SATURN Data Explorer:

A powerful and expandable tool for exploration of Columbia River data

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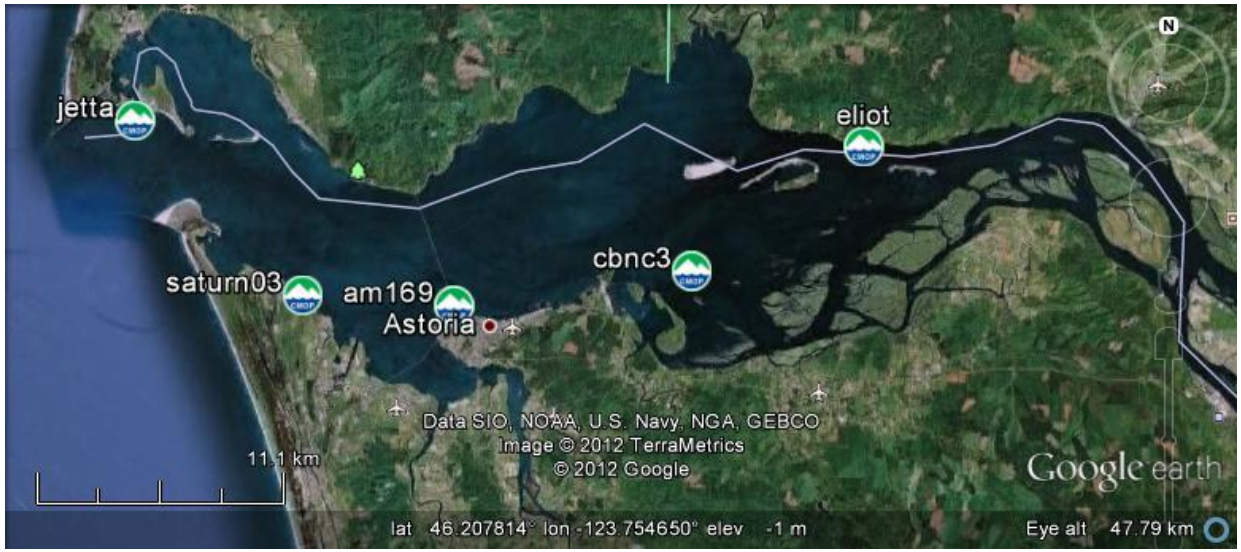
What the Data Explorer does

- Online tool for plotting data relevant to the Columbia River estuary (primarily CMOP data, but also NOAA-COOPS, USGS, NDBC, and US-ACE data)
- Variety of plotting options, from simple timeseries plots to 3 variable scatter plots to tide phase plots.
- Plotted data can be downloaded in text or matlab format
- Any real-time dataset included in the regional ocean observation system (NANOOS) can be plotted in the data explorer
- Historical datasets can be incorporated by special arrangement

What data is in the Data Explorer

- Salinity, temperature and pressure data from multiple fixed stations in the lower CR estuary, from 1997 (temperature) or 2001 (salinity) through today
- Biogeochemical data from SATURN fixed stations and gliders from 2009 to the present
- External data from USGS, NOAA-COOPS and NDBC (river discharge, elevation, offshore buoy data)
- Recent data (30 days) from all stations in the NANOOS data repository



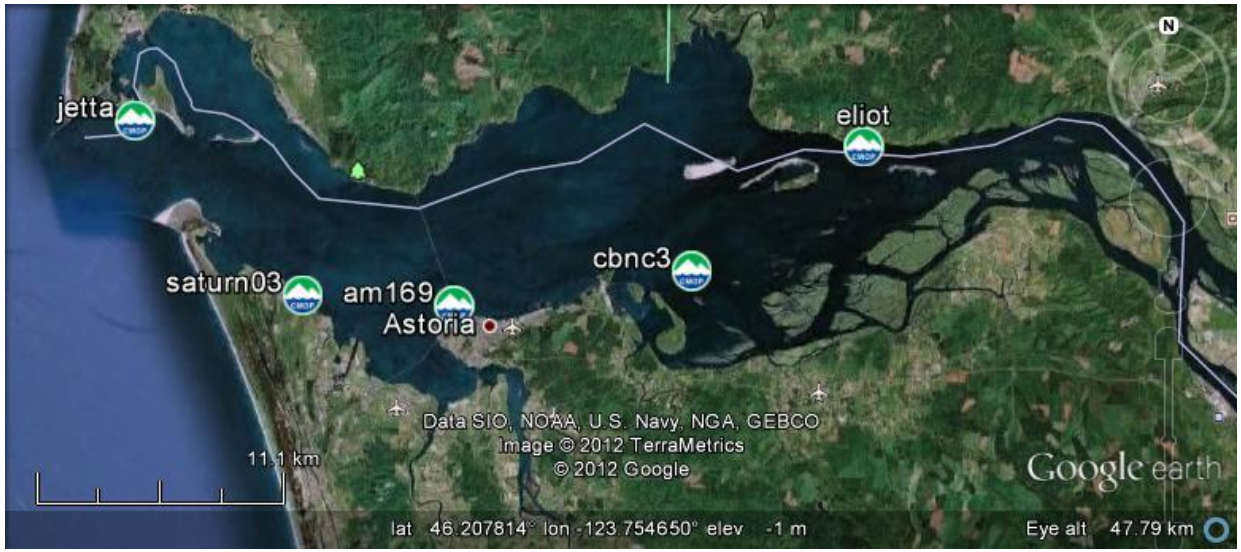
Salinity intrusion appears to transition between two modes tied to river discharge

At discharges below 5500 m^3/s, water greater than 10 psu reaches Elliot Point and into Cathlamet Bay

At discharges above 7500 m^3/s no salt reaches Elliott Point and little salt reaches into Cathlamet Bay

Lower estuary stations also show signs of this transition

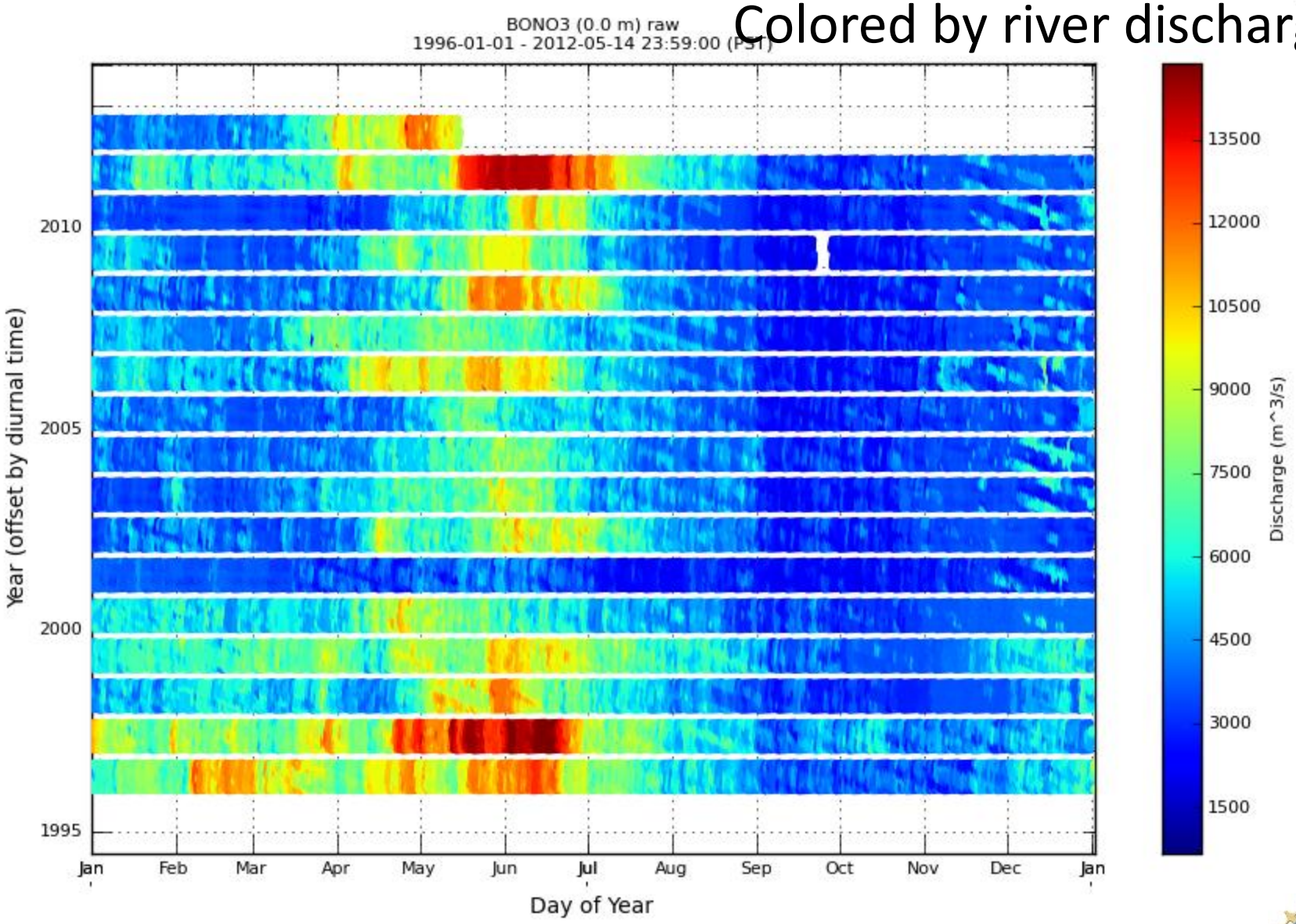
The limits of salinity: Elliott Point and Cathlamet Bay



- Elliott Point (eliot) is near the upper limit of salinity intrusion in the main channel
- Cathlamet Bay North Channel Light 3 (cbnc3) is near the downriver end of Cathlamet Bay
- Astoria Megler Bridge - South Channel (am169) is located at a point that reliably sees salinity, but that has a maximum salinity that is highly variable
- SATURN-03 is a recent multi-depth station in the lower estuary

