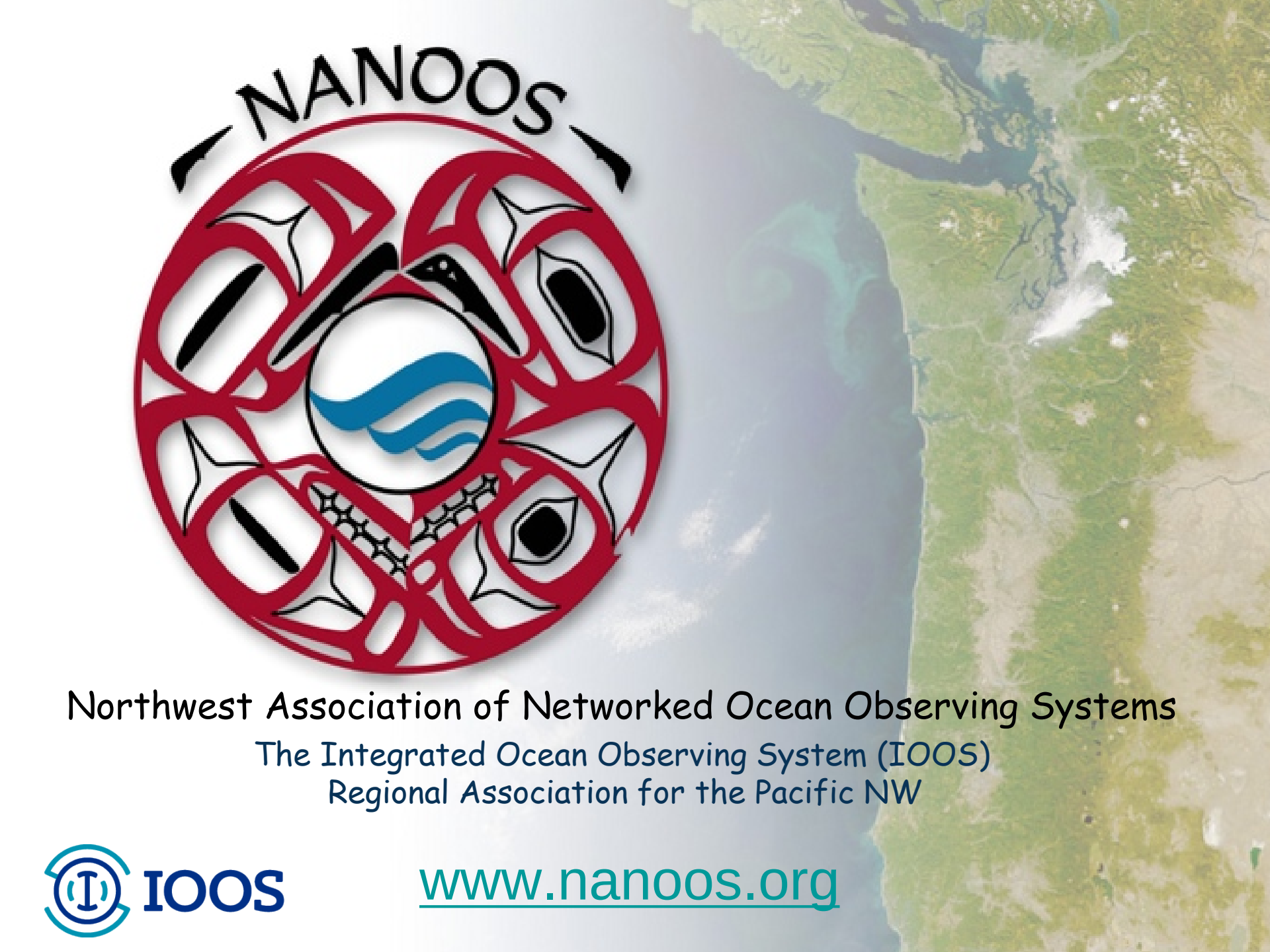


Northwest Association of Networked Ocean Observing Systems

The Integrated Ocean Observing System (IOOS)
Regional Association for the Pacific NW

IOOS

www.nanoos.org

1. Call to Order
Welcome, Charge for the Day, Introductions

David Martin
NANOOS GC Board Chair

2. Dr. Kathryn Sullivan
NOAA Administrator

3. IOOS Update

Jenifer Rhoades
NOAA US IOOS Office

US IOOS®

Jen Rhoades

US IOOS, OTT Project Manager

NANOOS annual meeting

IOOS | EYES ON THE OCEAN™

U.S IOOS By The Numbers

17
Federal Partners
Providing a Federal Backbone for IOOS

11
Regional Associations
Observing Assets and Data Feeds

1
Alliance for Coastal Technologies
A partnership supporting sensor evaluation and verification

1
Coastal Ocean Modeling Testbed
COMT - a conduit for research models to transition to operations

1
Marine Biodiversity Observing Network
MBON integrates marine biodiversity and ecosystem data

697
National Platforms
Buoys, Water level guages, Coastal and Estuary stations at the National level

254
Regional Platforms
Buoys, Water level guages, Coastal and Estuary stations at the Regional level

9
Ocean Technology Transition Projects
OTT supports transition of marine sensors to operations

15
Animal Telemetry Projects
Providing data on animal responses to the ocean and environment

140
HF-Radar Installations
High-Frequency Radar measures speed & direction of ocean currents

41,820
Glider Days
1 Glider in the water collecting data for 1 day

8
QARTOD Manuals
Realtime Oceanographic Quality Assurance

>15,000
Datasets
Oceanographic Datasets available in the IOOS Catalog

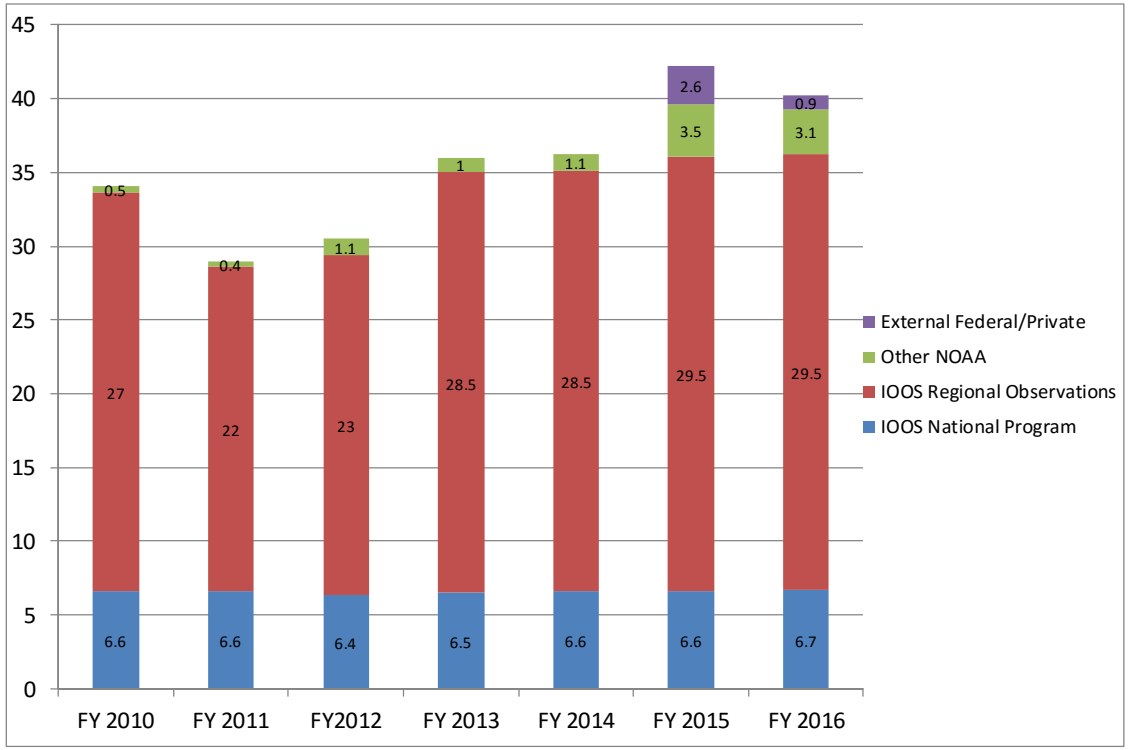
42
Servers
Top-level domains hosting data access

1
IOOS
Integrated Ocean Observing System

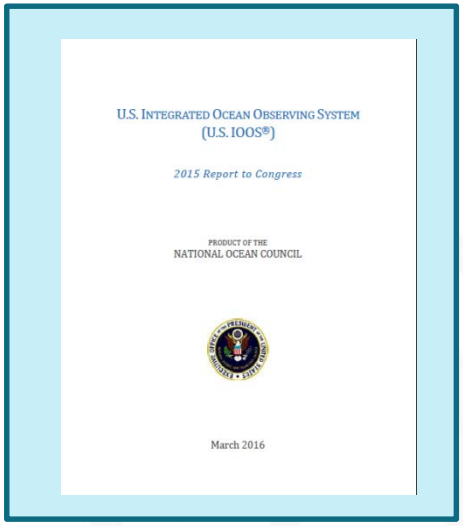
Programmatic - 2016

Budget History FY10-FY16

$ in M



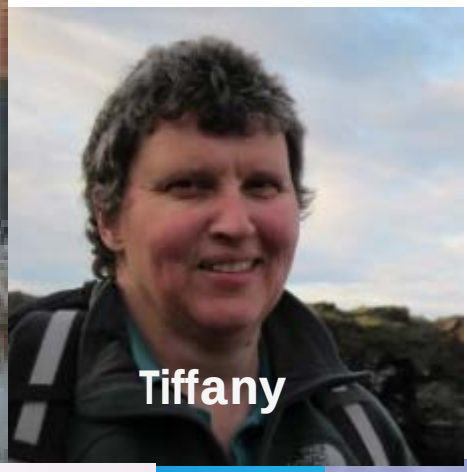
5 year Awards

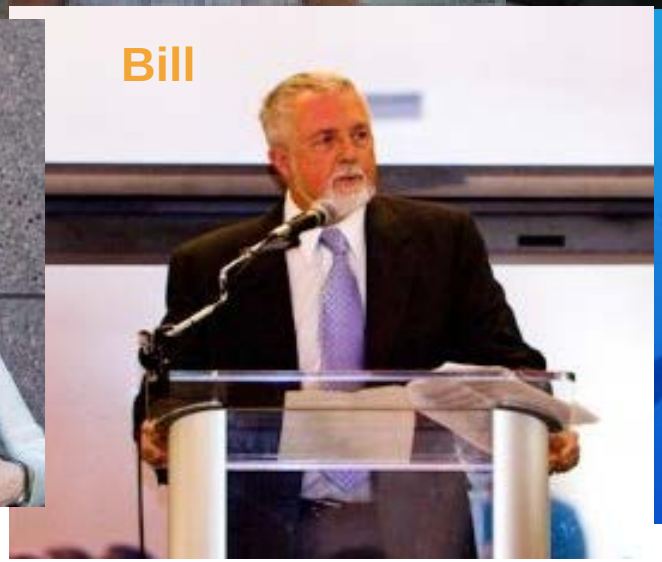


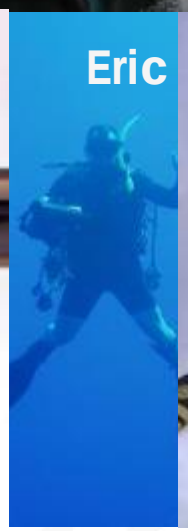
Administration Transition

IOOS | EYES ON THE OCEAN

MAY 2016 Staffing and Leadership Update





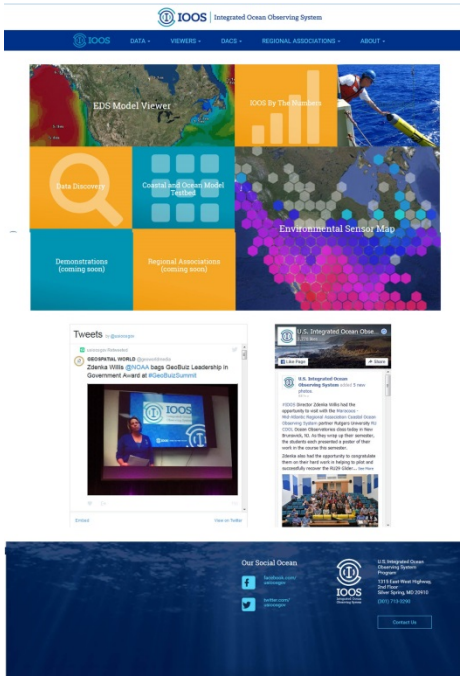


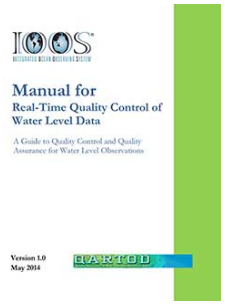
DMAC – Keep on Advancing

ioos.us Project

Outcomes:

- Single landing page/entry point for DMAC access.
- Full Capacity in June
- **New Glider DAC**





