Data Needs for **Realistic Circulation Modeling** of Inland & Coastal Waters of the Pacific Northwest

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NOAA Hydrographic Services Review Panel

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UW Coastal Modeling Group

I . What NOAA products, data, and services arc valued by your organization:

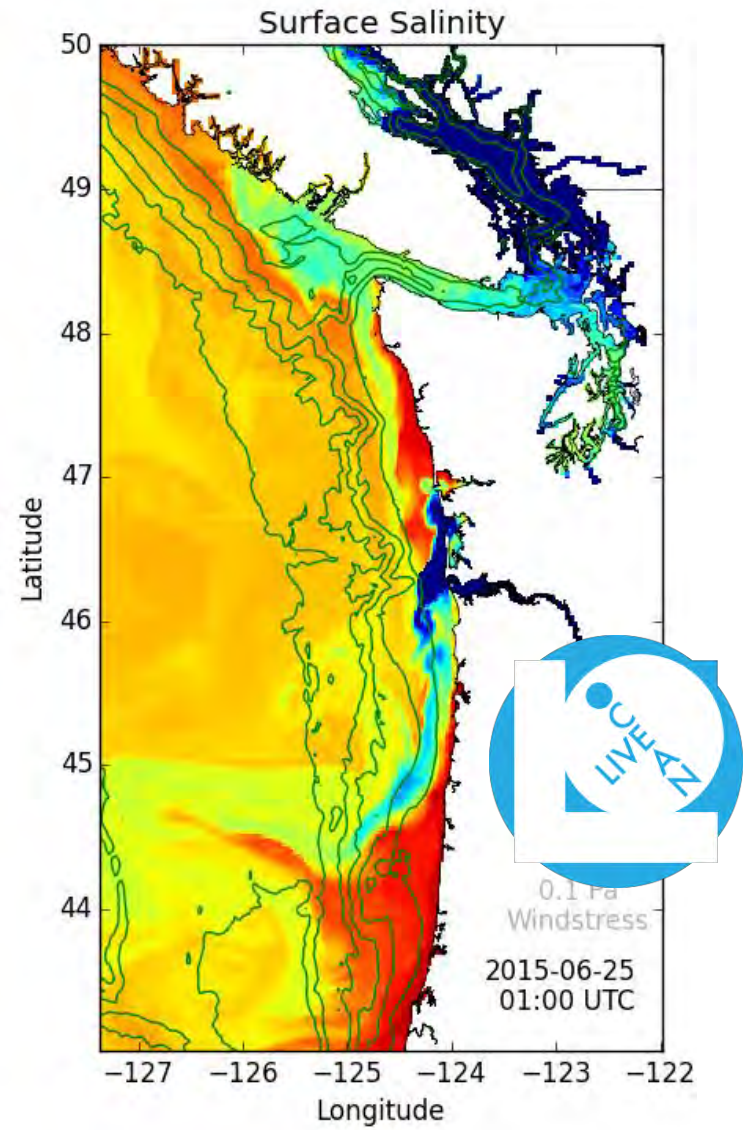
- NDBC buoys
- OCNMS Moorings
- Casts from NOAA cruises
- Sea level from tide stations

2 . What other products, data, and/or services would you like NOAA to approve, and/or offer:

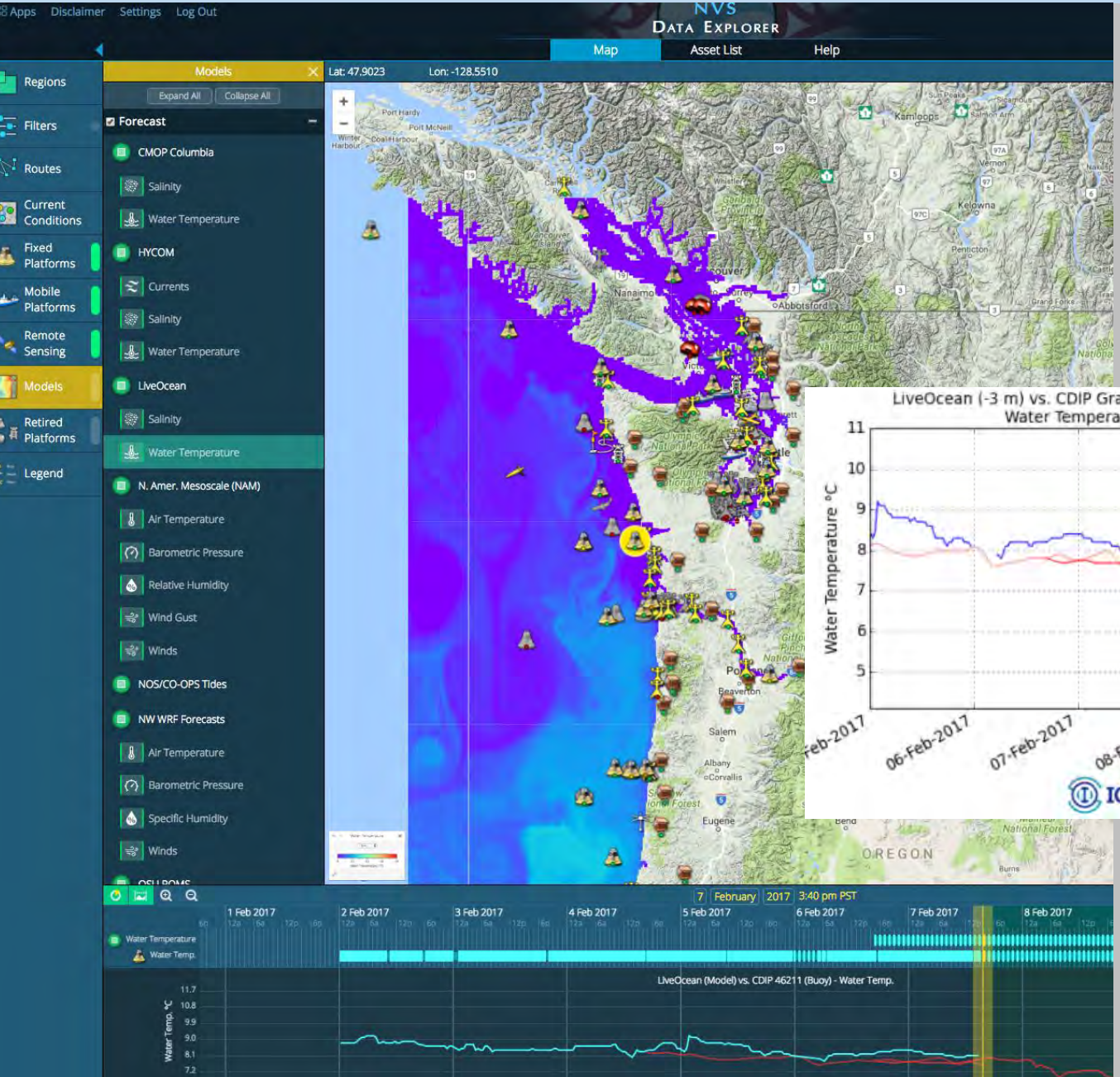
- Simplify automated web access to data
- Current meters
- Sub-surface Temperature, Salinity & Other Variables