Columbia River discharge at Bonneville 1996-2012

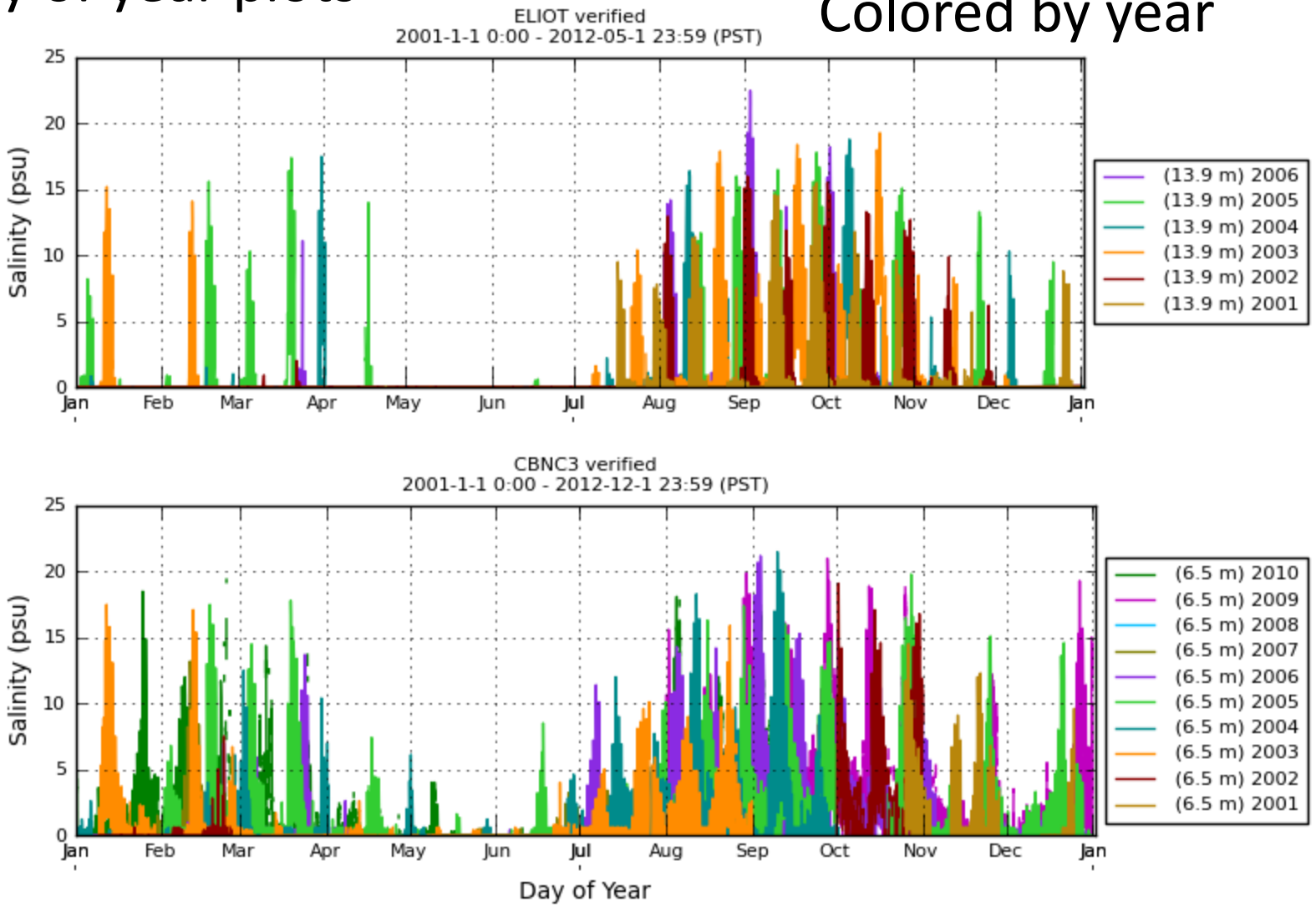
Colored by river discharge



Elliott Point and Cathlamet Bay North Channel

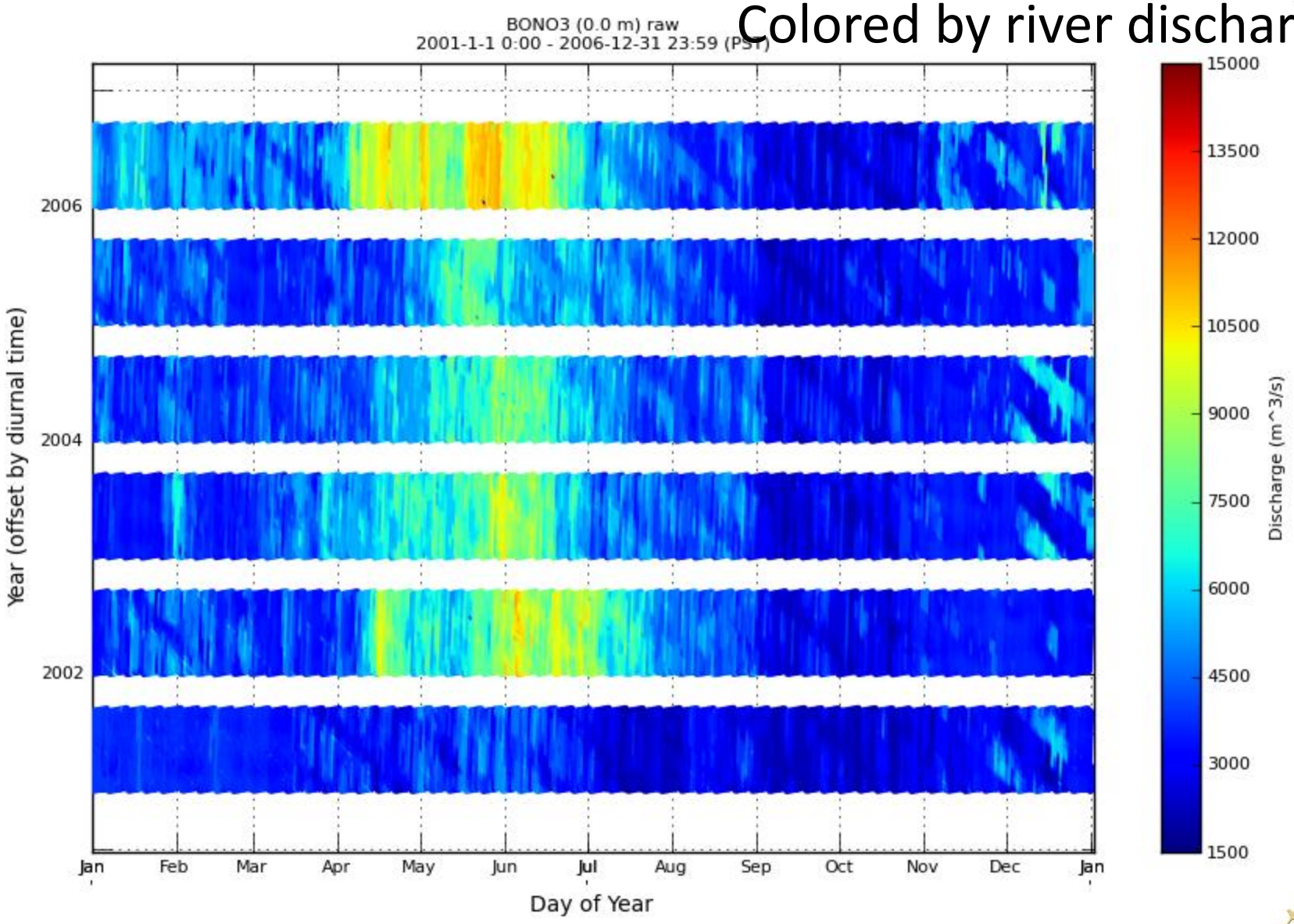
Day of year plots

Colored by year

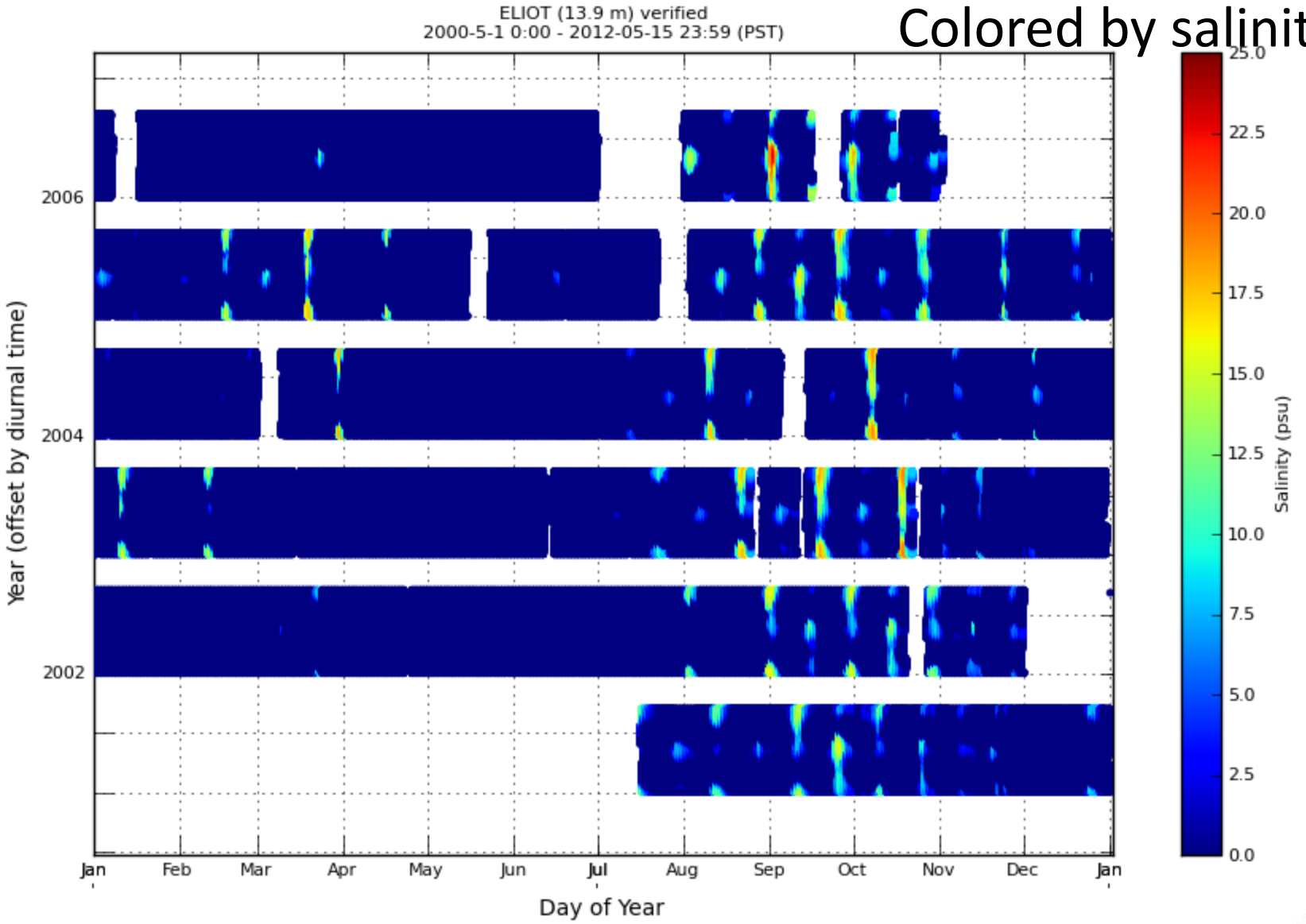


