □ CTD on Deck

Filename *

System

CTD

Additional Text

Custom Time (UTC) *

2024-10-17 13:12:03

Cancel | Submit

```
admin>: CTD
mt>: CRUISE --> status
mt>: SONAR --> status
guest>: SSP --> system
mt>: SONAR --> syster
guest>: SONAR --> sta
guest>: SONAR --> sta
```

Event Templates

Event templates are records that define the related observational data points that should be captured when submitting a particular event type.

In the case of the sample event, the “SAMPLE” event template would prompt the user for the following data points:

- Sample ID
- Sample type
- Storage location.

Sealog

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Installation

Installation instructions available at:

- http://www.oceandatatools.org/sealog-docs/server_install/
- http://www.oceandatatools.org/sealog-docs/client_install/

Built for Ubuntu but can be run on RHEL and Rocky

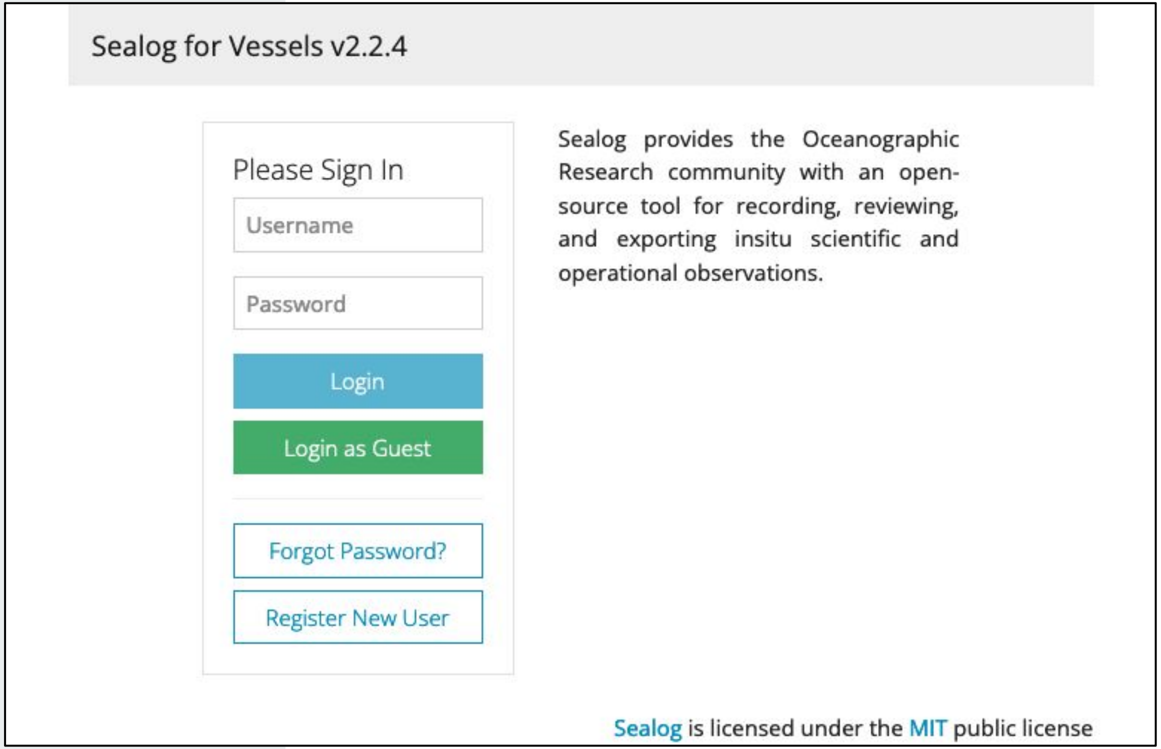
Can also be run as containerized deployment

Code Orientation

```
sealog-server/
├── config
├── demo
├── misc
│ _ ├── influx_sealog
│ _ ├── python_sealog
├── routes
├── Dockerfile
├── docker-compose.yml

sealog-client/
├── src
│ _ ├── components
│ _ ├── client_settings.js
│ _ ├── map_tilelayers.js
├── webpack.config.js
├── Dockerfile
├── docker-compose.yml
```

The Web UI



Sealog for Vessels v2.2.4

Please Sign In

Sealog provides the Oceanographic Research community with an open-source tool for recording, reviewing, and exporting insitu scientific and operational observations.

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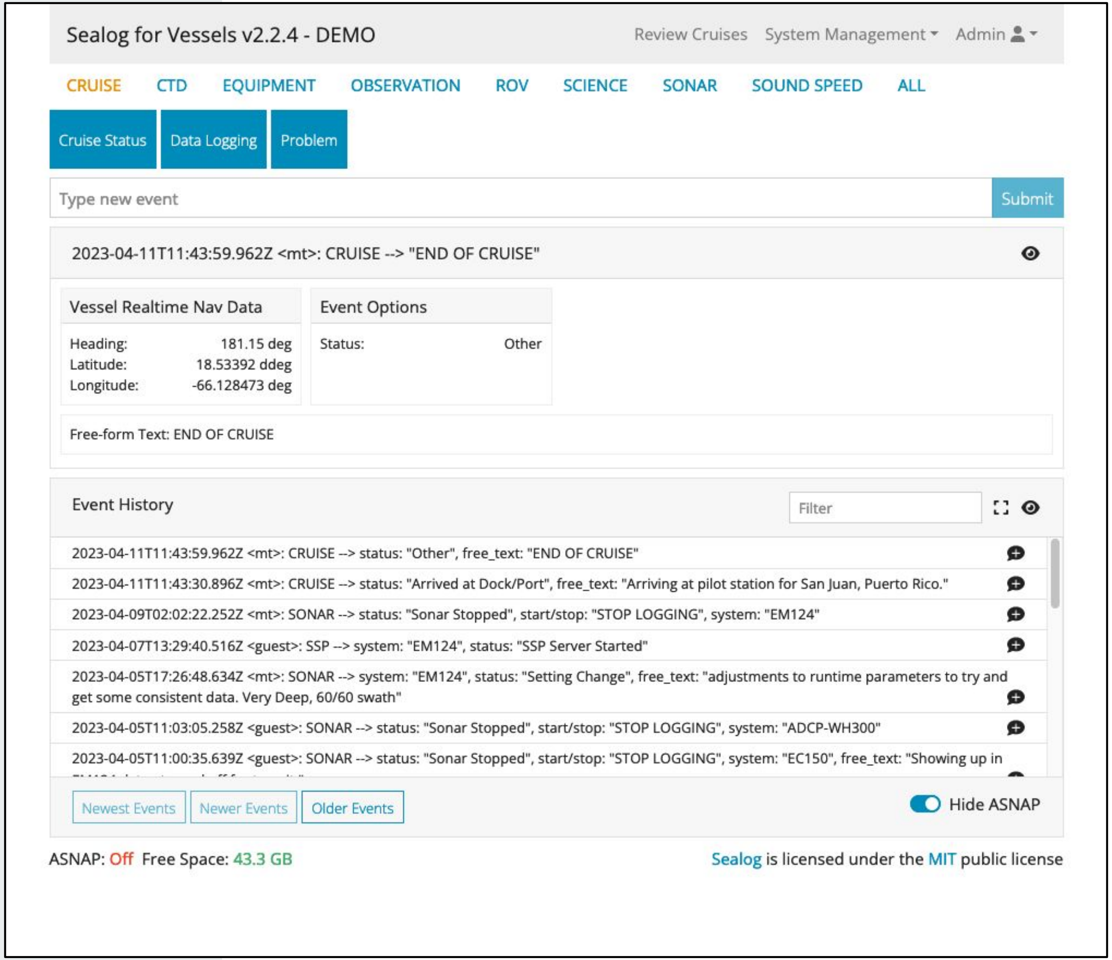
The Web UI

Main Event-Logging Screen

- Navigation Bar
- Event templates (blue buttons),
- Free-form text field,
- Recent event history,
- Sealog Auto-Snapshot (ASNAP) service status



2023-04-11T11:43:59.962Z <mt>: CRUISE --> "END OF CRUISE"

Vessel Realtime Nav Data

Heading:	181.15 deg
Latitude:	18.53392 ddeg
Longitude:	-66.128473 deg

Event Options

Status:	Other

Free-form Text: END OF CRUISE

Event History

```
2023-04-11T11:43:59.962Z <mt>: CRUISE --> status: "Other", free_text: "END OF CRUISE"
2023-04-11T11:43:30.896Z <mt>: CRUISE --> status: "Arrived at Dock/Port", free_text: "Arriving at pilot station for San Juan, Puerto Rico."
2023-04-09T02:02:22.252Z <mt>: SONAR --> status: "Sonar Stopped", start/stop: "STOP LOGGING", system: "EM124"
2023-04-07T13:29:40.516Z <guest>: SSP --> system: "EM124", status: "SSP Server Started"
2023-04-05T17:26:48.634Z <mt>: SONAR --> system: "EM124", status: "Setting Change", free_text: "adjustments to runtime parameters to try and
get some consistent data. Very Deep, 60/60 swath"
2023-04-05T11:03:05.258Z <guest>: SONAR --> status: "Sonar Stopped", start/stop: "STOP LOGGING", system: "ADCP-WH300"
2023-04-05T11:00:35.639Z <guest>: SONAR --> status: "Sonar Stopped", start/stop: "STOP LOGGING", system: "EC150", free_text: "Showing up in
```

ASNAP: Off Free Space: 43.3 GB

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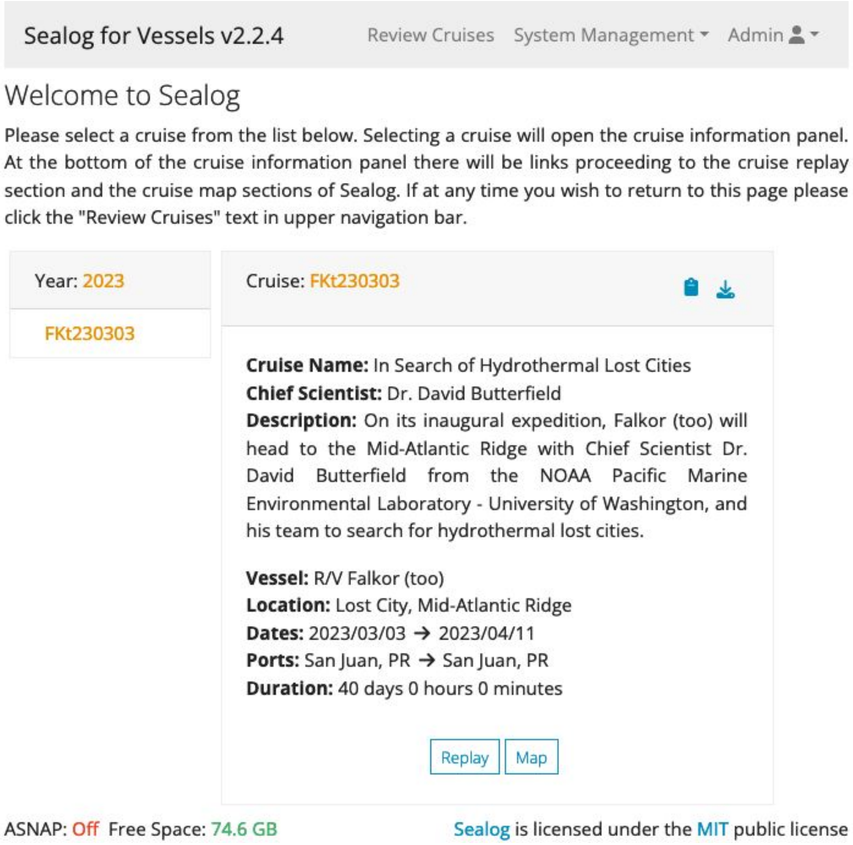
The Web UI

Reviewing Events



Welcome to Sealog

Please select a cruise from the list below. Selecting a cruise will open the cruise information panel. At the bottom of the cruise information panel there will be links proceeding to the cruise replay section and the cruise map sections of Sealog. If at any time you wish to return to this page please click the "Review Cruises" text in upper navigation bar.

