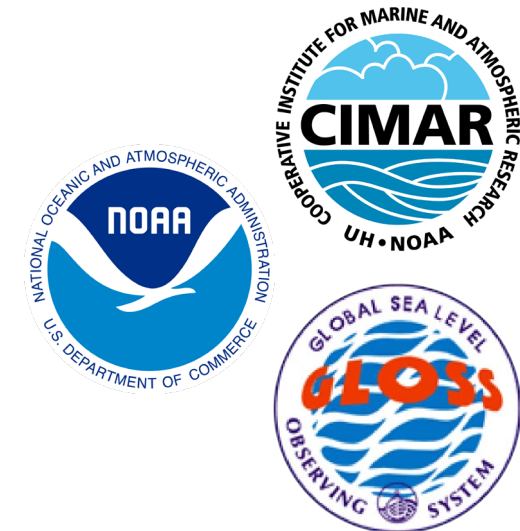


UNIVERSITY OF HAWAI'I SEA LEVEL CENTER

GLOSS-GE XVIII Data Center Report

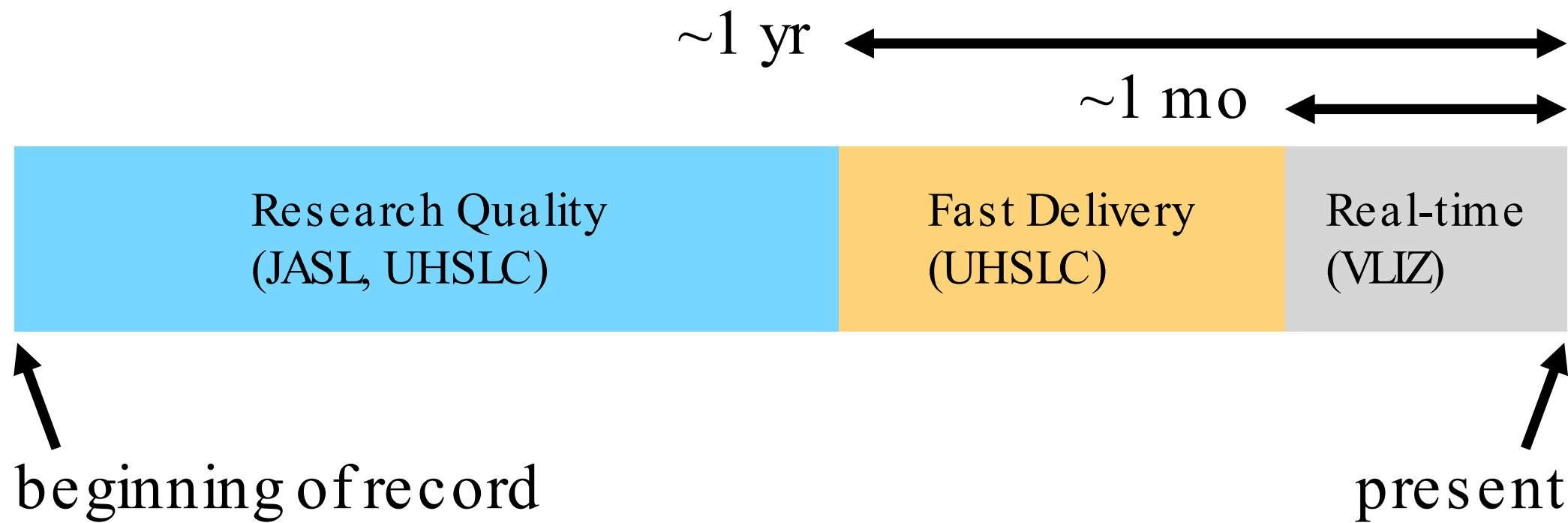
Phil Thompson

Associate Professor, Department of Oceanography, University of Hawai'i
Director, UH Sea Level Center



UHSLC Data Offerings

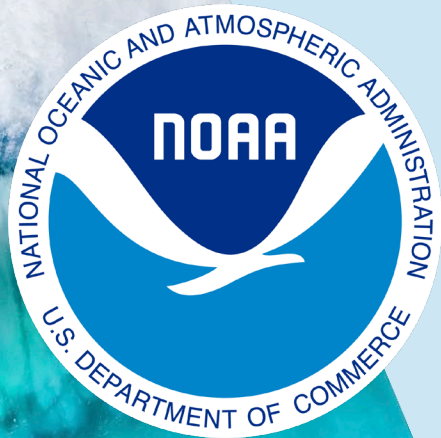
Two high-frequency data streams with hourly and daily resolution:



UHSLC Data Offerings

Two high-frequency data streams with hourly and daily resolution:

1. Fast Delivery → ~1-month latency
 - QC focused on outlier detection
 - Mostly focused on GLOSS Core Network
2. Research Quality (i.e., JASL) → ~1-year latency
 - QC focused on vertical stability and timing
 - Documentation of station history and metadata
 - Contributes data to PSMSL
 - Contributes data from 97 of the 114 countries in GESLA-3



JASL Research Quality Data Update

2025 GLOSS-GE-XVIII meeting

Ayesha Genz, JASL Data Manager

National Centers for
Environmental Information (NCEI)

March 11-14, 2025

Research Quality (JASL) update

As of December 2024

- Revamped metadata from .dmt files to .yaml files so that it is machine readable. This is a temporary solution until the UHSLC database is up and running.
- Total JASL archive contains **19,405 station-years** from **691 series**.
- GLOSS Research Quality archive contains **10,880 station-years** from **254 unique sites**.
- Relative to 2020 archive, the **2024 status added 928 station-years** from **157 series**.
- **18 series extended backwards** totaling 296 station-years.