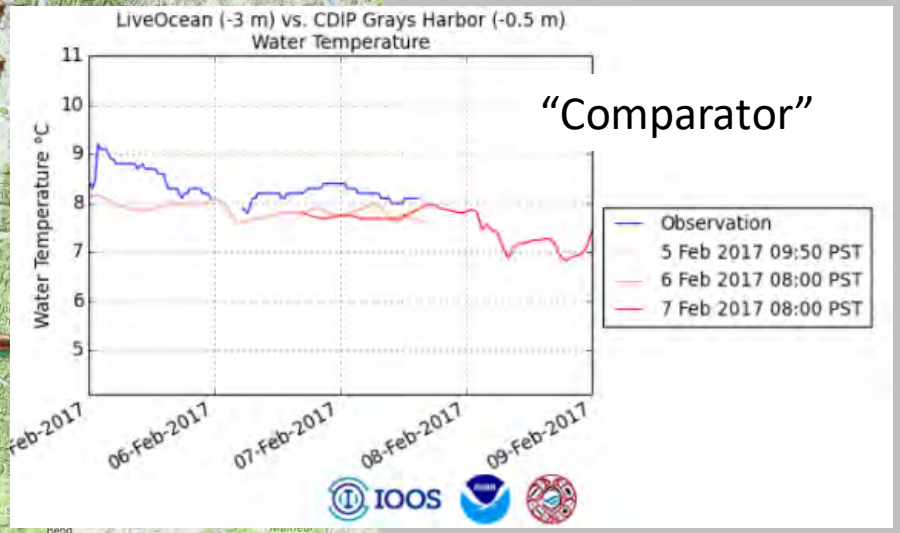
LiveOcean Daily Forecast Model

- ROMS (Regional Ocean Modeling System)
- OR-WA-BC Coast and Salish Sea
- Realistic tides, winds, rivers, and open ocean
- Horizontal grid: 1.5 km on coast
- 40 vertical layers
- Run daily on 72 cores: takes 1.5 hours for 3 days of model time
- Full 3D fields stored hourly and sent to cloud storage using Microsoft Azure, simplifying access
- Web front-end developed by NANOOS