Year: 2023

FKt230303

Cruise: FKt230303

Cruise Name: In Search of Hydrothermal Lost Cities
Chief Scientist: Dr. David Butterfield
Description: On its inaugural expedition, Falkor (too) will head to the Mid-Atlantic Ridge with Chief Scientist Dr. David Butterfield from the NOAA Pacific Marine Environmental Laboratory - University of Washington, and his team to search for hydrothermal lost cities.

Vessel: R/V Falkor (too)
Location: Lost City, Mid-Atlantic Ridge
Dates: 2023/03/03 → 2023/04/11
Ports: San Juan, PR → San Juan, PR
Duration: 40 days 0 hours 0 minutes

ASNAP: Off Free Space: 74.6 GB

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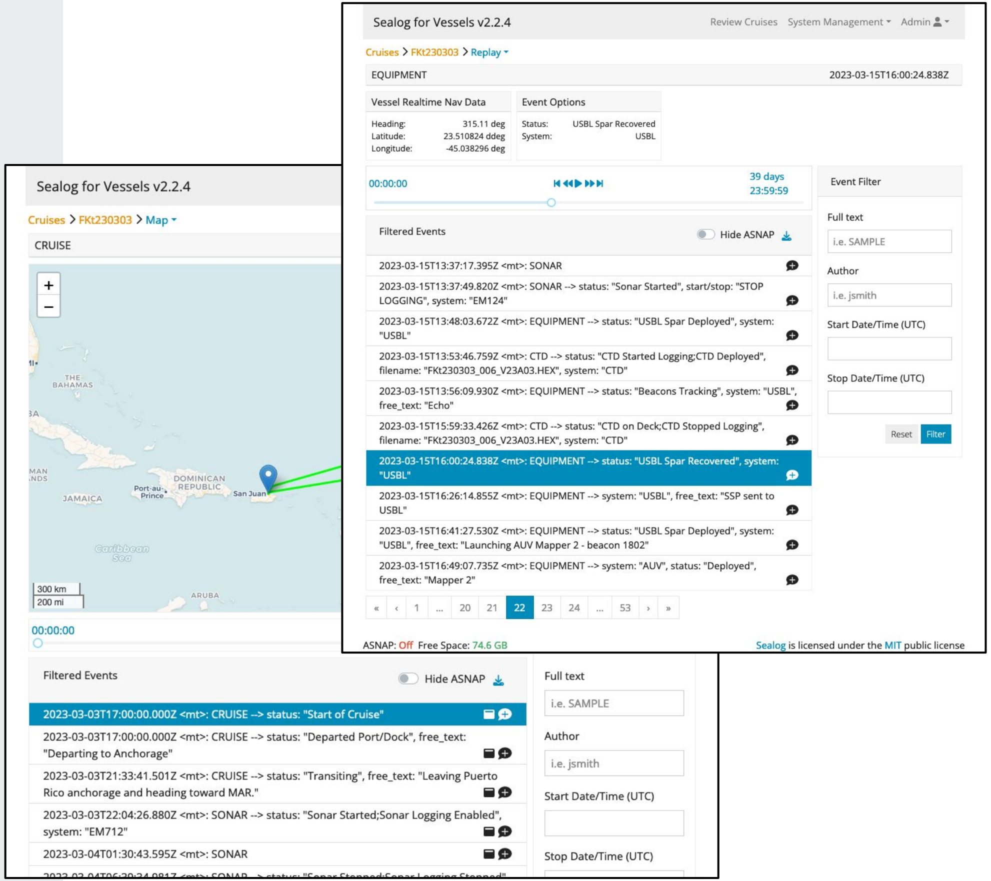
The Web UI

Reviewing Events

Replay: VLC-style controls and a slider for scanning through a cruise/lowering. All associated data for a given event is displayed including previews of image data (vehicle-version only).

Map: Similar to Replay and Review but with a focus on the position where the event was created. This interface includes a map of the lowering trackline and a slider for quickly scanning through the lowering.



2023-03-15T13:37:17.395Z <mt>: SONAR

2023-03-15T13:37:49.820Z <mt>: SONAR --> status: "Sonar Started", start/stop: "STOP LOGGING", system: "EM124"

2023-03-15T13:48:03.672Z <mt>: EQUIPMENT --> status: "USBL Spar Deployed", system: "USBL"

2023-03-15T13:53:46.759Z <mt>: CTD --> status: "CTD Started Logging;CTD Deployed", filename: "FKt230303_006_V23A03.HEX", system: "CTD"

2023-03-15T13:56:09.930Z <mt>: EQUIPMENT --> status: "Beacons Tracking", system: "USBL", free_text: "Echo"

2023-03-15T15:59:33.426Z <mt>: CTD --> status: "CTD on Deck;CTD Stopped Logging", filename: "FKt230303_006_V23A03.HEX", system: "CTD"

2023-03-15T16:00:24.838Z <mt>: EQUIPMENT --> status: "USBL Spar Recovered", system: "USBL"

2023-03-15T16:26:14.855Z <mt>: EQUIPMENT --> system: "USBL", free_text: "SSP sent to USBL"

2023-03-15T16:41:27.530Z <mt>: EQUIPMENT --> status: "USBL Spar Deployed", system: "USBL", free_text: "Launching AUV Mapper 2 - beacon 1802"

2023-03-15T16:49:07.735Z <mt>: EQUIPMENT --> system: "AUV", status: "Deployed", free_text: "Mapper 2"

ASNAP: Off Free Space: 74.6 GB

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2023-03-03T17:00:00.000Z <mt>: CRUISE --> status: "Start of Cruise"

2023-03-03T17:00:00.000Z <mt>: CRUISE --> status: "Departed Port/Dock", free_text: "Departing to Anchorage"

2023-03-03T21:33:41.501Z <mt>: CRUISE --> status: "Transiting", free_text: "Leaving Puerto Rico anchorage and heading toward MAR."

2023-03-03T22:04:26.880Z <mt>: SONAR --> status: "Sonar Started;Sonar Logging Enabled", system: "EM712"

2023-03-04T01:30:43.595Z <mt>: SONAR

2023-03-04T06:30:34.981Z <mt>: SONAR --> status: "Sonar Stopped;Sonar Logging Stopped"

The Web UI

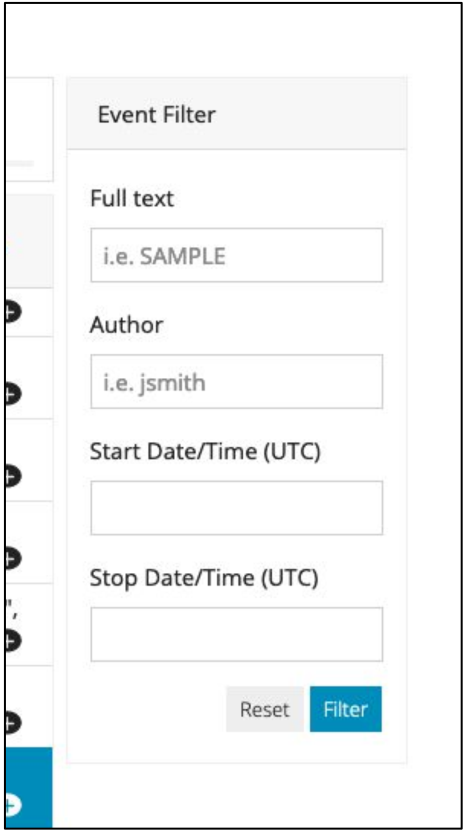
Searching Events

Filter form to query events by text, author or time.

The search form is case insensitive and supports partial matches.

Use commas between event values to search for multiple event values (i.e. FISH, CORAL).

Adding a ! prefix performs a logical NOT operation.



Event Filter

Full text

i.e. SAMPLE

Author

i.e. jsmith

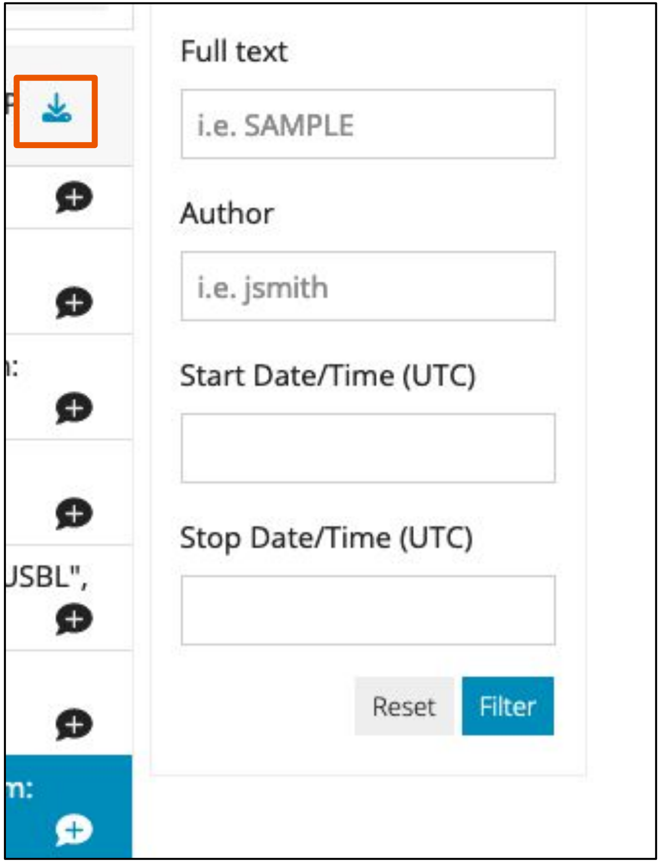
Start Date/Time (UTC)

Stop Date/Time (UTC)

The Web UI

Exporting Events

- Use the download icon
- Clicking the download icon will display options for exporting the event data with/without ancillary data in JSON or CSV format.



Full text

i.e. SAMPLE

Author

i.e. jsmith

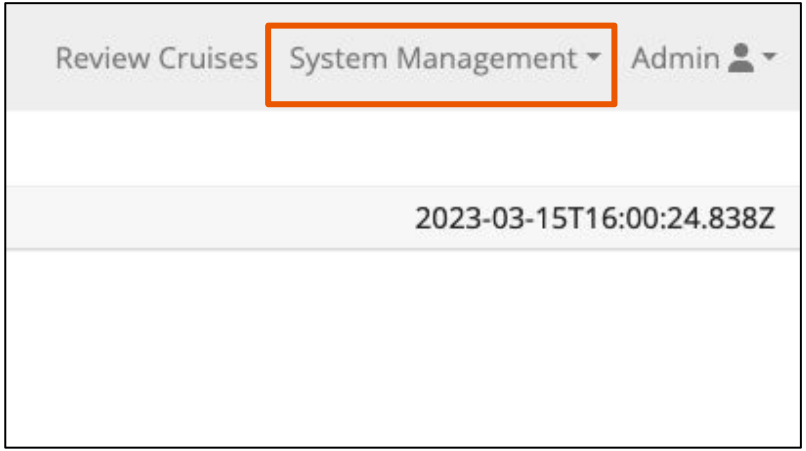
Start Date/Time (UTC)

Stop Date/Time (UTC)