JASL citation

Caldwell, Patrick C.; Merrifield, Mark A.; Thompson, Philip R. (2001). Sea level measured by tide gauges from global oceans as part of the Joint Archive for Sea Level (JASL) since 1846. NOAA National Centers for Environmental Information. Dataset. <https://doi.org/10.7289/v5v40s7w>

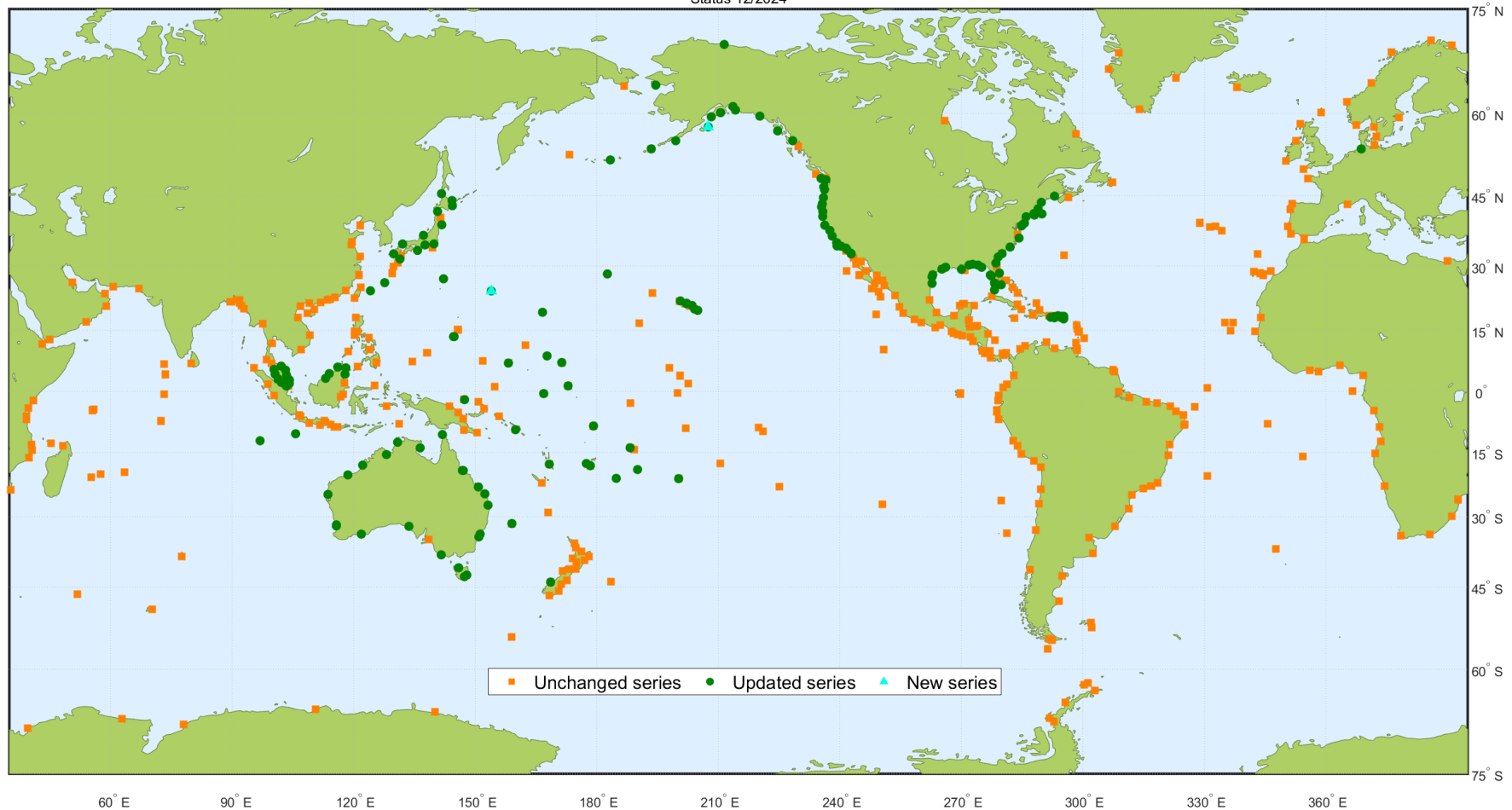