Discharge 2001-2006

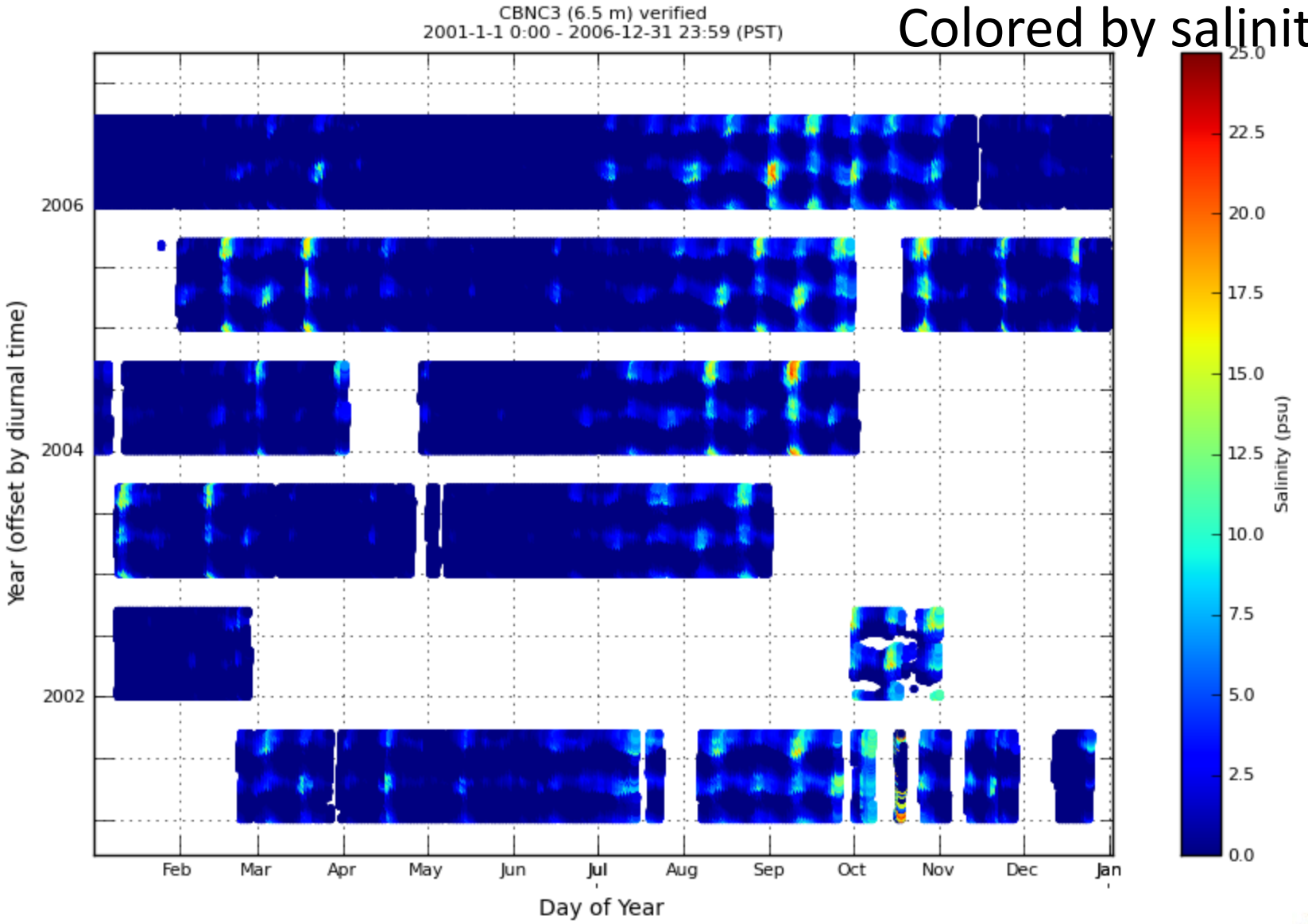
Colored by river discharge



Elliott Point salinity intrusion

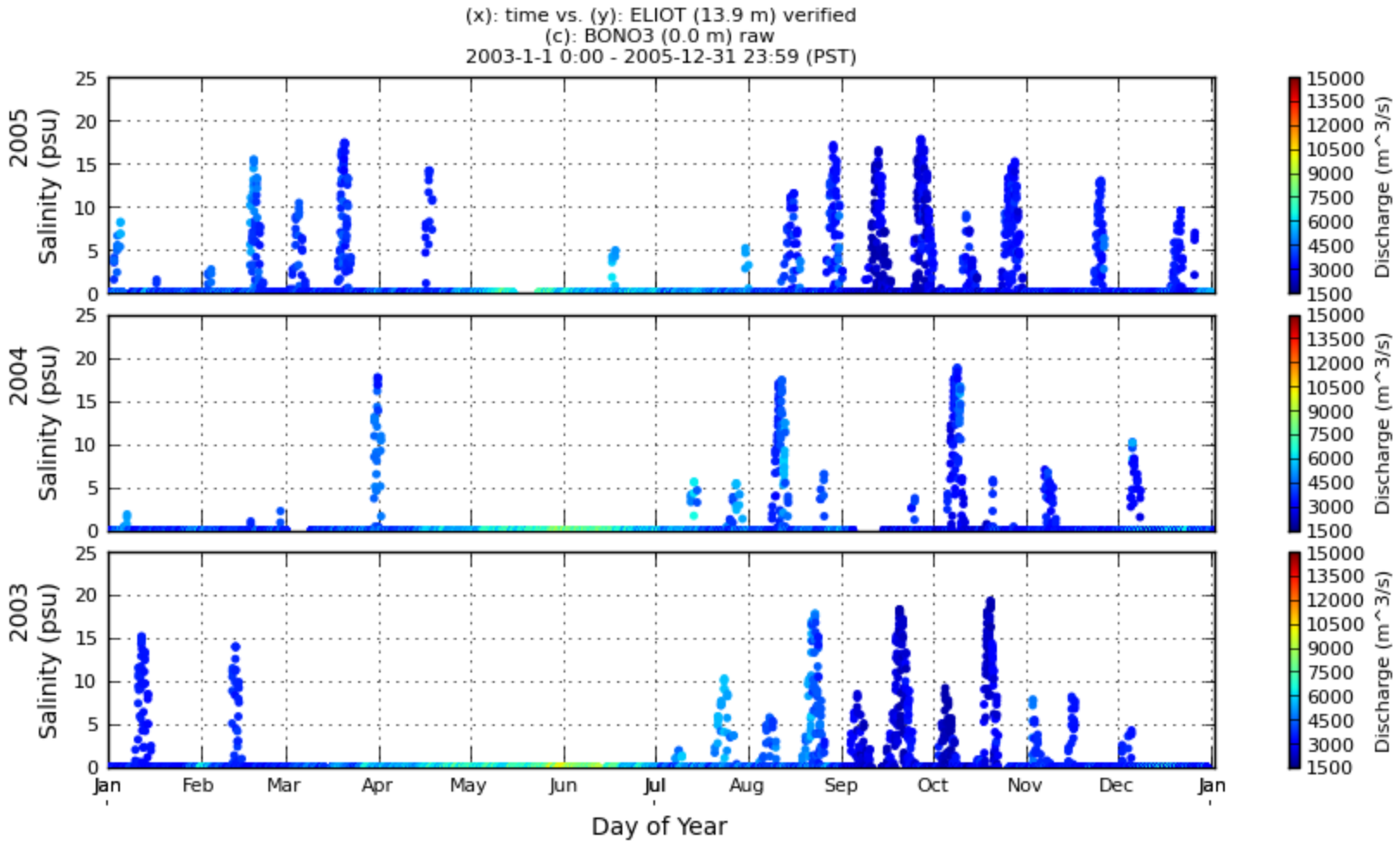


Cathlamet Bay North Channel



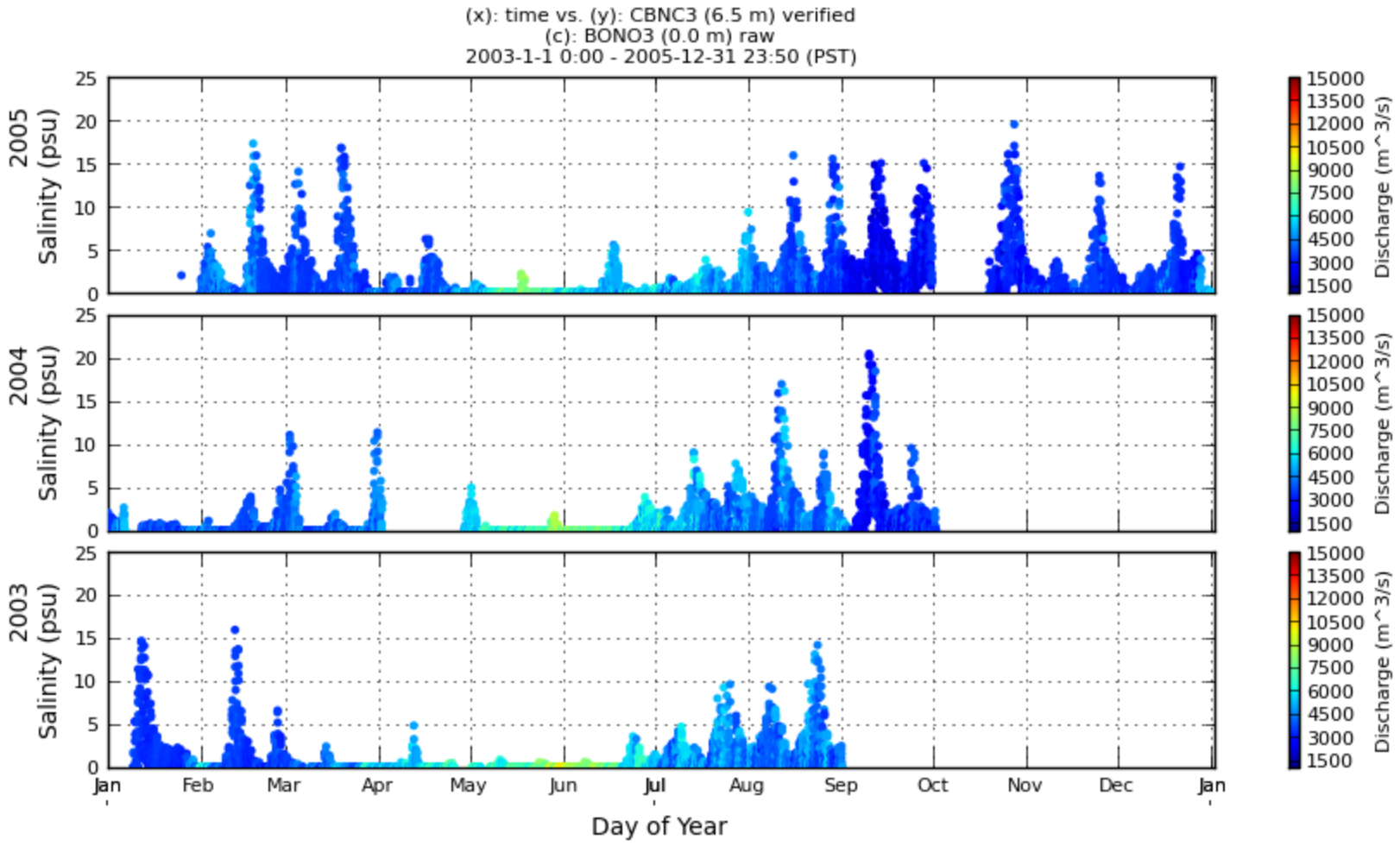
Elliot Point 2003-2006 response to discharge