New/Updated Manuals 2015

Dissolved Nutrients Observations

Ocean Optics Data

In-situ Temp. and Salinity Data

In-Situ Current Observations

In-Situ Surface Wave Data

Dissolved Oxygen Observations

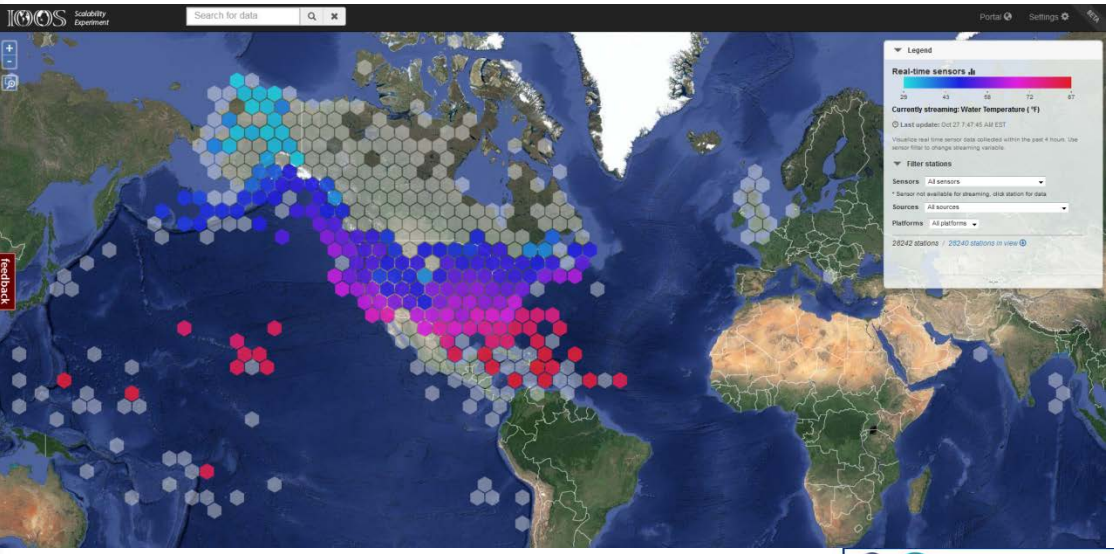
New/Updated Manuals - 2016

Glider

HFR Currents

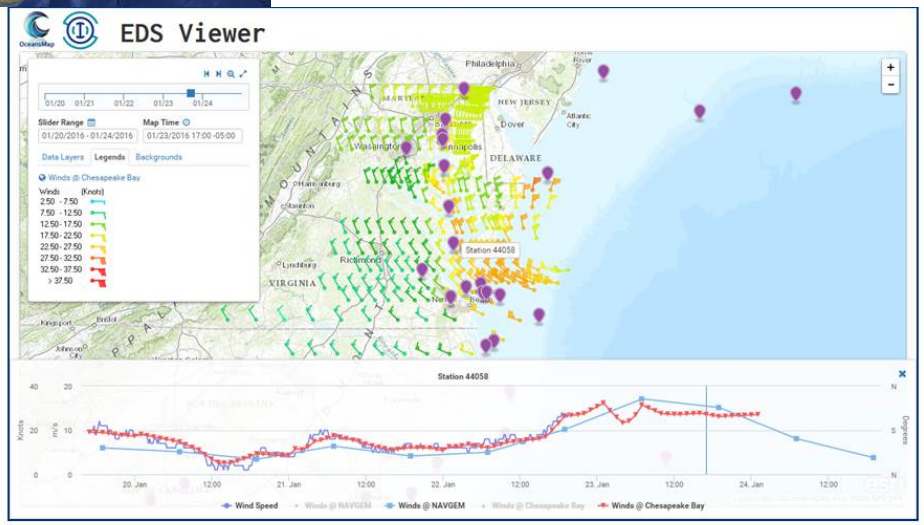
Water Level

DMAC – Environmental Sensors & Model Access



- 2 week cache of ALL known, available real-time observations
- AOOS & Axiom
- Release June 2016

- THREDDS, WMS access to all model output
- ASA
- Released 16 May 2016



Blizzard 2016: CBOFS winds at 1/23 17:00 EST. Time-series of model output and buoy observations (1/20 - 1/23)

IOOS | EYES ON THE OCEAN

HF Radar FY16 Outlook

- Refinement of O&M costs
- **At your local WFO**
- Significant Wave Height
- Tsunami detection – partner with NWS
- Global HF Radar – GEO/GOOS
- BOEM: CODAR understand offshore wind turbines impact to HFR
- Archiving continues every month

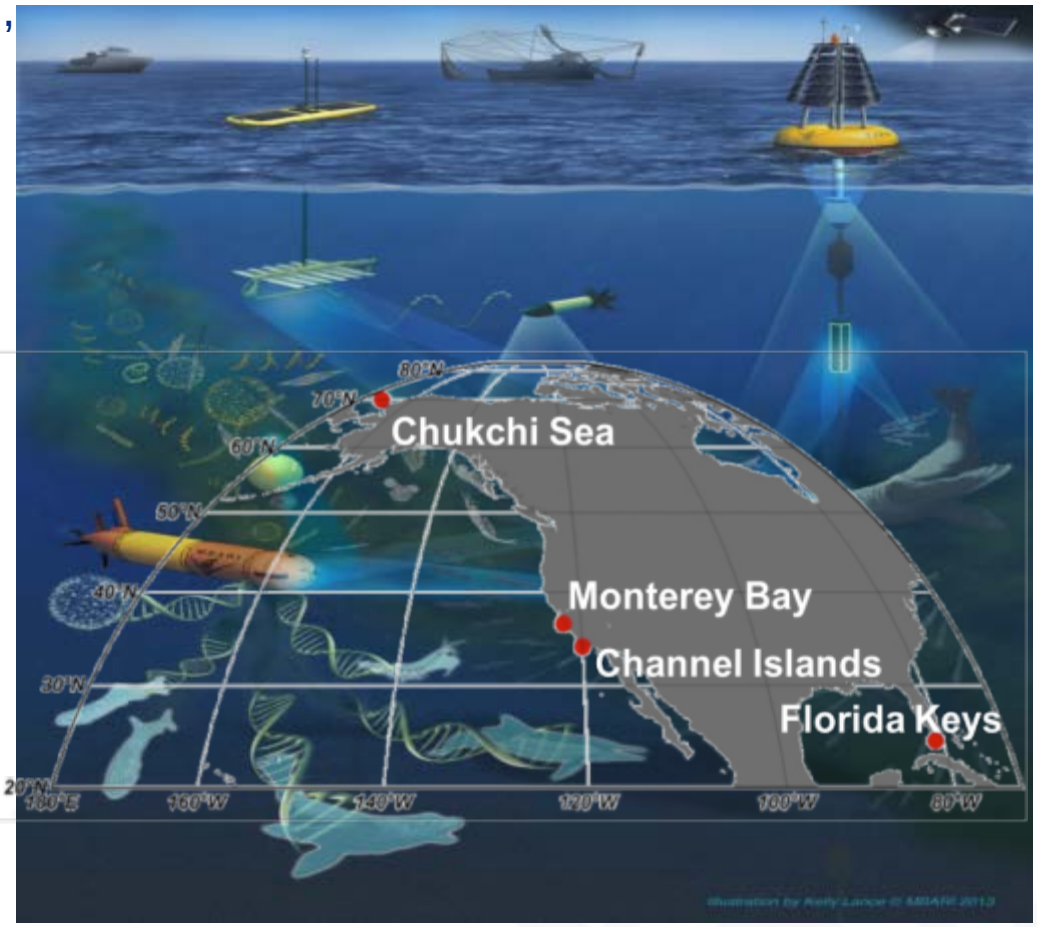
U.S. Marine Biodiversity Observation Network

Interagency support:

- $15M: NASA, NOAA (IOOS & OER), BOEM – FY14-18
- In-kind from USGS on DMAC, ecological mapping units
- MarineGEO/Tennenbaum is an MBON partner

MBON goals:

- Increase efficiencies and fill gaps in biodiversity monitoring
- Integrate biological and environmental observations
- Integrate remote sensing with in situ
- Develop methods for automated sampling of marine biodiversity
- Lead global development of marine biodiversity indicators and variables
- Develop a U.S. MBON
- Advance global MBON



Credit: MBARI

IOOS | EYES ON THE OCEAN

Ocean Technology Transition

IOOS advances technology through the transition of ocean, coastal, and marine sensors and platforms to operations

- Sponsors the transition of emerging marine observing technologies;

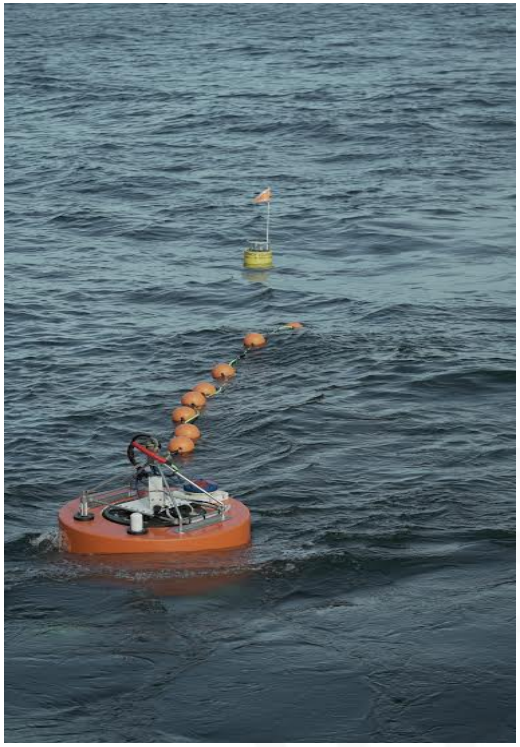
1. Basic principles observed and reported.
2. Technology concept and/or application formulated.
3. Analytical/experimental critical function or characteristic proof of concept.
4. Component validation in laboratory environment.
5. Component validation in relevant environment.
6. **System model or prototype demonstration in a relevant environment.**
7. **System prototype demonstration in an operational environment.**
8. **Actual system completed and qualified through test and demonstration.**
9. **Actual system proven through successful mission operations.**

Figure 1: An Overview of TRL Values

Ocean Technology Transition

IOOS advances technology through the transition of ocean, coastal, and marine sensors and platforms to operations

- Sponsors the transition of emerging marine observing technologies;
- Where there is an existing operational requirement; and
- A demonstrated commitment to integrate into operations mode.



Ocean Technology Transition

Transitioning innovative marine observing technology to operations is critical for helping us understand our ocean, coastal, and marine environments and improve environmental intelligence for environmental decision making.

"Toxic algae bloom in Pacific Ocean could be largest ever" CBS News, June 17, 2015

(Credit: Washington State Department of Health)

"Oyster farmers worried as climate change lowers ocean pH" SF Chronicle, August 14, 2015

The "Burk-o-lator" – developing low cost OA sensors

Ocean Technology Transition

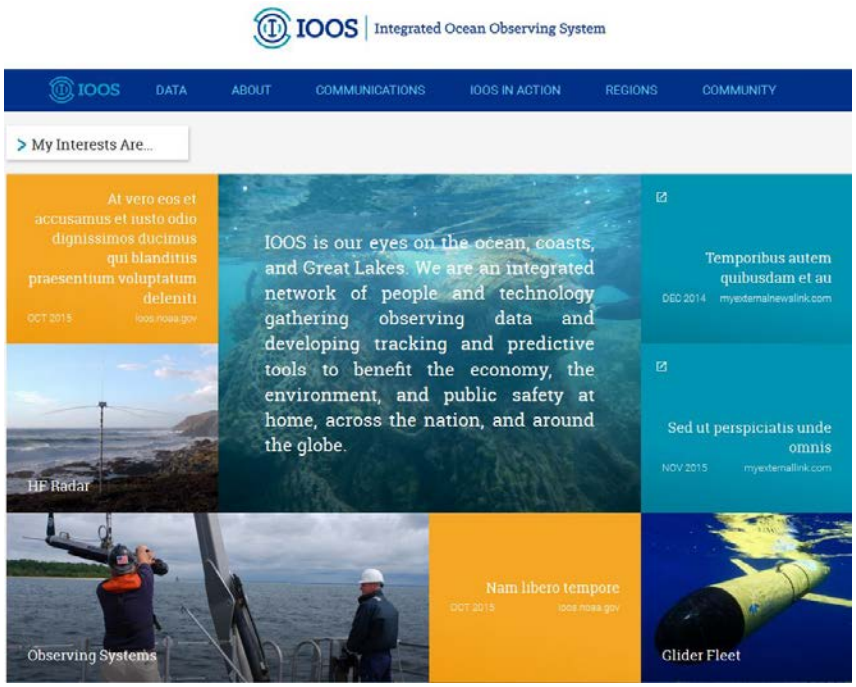
Ocean Technology Transition

- Innovative proven tech
- Proof of Concept
- Proof of Operational Need
- Committed Sponsor
- Seeking New Partnerships

Communicating

New Web Site

- Dynamic, Interactive; Streamlined
- May 2016

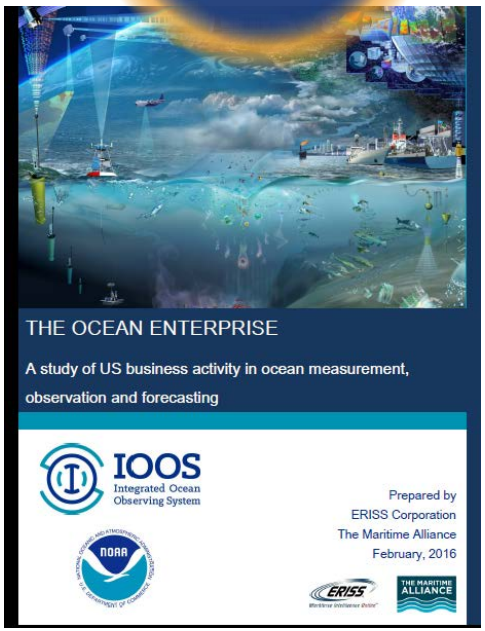


Getting our Story Out

New outlets:

- NOAA.GOV: New! Web stories 200-400 words in length, always with photos.
- New NOS Site: Photos, photos, photos; reinforced by close NOS Comms cooperation.
- Social Media: Regular posts create visibility with peers, partners, general public.
- IOOS Blog: Coming soon! Highlight projects, RA successes, events, topics, and more.