Research Quality (JASL) update

All Stations

Joint Archive for Sea Level

Status 12/2024

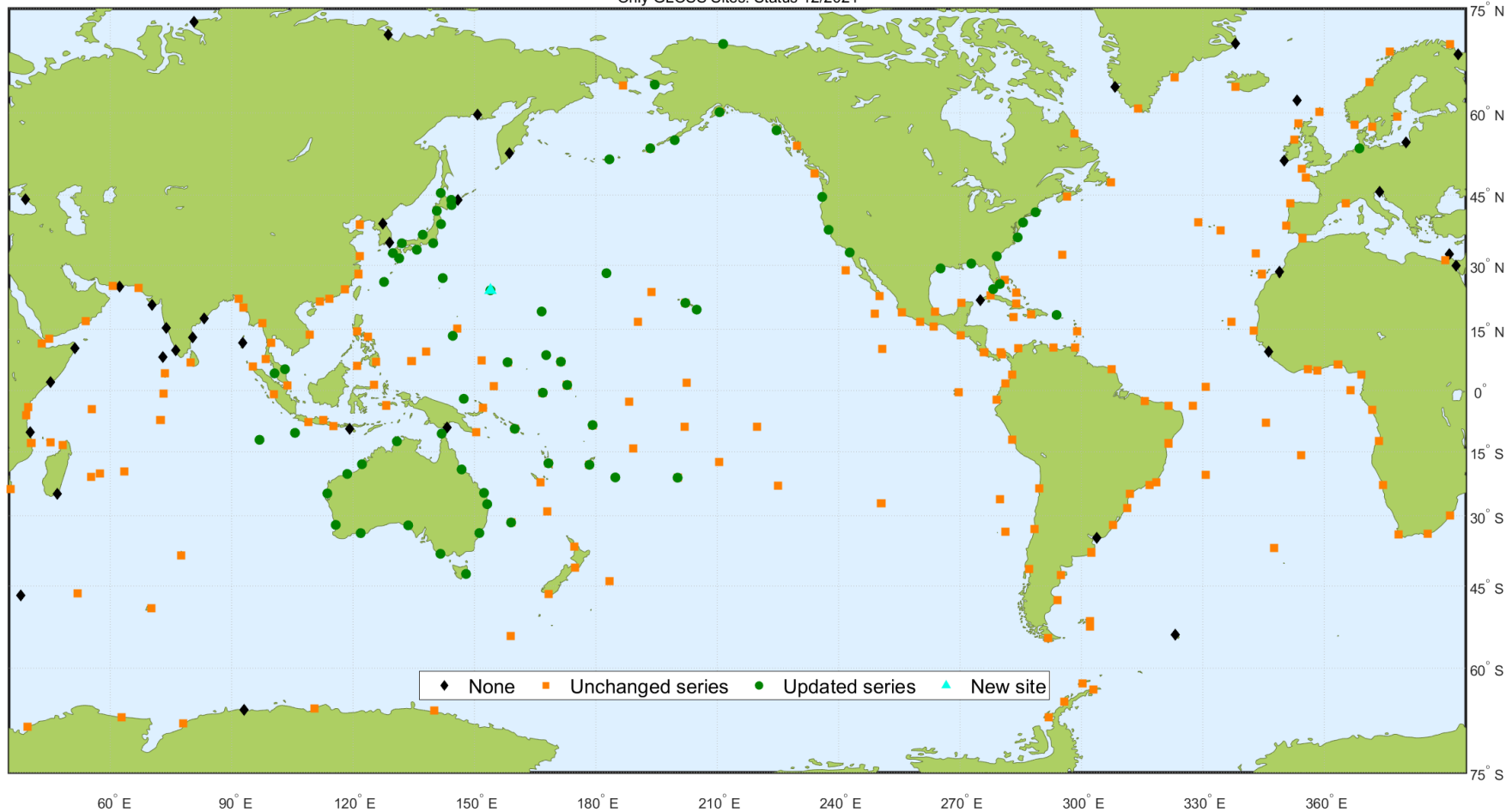


Research Quality (JASL) update

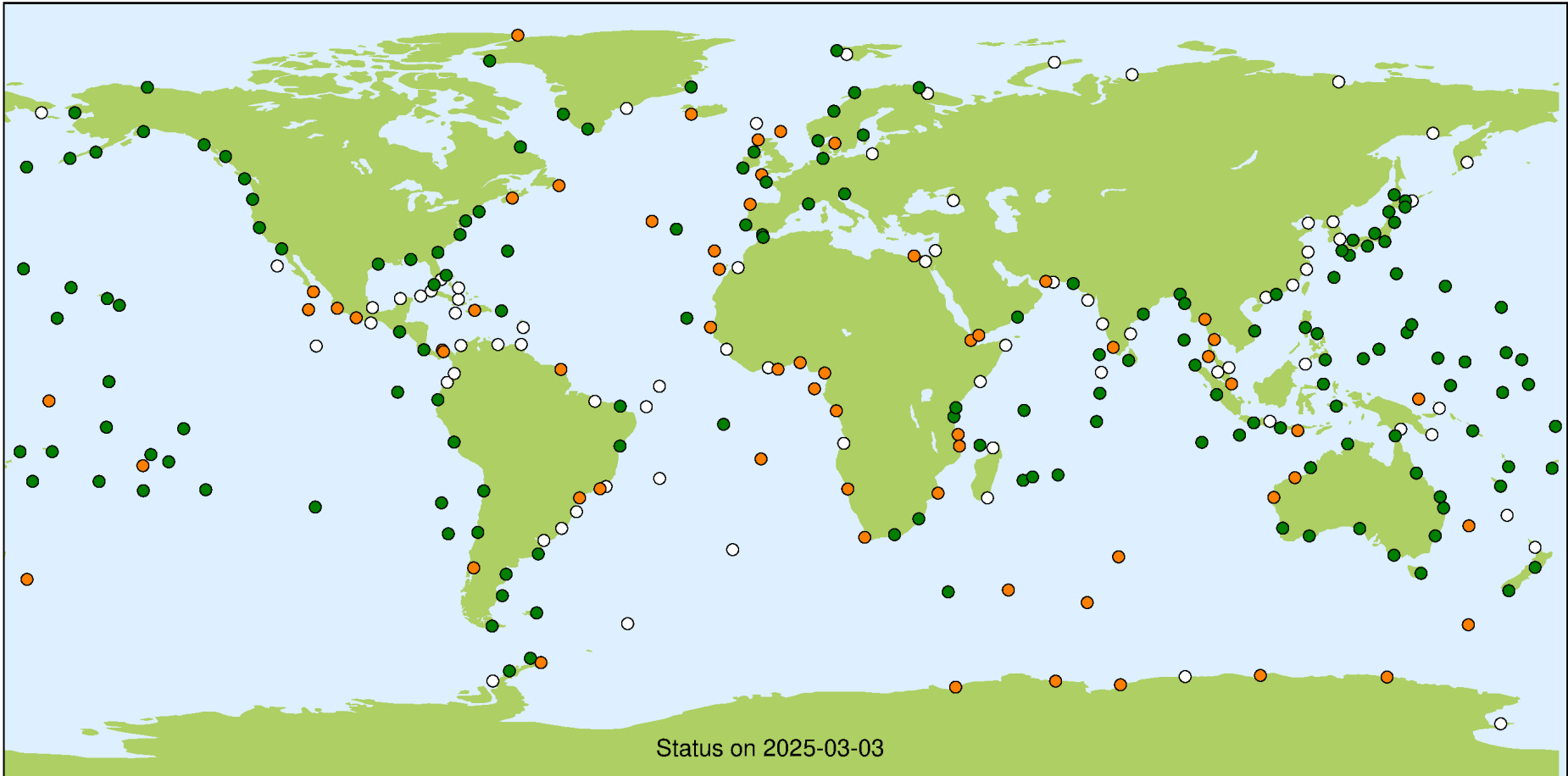
GLOSS Stations

Joint Archive for Sea Level

Only GLOSS Sites: Status 12/2024



UHSLC Fast Delivery Status




● Updated in past 6 months (158)