Colored by river discharge



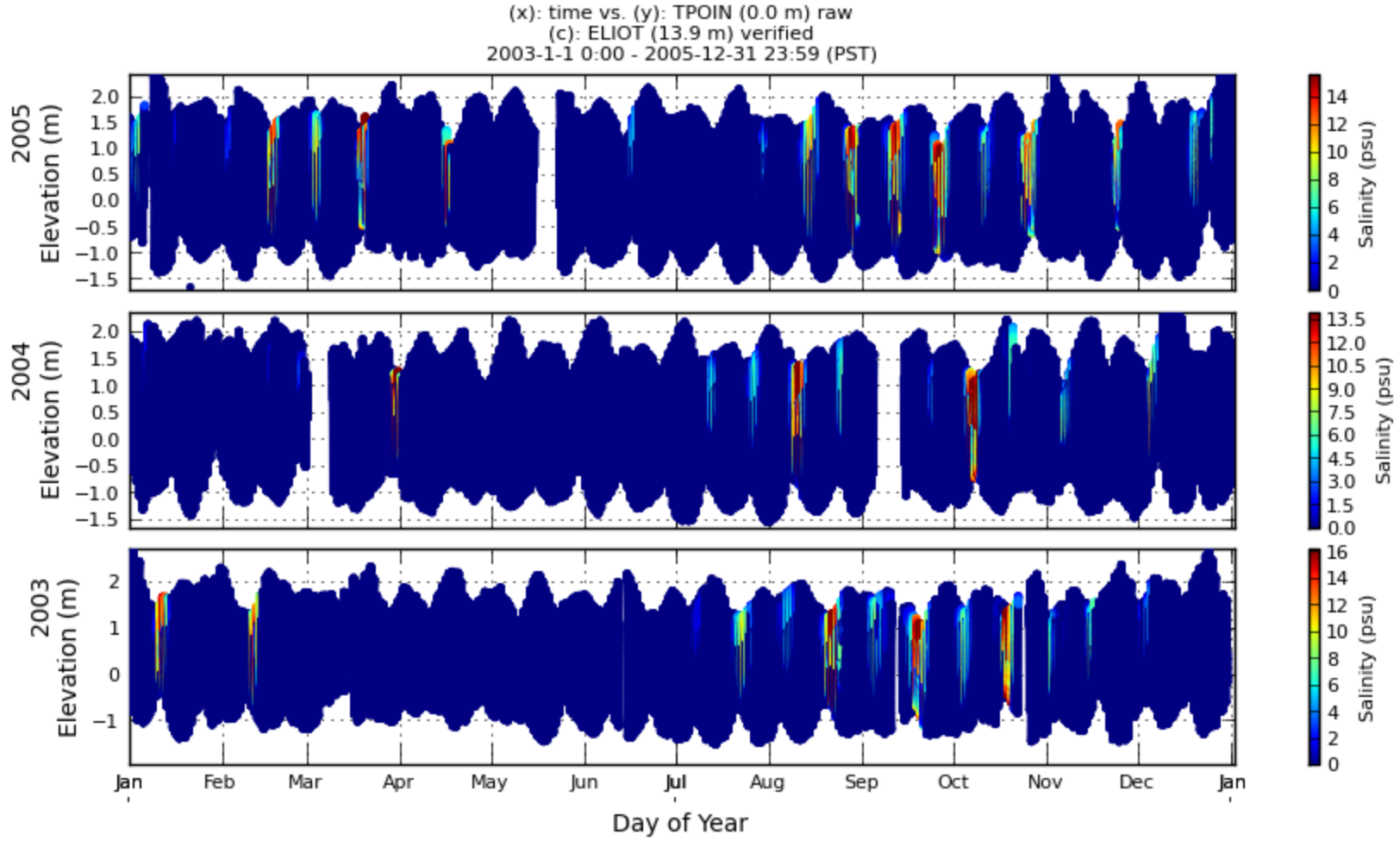
Cathlamet Bay North Channel response to discharge

Colored by river discharge



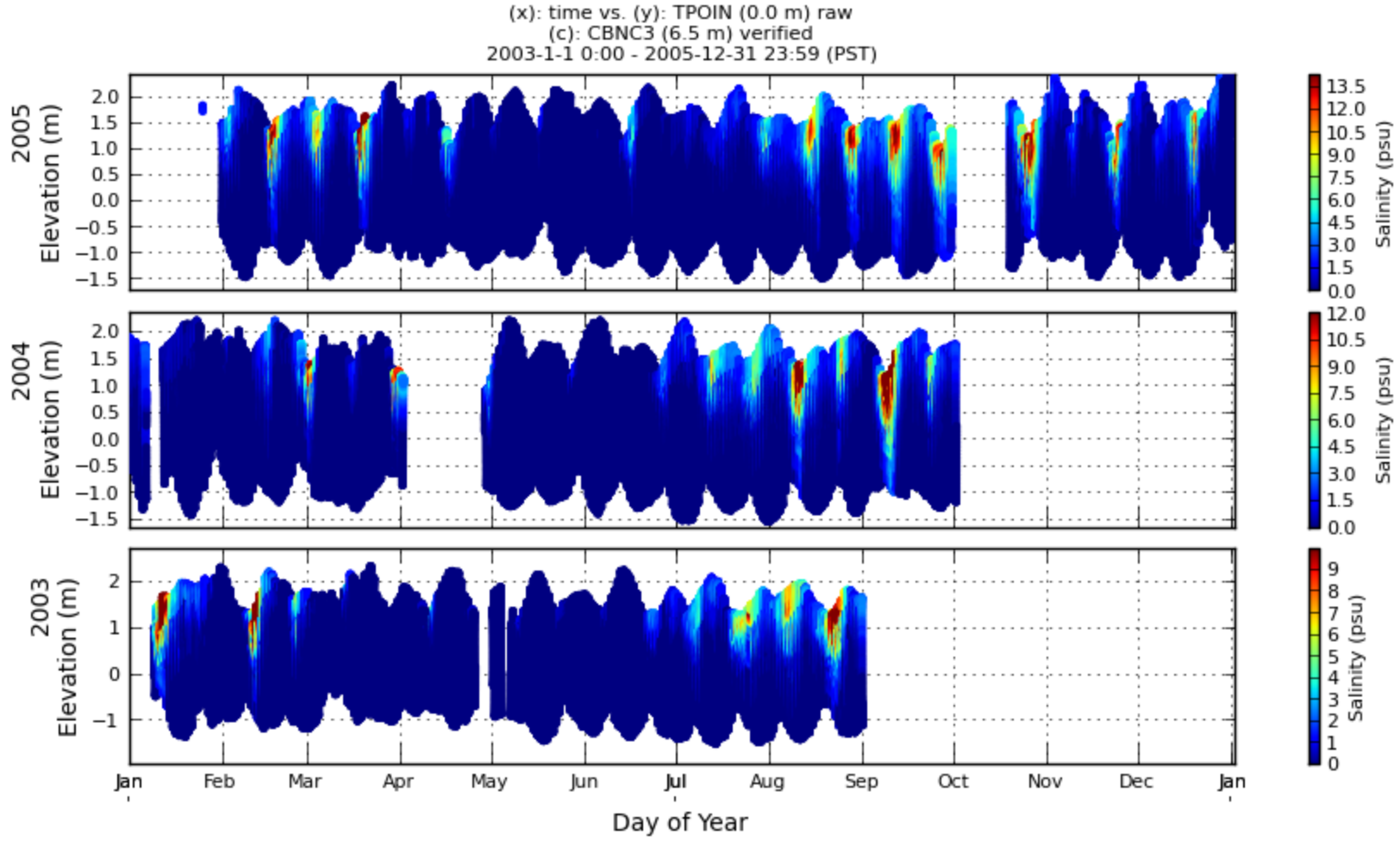
Astoria tides colored by Elliott Point salinity

Colored by salinity



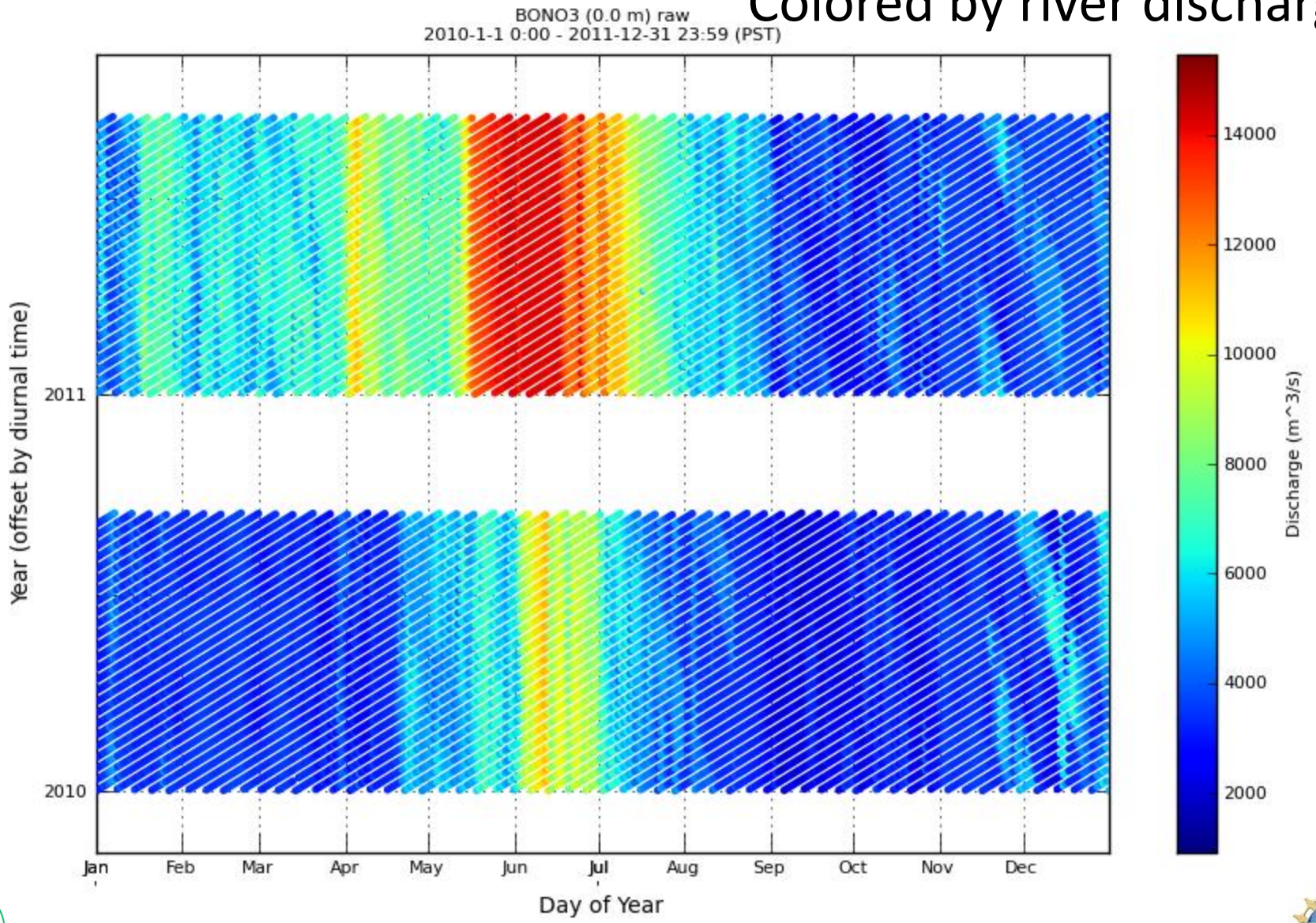
Astoria tides colored by Cathlamet Bay salinity