Model and Data combined on NANOOS NVS

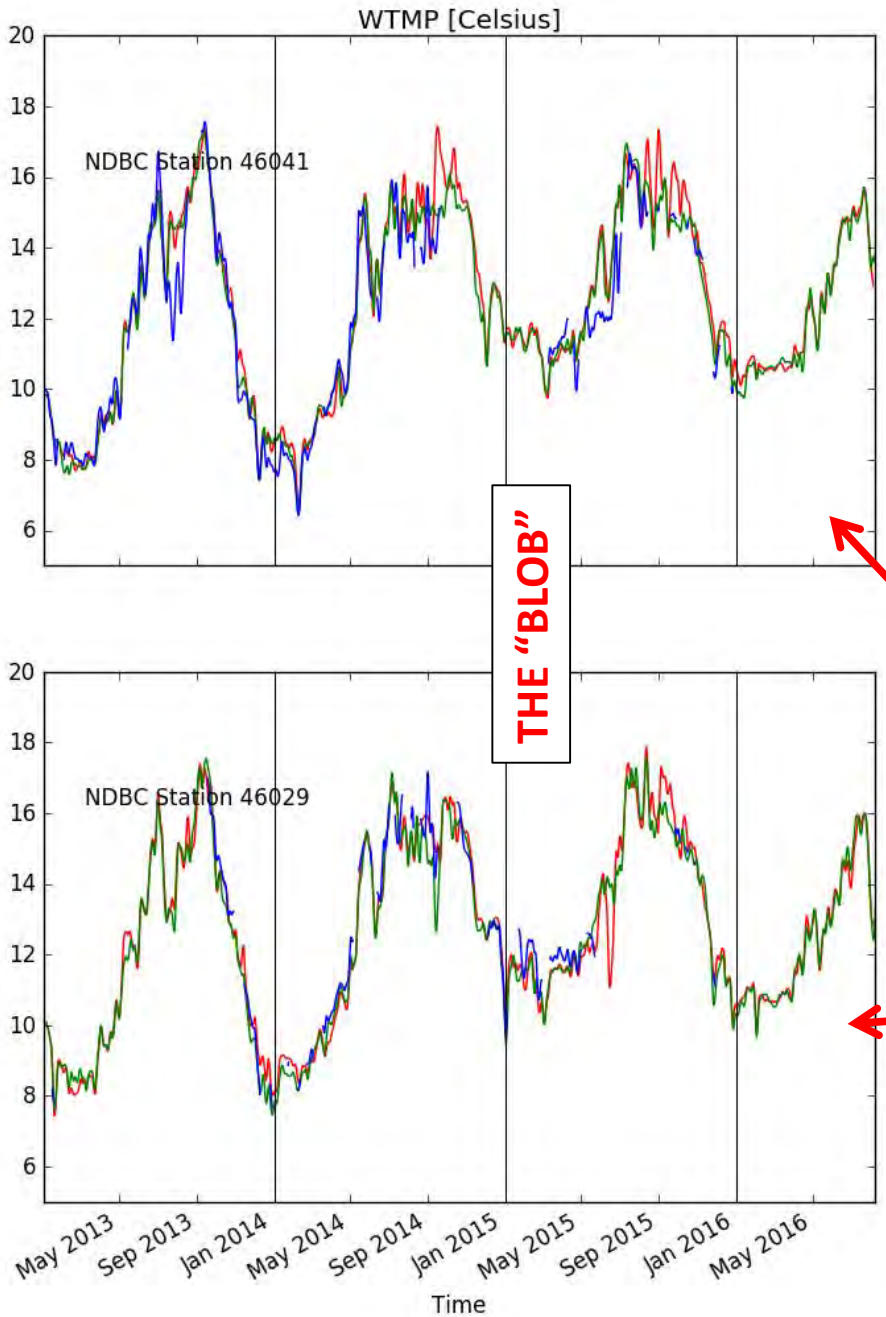


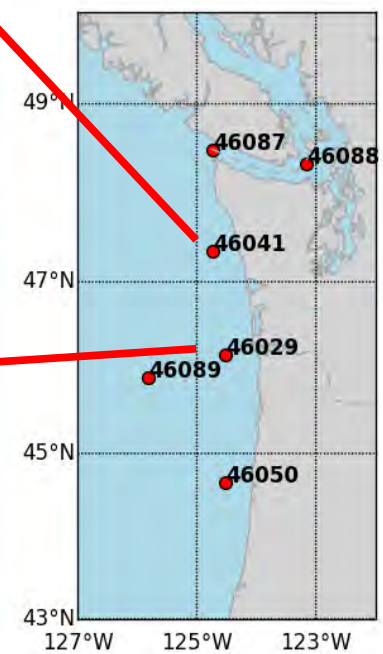


"Comparator"

Validation
NDBC Buoys
3.5 years

NDCB Observed SST
LiveOcean version 1
LiveOcean version2





NDBC Buoy **Data Issues**

- Historical data is designed to be accessed by clicking on a year on a website
- Can be automated (many years, many buoys) using python
- But process is “brittle” because data are served as csv. XML would be more robust (as is done for USGS rivers)
- Also, the csv headers change over time…
- Excellent data source – need more varibles and subsurface instruments.

NDBC Header Changes:

1984-1993:

YY MM DD hh WD WSPD GST WVHT DPD APD MWD BAR ATMP WTMP DEWP VIS

1994-1995:

YY MM DD hh WD WSPD GST WVHT DPD APD MWD BAR ATMP WTMP DEWP **VIS\r**

1996-1997:

YY MM DD hh WD WSPD GST WVHT DPD APD MWD BAR ATMP WTMP DEWP **VIS**

1999:

YYYY MM DD hh WD WSPD GST WVHT DPD APD MWD BAR ATMP WTMP DEWP VIS

2000-2004:

YYYY MM DD hh WD WSPD GST WVHT DPD APD MWD BAR ATMP WTMP DEWP VIS **TIDE**

2005-2006:

YYYY MM DD hh **mm** WD WSPD GST WVHT DPD APD MWD BAR ATMP WTMP DEWP VIS TIDE

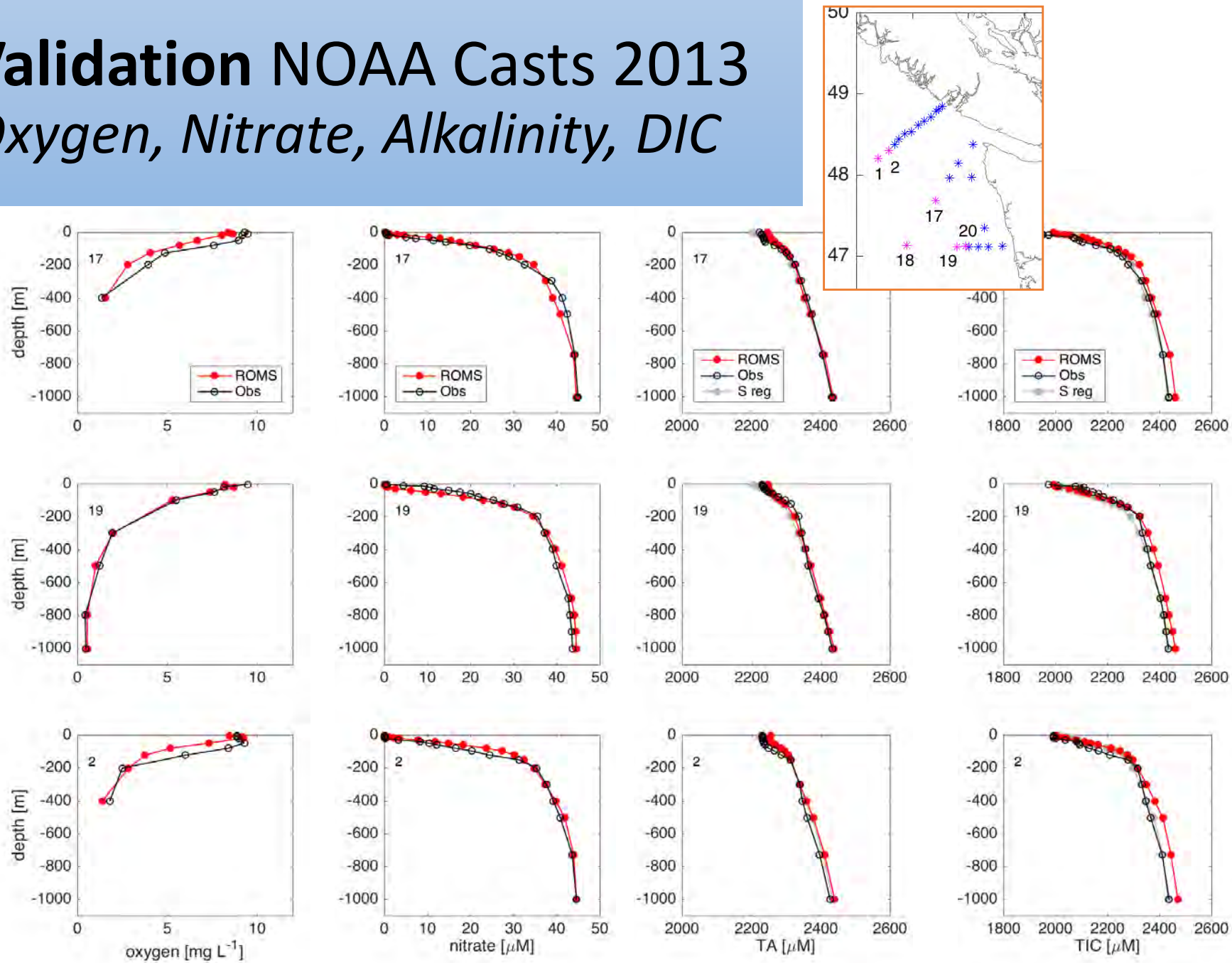
2007-2015: (**but 2008 and 2010 had deg instead of degT, just for MWD**)