● Has some data (62)

○ No data (74)

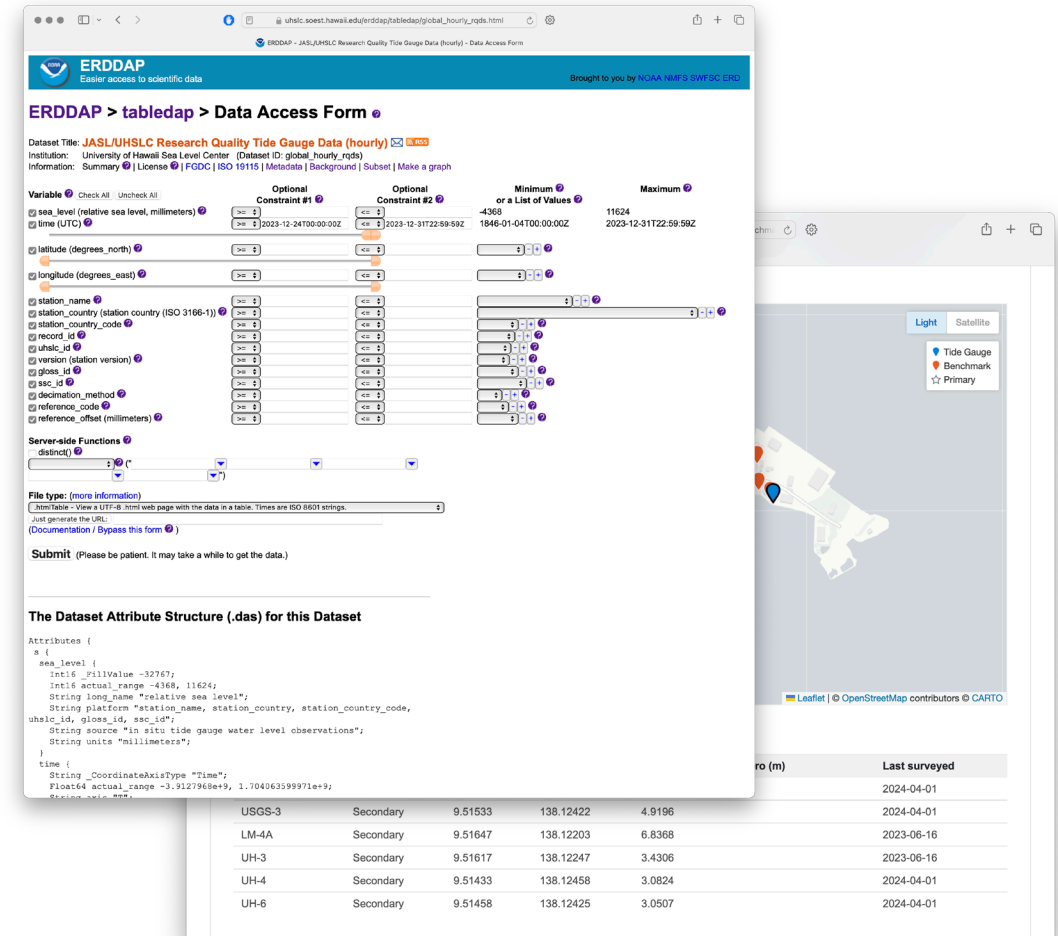
UHSLC Website and Data Access

Data access is provided via:

- Legacy data table
- ERDDAP 
- OpenDAP

Minor updates:

- RQ metadata migrated to machine readable YAML files (non-trivial!)
- UHSLC benchmark data standardized and (almost) on the web.