Colored by salinity



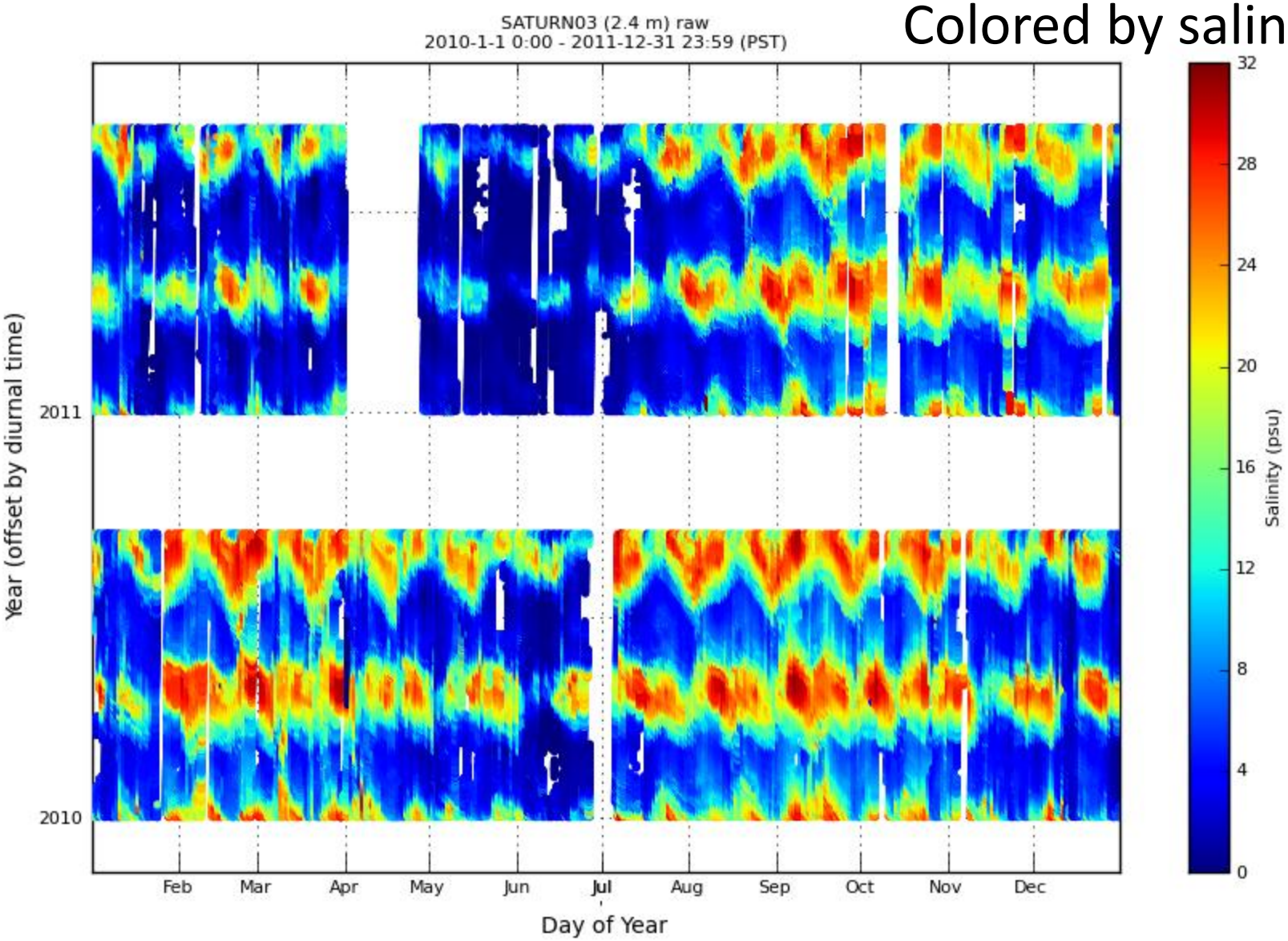
Bonneville discharge 2010-2011

Colored by river discharge



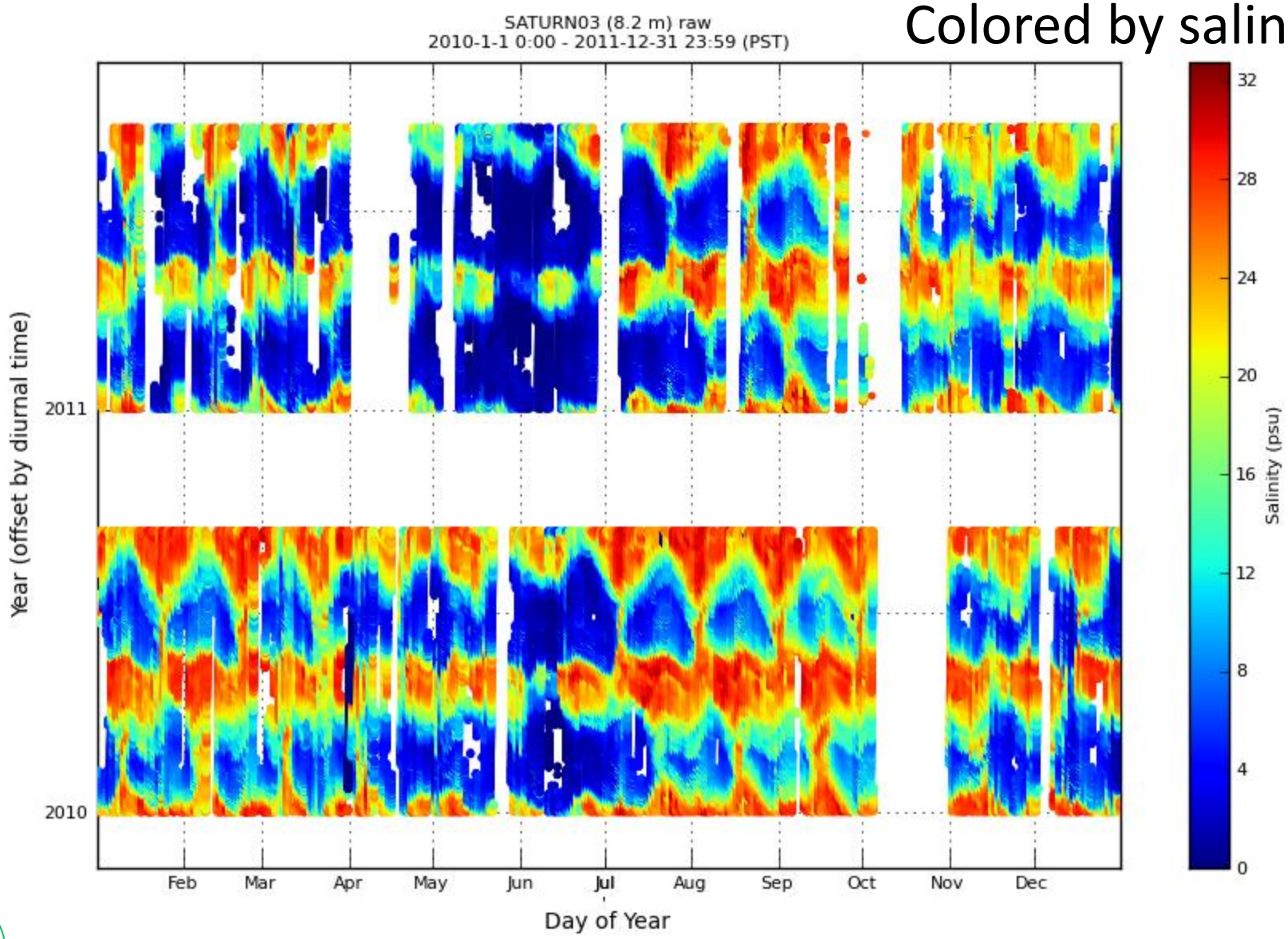
SATURN-03 2.4 m salinity 2010-2011

Colored by salinity



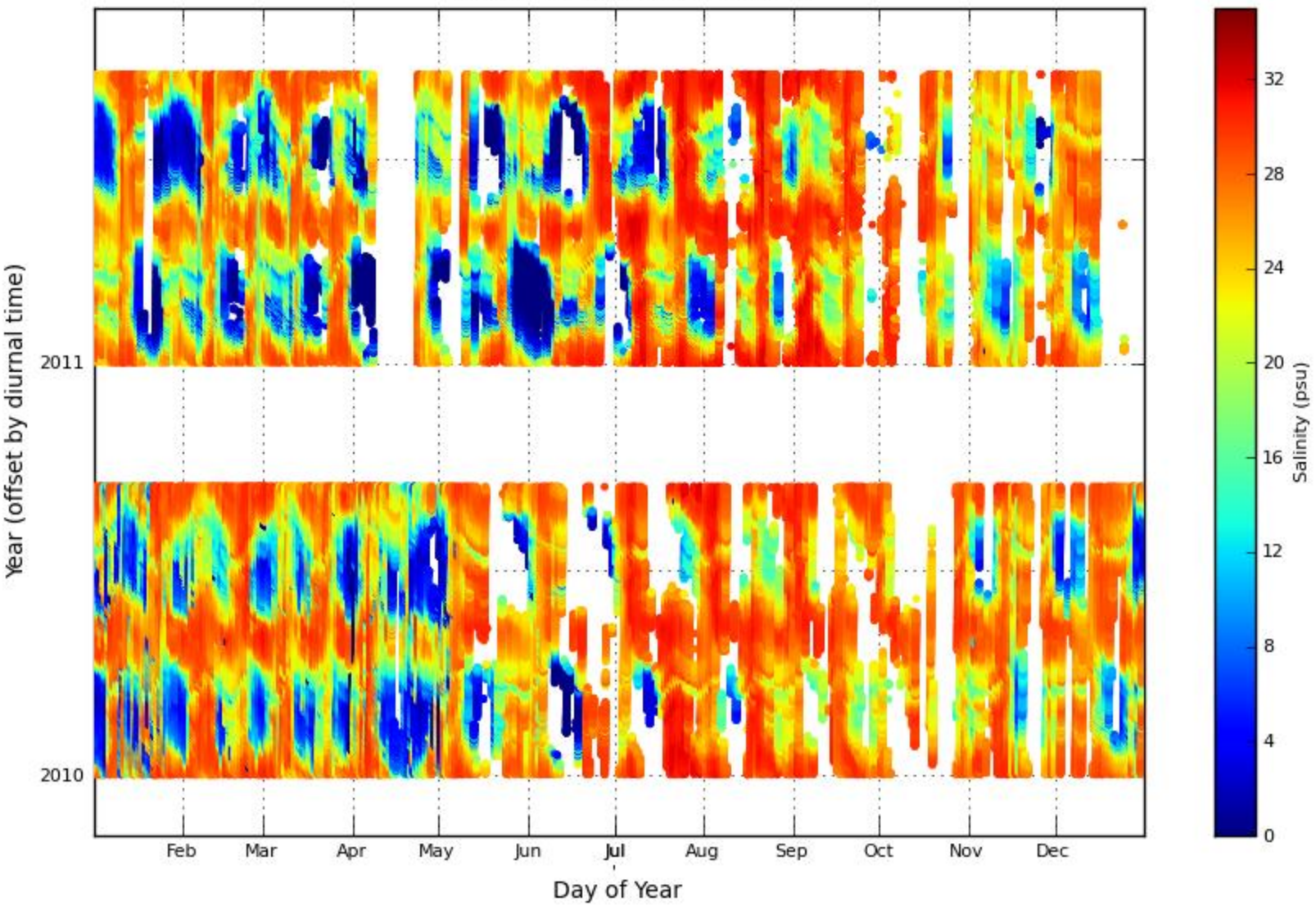