Background



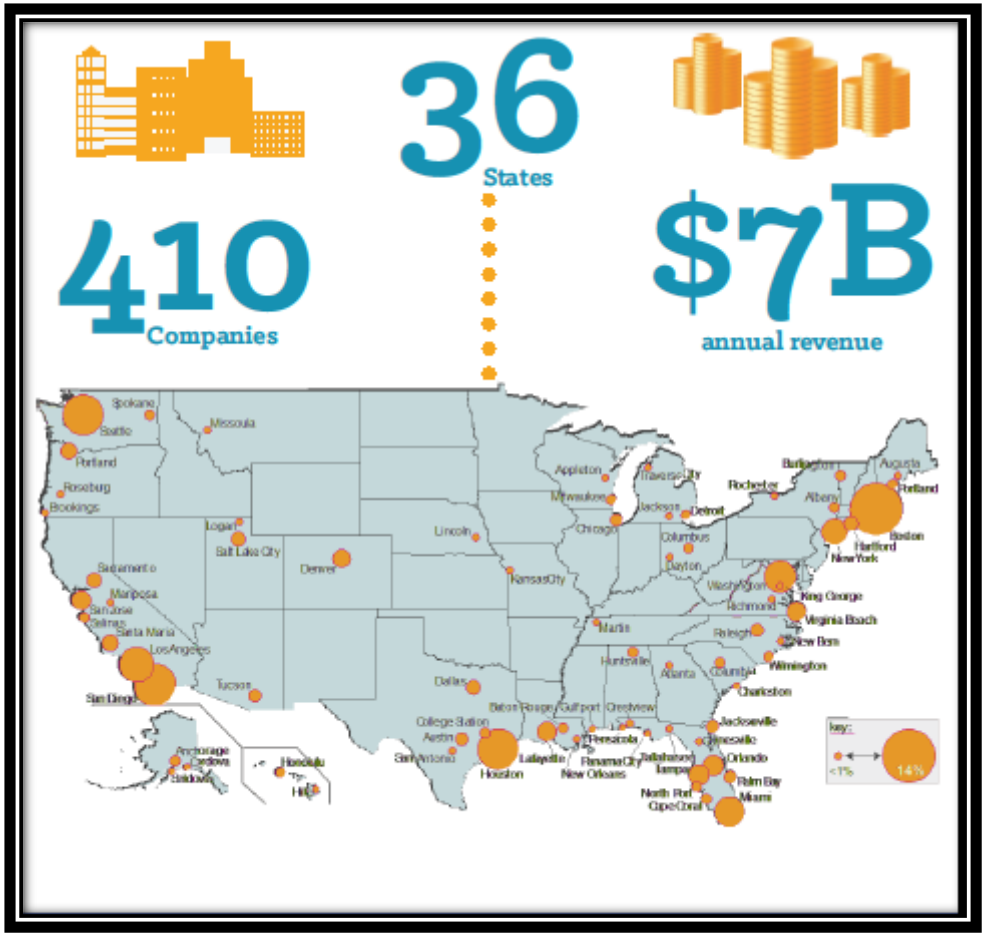
Study focus

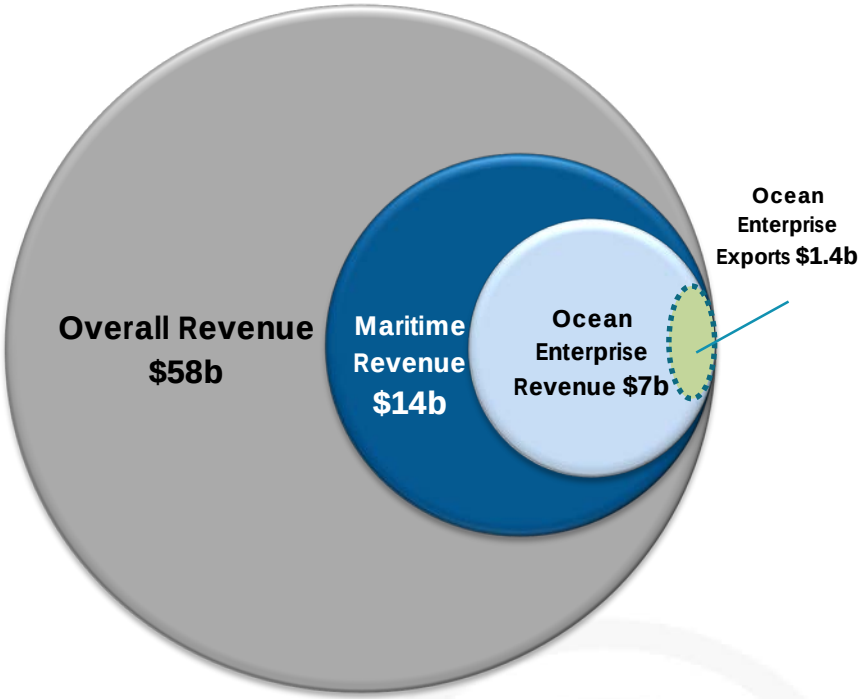
Public, Private, Non-Profit, Research, Academia

Information, Services, Infrastructure

ISSUES: Oceans – Ecosystems – Climate

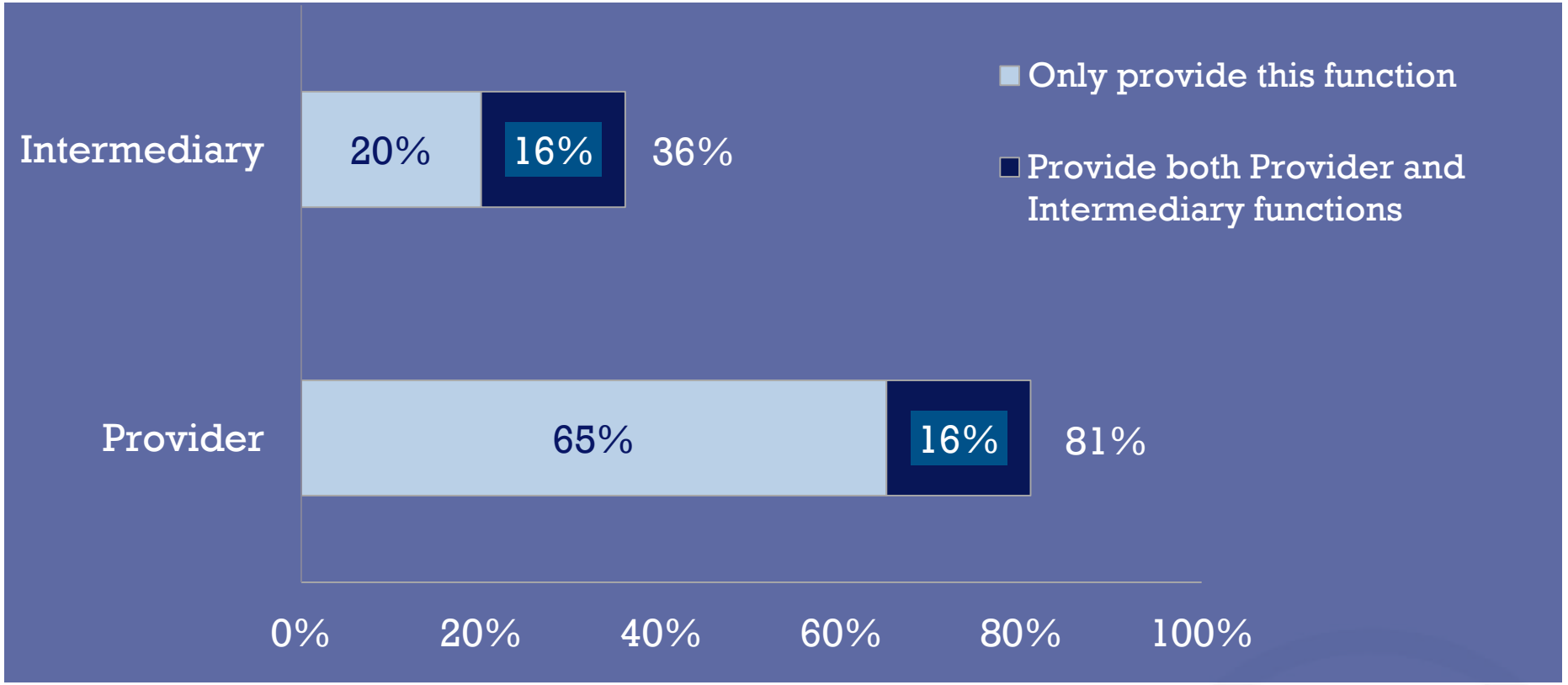
US IOOS/NOAA Ocean Enterprise Study





IOOS | EYES ON THE OCEAN

Ocean Enterprise Study 2015: Functions



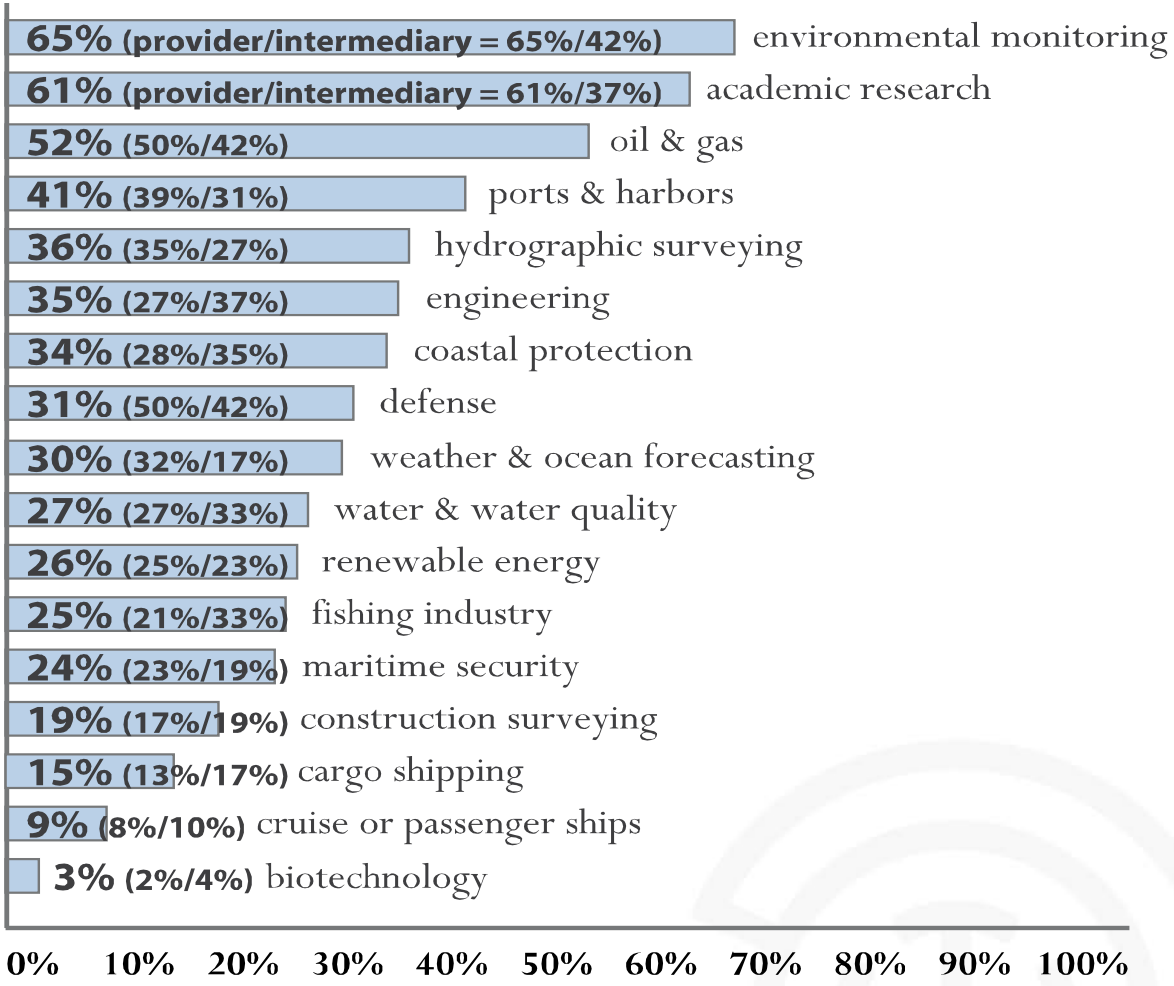
81 % of the companies we surveyed were providers