ERDDAP > tabledap > Data Access Form

Dataset Title: JASL/UHSLC Research Quality Tide Gauge Data (hourly) [View](#)

Institution: University of Hawaii Sea Level Center (Dataset ID: global_hourly_rqds)

Information: [Summary](#) | [License](#) | [FGDC](#) | [ISO 19115](#) | [Metadata](#) | [Background](#) | [Subset](#) | [Make a graph](#)

Variable: Check All Uncheck All

Variable	Optional Constraint #1	Optional Constraint #2	Minimum or a List of Values	Maximum
sea_level (relative sea level, millimeters)	<input type="checkbox"/> <= 1	<input type="checkbox"/> <= 2	-4368	11624
time (UTC)	<input type="checkbox"/> >= 1 2023-12-24T00:00:00Z	<input type="checkbox"/> <= 2 2023-12-31T22:59:59Z	1846-01-04T00:00:00Z	2023-12-31T22:59:59Z
latitude (degrees_north)	<input type="checkbox"/> >= 1	<input type="checkbox"/> <= 2	<input type="text" value=""/>	<input type="text" value=""/>
longitude (degrees_east)	<input type="checkbox"/> >= 1	<input type="checkbox"/> <= 2	<input type="text" value=""/>	<input type="text" value=""/>
station_name	<input type="checkbox"/> >= 1	<input type="checkbox"/> <= 2	<input type="text" value=""/>	<input type="text" value=""/>
station_country (station country (ISO 3166-1))	<input type="checkbox"/> >= 1	<input type="checkbox"/> <= 2	<input type="text" value=""/>	<input type="text" value=""/>
station_country_code	<input type="checkbox"/> >= 1	<input type="checkbox"/> <= 2	<input type="text" value=""/>	<input type="text" value=""/>
record_id	<input type="checkbox"/> >= 1	<input type="checkbox"/> <= 2	<input type="text" value=""/>	<input type="text" value=""/>
uhslc_id	<input type="checkbox"/> >= 1	<input type="checkbox"/> <= 2	<input type="text" value=""/>	<input type="text" value=""/>
version (station version)	<input type="checkbox"/> >= 1	<input type="checkbox"/> <= 2	<input type="text" value=""/>	<input type="text" value=""/>
gloss_id	<input type="checkbox"/> >= 1	<input type="checkbox"/> <= 2	<input type="text" value=""/>	<input type="text" value=""/>
ssc_id	<input type="checkbox"/> >= 1	<input type="checkbox"/> <= 2	<input type="text" value=""/>	<input type="text" value=""/>
decimation_method	<input type="checkbox"/> >= 1	<input type="checkbox"/> <= 2	<input type="text" value=""/>	<input type="text" value=""/>
reference_code	<input type="checkbox"/> >= 1	<input type="checkbox"/> <= 2	<input type="text" value=""/>	<input type="text" value=""/>
reference_offset (millimeters)	<input type="checkbox"/> >= 1	<input type="checkbox"/> <= 2	<input type="text" value=""/>	<input type="text" value=""/>

Server-side Functions: distinct()

File type: (more information)

Submit (Please be patient. It may take a while to get the data.)

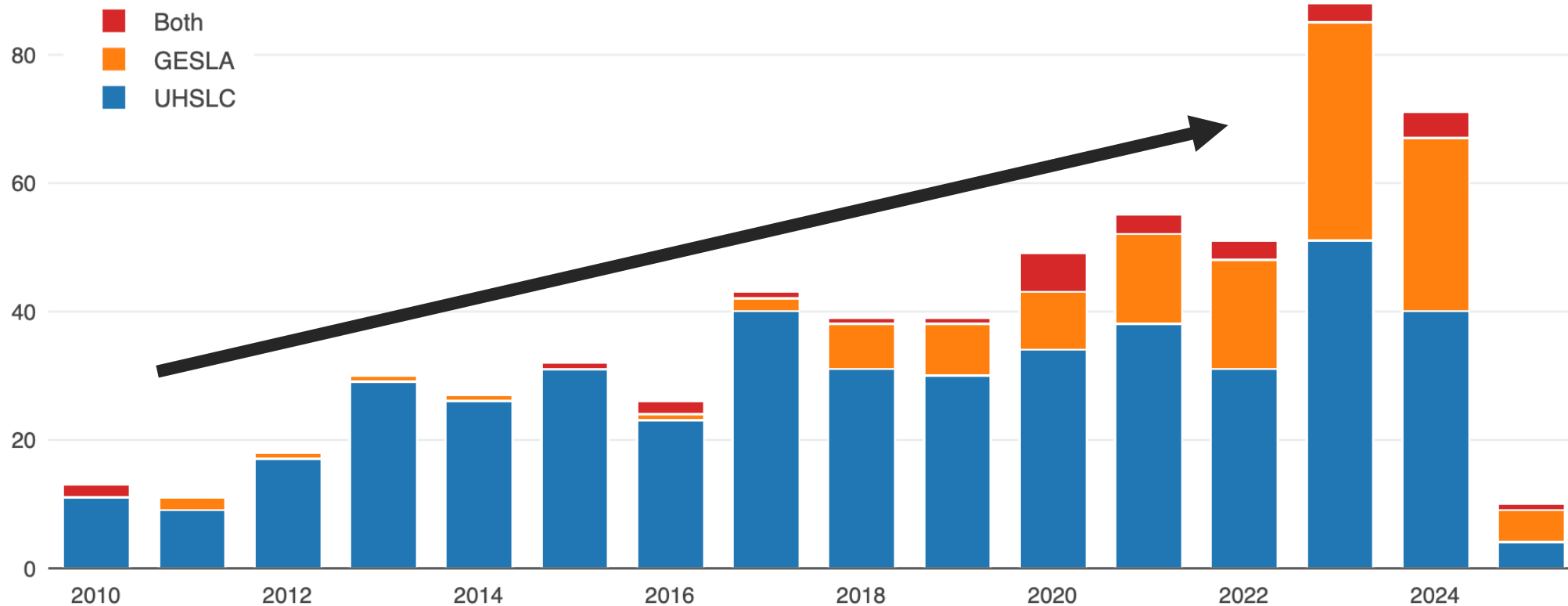
The Dataset Attribute Structure (.das) for this Dataset

```
Attributes {
  sea_level {
    Int16 FillValue -32767;
    Int16 actual_range -4368, 11624;
    String long_name "relative sea level";
    String platform "station_name, station_country, station_country_code,
uhslc_id, gloss_id, ssc_id";
    String source "in situ tide gauge water level observations";
    String units "millimeters";
  }
  time {
    String _CoordinateAxisType "Time";
    Float64 actual_range -3.9127968e+9, 1.704063599971e+9;
  }
}
```