The Web UI

System Management

- Event Templates
- Cruises
- Users



2023-03-15T16:00:24.838Z

The Web UI

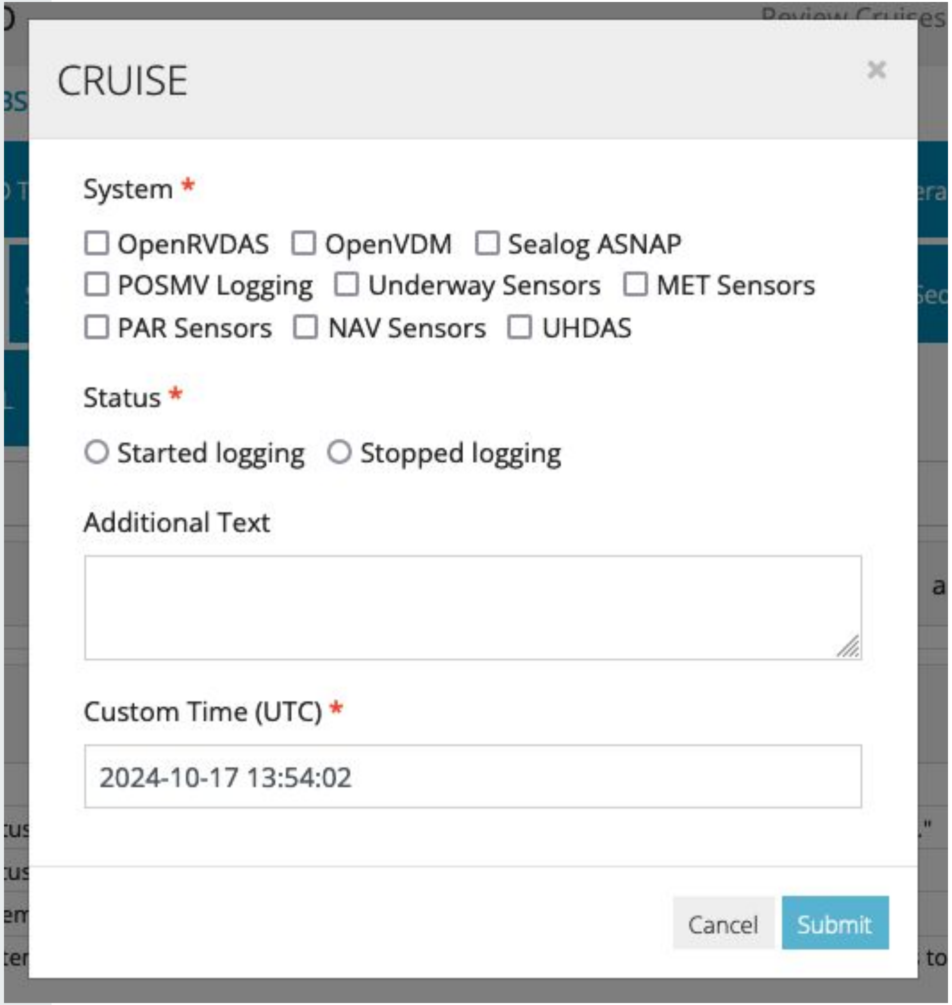
Event Templates

Elements

- Text
- Radio
- Checkboxes
- Require/Optional
- Custom Timestamps

Not shown Elements

- Static Text



CRUISE

System *

□ OpenRVDAS □ OpenVDM □ Sealog ASNAP
□ POSMV Logging □ Underway Sensors □ MET Sensors
□ PAR Sensors □ NAV Sensors □ UHDAS

Status *

○ Started logging ○ Stopped logging

Additional Text

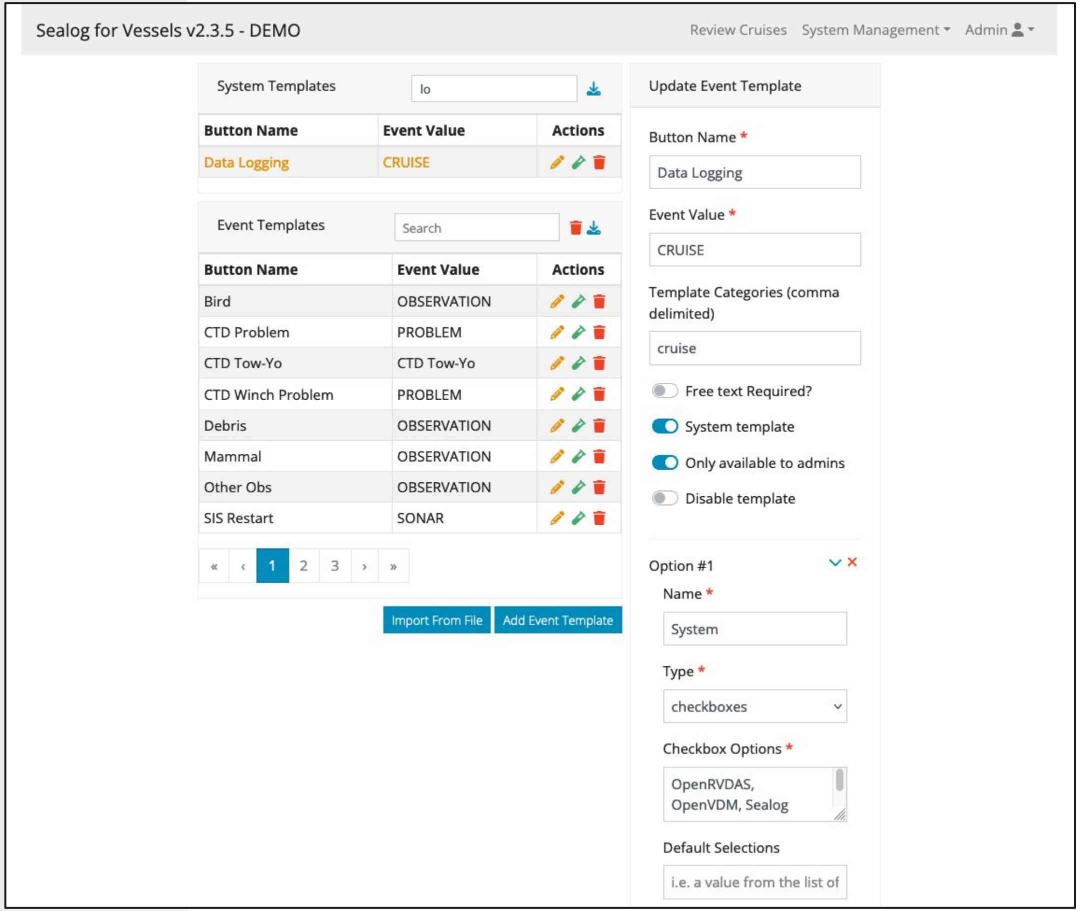
Custom Time (UTC) *

2024-10-17 13:54:02

The Web UI

Event Templates

- System vs Non-System
- Editing/Adding
- Permissions
- Importing



Sealog for Vessels v2.3.5 - DEMO

System Templates

lo

Button Name	Event Value	Actions
Data Logging	CRUISE	✎ ✎ 🗑

Event Templates

Search

Button Name	Event Value	Actions
Bird	OBSERVATION	✎ ✎ 🗑
CTD Problem	PROBLEM	✎ ✎ 🗑
CTD Tow-Yo	CTD Tow-Yo	✎ ✎ 🗑
CTD Winch Problem	PROBLEM	✎ ✎ 🗑
Debris	OBSERVATION	✎ ✎ 🗑
Mammal	OBSERVATION	✎ ✎ 🗑
Other Obs	OBSERVATION	✎ ✎ 🗑
SIS Restart	SONAR	✎ ✎ 🗑

Update Event Template

Button Name *

Data Logging

Event Value *

CRUISE

Template Categories (comma delimited)

cruise

○ Free text Required?

● System template

● Only available to admins

○ Disable template

Option #1

Name *

System

Type *

checkboxes

Checkbox Options *

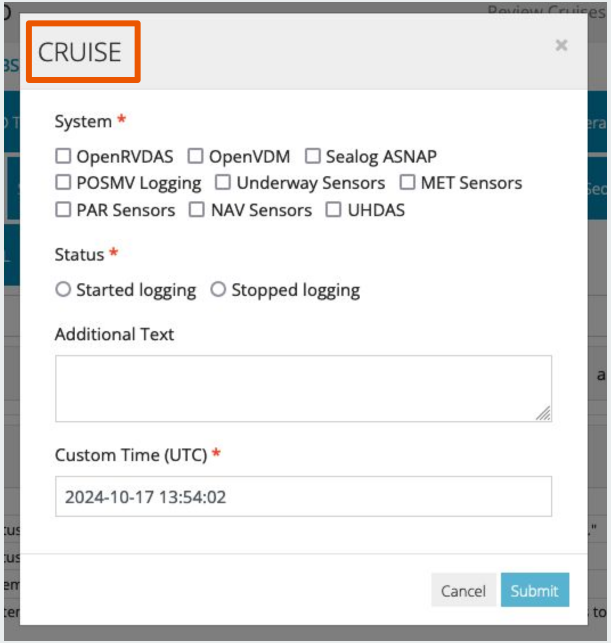
OpenRVDAS, OpenVDM, Sealog

Default Selections

i.e. a value from the list of

The Web UI

Event Templates



CRUISE

System *

□ OpenRVDAS □ OpenVDM □ Sealog ASNAP
□ POSMV Logging □ Underway Sensors □ MET Sensors
□ PAR Sensors □ NAV Sensors □ UHDAS

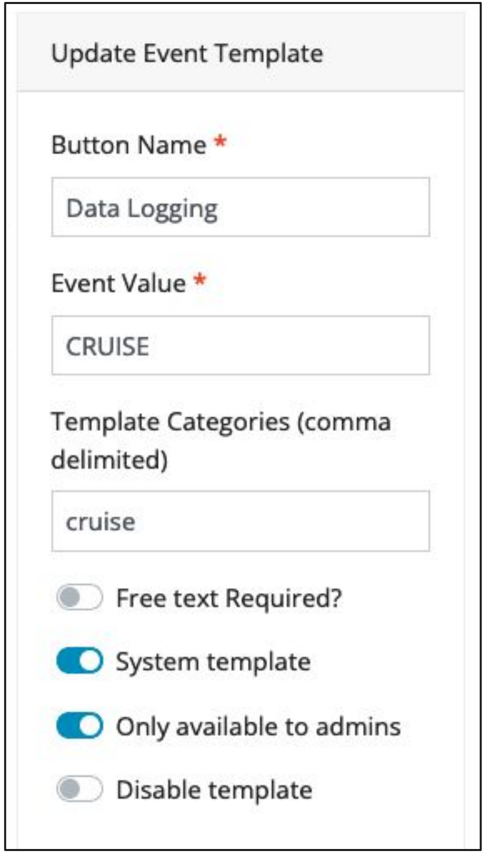
Status *

○ Started logging ○ Stopped logging

Additional Text

Custom Time (UTC) *

2024-10-17 13:54:02



Update Event Template

Button Name *

Data Logging

Event Value *

CRUISE

Template Categories (comma delimited)

cruise

○ Free text Required?