#YY MM DD hh mm WDIR WSPD GST WVHT DPD APD MWD PRES ATMP WTMP DEWP VIS TIDE

#yr mo dy hr mn degT m/s m/s m sec sec degT hPa degC degC degC mi ft

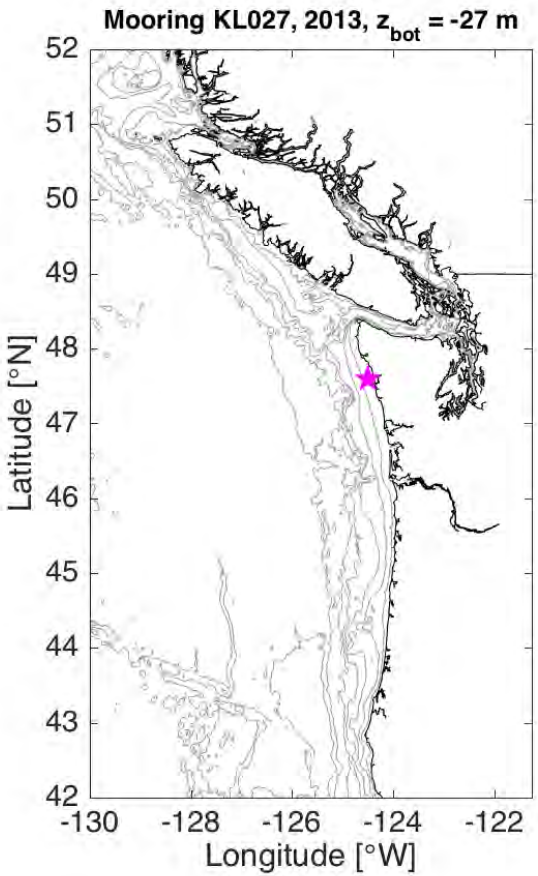
Validation NOAA Casts 2013

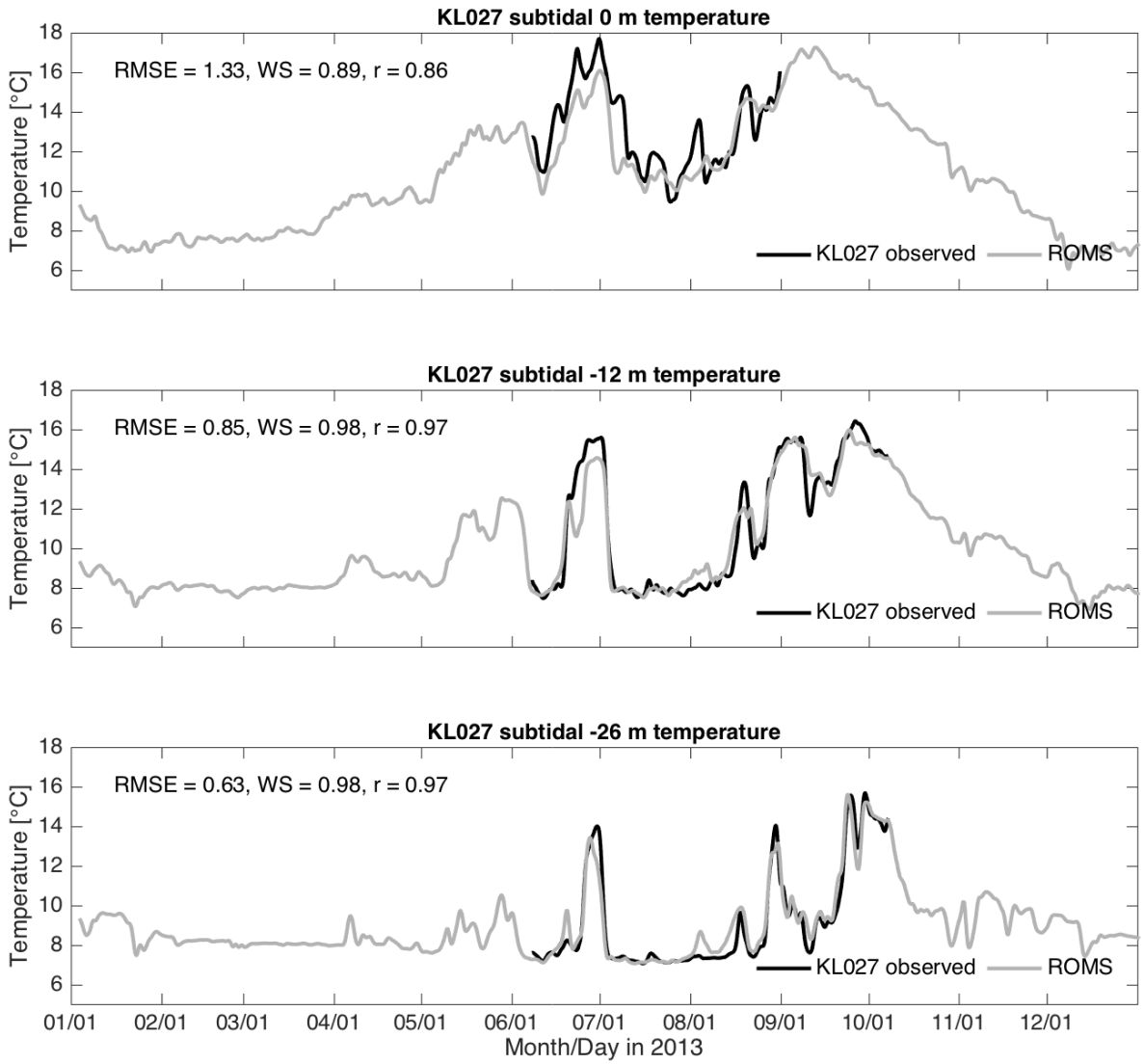
Oxygen, Nitrate, Alkalinity, DIC