Station ID	Platform	Latitude (m)	Longitude (m)	Last surveyed
USGS-3	Secondary	9.51533	138.12422	2024-04-01
LM-4A	Secondary	9.51647	138.12203	2023-06-16
UH-3	Secondary	9.51617	138.12247	2023-06-16
UH-4	Secondary	9.51433	138.12458	2024-04-01
UH-6	Secondary	9.51458	138.12425	2024-04-01

UHSLC Website and Data Access

Data use in peer-reviewed publications



UHSLC Website and Data Access

Data access is provided via:

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- OpenDAP

Minor updates:

- RQ metadata migrated to machine readable YAML files (non-trivial!)
- UHSLC benchmark data standardized and (almost) on the web. ➡

The image shows two overlapping browser windows. The top window is the ERDDAP Data Access Form for the dataset 'JASL/UHSLC Research Quality Tide Gauge Data (hourly)'. It displays metadata such as 'Institution: University of Hawaii Sea Level Center' and 'Information: Summary | License | FGDC | ISO 19115 | Metadata | Background | Subset | Make a graph'. The 'Variable' section lists 'sea_level (relative sea level, millimeters)' and 'time (UTC)'. The bottom window is the 'Station Map' for 'Yap Island', showing a map with several benchmark locations marked with red pins. A photo of a tide gauge station is displayed, with the caption 'Photo date: April 2024'. Below the map is a table titled 'Benchmark Locations and Levels'.

Benchmark	Type	Latitude	Longitude	Level above station zero (m)	Last surveyed
BM@	Primary	9.51426	138.12466	2.6003	2024-04-01
USGS-3	Secondary	9.51533	138.12422	4.9196	2024-04-01
LM-4A	Secondary	9.51647	138.12203	6.8368	2023-06-16
UH-3	Secondary	9.51617	138.12247	3.4306	2023-06-16
UH-4	Secondary	9.51433	138.12458	3.0824	2024-04-01
UH-6	Secondary	9.51458	138.12425	3.0507	2024-04-01