36% were Intermediaries

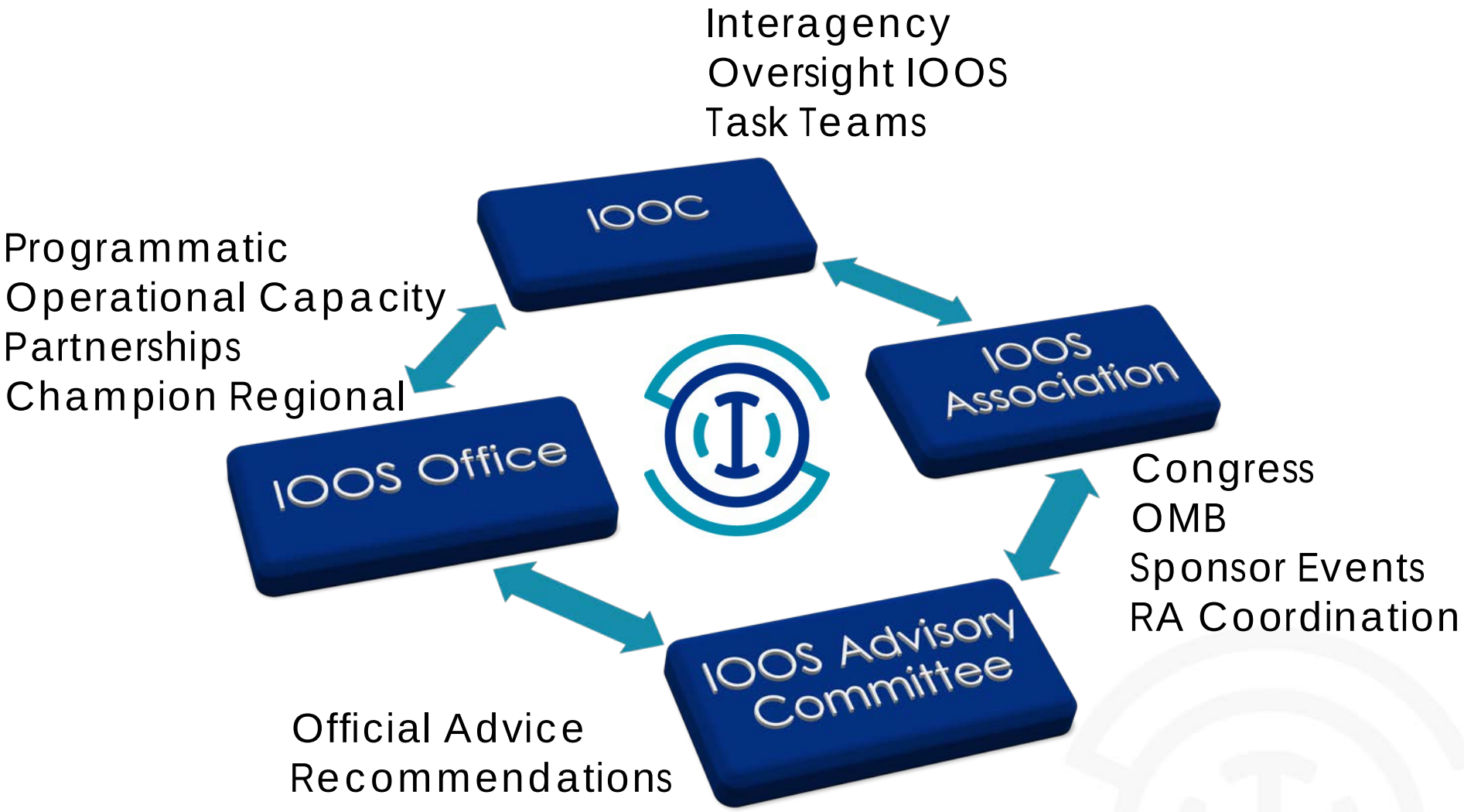
Market Sectors

Represents 'overall' activities of firms

Shows provider, intermediary split



IOOS is a Team Sport



Questions

Enables decision making

Fosters Advances in Science and Technology

www.noaa.ioos.gov

https://www.facebook.com/usioosgov

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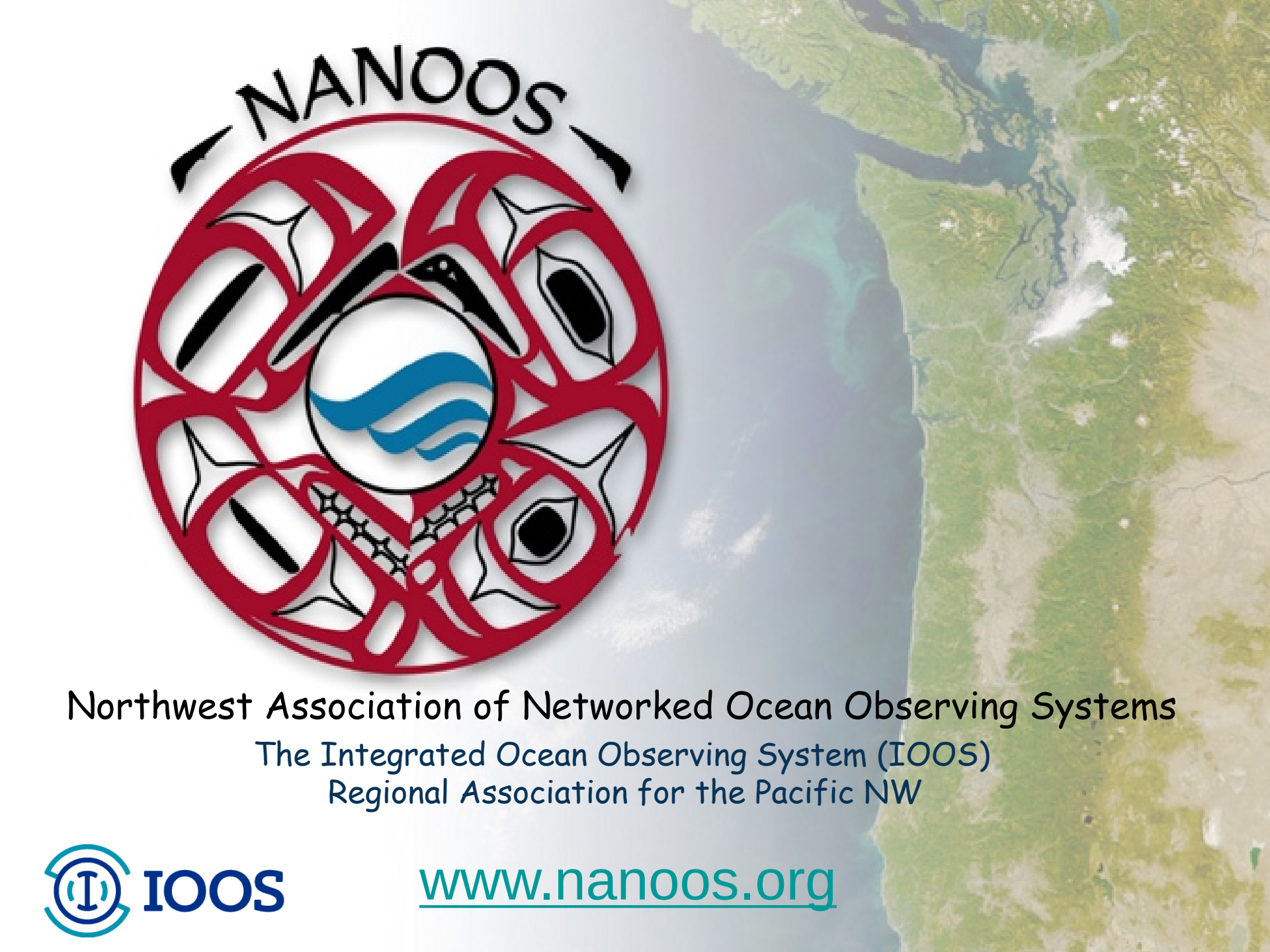
IOOS | EYES ON THE OCEAN™

4. NANOOS Update

Jan Newton
NANOOS Executive Director



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NANOOS Governing Council Members 8/2016

NORTHWEST ASSOCIATION OF NETWORKED OCEAN OBSERVING SYSTEMS

WASHINGTON - OREGON - NORTHERN CALIFORNIA

1. Ocean Inquiry Project
2. OR Dept of Land Conservation & Development
3. Surfrider Foundation
4. The Boeing Company
5. Oregon State University
6. Oregon Sea Grant
7. Puget Sound Partnership
8. University of Washington
9. Washington Sea Grant
10. WET Labs, Inc.
11. Oregon Health and Sciences University
12. Quileute Indian Tribe
13. OR Dept of Geology and Mineral Industries
14. Humboldt State University
15. Marine Exchange of Puget Sound
16. WA Dept of Ecology
17. Pacific Northwest National Laboratory
18. Port of Newport
19. Puget Sound Harbor Safety Committee
20. Sound Ocean Systems, Inc.
21. Council of American Master Mariners
22. Pacific Northwest Salmon Center (& HCSEG)
23. Northwest Indian Fisheries Commission
24. Sea-Bird Electronics, Inc.
25. Western Association of Marine Laboratories
26. Science Applications International Corporation
27. OR Dept of Fish and Wildlife
28. King County Dept Natural Resources & Parks
29. Quinault Indian Nation
30. Western Resources and Applications
31. OR Dept of State Lands
32. Columbia River Crab Fisherman's Association
33. Port of Neah Bay
34. Northwest Research Associates
35. Pacific Ocean Shelf Tracking Project
36. WA Dept of Fish and Wildlife
37. Northwest Aquatic and Marine Educators
38. Seattle Aquarium
39. NOAA Northwest Fisheries Science Center
40. Port Gamble S'Klallam Tribe
41. The Nature Conservancy
42. Portland State University
43. NOAA Olympic Coast National Marine Sanctuary
44. University of Victoria
45. University of Oregon
46. Port Townsend Marine Science Center
47. Intellicheck-Mobilisa
48. NortekUSA
49. Grays Harbor Historical Seaport Authority
50. Pacific Coast Shellfish Growers Association
51. US Army Corps Engineers
52. Olympic National Park
53. Oak Harbor Middle School
54. Vancouver Island University
55. Ocean Networks Canada
56. Lower Columbia Estuary Partnership
57. Western Washington University
58. Raincoast GeoResarch
59. WA Dept of Health
60. Say Yes to Life Swims
61. NOAA PMEL
62. Hakai Institute
63. Salish Sea Expeditions

KEY: Tribal Government | Industry | NGO | Academia/Research | Federal/State/Local Government

New NANOOS members

- NOAA PMEL
- Hakai Institute
- Salish Sea Expeditions

Welcome !

Coastal ocean:

Northern extent of California Current

Winds, topography, freshwater input, ENSO & other climate cycles

Major inland basins:

Puget Sound-Georgia Basin, Columbia River

Urban centers, nearshore development, climate variation

Coastal estuaries:

Willapa Bay, Grays Harbor, Yaquina Bay, Coos Bay, +20

Resource extraction, development, climate

Shorelines:

Rocky to sandy, dynamic: storms, erosion

Winds, development, climate

Major rivers:

Columbia River (~75% FW input to Pacific from US WC)

many rivers (e.g., Fraser, Skagit) via Strait Juan de Fuca

Dredging, water regulation, climate change

NANOOS Region User Groups:

Maritime: shipping, oil transport/spill remediation

Fisheries: salmon, shellfish, crab, groundfish, aquaculture

Environmental management: HABs, hypoxia

Shoreline: erosion, inundation

Hazards: Search and rescue, national security

Educators: formal, informal, research

Marine recreation: boating, surfing, diving

NANOOS budget:

FY07-09: $1.4M + 0.4M = $1,800,000

Year 1, 2, 3

FY10: $1.7M + 0.4M = $2,100,000

Year 4

FY11: $2,087,500 *(w/ new start date)*

Year 5 or 1 of new 5-y award

FY12: $2,428,291 ($2,288,000 base; ~$140K for DMAC, OA workshops)

Year 6 or 2

FY13: $3,089,477 ($2,392,136 base; ~$700K for MSI on OA plus OAP)

Year 7 or 3

FY14: $2,818,441 ($2,442,136 base; $109K HF; $217K OAP; $50K glider)

Year 8 or 4

FY15: $2,771,890 ($2,462,136 base; $309K OAP obs/adds)

Year 9 or 5

FY16: $2,774,532 ($2,452,552 base; $317K OAP obs; $5K adds) + $74K

Year 10 or 1 = $2,848,900

NANOOS budget:

FY16: $2,774,532 ($2,452,552 base; $317K OAP obs; $5K adds) + $74K
Year 10 or 1
= $2,848,900

- $5,000 for System Advisory Committee Meeting travel

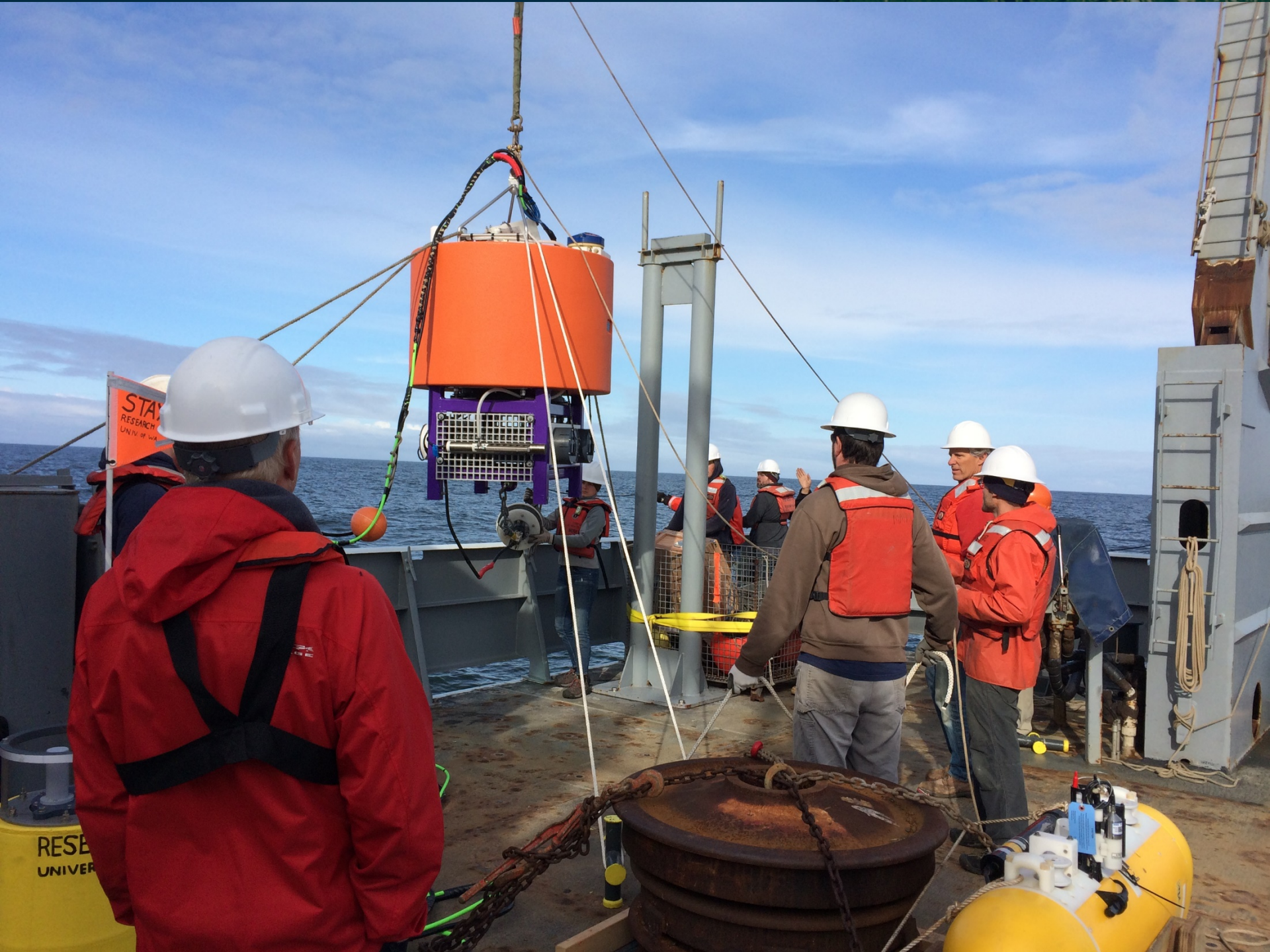
- $192,543 for NANOOS Ocean Acidification Monitoring and Prediction in Oregon Coastal Waters
- $99,437 NANOOS UW OA observatories
- $25,000 NANOOS UW OA observatories: Closing the data Gap Enhancing the Cha'ba Mooring Program to Allow Year-Round Deployments

- $30,000 for GOA-ON portal
- $11,409 for UW support of NOAA PMEL prawler testing
- $32,959 for modeling and RS for synoptic time-series and nowcast maps of OA variables

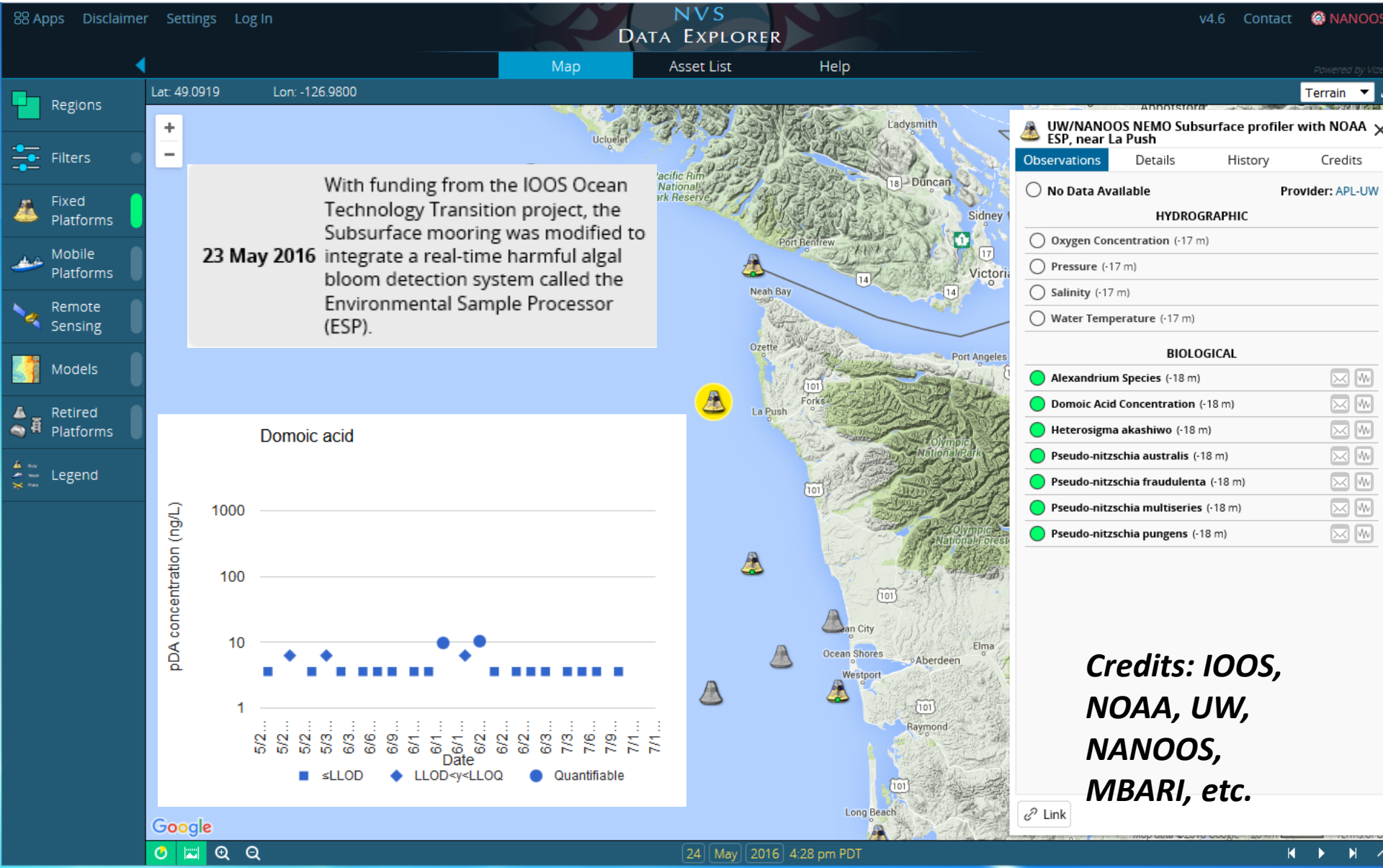
OTT: HABs

"Operational ecological forecasting of harmful algal blooms in the Pacific Northwest using an environmental sample processor"