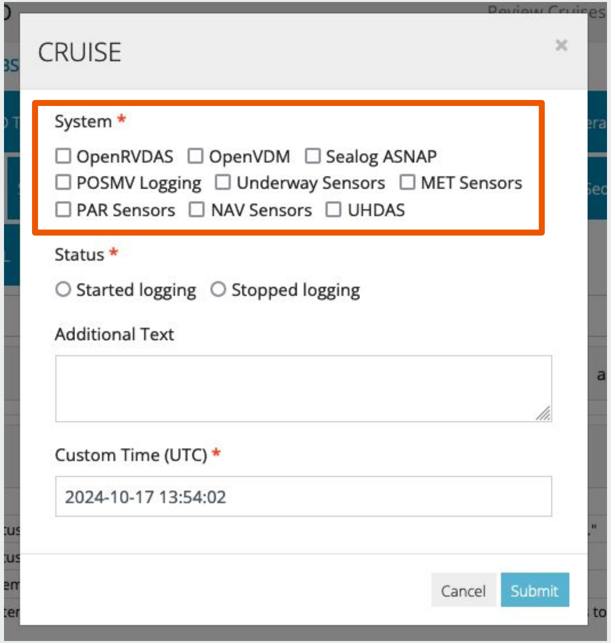
● System template

● Only available to admins

○ Disable template

The Web UI

Event Templates



CRUISE

System *

□ OpenRVDAS □ OpenVDM □ Sealog ASNAP
□ POSMV Logging □ Underway Sensors □ MET Sensors
□ PAR Sensors □ NAV Sensors □ UHDAS

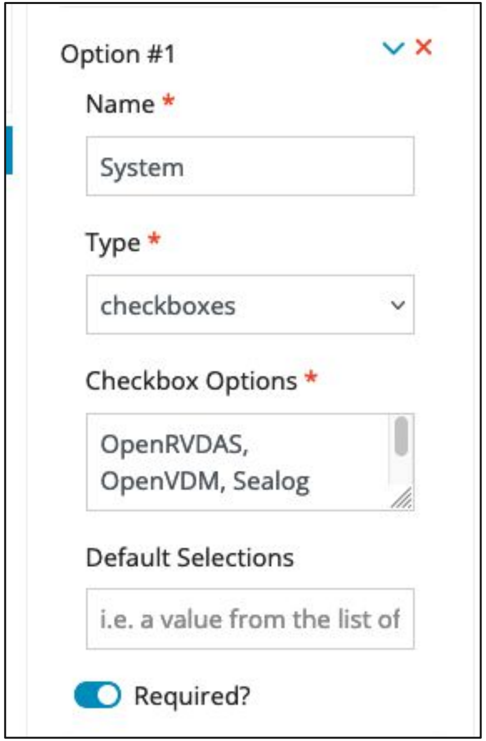
Status *

○ Started logging ○ Stopped logging

Additional Text

Custom Time (UTC) *

2024-10-17 13:54:02



Option #1

Name *

System

Type *

checkboxes

Checkbox Options *

OpenRVDAS,
OpenVDM, Sealog

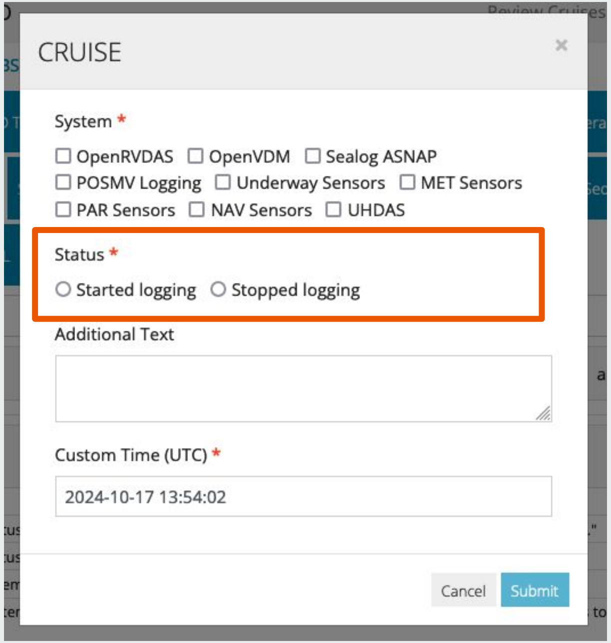
Default Selections

i.e. a value from the list of

Required?

The Web UI

Event Templates



CRUISE

System *

□ OpenRVDAS □ OpenVDM □ Sealog ASNAP
□ POSMV Logging □ Underway Sensors □ MET Sensors
□ PAR Sensors □ NAV Sensors □ UHDAS

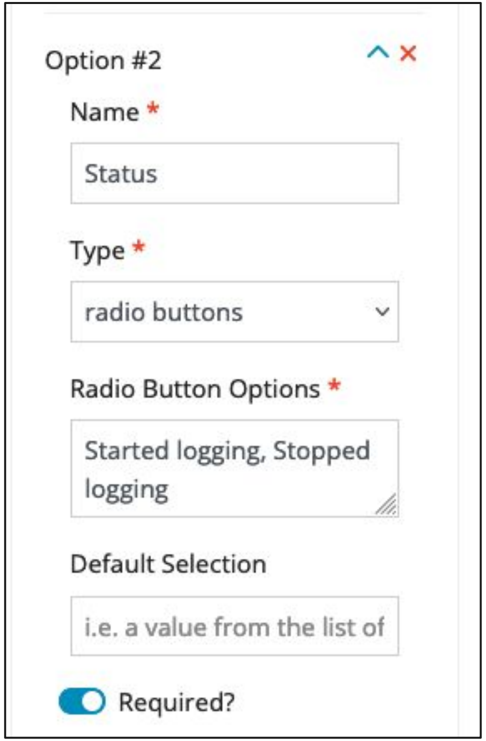
Status *

○ Started logging ○ Stopped logging

Additional Text

Custom Time (UTC) *

2024-10-17 13:54:02



Option #2

Name *

Status

Type *

radio buttons

Radio Button Options *

Started logging, Stopped logging

Default Selection

i.e. a value from the list of

Required?

The Web UI

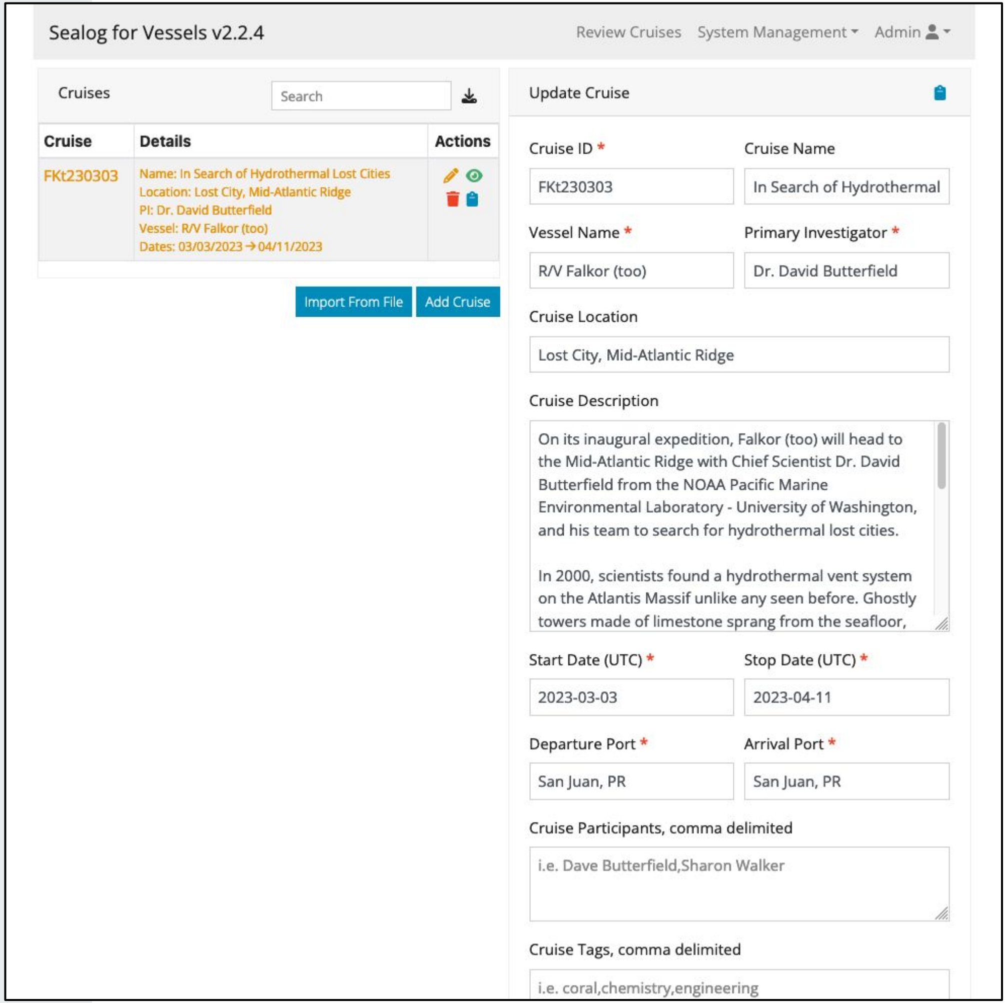
Event Templates - Best Practices

- Think about how the data is used… (it’s likely Excel)
- Use concise event_option names
- Reuse event_option names to minimize the number of columns in the output
- Use the FreeText field

```
event_value -> event_option: value, ...
----------------------------------------------------
Cruise -> Status: Start of Cruise
Cruise -> Status: Leaving EEZ
Cruise -> Status: Entering EEZ
Cruise -> Status: End of Cruise

Seawater -> Status: Enabled pump
Seawater -> Status: Pump Secured

Multibeam -> Status: Start of Survey, System: EM712
Multibeam -> Status: Setting Change, System: EM712 *
Multibeam -> Status: End of line, System: EM712
Multibeam -> Status: Start of line, System: EM712
Multibeam -> Status: End of Survey, System: EM712
Multibeam -> Status: Applied SSP, System:
EM712;EM124

Problem -> System: ADCP *
Problem -> System: CTD *
Problem -> System: EM712 *
Problem -> System: Seawater *
Problem -> System: Winch *

*(Free_form field required)
```

The Web UI

Cruises



Cruise	Details	Actions
FKt230303	Name: In Search of Hydrothermal Lost Cities Location: Lost City, Mid-Atlantic Ridge PI: Dr. David Butterfield Vessel: R/V Falkor (too) Dates: 03/03/2023 → 04/11/2023	

Cruise ID *: FKt230303

Cruise Name: In Search of Hydrothermal

Vessel Name *: R/V Falkor (too)

Primary Investigator *: Dr. David Butterfield

Cruise Location: Lost City, Mid-Atlantic Ridge

Cruise Description:

On its inaugural expedition, Falkor (too) will head to the Mid-Atlantic Ridge with Chief Scientist Dr. David Butterfield from the NOAA Pacific Marine Environmental Laboratory - University of Washington, and his team to search for hydrothermal lost cities.

In 2000, scientists found a hydrothermal vent system on the Atlantis Massif unlike any seen before. Ghostly towers made of limestone sprang from the seafloor,

Start Date (UTC) *: 2023-03-03

Stop Date (UTC) *: 2023-04-11

Departure Port *: San Juan, PR

Arrival Port *: San Juan, PR

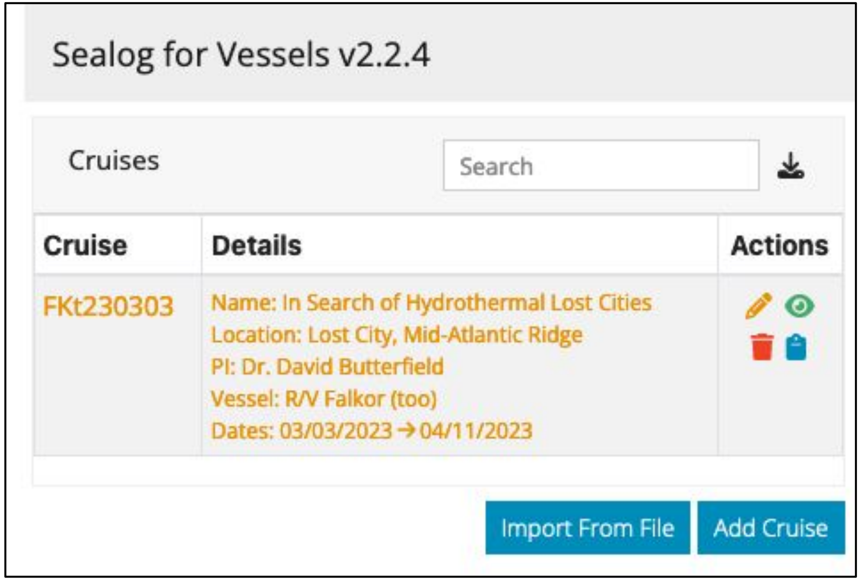
Cruise Participants, comma delimited: i.e. Dave Butterfield,Sharon Walker