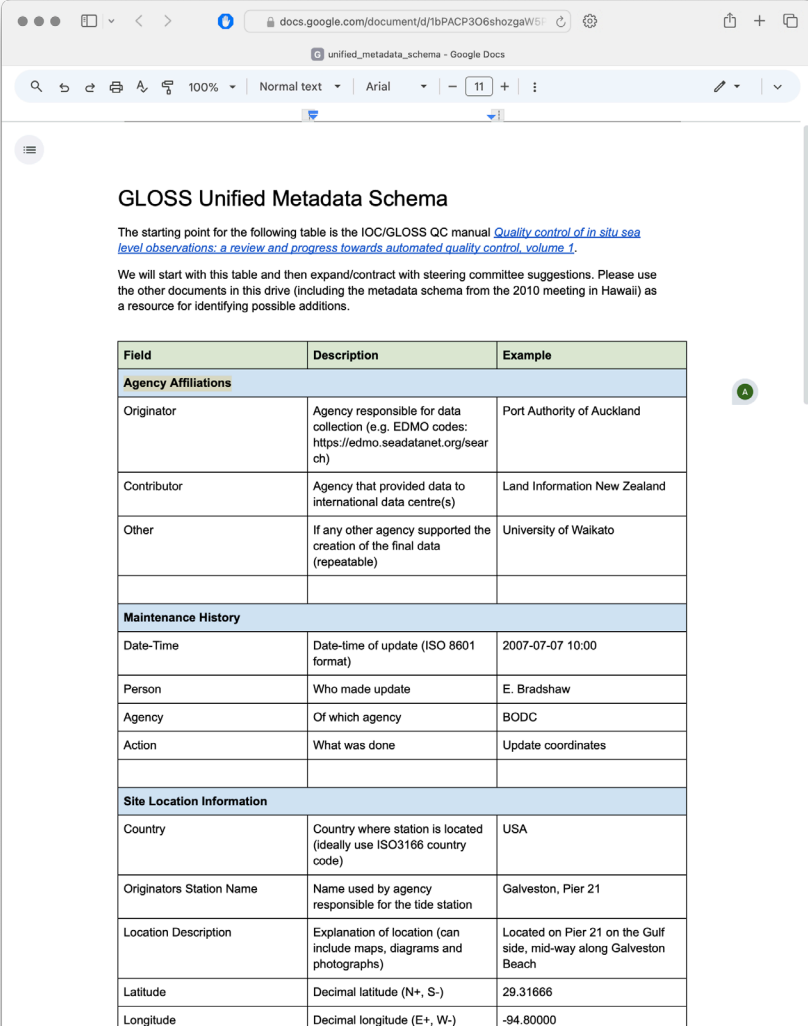
UHSLC Website and Data Access

From GLOSS SC meeting January 2024

Ongoing objectives

Update UHSLC database schema

- Update to GLOSS unified metadata schema
- Reclassify data streams using controlled language
 - Water level vs. relative sea level
 - Raw → Level 0
 - Research Quality → Level 4
- Produce “best available” time series
 - Each value receives a quality flag (Level 3, 4, etc.)
 - Possible with database modernization (next slide)



The screenshot shows a Google Docs document titled "GLOSS Unified Metadata Schema". The document contains a table with three columns: Field, Description, and Example. The table is divided into sections: Agency Affiliations, Maintenance History, and Site Location Information. The Agency Affiliations section includes rows for Originator, Contributor, and Other. The Maintenance History section includes rows for Date-Time, Person, Agency, and Action. The Site Location Information section includes rows for Country, Originators Station Name, Location Description, Latitude, and Longitude.

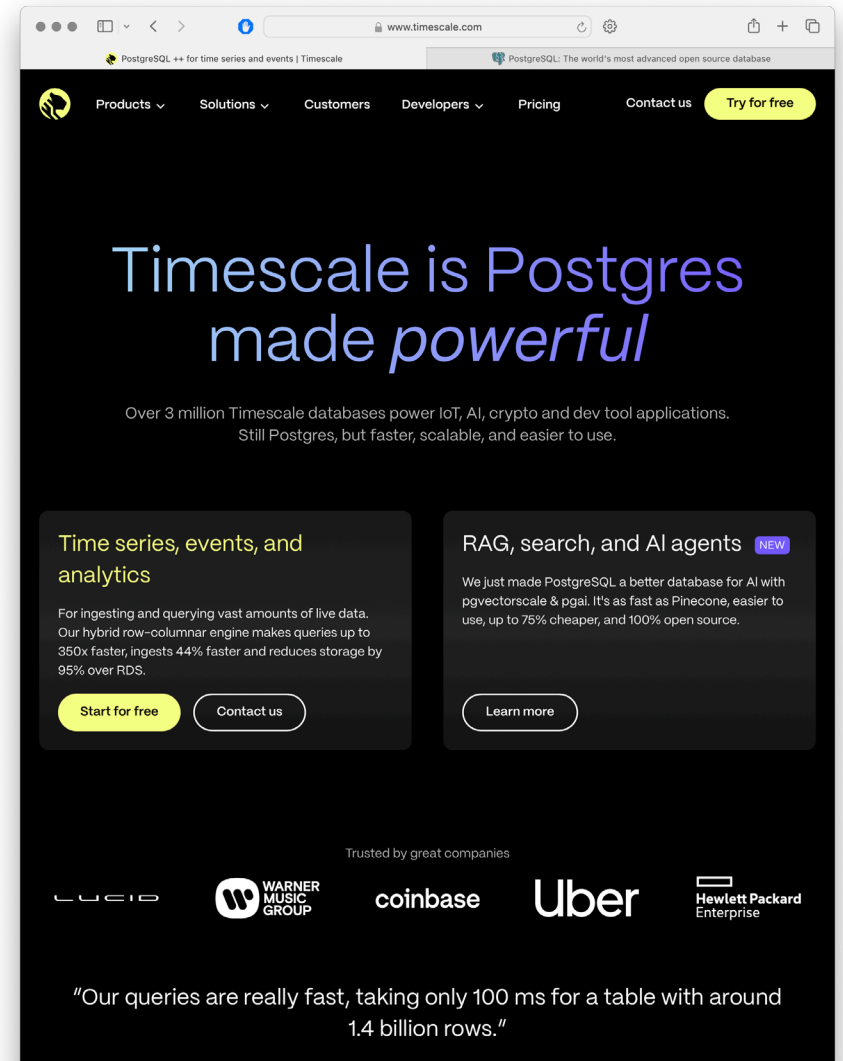
Field	Description	Example
Agency Affiliations		
Originator	Agency responsible for data collection (e.g. EDMO codes: https://edmo.seadatanet.org/search)	Port Authority of Auckland
Contributor	Agency that provided data to international data centre(s)	Land Information New Zealand
Other	If any other agency supported the creation of the final data (repeatable)	University of Waikato
Maintenance History		
Date-Time	Date-time of update (ISO 8601 format)	2007-07-07 10:00
Person	Who made update	E. Bradshaw
Agency	Of which agency	BODC
Action	What was done	Update coordinates
Site Location Information		
Country	Country where station is located (ideally use ISO3166 country code)	USA
Originators Station Name	Name used by agency responsible for the tide station	Galveston, Pier 21
Location Description	Explanation of location (can include maps, diagrams and photographs)	Located on Pier 21 on the Gulf side, mid-way along Galveston Beach
Latitude	Decimal latitude (N+, S-)	29.31666
Longitude	Decimal longitude (E+, W-)	-94.80000