SATURN-03 8.4 m salinity 2010-2011

Colored by salinity



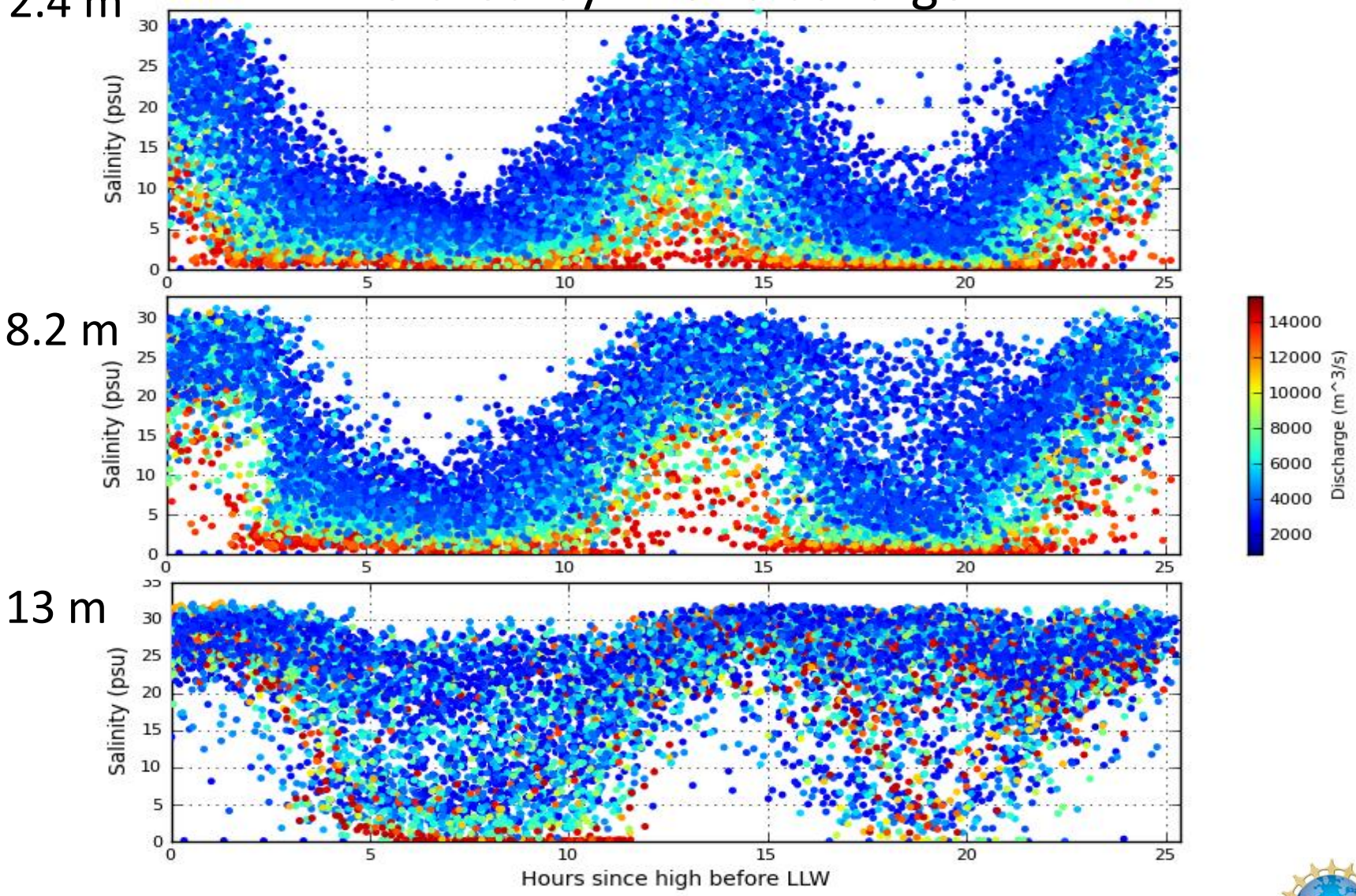
SATURN-03 13 m salinity 2010-2011

Colored by salinity



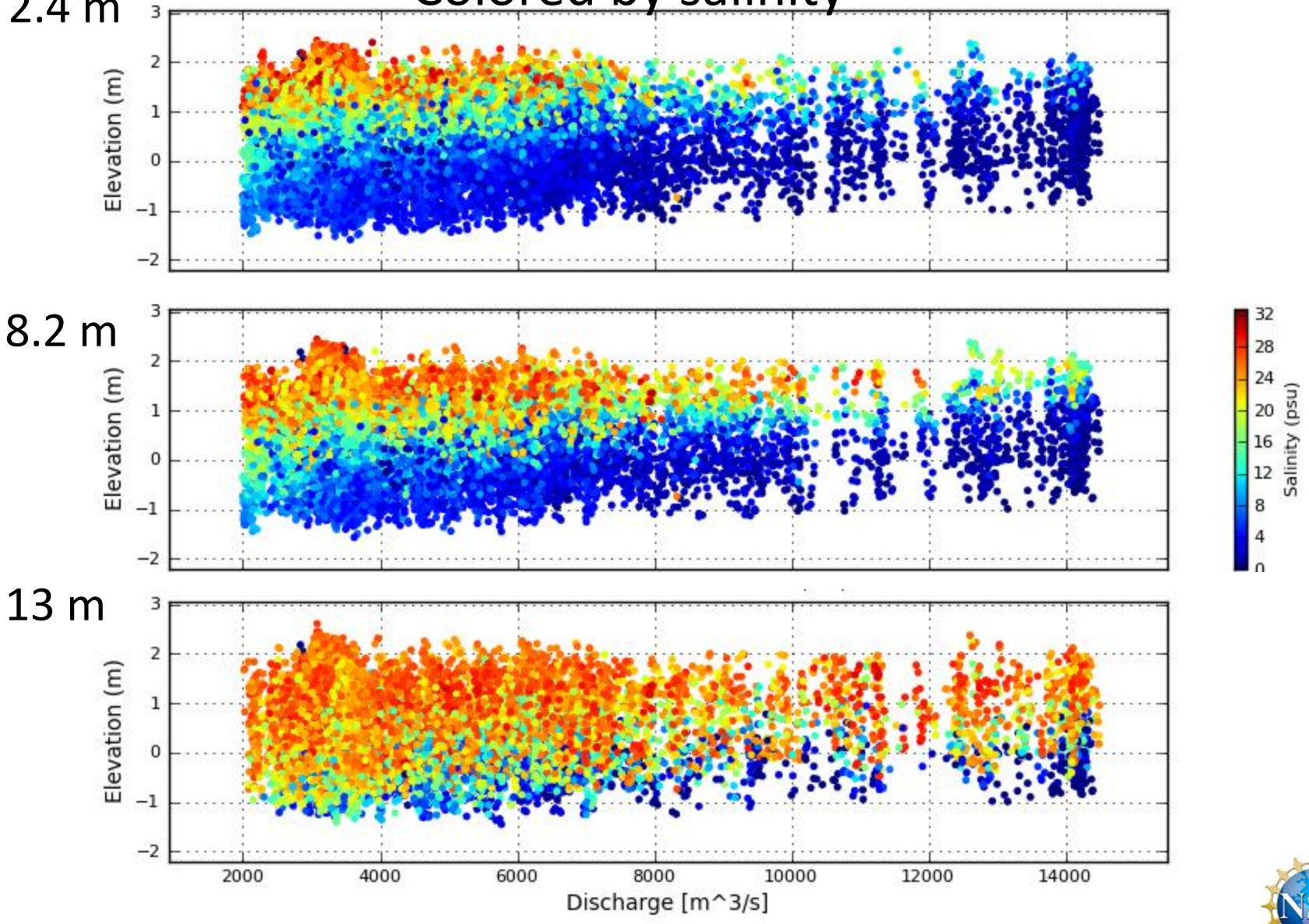
SATURN-03 response to discharge at different depths