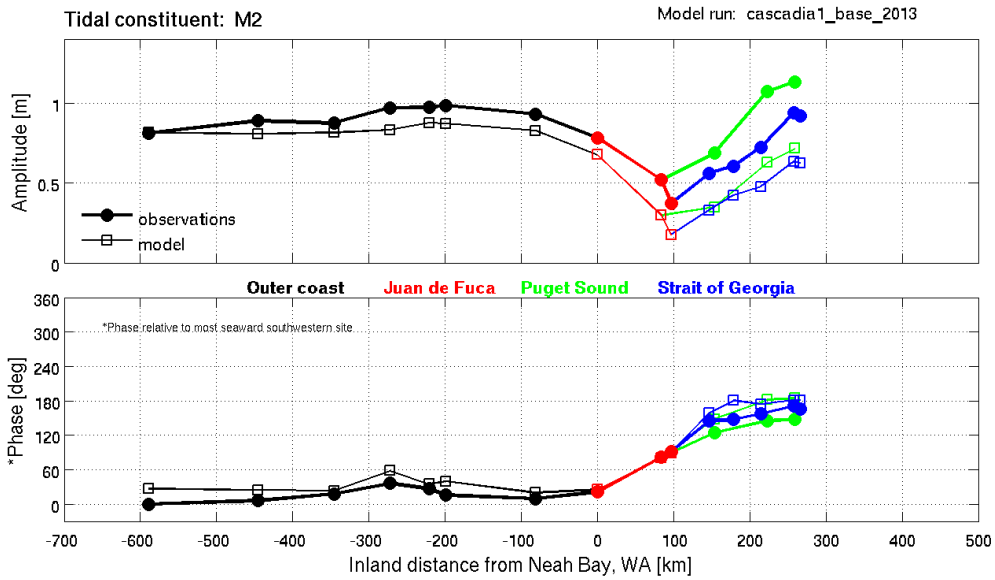
Validation OCNMS Mooring

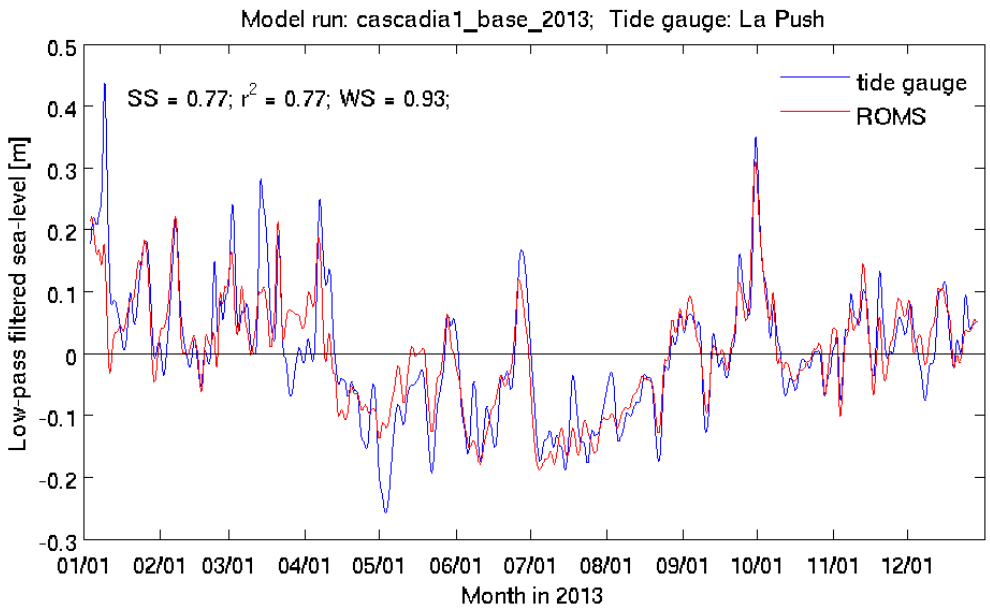
Temperature in 27 m of water

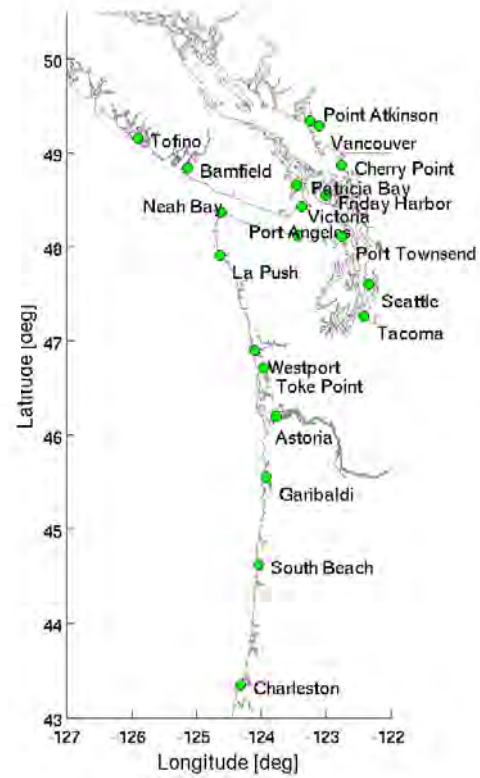




Validation: Tides

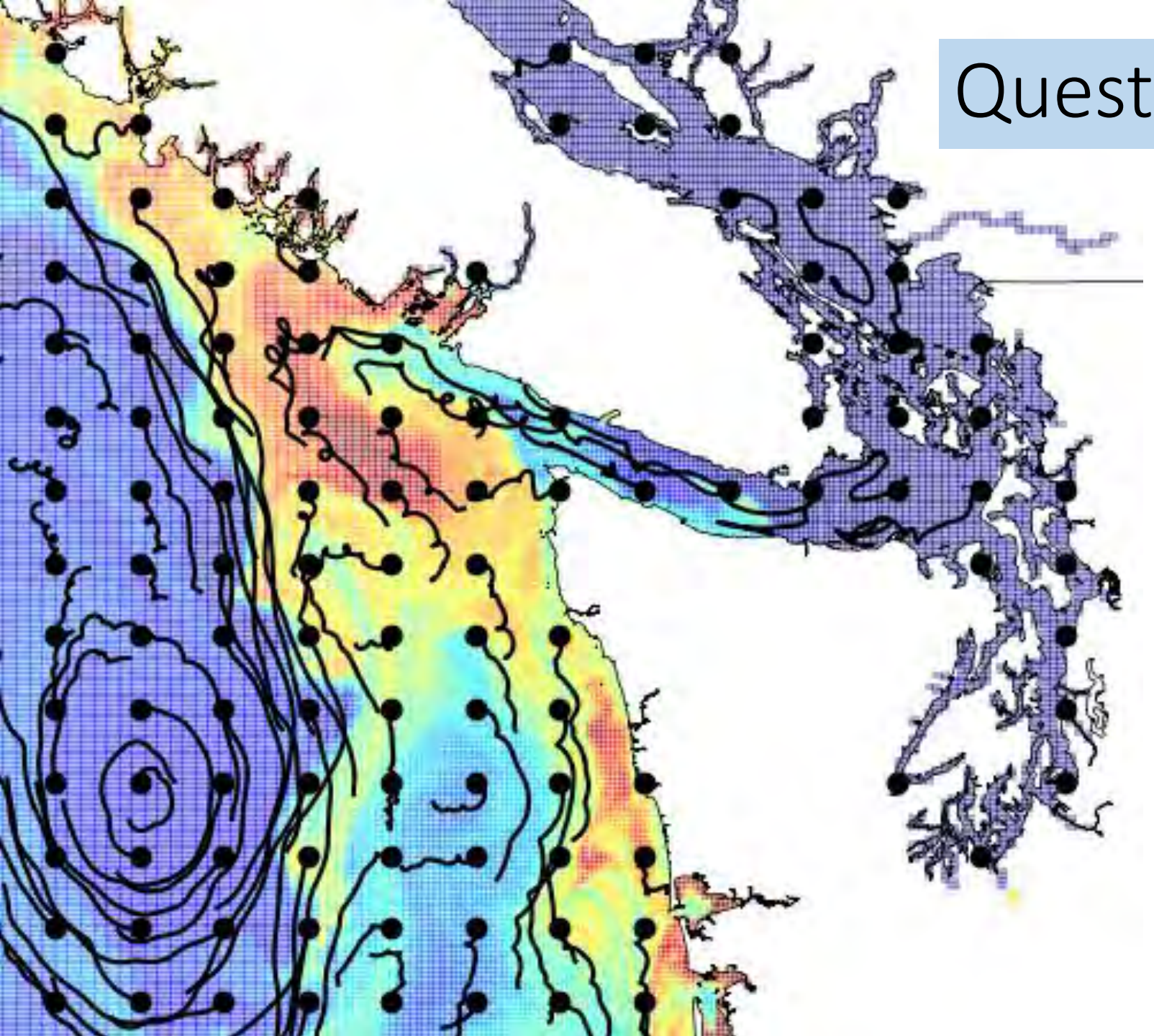






Tide Station **Data Issues**

- Have to download 1 year at a time by hand (probably could be automated).
- Longer time series are available (e.g. Seattle goes back to pre-1900!!)
- BUT one can only get monthly averages for longer records.
- The NOAA Tides & Currents website is becoming an outstanding source of tide information. Great for teaching.



Questions?