- ESP on Cha'ba at La Push
- UW, NOAA NWFSC, MBARI, NOAA CCEHBR, NWIC, Spyglass, WHOI
- Detects *Pseudo-nitzschia* cells, species, toxicity
- Strong support from coastal tribes
- Tested in PS 2013; NANOOS served data
- Tested off coast in May 2016



ESP detected Domoic Acid

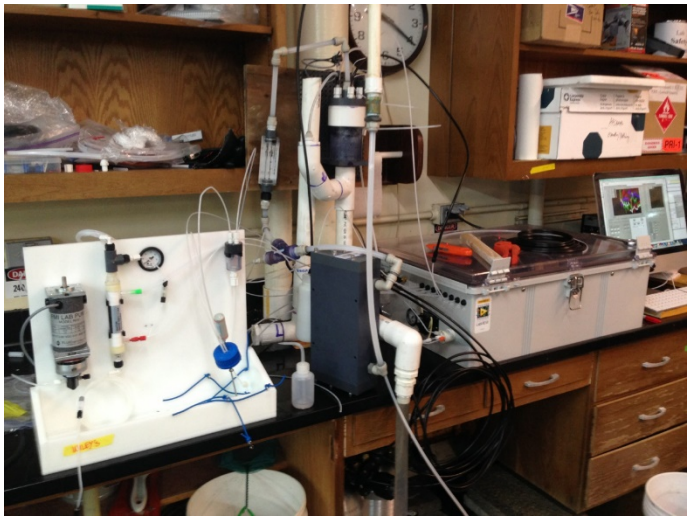


OTT: OA

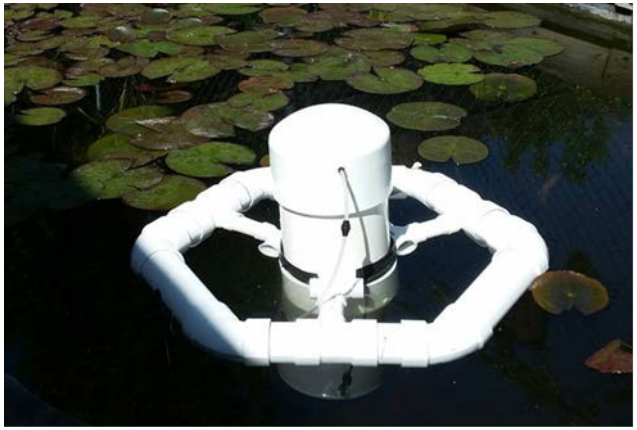
“Turning the headlight on 'high': Improving an ocean acidification observation system in support of Pacific coast shellfish growers.”

- New “ACDC” pCO_2 sensor
- UW, OSU, Sunburst, AOOS, CeNCOOS, SCCOOS, NOAA PMEL, PCSGA
- Lower cost pCO_2 for “weather” grade data
- Strong support from shellfish industry
- Builds on existing Burke-o-lators in hatcheries and the IPACOA portal

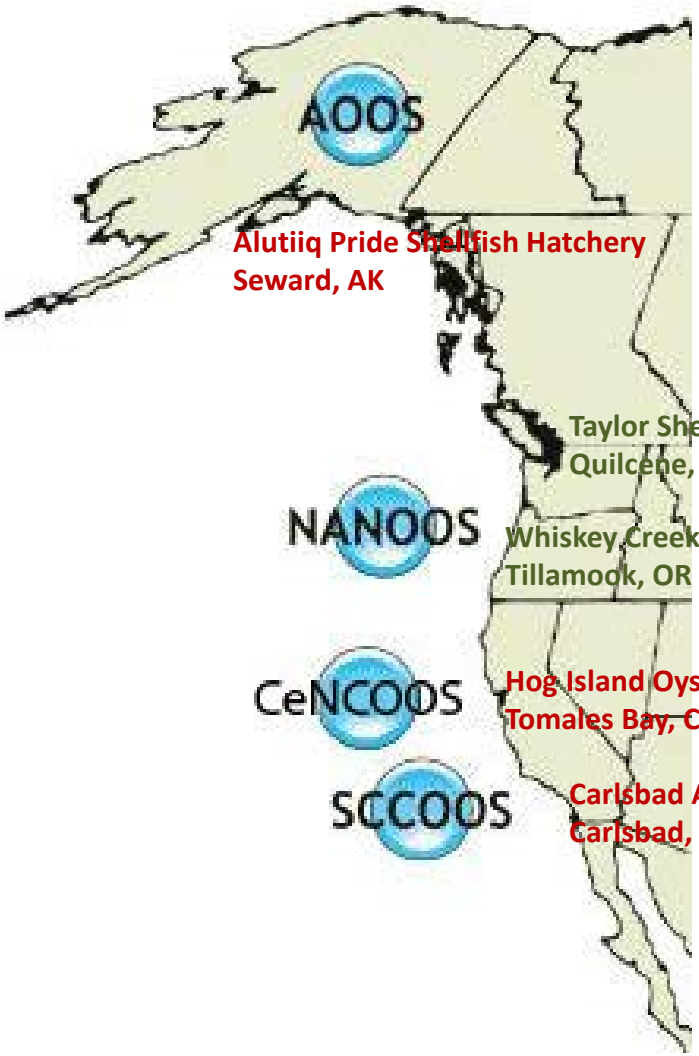
Burkeolator



ACDC



Partnerships



OAP
OCEAN ACIDIFICATION PROGRAM

IOOS
INTEGRATED OCEAN OBSERVING SYSTEM

Partnerships

AOOS
Alaska Ocean Observing System

Alutiiq Pride Shellfish Hatchery
Seward, AK

NANOOS

Taylor Shellfish Hatchery
Quilcene, WA

Whiskey Creek Shellfish Hatchery
Tillamook, OR

CeNCOOS

Hog Island Oyster Company
Tomales Bay, CA

Southern California Coastal Ocean Observing System

Carlsbad Aquafarm
Carlsbad, CA

STATE OF OREGON
1859

OAP
OCEAN ACIDIFICATION PROGRAM

IOOS®
INTEGRATED OCEAN OBSERVING SYSTEM

Science-Grower Partnerships

Wiley Evans,
Hakai Institute

Simone Alin,
NOAA PMEL

QA

AOOS
Alaska Ocean Observing System

Alutiiq Pride Shellfish Hatchery
Seward, AK

Tessa Hill,
UC Davis

NANOOS

Taylor Shellfish Hatchery
Quilcene, WA

Whiskey Creek Shellfish Hatchery
Tillamook, OR

CeNCOOS

Hog Island Oyster Company
Tomales Bay, CA

Carlsbad Aquafarm
Carlsbad, CA

Burke Hales,
OSU

Todd Martz,
SIO

Southern California Coastal Ocean Observing System

STATE OF OREGON 1859

OAP
OCEAN ACIDIFICATION PROGRAM

IOOS
INTEGRATED OCEAN OBSERVING SYSTEM

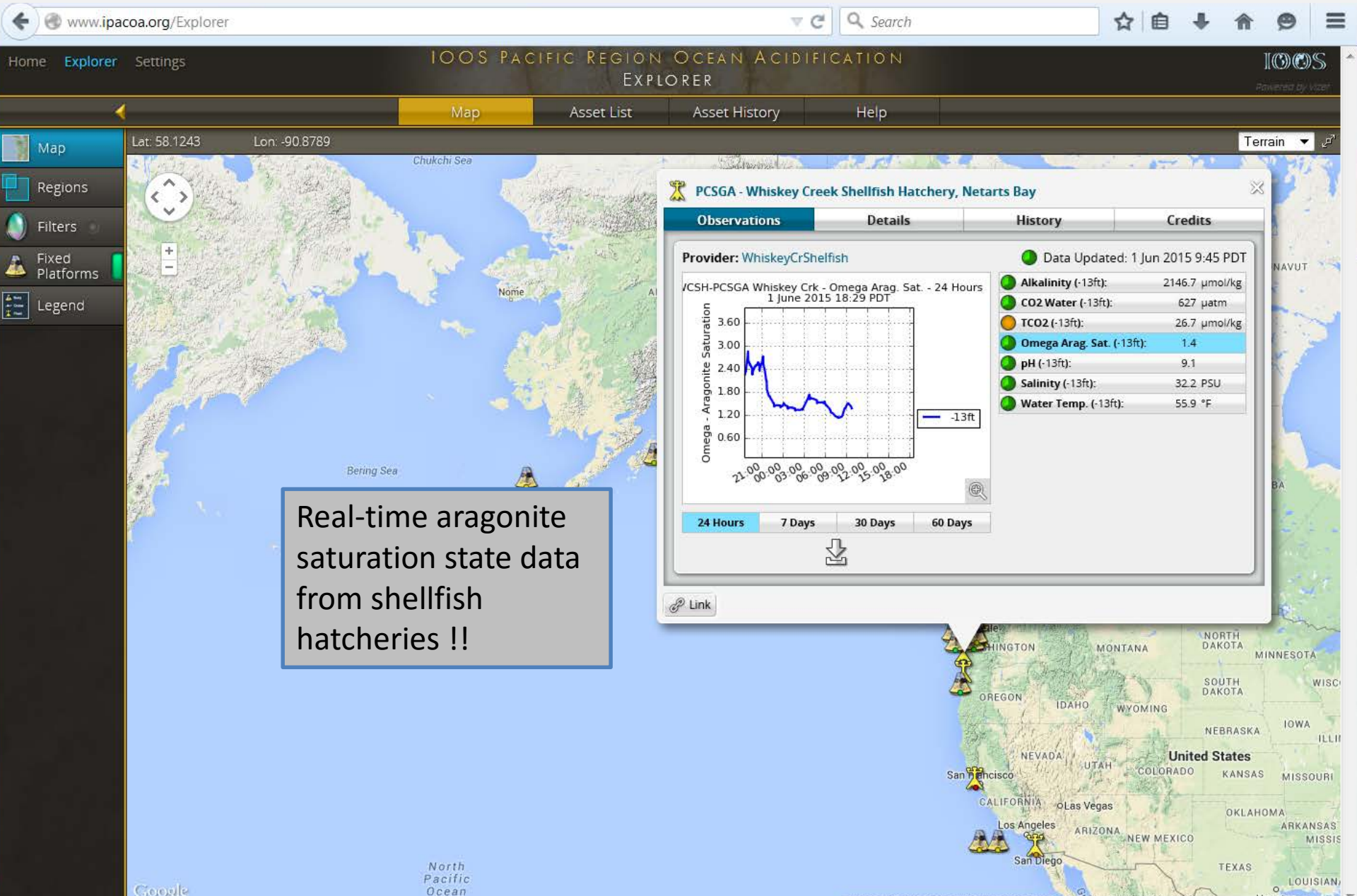
Science-Grower Partnerships

Site	On-site	Regional support	Regional Expert
Alutiiq Pride Shellfish, Seward, AK	J. Hetrick* (APSH)	J. Ramsay (UAF/APSH)	W. Evans (Hakai Institute)
Taylor Shellfish, Quilcene, WA	B. Eudeline* (Taylor)	G. LeBon (NOAA/PMEL)	S. Alin (NOAA/PMEL)
Whiskey Creek Shellfish, Netarts, OR	A. Barton* (WCSH)	S. Smith/D. Hubbard (OSU)	B. Hales (OSU)
Hog Island Oyster Co., Marshall, CA	T. Sawyer* (HIOC)	G. Susner (UCD-Bodega)	T. Hill (UCD-Bodega)
Carlsbad AquaFarm, Carlsbad, CA	T. Grimm* (CAF)	K. Shipley (UCSD-SIO)	T. Martz (UCSD – SIO)

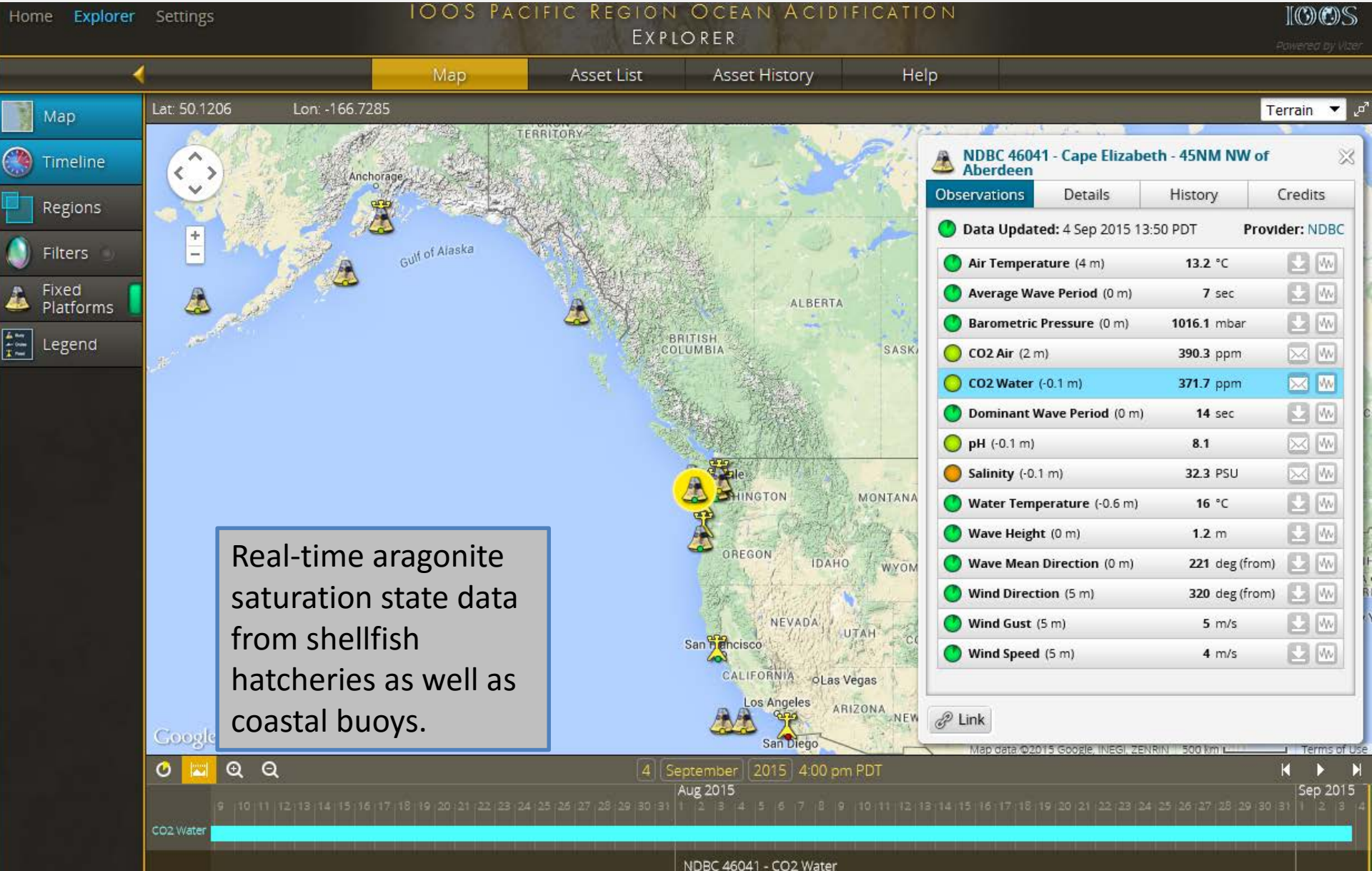
*Hatchery manager responsible for designating routine maintenance responsibilities to hatchery personnel.