Colored by river discharge



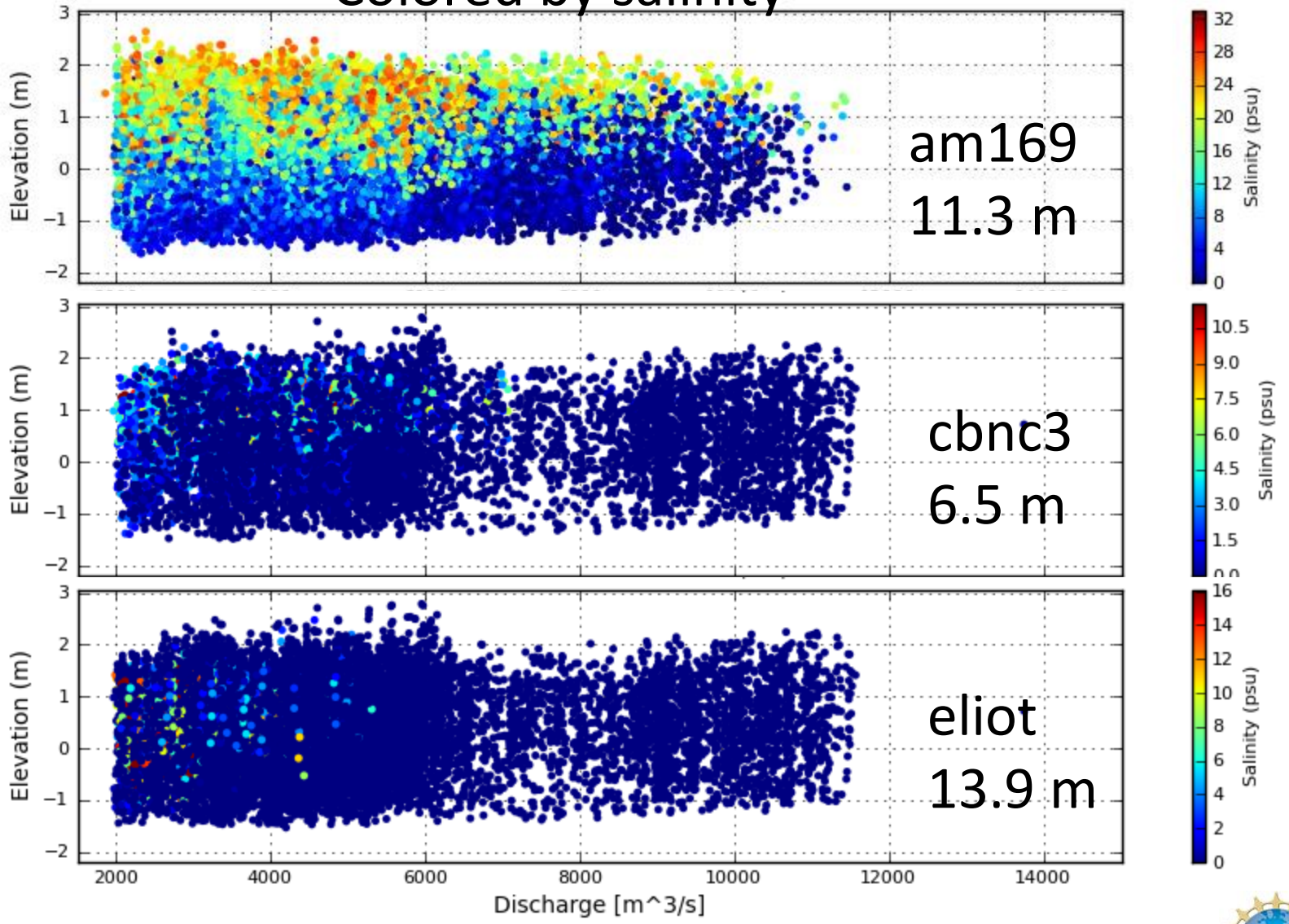
Salinity vs. discharge vs. tides at SATURN-03

Colored by salinity



Salinity vs. discharge vs. tides further upriver

Colored by salinity



How to use the Data Explorer

http://www.stccmop.org/datamart/observation_network/dataexplorer (offline demo)

- Basic features:
  - make plots, download data
- Advanced features:
  - require CMOP login, available on request to webmaster@stccmop.org)
  - save and share plots online, comment on plots (your own or other's)

Summary

- We use the Data Explorer to show that salinity intrusion in the lower CR estuary undergoes a transition at river discharges near 6000-8000 m^3/s.
- The CMOP Data Explorer is a powerful online visualization tool for CR estuary data.
- It is useful for monitoring real-time data and for visual exploration of historical data
- Non-CMOP data can be incorporated into the Data Explorer either via NANOOS or through arrangement with CMOP

CMOP
Center for Coastal Margin Observation & Prediction

Understanding Variability to Anticipate Change

www.stccmop.org

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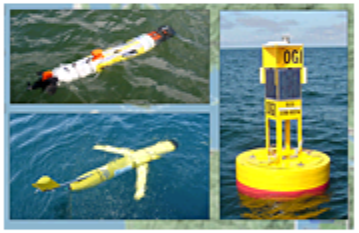
Multidisciplinary Journal of Microbial Ecology

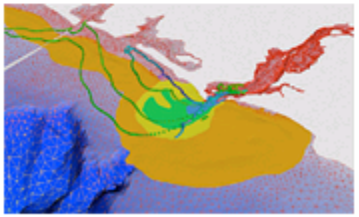
SATURN

SATURN

SATURN
A river-to-shelf collaboratory with the following features:



Observation Network
Physical and biogeochemical data from endurance and pioneer stations



Virtual Columbia River
A skill-assessed modeling environment with daily forecasts, simulation

Endurance Stations

(List West to East)

- Offshore Buoy
- SATURN-02
- Jetty A
- SATURN-07
- Lower Sand Island light (USCG day mark green 5)
- Desdemona Sands Light
- Hammond Tide Gage
- Fort Stevens Wharf (USCG day mark red26)
- SATURN-03
- Tansy Point (USCG front range board)
- SATURN-01
- Astoria-Megler Bridge South Channel (ODOT pier 169)
- Waste water outfall (City of Astoria)
- Grays Point (USCG day mark green 13)
- SATURN-04
- SATURN-04A
- Cathlamet Bay North Channel (USCG day mark green 3)
- Svenson Island (USCG day mark 12A)

Home › Data ›

SATURN Observation Network: Endurance Stations

This is an interactive map with links to physical and biogeochemical data from endurance stations in the Columbia River estuary. Stations are part of CMOP's end-to-end collaboratory, SATURN, and contribute to NANOOS, a regional association of the U.S. Integrated Ocean Observing System.

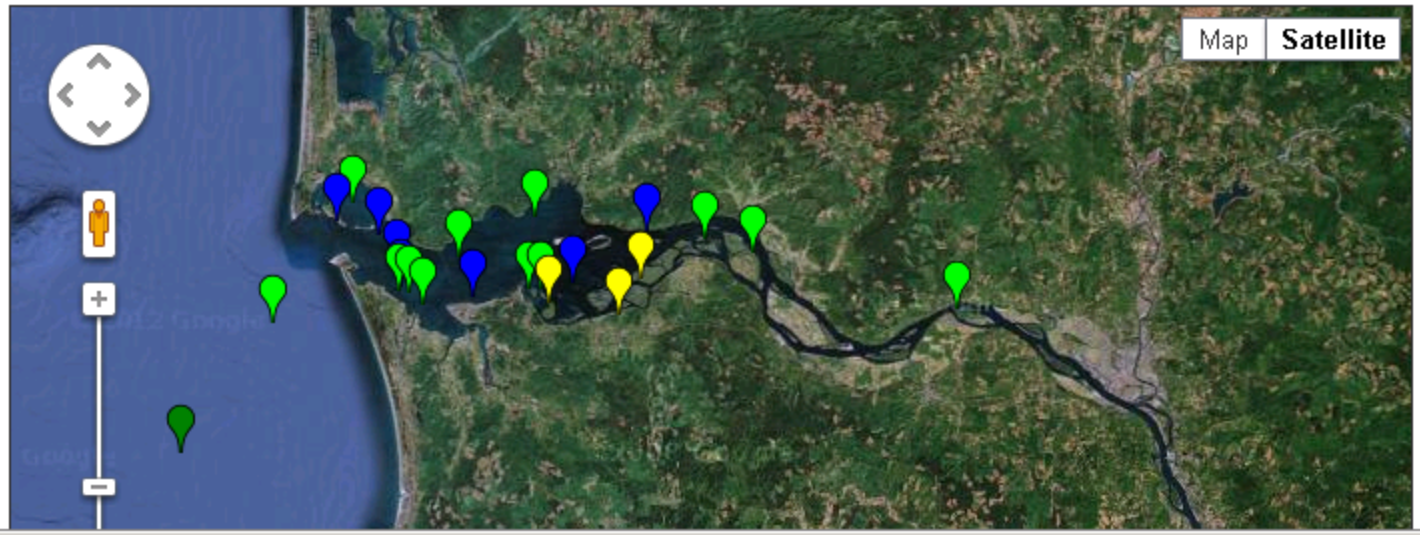
A graph displaying metrics of cumulative physical and biogeochemical observations through 2011 can be found here.

DATA Explorer

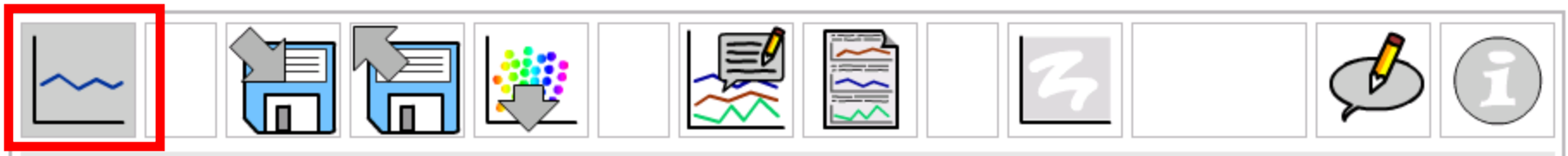
Asset

Offshore Buoy

- (•) All stations
- ( ) Physical-only stations
- ( ) Biochemical stations



Data Explorer



Current session:

Create new plots.

Save your plots as a web page.

Save your plots as an online session.

Remove all plots.

Load a saved session (your own or someone else's).

Questions or complaints? Email support.

Save your plots as an image file.

Further help.

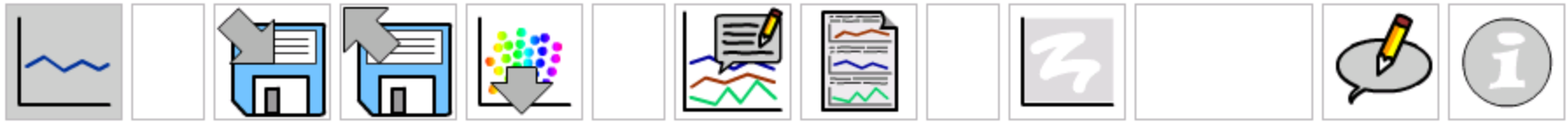
Write a comment for session.