Cruise Tags, comma delimited: i.e. coral,chemistry,engineering

The Web UI

Cruises

- Edit
- Hide
- Delete
- Copy to clipboard
- Export
- Permissions



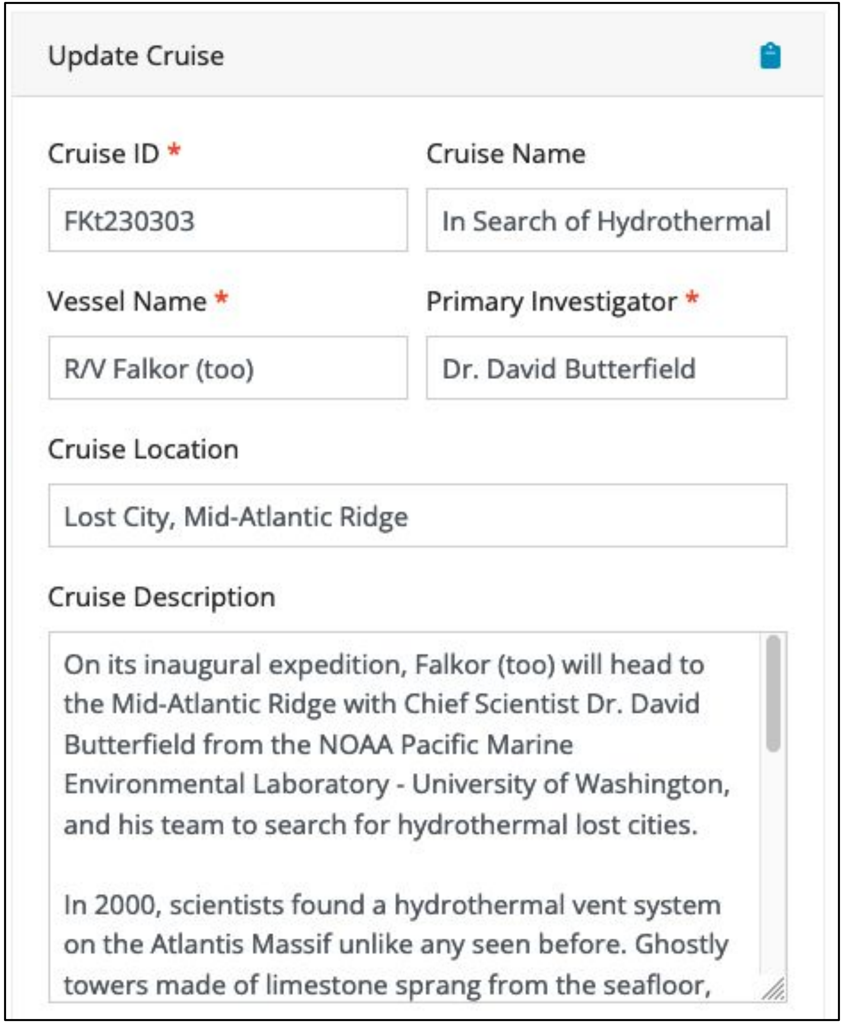
Sealog for Vessels v2.2.4

Cruises

Cruise	Details	Actions
FKt230303	Name: In Search of Hydrothermal Lost Cities Location: Lost City, Mid-Atlantic Ridge PI: Dr. David Butterfield Vessel: R/V Falkor (too) Dates: 03/03/2023 → 04/11/2023	

The Web UI

Cruises



Update Cruise

Cruise ID * FKt230303

Cruise Name In Search of Hydrothermal

Vessel Name * R/V Falkor (too)

Primary Investigator * Dr. David Butterfield

Cruise Location Lost City, Mid-Atlantic Ridge

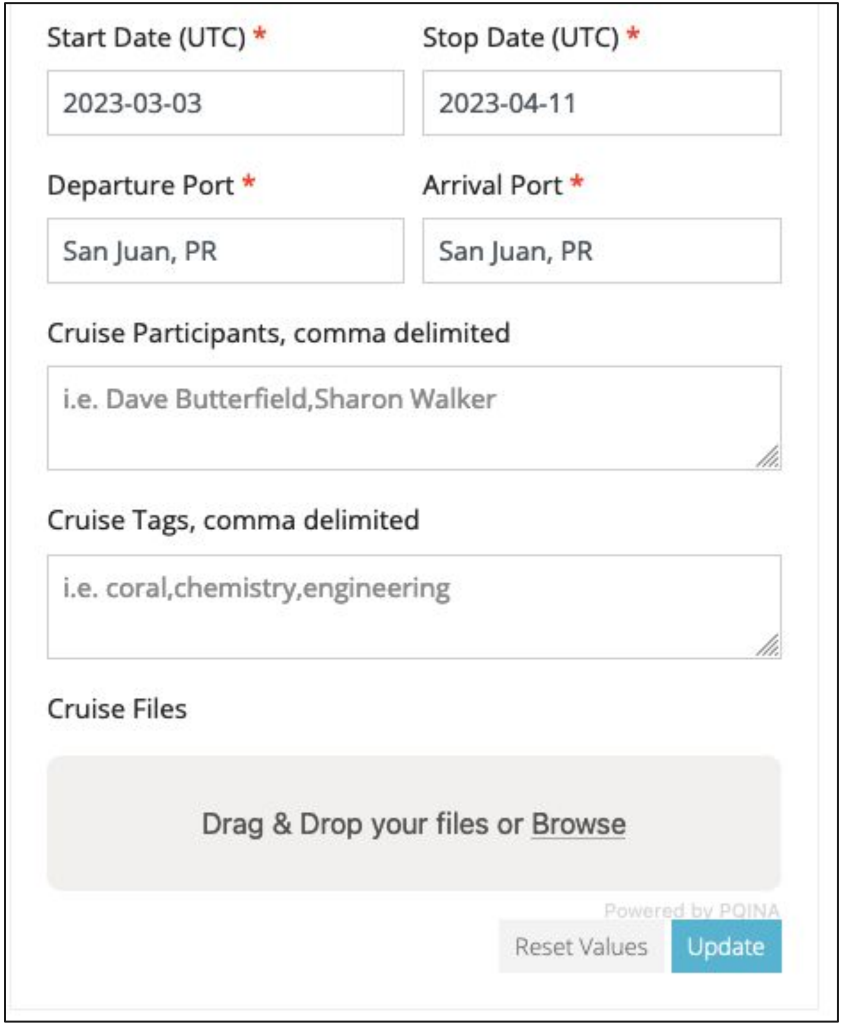
Cruise Description

On its inaugural expedition, Falkor (too) will head to the Mid-Atlantic Ridge with Chief Scientist Dr. David Butterfield from the NOAA Pacific Marine Environmental Laboratory - University of Washington, and his team to search for hydrothermal lost cities.

In 2000, scientists found a hydrothermal vent system on the Atlantis Massif unlike any seen before. Ghostly towers made of limestone sprang from the seafloor,

The Web UI

Cruises



Start Date (UTC) * 2023-03-03

Stop Date (UTC) * 2023-04-11

Departure Port * San Juan, PR

Arrival Port * San Juan, PR

Cruise Participants, comma delimited

i.e. Dave Butterfield,Sharon Walker

Cruise Tags, comma delimited

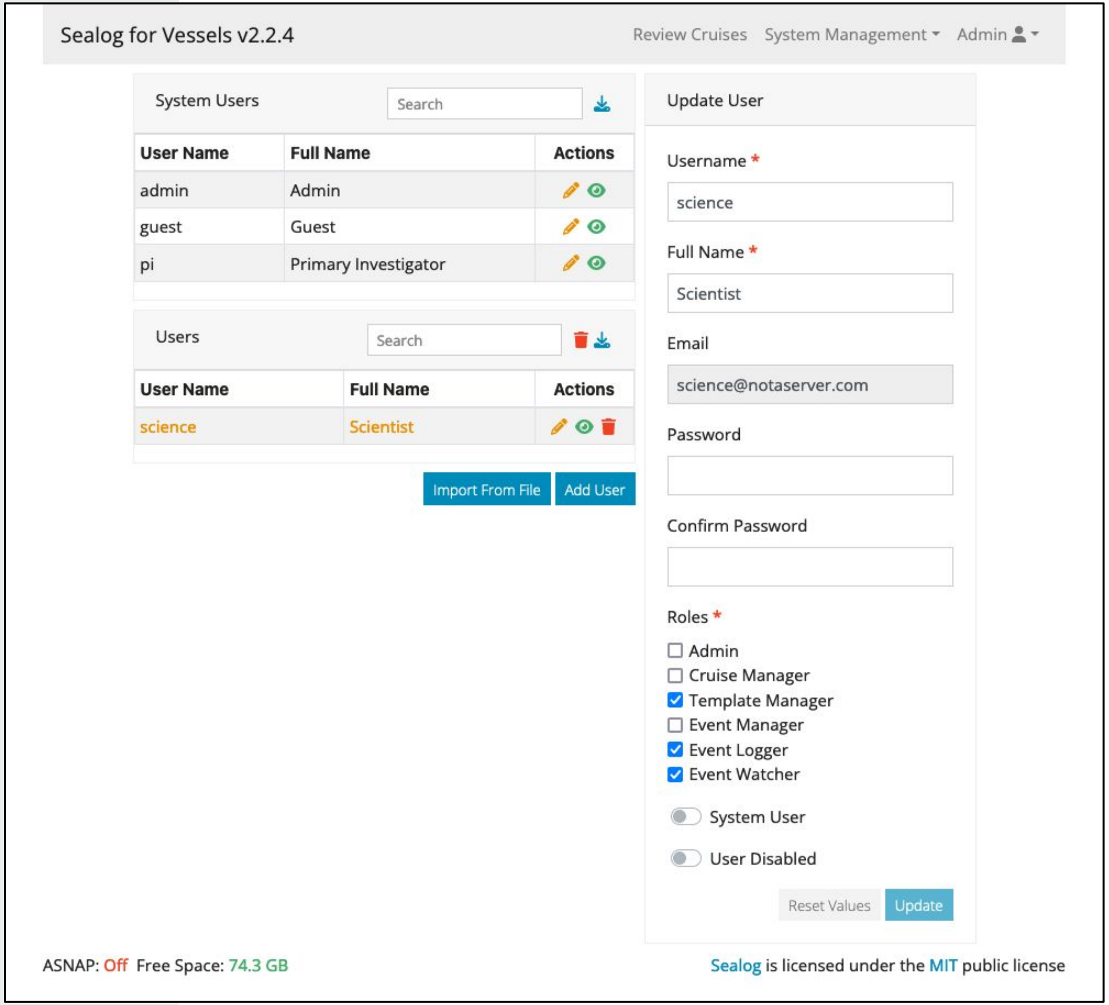
i.e. coral,chemistry,engineering

Cruise Files

The Web UI

Users

- System vs Non-System
- Editing/Adding
- Permissions
- Importing



System Users

User Name	Full Name	Actions
admin	Admin	✎ ◉
guest	Guest	✎ ◉
pi	Primary Investigator	✎ ◉

Users

User Name	Full Name	Actions
science	Scientist	✎ ◉ 🗑

Update User

Username *
science

Full Name *
Scientist

Email
science@notaserver.com

Password

Confirm Password

Roles *

- □ Admin
- □ Cruise Manager
- ☑ Template Manager
- □ Event Manager
- ☑ Event Logger
- ☑ Event Watcher