This partnership will expand, has to BC thanks to Hakai, and other places: From Ron Zebel: *"Fantastic job Wiley. At the OceansAlaska hatchery,* ***we learned more about our water quality in 7 hours of Burke-O-Lator data than we did in 7 years of monitoring with off the shelf instrumentation****. We have adjusted our soda ash injections upward and are going forward with expanded kelp bioconditioning."*

IPACOA: IOOS Pacific Region ocean acidification data portal



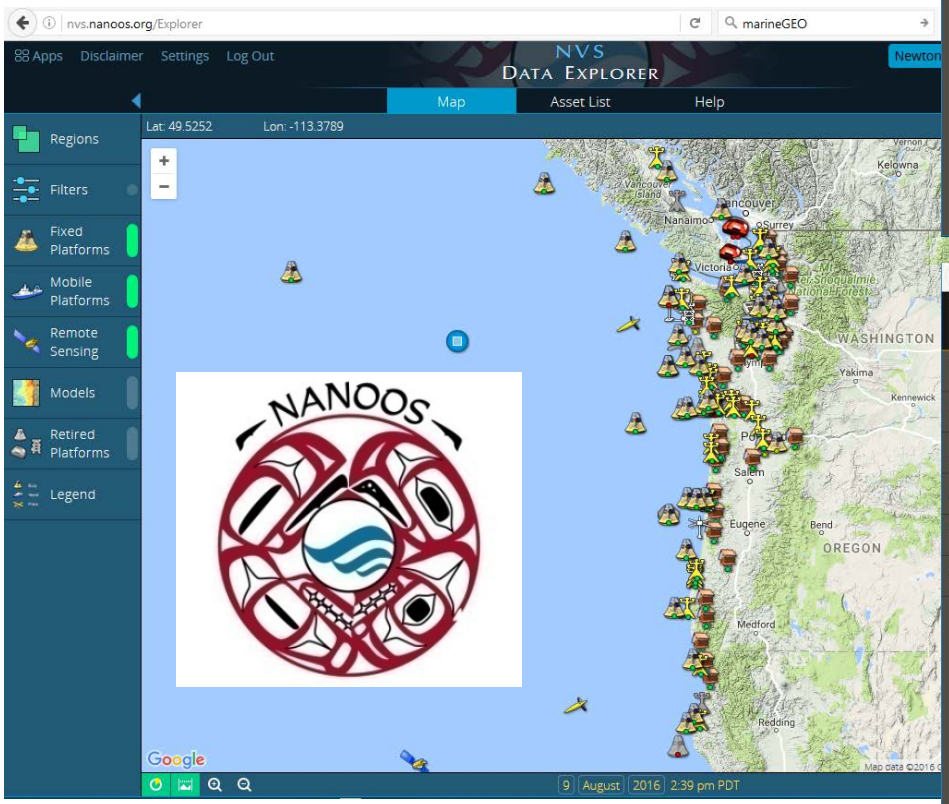
IPACOA: IOOS Pacific Region ocean acidification data portal



Other NANOOS activity

- Predictions: hypoxia, OA corrosivity, HABs
- Synthesis: Pacific Anomalies Workshop 2
- Science: Ocean Sciences 2016, etc.
- Tribes: Bellingham Bay buoy Se'lhaem via CMOP
- Data: NVS demo video; upgrade to 4.6; OOI etc.
- Public: "Seafood 101" flyer in Seattle Times
- Synergies: Slides for NOAA Western Regional Environmental Conditions & Impacts Coordination
- Education/Engagement: Quileute Tribal Summer school and other education workshops

From NANOOS to the world…



GOA-ON

Global Ocean Acidification Observing Network

3rd workshop, Hobart, TAS

130 scientists from 37 nations

Coastal ocean:

Northern extent of California Current

Winds, topography, freshwater input, ENSO & other climate cycles

Major inland basins:

Puget Sound-Georgia Basin, Columbia River

Urban centers, nearshore development, climate variation

Coastal estuaries:

Willapa Bay, Grays Harbor, Yaquina Bay, Coos Bay, +20

Resource extraction, development, climate

Shorelines:

Rocky to sandy, dynamic: storms, erosion

Winds, development, climate

Major rivers:

Columbia River (~75% FW input to Pacific from US WC)

many rivers (e.g., Fraser, Skagit) via Strait Juan de Fuca

Dredging, water regulation, climate change

NANOOS Region User Groups:

Maritime: shipping, oil transport/spill remediation

Fisheries: salmon, shellfish, crab, groundfish, aquaculture

Environmental management: HABs, hypoxia

Shoreline: erosion, inundation

Hazards: Search and rescue, national security

Educators: formal, informal, research

Marine recreation: boating, surfing, diving

New award

- 5-years
- PIs submitted ‘sustain’ and ‘new’ LOIs
- Used NANOOS GC and ExCom to identify and prioritize activity
- Translated that input well: scores of 97, 97, 88 out of 100

NANOOS Stakeholder Priorities

The NANOOS Governing Council selected five areas from results of numerous regional workshops as the highest regional priorities because "these issues represent those having the greatest impact on PNW citizenry and ecosystems and, we believe, are amenable to being substantively improved with the development of a PNW Regional Coastal Ocean Observing System:"

- **Maritime Operations**
- **Ecosystem Assessment**
- **Fisheries and Biodiversity**
- **Coastal Hazards**
- **Climate**

NANOOS focus areas:

Coastal Ocean

Estuaries and Bays

Shorelines

NANOOS "Effort versus Application" Map for Observing and Modeling

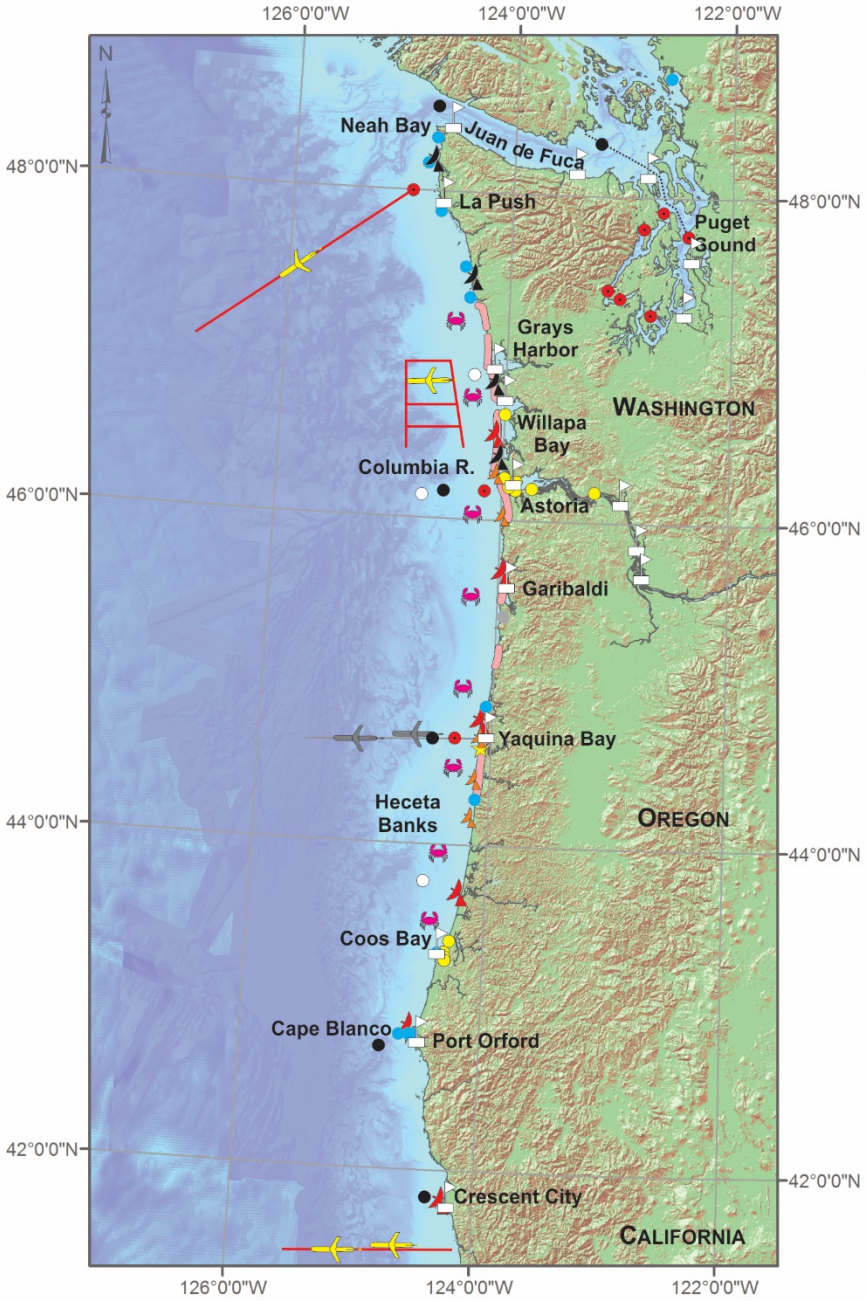
APPLICATIONS: / EFFORTS:	Coastal Ocean					Estuaries					Shorelines				
	mar ops	ecology	hazards	biodivesity	climate	mar ops	ecology	hazards	biodivesity	climate	mar ops	ecology	hazards	biodivesity	climate
Multivariable assets:															
WA shelf glider line															
Columbia shelf, glider tracks															
CA shelf glider line															
WA shelf buoy															
Columbia shelf buoy															
OR shelf buoy															
WA nearshore OAH															
PNW nearshore hypoxia	*no coastal nearshore*														
OR nearshore OAH															
Puget Sound estuary buoys															
Puget Sound estuary ferrybox															
Columbia estuary buoys															
South Slough estuary moorings															
Salish Sea estuary buoy						*no central Salish Sea*									
Biological sampling:															
OR shelf plankton timeseries		*no plankton*		*no plankton*											
OR estuarine timeseries							*no plankton*		*no plankton*						
Shorelines:															
Washington shorelines															
Oregon shorelines															
PNW bathymetry															
Surface currents:															
Oregon coastlines HF															
Washington coastlines HF	*no WA*		*no WA*		*no WA*						*no WA*		*no WA*		*no WA*
Critical coastal ports X-band															
Forecast models:															
PNW circulation forecasts															
Puget Sound circulation forecasts															
Columbia circulation forecasts															
PNW biogeochem forecasts															
Puget Sound biogeochem forecasts															
Columbia estuary habitat forecasts															
Coastal wave forecasts	*no forecast*		*no forecast*		*no forecast*	*no forecast*		*no forecast*		*no forecast*					
Flood/erosion forecasts	*no forecast*		*no forecast*		*no forecast*						*no forecast*		*no forecast*		*no forecast*

KEY:

Italicized efforts indicate new investment	Currently directly supports	Proposed to directly support	Not applicable
	Currently indirectly supports	Proposed to indirectly support	*no ...* Text explains the current gap the proposed activites fill

NANOOS new efforts proposed

- Need WA HFR
- Need forecasting of:
  - Waves
  - Flood & erosion
- Need coastal nearshore OA and Hypoxia observations
  - PNW hypoxia via crab pots
  - Central Oregon OAH
  - Washington Olympic Coast NMS OAH
- Need biological observations on plankton
  - Estuarine phytoplankton monitoring
  - Shelf plankton monitoring
- Need to strengthen more human connections
  - Indigenous Water Network
  - West Coast Governors' Alliance collaboration



NANOOS RCOOS

Existing assets to be sustained in partnership:

- Existing ***coastal*** and ***estuarine*** buoys
- Existing fixed mooring ***estuarine*** buoys
- Existing glider tracks
- Existing long-range (180 km range) HF radar site
- Existing standard-range (50 km range) HF radar site
- Port X-band wave radar
- Beach and shoreline assessment. Includes multiple sites where nearshore bathymetry is being collected
- Puget Sound ferry box
- Existing glider tracks (OOI)

Federal assets:

- NDBC buoys
- CDIP buoys
- NOS Tide gauges

Proposed for new support to be sustained in partnership:

- Proposed long and short-range radar site
- Proposed support for estuarine and nearshore sites
- Crab pot moorings

NANOOS Objectives for FY2016

1) Maintain **NANOOS as the U.S. IOOS PNW Regional Associ**ation

2) Maintain **surface current and wave mapping** capability.

3) Sustain **existing buoys and gliders in the PNW coastal ocean**, in coordination with national programs.

4) Maintain **observation capabilities in PNW estuaries**, in coordination with local and regional programs.

5) Maintain **core elements of beach and shoreline observing** programs.

6) Provide sustained support to a **community of complementary regional numerical models**.

7) Maintain NANOOS' Data Management and Communications (DMAC) system for **routine operational distribution of data and information**.

8) Continue to **deliver existing and, to the extent possible, create innovative and transformative user-defined products and services** for PNW stakeholders.

9) Sustain **NANOOS outreach, engagement and education**.

NANOOS remains vital !

"Why is NANOOS so good?"