UHSLC Website and Data Access

Ongoing objectives

Database migration: ASCII → PostgreSQL

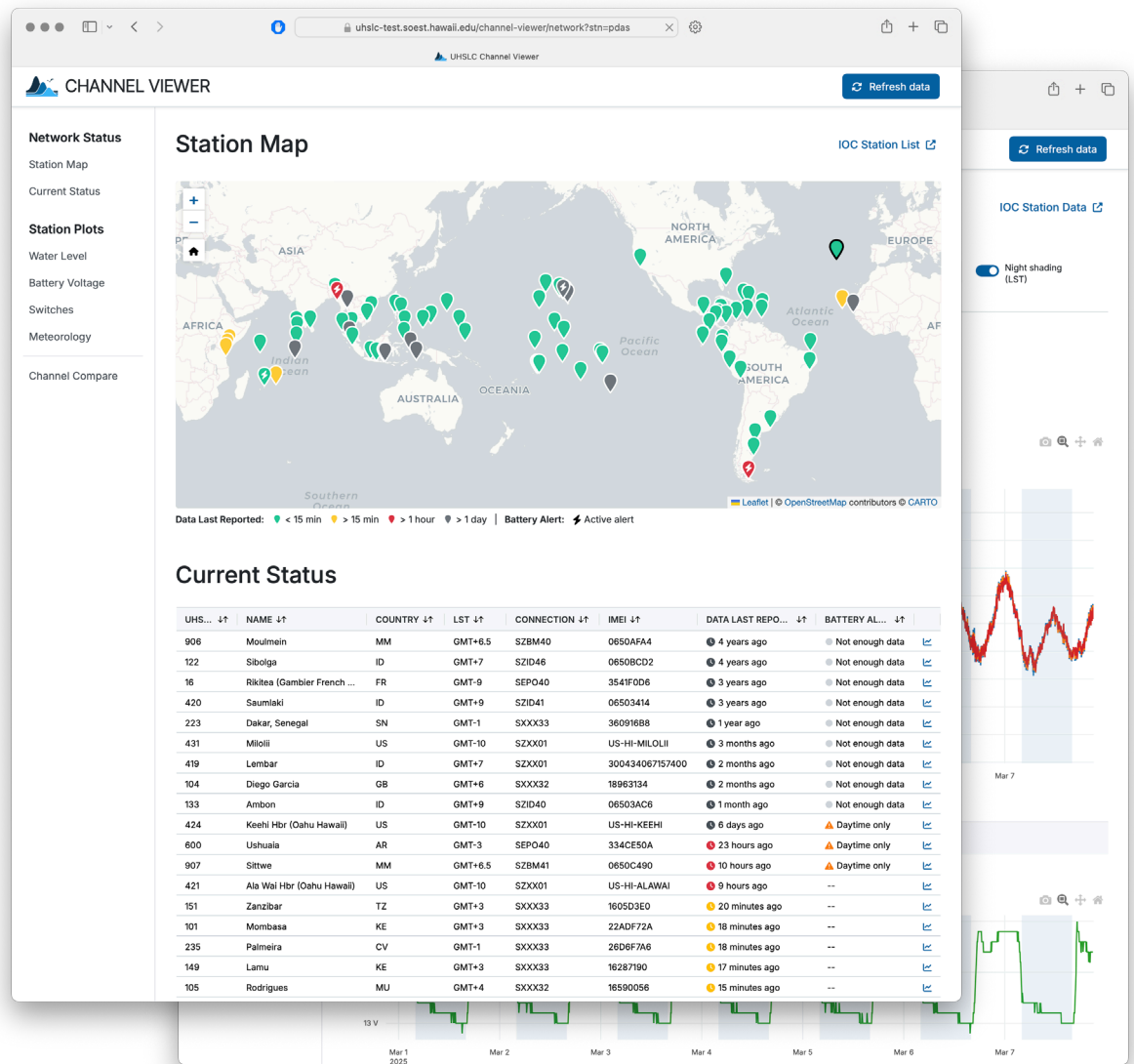
- Modernize database infrastructure to improve data access and interactivity
- Utilize an open-source, extended PostgreSQL framework optimized for time series (Timescale)
- Design database structure to accommodate complex tide-gauge metadata and relationships between time series
- UHSLC real-time streams are operational



UHS LC Website and Data Access

Modern database enables:

- New internal tool for technicians to monitor the status of UHS LC real-time stations/data.
- Ongoing development is focused on public tools to interact with historical records.



UHSLC Website and Data Access

Modern database enables:

- New internal tool for technicians to monitor the status of UHSLC real-time stations/data.
- Ongoing development is focused on public tools to interact with historical records.