○ System User

○ User Disabled

ASNAP: Off Free Space: 74.3 GB

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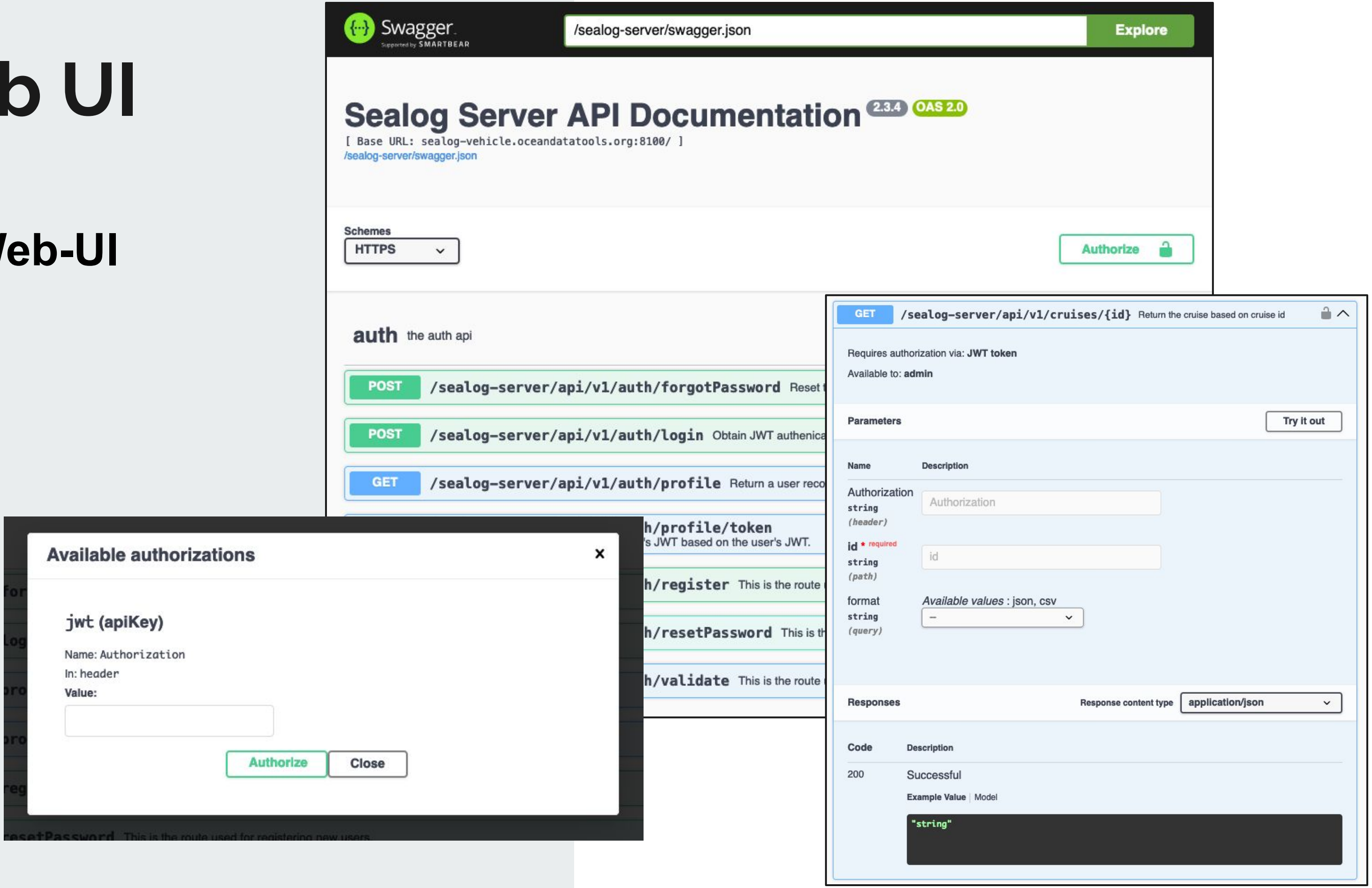
The Web UI

OpenAPI Web-UI



Swagger
Supported by SMARTBEAR

/sealog-server/swagger.json Explore

Sealog Server API Documentation 2.3.4 OAS 2.0

[Base URL: sealog-vehicle.oceandatatools.org:8100/]
/sealog-server/swagger.json

Schemes
HTTPS

Authorize

auth the auth api

POST /sealog-server/api/v1/auth/forgotPassword Reset t

POST /sealog-server/api/v1/auth/login Obtain JWT authenica

GET /sealog-server/api/v1/auth/profile Return a user reco

h/profile/token
's JWT based on the user's JWT.

h/register This is the route

h/resetPassword This is th

h/validate This is the route

for

log

pro

pro

reg

resetPassword This is the route used for registering new users.

Available authorizations ×

jwt (apiKey)

Name: Authorization
In: header
Value:

Authorize Close

GET /sealog-server/api/v1/cruises/{id} Return the cruise based on cruise id

Requires authorization via: **JWT token**
Available to: **admin**

Parameters Try it out

Name	Description
Authorization string *(header)*	Authorization
id * required string *(path)*	id
format string *(query)*	*Available values* : json, csv --

Responses Response content type application/json

Code	Description
200	Successful **Example Value** | Model "string"

Sealog

- Introduction
- Lingo 101
- System overview
- **Backend Services**
- Best practices
- Contributing
- Where to from here?

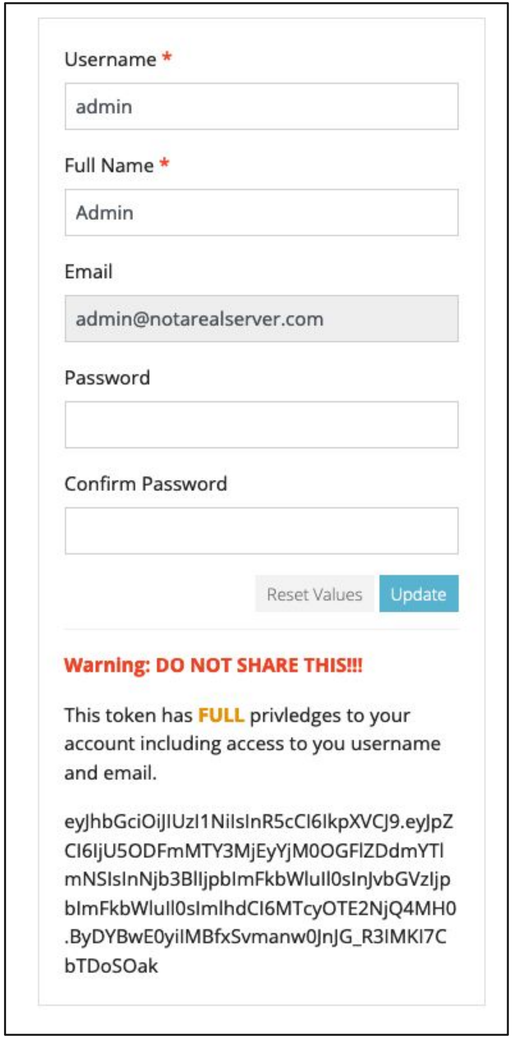
Ok, time to grab a snorkel…

- Setup JWT Authentication/Authorization
- Setup ASNAP
- Setup AutoActions
- Setup InfluxDB integration
- Setup Data Export

Backend Services

Authorization/Authentication

- Most communication with Sealog Server requires some level of authorization/authentication
- This is handled via Javascript Web Token (JWT)
- Obtaining JWT for desired privileged user



Username *

admin

Full Name *

Admin

Email

admin@notarealserver.com

Password

Confirm Password

Warning: DO NOT SHARE THIS!!!

This token has **FULL** privledges to your account including access to you username and email.

```
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJpZ
CI6IjU5ODFmMTY3MjEyYjM0OGFlZDdmYTl
mNSIsInNjb3BlIjpbImFkbWluIl0sInJvbGVzIjp
bImFkbWluIl0sImlhdCI6MTcyOTE2NjQ4MH0
.ByDYBwE0yiIMBfxSvmanw0JnJG_R3IMKI7C
bTDoSOak
```

Backend Services

Setup Authentication for Services

- **Create settings.py**

```
cp ./misc/sealog_asnap.py.dist
./misc/sealog_asnap.py
```

- **Add JWT to settings.py**

```
API_SERVER_URL = 'http://localhost:8000/sealog-server'
WS_SERVER_URL = 'ws://localhost:8000/ws'

CRUISES_API_PATH = '/api/v1/cruises'

CUSTOM_VAR_API_PATH = '/api/v1/custom_vars'

EVENTS_API_PATH = '/api/v1/events'

EVENT_AUX_DATA_API_PATH = '/api/v1/event_aux_data'

EVENT_EXPORTS_API_PATH = '/api/v1/event_exports'

EVENT_TEMPLATES_API_PATH = '/api/v1/event_templates'

LOWERINGS_API_PATH = '/api/v1/lowerings'

API_SERVER_FILE_PATH = '/data/sealog-files'

TOKEN = ''

HEADERS = {
  'Authorization': 'Bearer ' + TOKEN
}
```

Backend Services

ASNAP Service

What is ASNAP?

ASNAP (Automatic Snapshot)

- Background process that when enabled submits an ASNAP event to the server.
- Ensures a minimum resolution of events

```
{
        "event_value": "ASNAP",
        "event_free_text": ""
}
```

Backend Services

ASNAP Service

Make a copy of the distributed version

```
cp ./misc/sealog_asnap.py.dist
./misc/sealog_asnap.py
```

Modify default behavior

```
     DEFAULT_INTERVAL = 10  # seconds

     ASNAP_EVENT = {
           "event_value": "ASNAP",
           "event_options": [],
           "event_free_text": ""
     }
```

Backend Services

ASNAP Service

Supervisor to start service at boot

```
sudo vim /etc/supervisor/conf.d/sealog-server.conf
```

```
[program:sealog-asnap]
directory=/opt/sealog-server/misc
command=/opt/sealog-server/venv/bin/python
sealog_asnap.py
redirect_stderr=true
stdout_logfile=/var/log/sealog-asnap_STDOUT.log
user=sealog
autostart=true
autorestart=true
stopsignal=QUIT
```

Backend Services

AutoAction Service

What is AutoActions?

Auto-Actions

- Auto-Actions is a service that triggers additional actions based on submitted events.
- Most common example of AutoAction is turning on/off ASNAP
- Can be used to communicate with other systems

Backend Services

AutoActions Service

Make a copy of the distributed version

```
cp ./misc/sealog_auto_actions.py.dist
./misc/sealog_auto_actions.py
```

Modify default behavior

```
# ------------------------------------------------
# For vessel-focused sealog instances
# ------------------------------------------------
INCLUDE_SET = ('CRUISE')

ASNAP_LOOKUP = {
      'Start of Cruise': 'On',
      'End of Cruise': 'Off'
}
# ------------------------------------------------
```

Backend Services

AutoActions Service

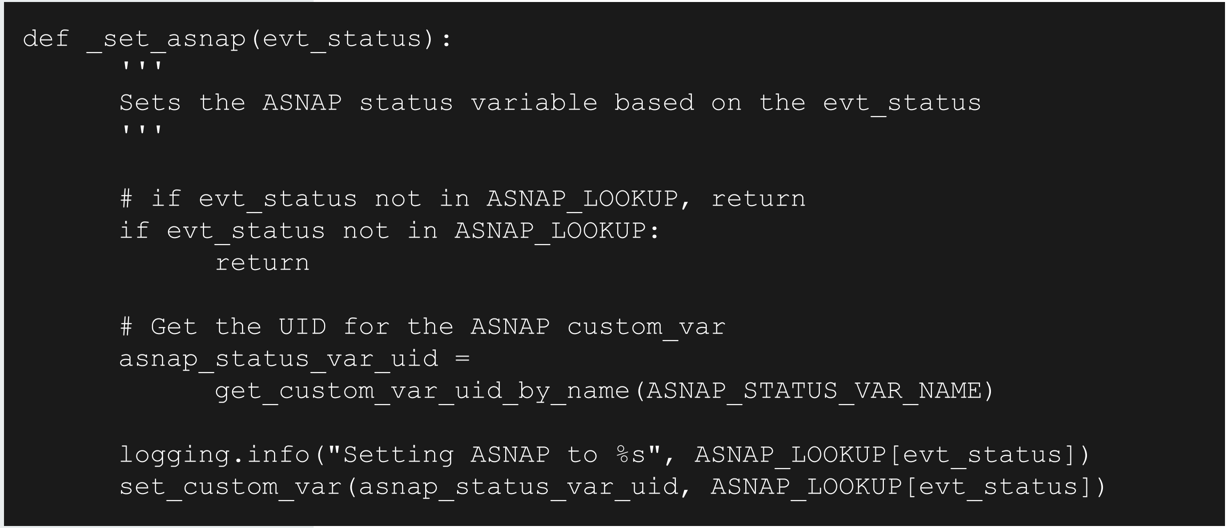
Defining the behavior

```
def _handle_cruise_event(event):
      '''
      The function handle auto actions for the CRUISE event_value.
      It uses the included event_options to set the ASNAP status.
      '''

      if event['event_value'] != 'CRUISE':
            return

      status = None

      # if event has status event_option, pass status to
      # _set_asnap
      for option in event['event_options']:
            if option['event_option_name'] == "status":
                  milestone = option['event_option_value']
                  break

            if status is not None:
                  _set_asnap(status)
```