- The people: creativity
- The spirit: cooperation
- The concept: collaboration

- New capabilities in all sectors

Accomplishments:

NANOOS sets bar high

NANOOS is supporting the region

NANOOS is relevant nationally

NANOOS leadership visible internationally

NANOOS uses its governance; is growing

Challenges

- Sustaining infrastructure on ~level funding

4. IOOS Association Update

slides from: Josie Quintrell
IOOS Association Executive Director

IOOS Association

Observing our oceans, coasts and Great Lakes

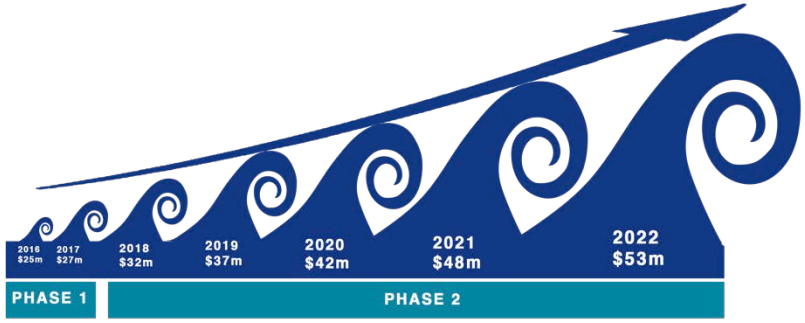
Providing information to those who need it, when they need it

- Advocacy
- Common Issues
- IOOS federal/non-federal partnership
  - Administration
  - Congress
  - National Partners
- Emerging Issues

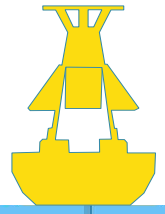
IOOS | EYES ON THE OCEAN

CLOSING THE GAPS CAMPAIGN

- Scalable campaign
- Tangible outcomes
- Initial focus
  - Water levels
  - Precision navigation
  - HAB forecasting
  - Ocean acidification
- Defining IOOS niche - Federal/Non-federal partnership



Double IOOS funding in 5 years to fill key gaps in the nation's coastal, ocean and Great Lakes observing systems.



TECHNOLOGIES

Gliders Moorings HFR

THEMES

Resilience

Eco Forecasting

Ocean Acidification

Blue Highway

2022, $53M

2021, $48M

2020, $42M

2019, $37M

Change in Administration

2018, $32M

US IOOS FY 17 Request

Regional System Request: $33.9 m

$24.3 million for the national network of 11 regional coastal observing systems

$1.5 million for upgrades and repairs for aging regional systems

$3.1 million to install 12 high frequency radar systems, to close key gaps and make the U.S. surface current mapping system the most reliable, efficient and comprehensive in the world

$5.0 million for research and development, including competitive grants, modeling and verification to develop new products and systems to ensure comprehensive coverage

National System Request- $6.7 m

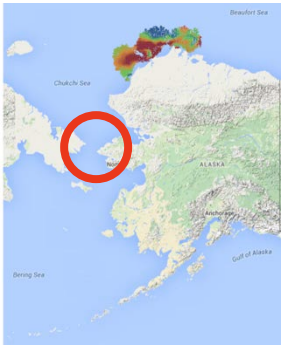
These funds will support the IOOS Program Office, to help:

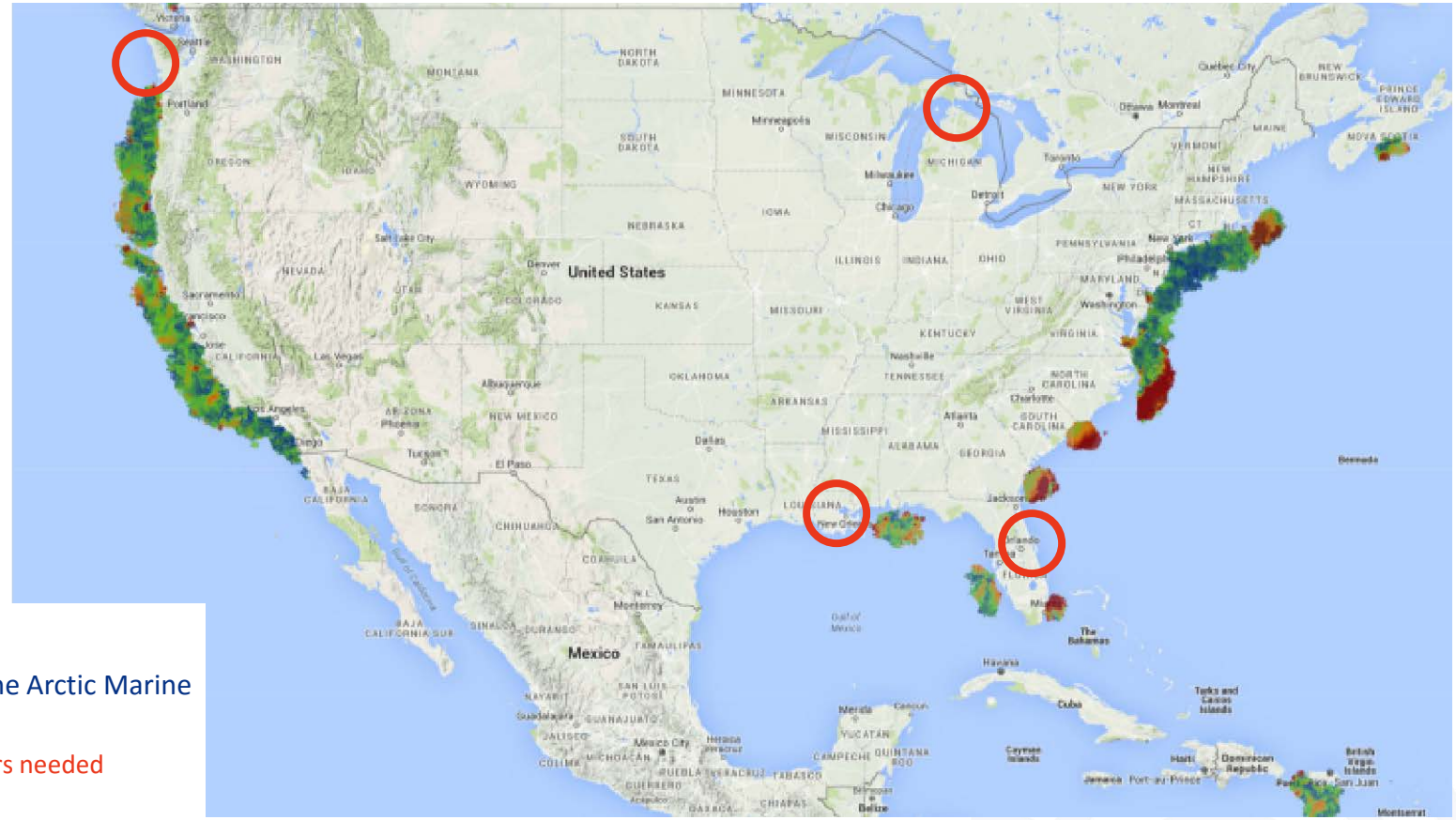
- integrate federal and non-federal data
- develop the nation's first quality control standards for real-time data
- coordinate across NOAA and the 12 Federal IOOS agencies and
- certify the regional systems.

IOOS | EYES ON THE OCEAN

US IOOS FY 17 High Frequency Radar Request

$3.1 million to install 12 high frequency radar systems





Safeguarding the Arctic Marine Highway

2 remote radars needed

Protecting Lives and Public Health in the Pacific Northwest

3 radars needed

Cleaning up the Great Lakes

3 radars needed

Saving Lives off Florida's Coast

2 radars needed

Saving Millions in the Gulf of Mexico

3 radars needed

IOOS | EYES ON THE OCEAN

Appropriations

IOOS Appropriations	FY11 Spend Plan	FY 12 Spend Plan	FY 13 Spend Plan	FY 14 Enacted	FY 15 Enacted	FY 16 Enacted	FY 17 Pres Bud	FY 17 Senate	FY 17 House
Regional IOOS Total	**$21.9m**	**$23 m**	**$26.5m**	**$28.5m**	**$29.5m**	**29.5m**	**29.5m**	**31.5m**	**31.5m**
Competitive funding for the national network of regional systems, including surface currents	*$20m*	*$22m*	*$23.5m*	*$24.3m*	*$24.5 m*	*$24.5m*			
Marine Sensor Innovation Grants, Modeling Test bed, Sensor Verification	*$1.9m*	*$1m*	*$3m*	*$4.2m*	*$5 m*	*$5m*			
U.S. IOOS Program Office*	**$6.5m**	**$6.4m**	**$5.9m**	***$6.6m***	***$6.6m***	***$6.6m***	**$6.6m**		
Total U.S. IOOS	$28.4m	$29.4m	$32.4m	$35.1m	$ 36.1m	$36.1 m	$36.1 m		

* Starting in FY 14 included in the Navigation, Observations and Predictions budget line

IOOS | EYES ON THE OCEAN

US IOOS FY 18 and beyond…

- FY 18 likely gliders
  NANOOS request:
  - Make Columbia and La Push gliders operational
  - More gliders for swapping
  - New Cape Blanco line

- Beyond:
  - HABs
  - Water level
  - Navigation

ICOOS Act Reauthorization

Senate

Wicker
R-MS

Cantwell
D- WA

S 1886

Thru Committee Mark Up Report Completed

House

Young
R-AK

Sablan
D- MPO

HR 2744

In Water, Power and Oceans Subcommittee

McClintock, La Malfa, Denham Huffman,Napolitano*, Costa, Ruiz, Lowenthal*, Torres

5. NANOOS Standing Committees reports

NANOOS
User Products

Jonathan Allan, Mike Kosro, Emilio Mayorga,
Jan Newton, Craig Risien, Charles Seaton,
Amy Sprenger, Troy Tanner, and Rachel Vander Giessen

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INTEGRATED OCEAN OBSERVING SYSTEM

NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

NANOOS

Why have a NANOOS visualization system?

- **Disparate suite of web sites available to the public** (serving a wide range of data).
- **Regional needs: seamless delivery of coastal, estuarine and ocean data to stakeholders within the NANOOS domain**

  (+external partners, other RCOOS, and national/international programs).

- **NANOOS currently provides access to 47 different types of variables, and in total 226 'assets' & 19 model/forecast overlays.**

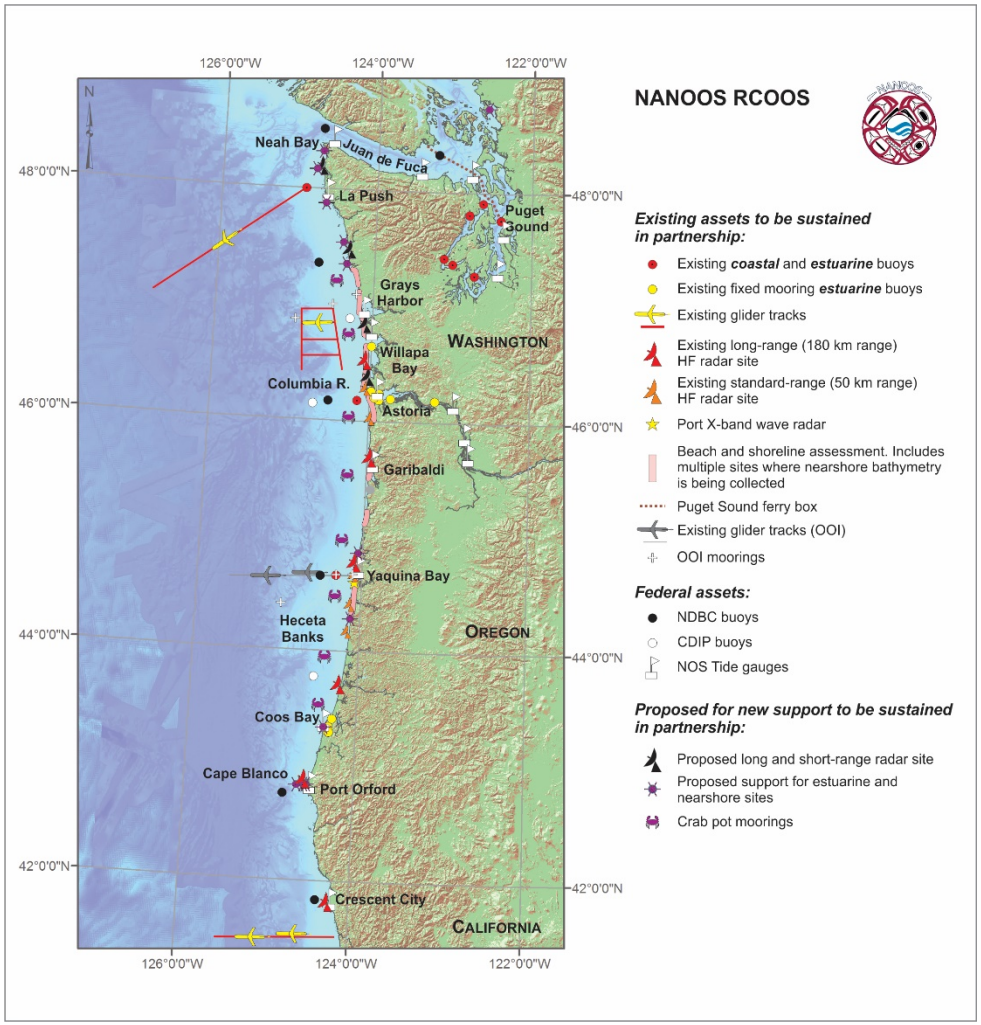
  Effective delivery of these data and product feeds can lead to:
  - **greater situational awareness (local and regional scales);**
  - **improved access to and understanding of environmental variables/conditions; and,**
  - **enable development and access to short- and long-term time-series.**

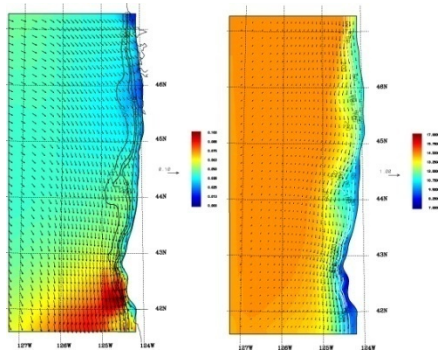
- Overall goal: to aid our understanding of **climate variability**, **safety**, **operations**, and lead to **improved resource management** and **regional productivity**.