Data Explorer link

NANOOS Data Explorer link

Home > Data > Observation Network >

Data Explorer



Current session

1. Sources >> 2. Options

Source: -- Select a station --

☑ **Current deployments only**

Quality Verified (PD2) **T. mod:** None

Variable:

> T > < > <

X: Time

Y:

Colored by:

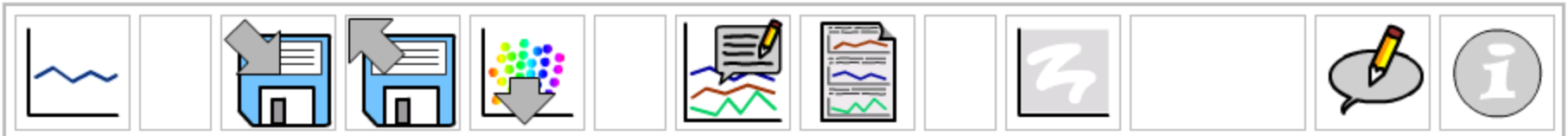
Availability Add series

Remove series

Prev Next Done Cancel

Home > Data > Observation Network >

Data Explorer



Current session

1. Sources >> 2. Options

Source -- Select a station --

☑ **Current deployments only**

Quality: Verified (PD2) **T. mod:** None

Raw (PD0)
Preliminary (PD1)
Verified (PD2)
Best available

Variable

> T > < > <

X: Time

Y:

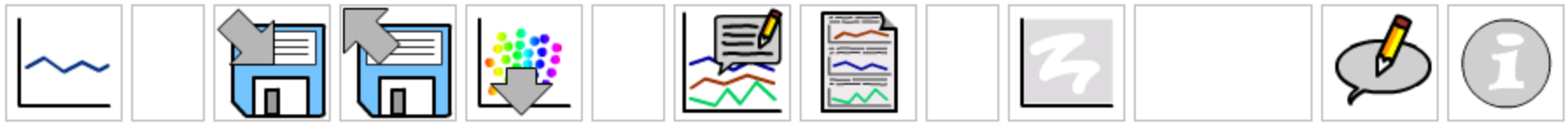
Colored by:

Availability Add series

Remove series

Prev Next Done Cancel

Data Explorer



Current session

1. Sources >> 2. Options

Source: -- Select a station --

- Lower Columbia River Estuary
- Lower Sand Island light (USCG day mark green 5)
- NOAA Station 46029 Col River Bar
- NOAA Station 46041 Cape Elizabeth
- NOAA Station 46089 Tillamook
- NOAA Station 46243 Clatsop Spit
- Offshore Buoy
- Oregon State University NH-10 Buoy
- SATURN-01
- SATURN-02
- SATURN-03
- SATURN-04
- SATURN-05
- SATURN-06
- SATURN-07
- South Beach, OR
- Tansy Point (USCG front range board)
- Tenasillahe Island (USFW dock)
- Vancouver, WA
- Waste water outfall (City of Astoria)

Remove series

Prev Next Done Cancel

Current session

1. Sources >> 2. Options

Source: SATURN-03

Current deployments only

Quality: Raw (PD0)

T. mod: None

None
day of year
time of tidal, fixed tidal day
time since HW before LLW
time since HHW
hour of calendar day
year + fraction of tidal day
year

Variable:

CDOM at 2.4 m [CDOM Fluoro
CDOM at 8.2 m [CDOM Fluoro
CDOM at 13 m [CDOM Fluoror
Chlorophyll at 2.4 m [Fluorome
Chlorophyll at 8.2 m [Fluorome
Chlorophyll at 13 m [Fluoromet
Cumulative Flow at 2.4 m [Pum
Cumulative Flow at 8.2 m [Pum
Cumulative Flow at 13 m [Pum
Dissolved oxygen at 2.4 m [Ox
Dissolved oxygen at 8.2 m [Ox
Dissolved oxygen at 13 m [Oxy

> T > < > <

X: Tir

Y:

Colored by:

Availability

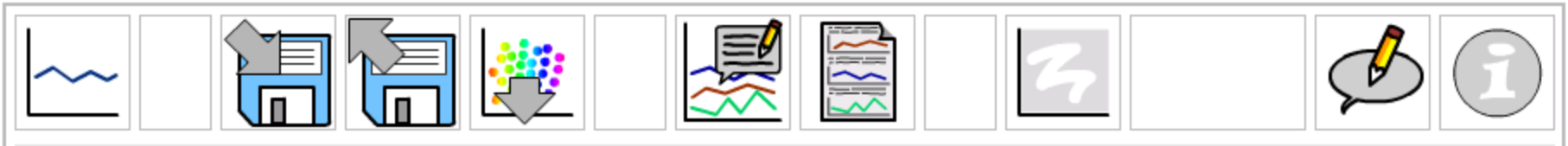
Add series

Remove series

Prev Next Done Cancel

Multiple ways of plotting time

Data Explorer



Current session

1. Sources >> 2. Options

Source: SATURN-03

Current deployments only

Quality: Raw (PD0) **T. mod:** None

Variable:

pump at 2.4 m [Pump]
pump at 8.2 m [Pump]
pump at 13 m [Pump]
Quantum Yield (fv/fm) at 2.4 m
Quantum Yield (fv/fm) at 8.2 m
Salinity at 2.4 m [CT]
Salinity at 8.2 m [CT]
Salinity at 13 m [CT]
Sal-Oxy Slope at 8.2 m [Derive
S-T slope at 2.4 m [Derived ST

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Availability

X: Time

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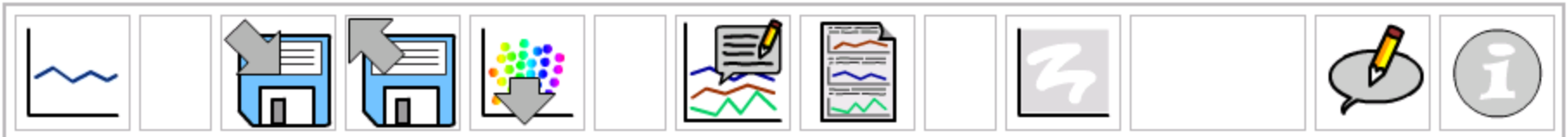
Colored by:

Add series

Remove series

Prev Next Done Cancel



Current session

1. Sources >> 2. Options

Range | Limits | Layout

Time range

- 1 day from End date
- 7 days from End date
- 15 days from End date
- 30 days from End date
- custom

Start date

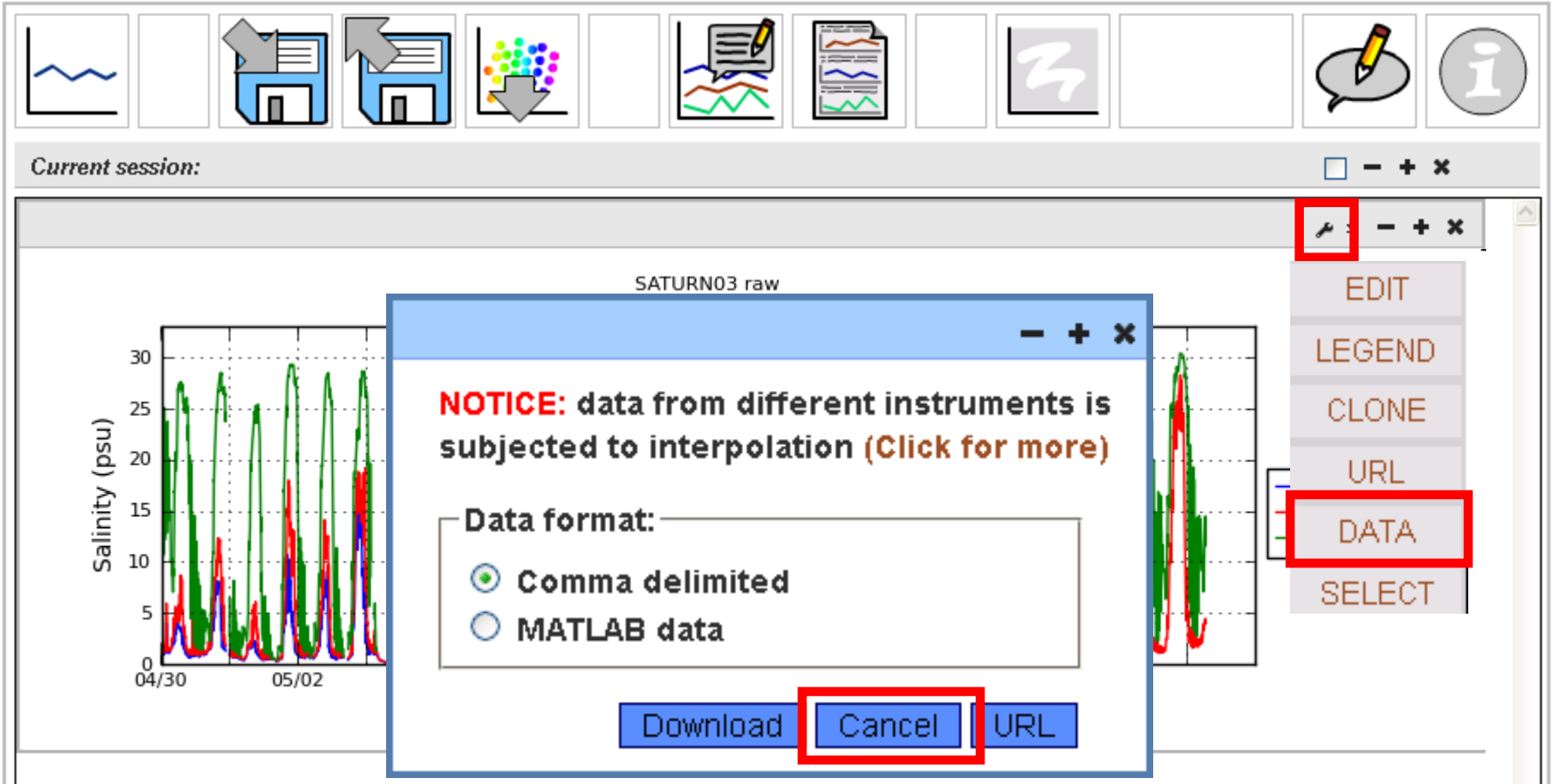
2012 | 5 | 14 - 00 : 00

End date

2012 | 5 | 14 - 23 : 59

Prev | Next | Done | Cancel

Data Explorer



To download data, first make a timeseries plot, then select the wrench icon and select “DATA”