Backend Services

Defining the behavior

AutoActions Service



```
def _set_asnap(evt_status):
      '''
      Sets the ASNAP status variable based on the evt_status
      '''

      # if evt_status not in ASNAP_LOOKUP, return
      if evt_status not in ASNAP_LOOKUP:
            return

      # Get the UID for the ASNAP custom_var
      asnap_status_var_uid =
            get_custom_var_uid_by_name(ASNAP_STATUS_VAR_NAME)

      logging.info("Setting ASNAP to %s", ASNAP_LOOKUP[evt_status])
      set_custom_var(asnap_status_var_uid, ASNAP_LOOKUP[evt_status])
```

Backend Services

AutoActions Service

Listening for events

```
async def auto_actions():
  '''
  Listen to the new and updated events and respond as instructed based on the
  event and it's options
  '''

  try:
    async with websockets.connect(WS_SERVER_URL) as websocket:

    await websocket.send(json.dumps(HELLO))

    while True:

      msg = await websocket.recv()
      msg_obj = json.loads(msg)

      if msg_obj['type'] and msg_obj['type'] == 'ping':
        await websocket.send(json.dumps(PING))

      elif msg_obj['type'] and msg_obj['type'] == 'pub':

        event = msg_obj['message']
        logging.debug("Event: \n%s", json.dumps(event, indent=2))

        if event['event_value'] not in INCLUDE_SET:
          logging.debug("Skipping because event value is not in the include set")
          continue

        _handle_cruise_event(event)

  except Exception as exc:
    logging.error(str(exc))
```

Backend Services

AutoActions Service

Connecting to the server and starting the service

```
# Run the main loop
while True:

  # Wait 5 seconds for the server to complete startup
  time.sleep(5)

  try:
    logging.debug("Listening to event websocket feed...")
    asyncio.get_event_loop().run_until_complete(auto_actions())
  except KeyboardInterrupt:
    logging.error('Keyboard Interrupted')

    try:
      sys.exit(0)
    except SystemExit:
      os._exit(0)  # pylint: disable=protected-access
    except Exception as exc:
      logging.error("Lost connection to server, trying again in 5
seconds")
      logging.debug(str(exc))
```

Backend Services

AutoActions Service

Supervisor to start service at boot

```
sudo vim /etc/supervisor/conf.d/sealog-server.conf
```

```
[program:sealog-auto-actions]
directory=/opt/sealog-server/misc
command=/opt/sealog-server/venv/bin/python
sealog_auto_actions.py
redirect_stderr=true
stdout_logfile=/var/log/sealog-auto-actions_STDOUT.log
user=sealog
autostart=true
autorestart=true
stopsignal=QUIT
```

Backend Services

InfluxDB Integration

What is it?

Ability to create aux_data records using data pulled from the InfluxDB time series database.

Sealog events can be created with timestamps in the past and still have the correct ancillary data associated.

Backend Services

InfluxDB Integration

Usage Statement

```
usage: sealog_aux_data_inserter_influx.py [-h] [-v] [-f CONFIG_FILE] [-n] [-e EVENTS] [-c CRUISE_ID]
Aux Data Inserter Service - InfluxDB

options:
  -h, --help                 show this help message and exit
  -v, --verbosity            Increase output verbosity
  -f, --config_file CONFIG_FILE
                             use the specified configuration file
  -n, --dry_run              compile the data but do not push to server
  -e, --events EVENTS        list of event_ids to apply the influx data
  -c, --cruise_id CRUISE_ID  cruise_id to fix aux_data for
```

Backend Services

InfluxDB Integration

Setup

- Requires active InfluxDB Server that Sealog can access via network
- Setup ./misc/influx_sealog/settings.py

*file is identical to ./database/influxdb/settings.py

```
# InfluxDB settings
INFLUXDB_URL = 'http://localhost:8086'
INFLUXDB_ORG = 'openrvdas'
INFLUXDB_BUCKET = 'openrvdas'
INFLUXDB_AUTH_TOKEN = 'DEFAULT_INFLUXDB_AUTH_TOKEN'
INFLUXDB_VERIFY_SSL = False
```

- Create sealog_aux_data_inserter_influx.py

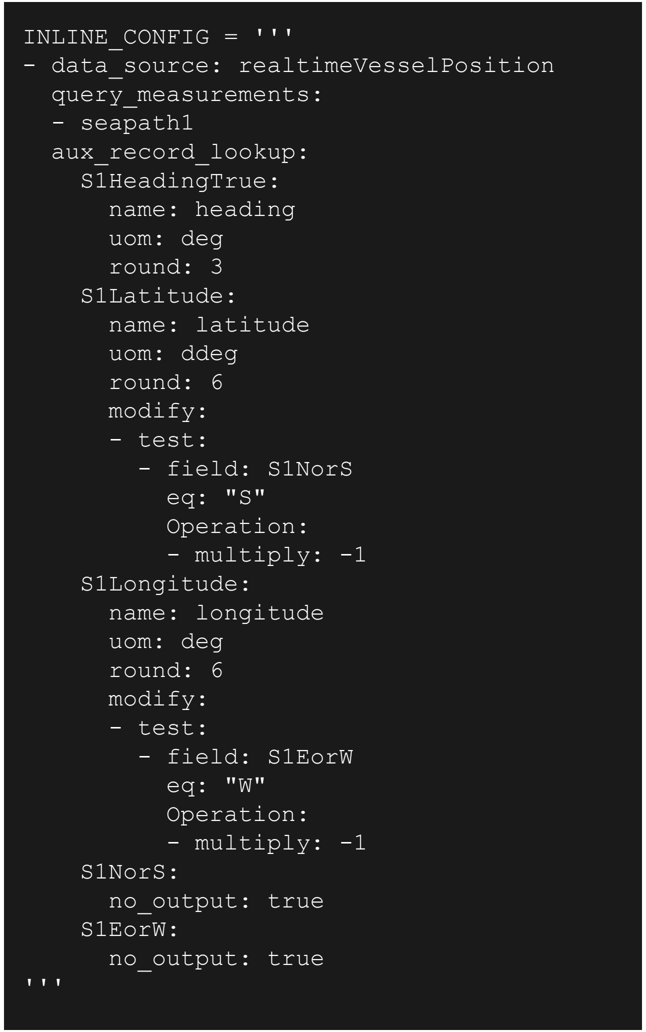
```
cp sealog_aux_data_inserter_influx.py.dist
sealog_aux_data_inserter_influx.py
```

Backend Services

InfluxDB Integration

Configuration

- Inline
- External file



```
INLINE_CONFIG = '''
- data_source: realtimeVesselPosition
  query_measurements:
  - seapath1
  aux_record_lookup:
    S1HeadingTrue:
      name: heading
      uom: deg
      round: 3
    S1Latitude:
      name: latitude
      uom: ddeg
      round: 6
      modify:
      - test:
        - field: S1NorS
          eq: "S"
          Operation:
          - multiply: -1
    S1Longitude:
      name: longitude
      uom: deg
      round: 6
      modify:
      - test:
        - field: S1EorW
          eq: "W"
          Operation:
          - multiply: -1
    S1NorS:
      no_output: true
    S1EorW:
      no_output: true
'''
```

Backend Services

InfluxDB Integration

Supervisor to start service at boot

```
sudo vim /etc/supervisor/conf.d/sealog-server.conf

[program:sealog-aux-data-influx]
directory=/opt/sealog-server
command=/opt/sealog-server/venv/bin/python ./misc/sealog_aux_data_inserter_influx.py
-f ./misc/sealog_influx_embed.yml
redirect_stderr=true
stdout_logfile=/var/log/sealog-aux-data-influx_STDOUT.log
user=sealog
autostart=true
autorestart=true
stopsignal=QUIT
```

Backend Services

Data Export Service

What does it entail?

Export data from Sealog Database to file:

- Cruise Record
- Events w/ Aux Data (csv, json)
- Events w/o Aux Data (csv, json)
- Aux Data (json)

Backend Services

Data Export Service

What else could it entail?

Typically used with vehicles:

- Crop OpenRVDAS data to match the start/stop of a dive
- Organize/Export Images
- Build navigational products: (GeoJSON/KML/CSV)
- Build reports

Backend Services

Data Export

Usage Statement

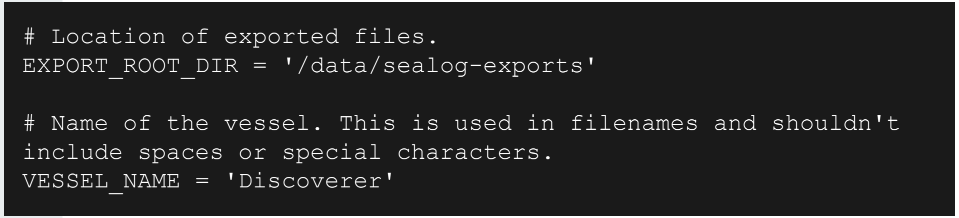
```
usage: sealog_data_export.py [-h] [-v] [-n] [-t] [-C CRUISE_ID]

Sealog Data Export Utility

options:
  -h, --help            show this help message and exit
  -v, --verbosity       Increase output verbosity
  -n, --no_transfer     build reports and export data but do not push to data warehouse
  -t, --transfer_only   only push the exported data to data warehouse
  -C, --cruise_id CRUISE_ID
                        export all cruise data for the specified cruise (i.e. FK200126)
```

Backend Services

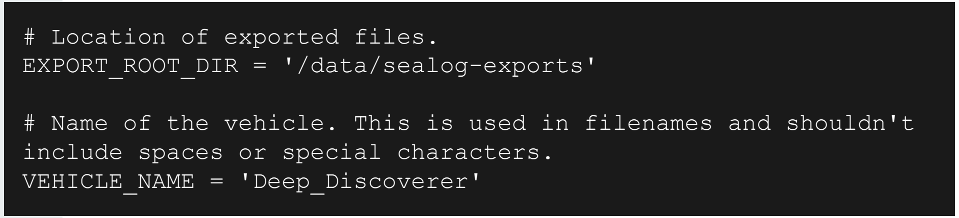
Data Export

Repo includes two versions

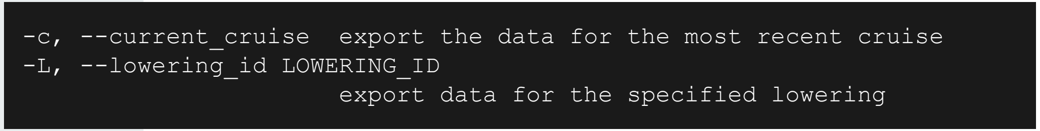
- Vessel-focused
- Vehicle-focused



```
# Location of exported files.
EXPORT_ROOT_DIR = '/data/sealog-exports'

# Name of the vessel. This is used in filenames and shouldn't
include spaces or special characters.
VESSEL_NAME = 'Discoverer'
```



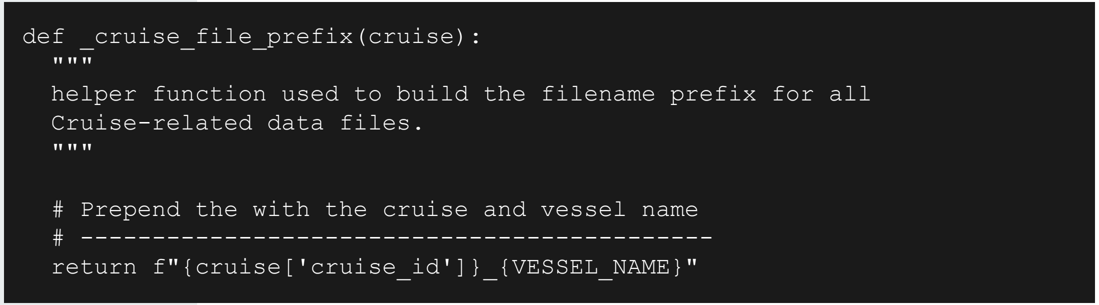
```
# Location of exported files.
EXPORT_ROOT_DIR = '/data/sealog-exports'

# Name of the vehicle. This is used in filenames and shouldn't
include spaces or special characters.
VEHICLE_NAME = 'Deep_Discoverer'
```



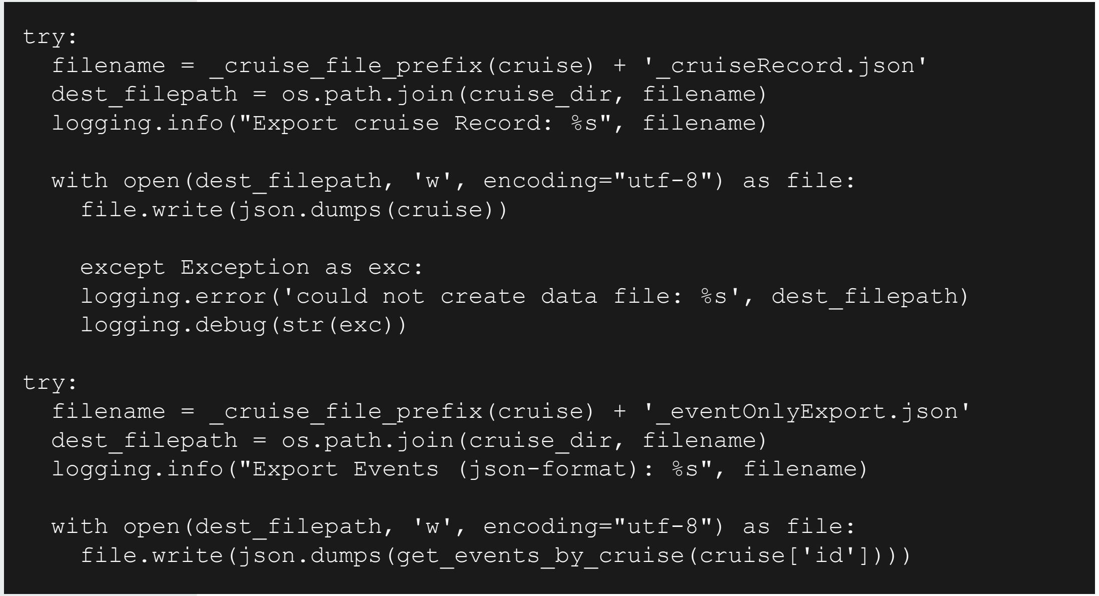
```
-c, --current_cruise  export the data for the most recent cruise
-L, --lowering_id LOWERING_ID
                      export data for the specified lowering
```

Backend Services

Data Export



```python
def _cruise_file_prefix(cruise):
  """
  helper function used to build the filename prefix for all
  Cruise-related data files.
  """

  # Prepend the with the cruise and vessel name
  # --------------------------------------------
  return f"{cruise['cruise_id']}_{VESSEL_NAME}"
```



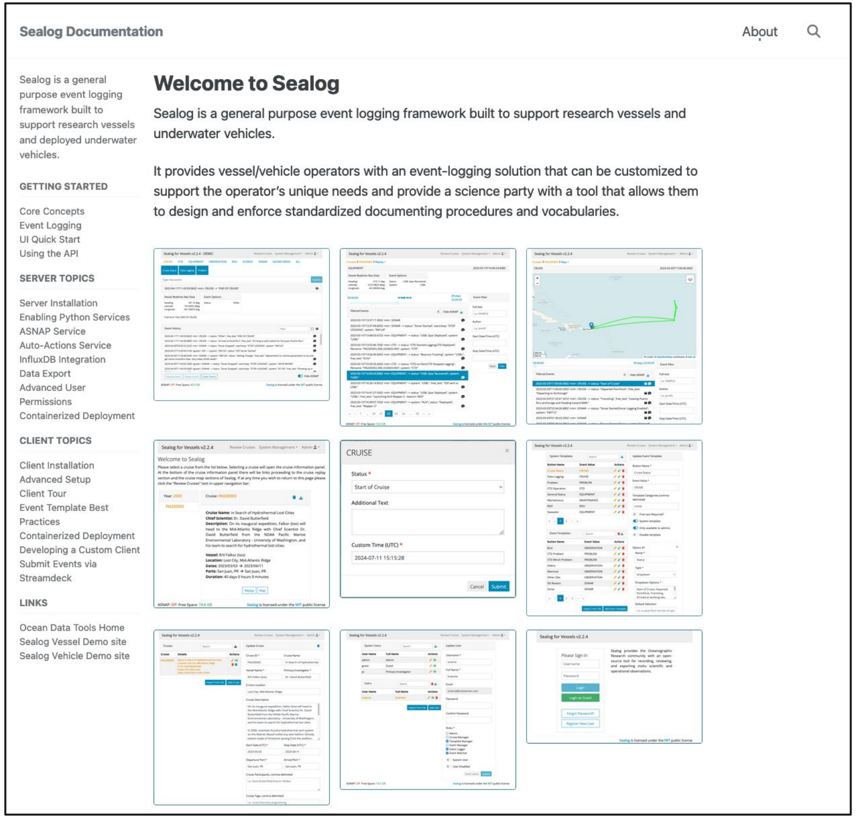
```python
try:
  filename = _cruise_file_prefix(cruise) + '_cruiseRecord.json'
  dest_filepath = os.path.join(cruise_dir, filename)
  logging.info("Export cruise Record: %s", filename)

  with open(dest_filepath, 'w', encoding="utf-8") as file:
    file.write(json.dumps(cruise))

    except Exception as exc:
    logging.error('could not create data file: %s', dest_filepath)
    logging.debug(str(exc))

try:
  filename = _cruise_file_prefix(cruise) + '_eventOnlyExport.json'
  dest_filepath = os.path.join(cruise_dir, filename)
  logging.info("Export Events (json-format): %s", filename)

  with open(dest_filepath, 'w', encoding="utf-8") as file:
    file.write(json.dumps(get_events_by_cruise(cruise['id'])))
```

Sealog

- Introduction
- Lingo 101
- System overview
- Backend Services
- **Best practices**
- Contributing
- Where to from here?

Best Practices

http://www.oceandatatools.org/sealog-docs/



Sealog Documentation

Sealog is a general purpose event logging framework built to support research vessels and deployed underwater vehicles.

GETTING STARTED

- Core Concepts
- Event Logging
- UI Quick Start
- Using the API

SERVER TOPICS

- Server Installation
- Enabling Python Services
- ASNAP Service
- Auto-Actions Service
- InfluxDB Integration
- Data Export
- Advanced User Permissions
- Containerized Deployment

CLIENT TOPICS

- Client Installation
- Advanced Setup
- Client Tour
- Event Template Best Practices
- Containerized Deployment
- Developing a Custom Client
- Submit Events via Streamdeck

LINKS

- Ocean Data Tools Home
- Sealog Vessel Demo site
- Sealog Vehicle Demo site

Welcome to Sealog

Sealog is a general purpose event logging framework built to support research vessels and underwater vehicles.

It provides vessel/vehicle operators with an event-logging solution that can be customized to support the operator's unique needs and provide a science party with a tool that allows them to design and enforce standardized documenting procedures and vocabularies.

Sealog

- Introduction
- Lingo 101
- System overview
- Backend Services
- Best practices
- **Contributing**
- Where to from here?

Contributing to Sealog

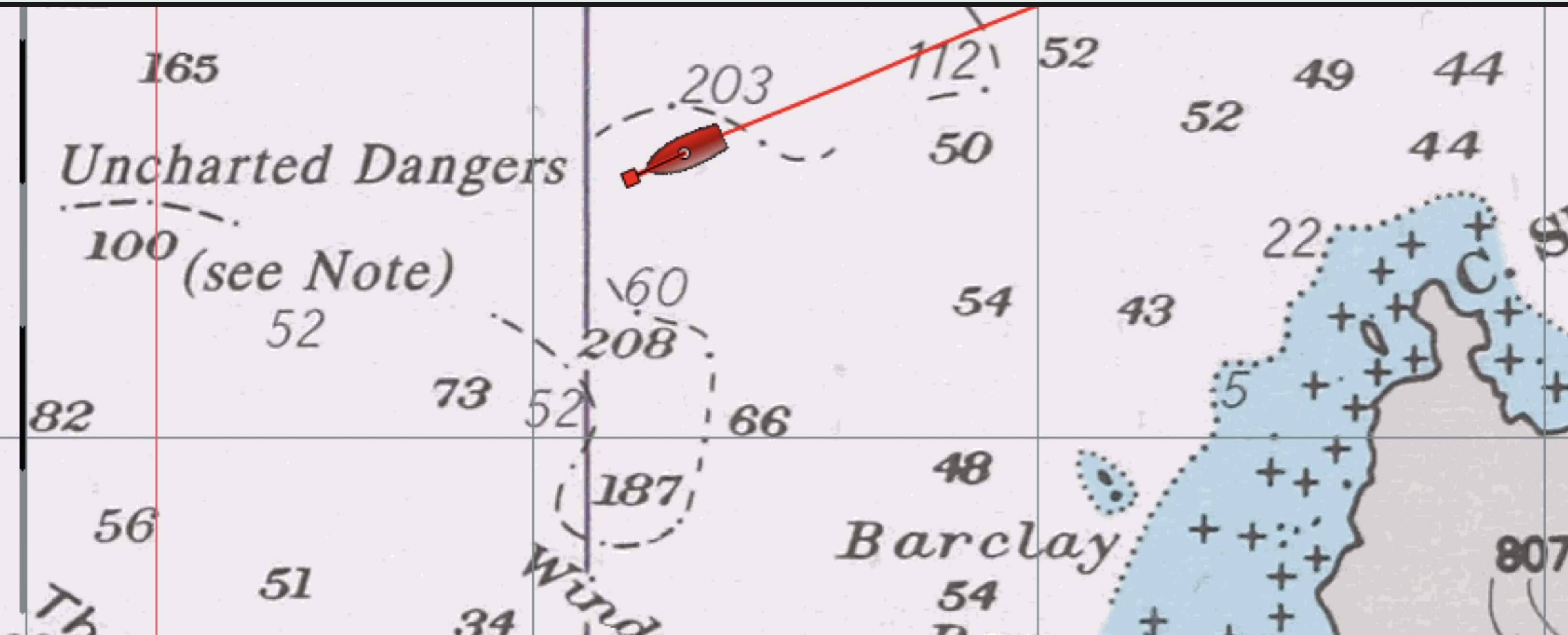
Because sharing is caring! ❤️

- Bug reports/feature requests:
  https://github.com/OceanDataTools/sealog-server/issues

  https://github.com/OceanDataTools/sealog-client-vessel/issues

  https://github.com/OceanDataTools/sealog-client-vehicle/issues

Where to from here?



Where to from here?

- Shore-side replication
- Cloud-services integration
- Integration with 3rd party services