A Challenge - Many Stakeholders

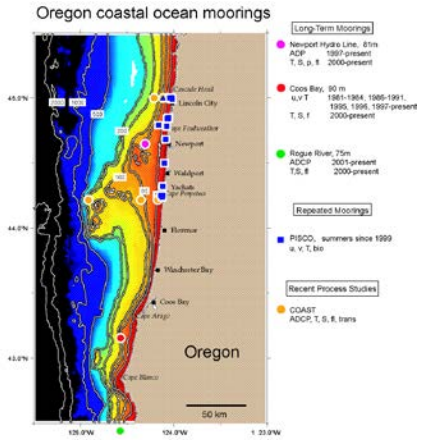
- State agencies (e.g. ODFW, WADOE, DSL, etc.)
- Federal agencies (NOAA, NWS, FEMA, US Coast Guard, etc.)
- Cities and Counties
- Ocean engineering (instruments, wave energy, telecommunication)
- NGO's
- Ports
- Bar pilots
- Fishers (recreational and commercial)
- Shellfish growers
- Recreational boaters
- Tribes
- Geotechnical consultants
- Universities/researchers
- Schools (K-12)
- Public-at-large
- Scientists
- and many others…

A Challenge - Many Data Types & How to Display Complex Data Effectively

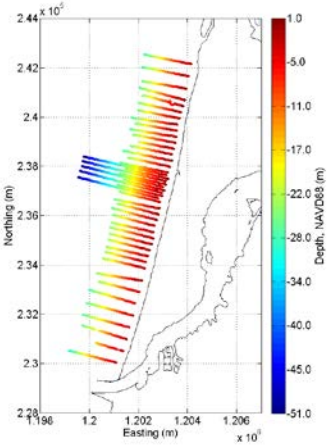




Overlays (Satellite, Models, & other geospatial data)



Shelf moorings & gliders



Shorelines & Bathymetry

NVS History and Status:

Nov. 2009 - v1.0 released

….

May 2010 - v1.6 released (added access to various map image overlays e.g. HF radar, satellite imagery, and ocean models). v1.0 iPhone NVS mobile app released

….

Jun 2011 - v. 2.0 iPhone NVS released (Android Sep 2011)

Nov 2011 - v2.6 released (Tsunami evacuation zones web app)

Nov 2011 - v. 1.0 iPhone TsunamiNW-Evac app released (Android Jan 2012 –**BROKEN**)

Mar 2013 - v3.0 – Major overhaul of interface; move to Google Maps 3 API; move to dedicated web apps.

Apr 2014 - v3.2 – Major overhaul of NANOOS database and harvesters

….

Oct 2014 – v3.8 – Climatology web app released

Jul 2015 – v4.0 – New timeline, plotting tool, and depth control for overlays released

Aug 2016 – v4.6 – Updated GUI enhancements in NVS platform; data from mobile assets now available; retired asset panel added; variables now grouped by type, mobile friendly…

NANOOS

Northwest Association of Networked Ocean Observing Systems

Washington - Oregon - Northern California

IOOS | Integrated Ocean Observing System

NANOOS

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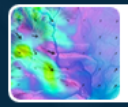
Internal Site

Welcome to the NANOOS, the Northwest Association of Networked Ocean Observing Systems.
NANOOS is part of IOOS and provides information and products related to weather and ocean data.



NANOOS Visualization System

NVS provides easy access to observations, forecasts, data, and visualizations.

Demo

Bloom seen from space!

A recent phytoplankton bloom in Hood Canal, Washington was seen from space! NASA's satellites recorded images of a rare bloom of coccolithophores occurring this summer in Hood Canal and Dabob Bay, Washington. Coccolithophores are phytoplankton with calcium carbonate plates that reflect light, showing up as a milky turquoise color. Washington Sea Grant, a NANOOS partner, observed the bloom from the beach.

More Info from NASA

Go

Will there be a Hood Canal fish kill this year?

Go

Bloom seen from space!

Go

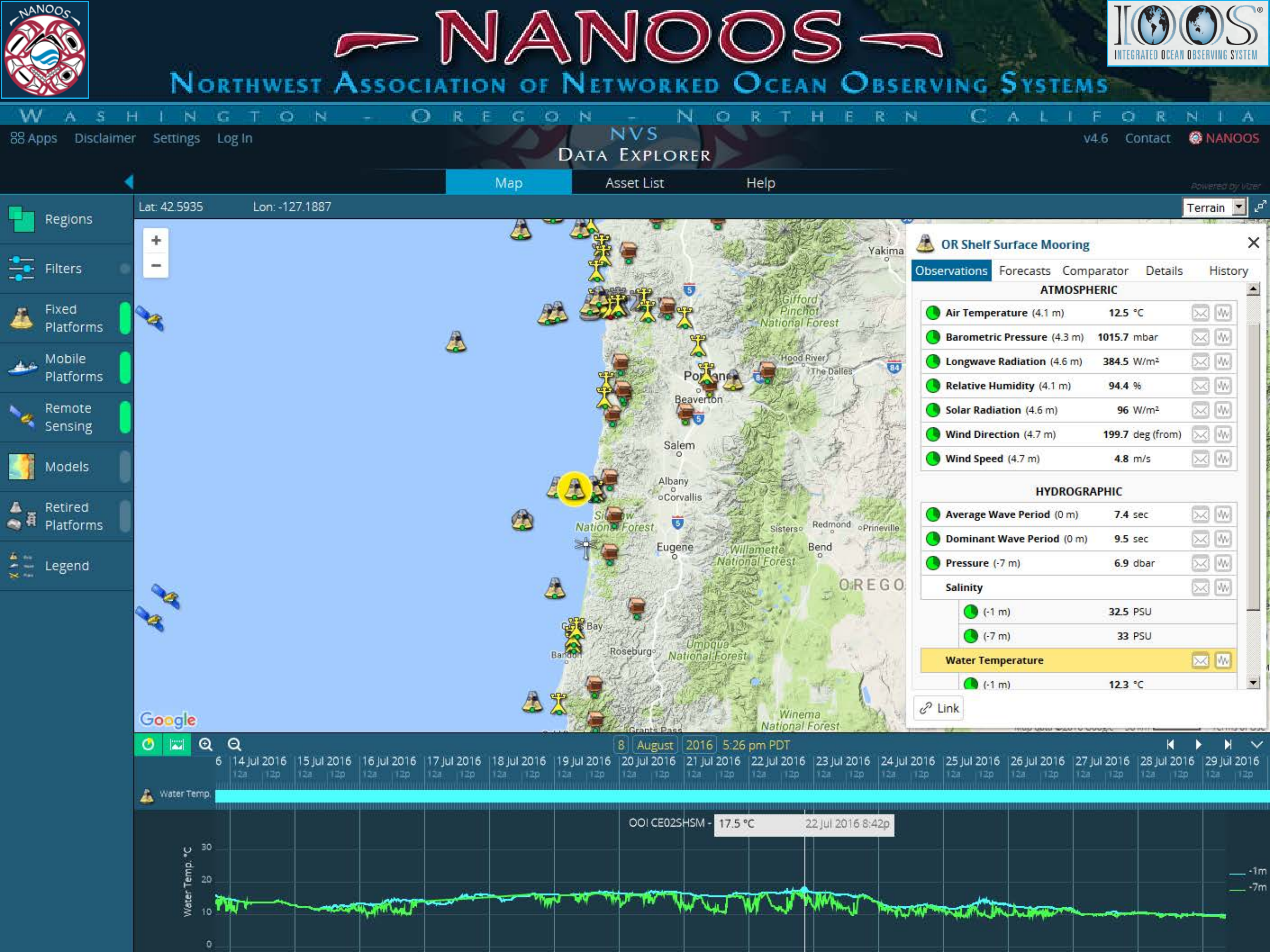
OOI Coastal Endurance Array Data Streams for

Go

NANOOS Receives New Five Year Award

Go

New HAB Monitoring in Real-time!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Fixed Platforms
Mobile Platforms
Remote Sensing
Models
Retired Platforms
Legend
Lat: 42.5935
Lon: -127.1887
Terrain
OR Shelf Surface Mooring
Observations
Forecasts
Comparator
Details
History
ATMOSPHERIC
Air Temperature (4.1 m) 12.5 °C
Barometric Pressure (4.3 m) 1015.7 mbar
Longwave Radiation (4.6 m) 384.5 W/m²
Relative Humidity (4.1 m) 94.4 %
Solar Radiation (4.6 m) 96 W/m²
Wind Direction (4.7 m) 199.7 deg (from)
Wind Speed (4.7 m) 4.8 m/s
HYDROGRAPHIC
Average Wave Period (0 m) 7.4 sec
Dominant Wave Period (0 m) 9.5 sec
Pressure (-7 m) 6.9 dbar
Salinity
(-1 m) 32.5 PSU
(-7 m) 33 PSU
Water Temperature
(-1 m) 12.3 °C
Link
Yakima
Gifford Pinchot National Forest
Hood River
The Dalles
Portland
Beaverton
Salem
Albany
Corvallis
Siuslaw National Forest
Eugene
Sisters
Redmond
Prineville
Bend
Willamette National Forest
OREGON
Coos Bay
Bandon
Roseburg
Umpqua National Forest
Winema National Forest
Google
8 August 2016 5:26 pm PDT
14 Jul 2016
15 Jul 2016
16 Jul 2016
17 Jul 2016
18 Jul 2016
19 Jul 2016
20 Jul 2016
21 Jul 2016
22 Jul 2016
23 Jul 2016
24 Jul 2016
25 Jul 2016
26 Jul 2016
27 Jul 2016
28 Jul 2016
29 Jul 2016
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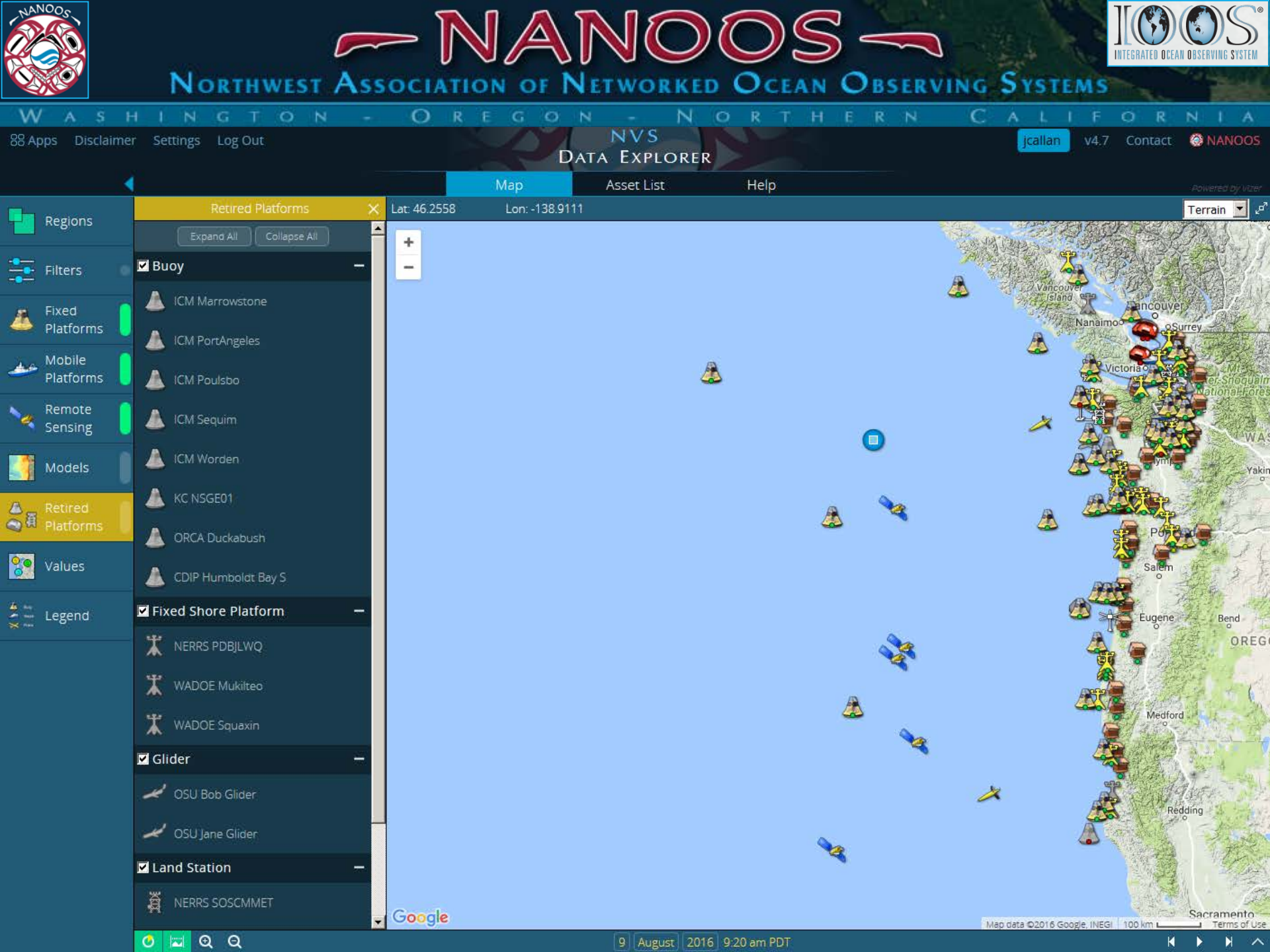
OOI CE02SHSM - 17.5 °C 22 Jul 2016 8:42p
Water Temp. °C
30
20
10
0
-1m
-7m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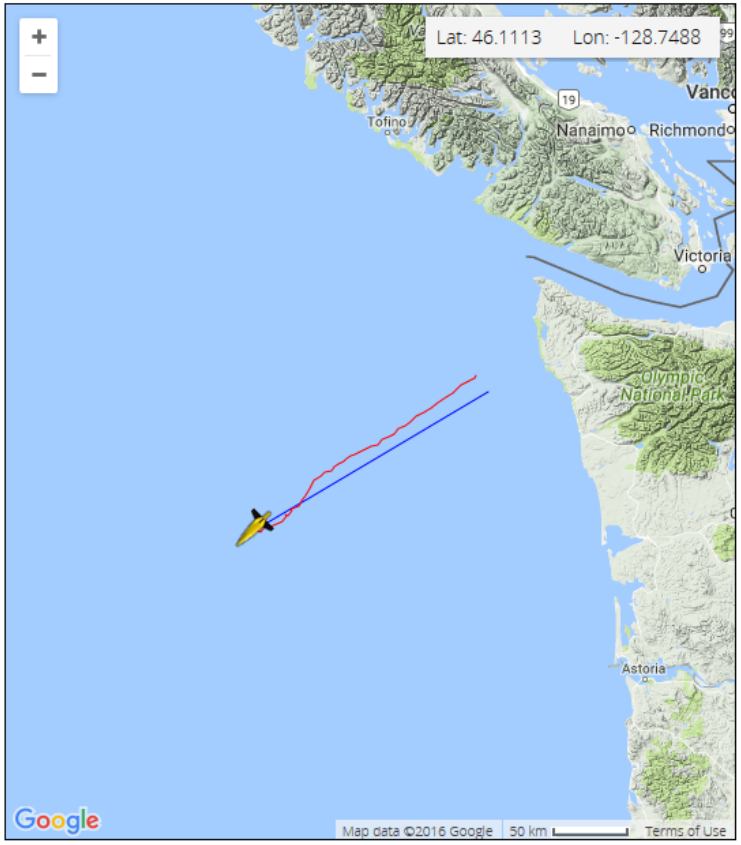
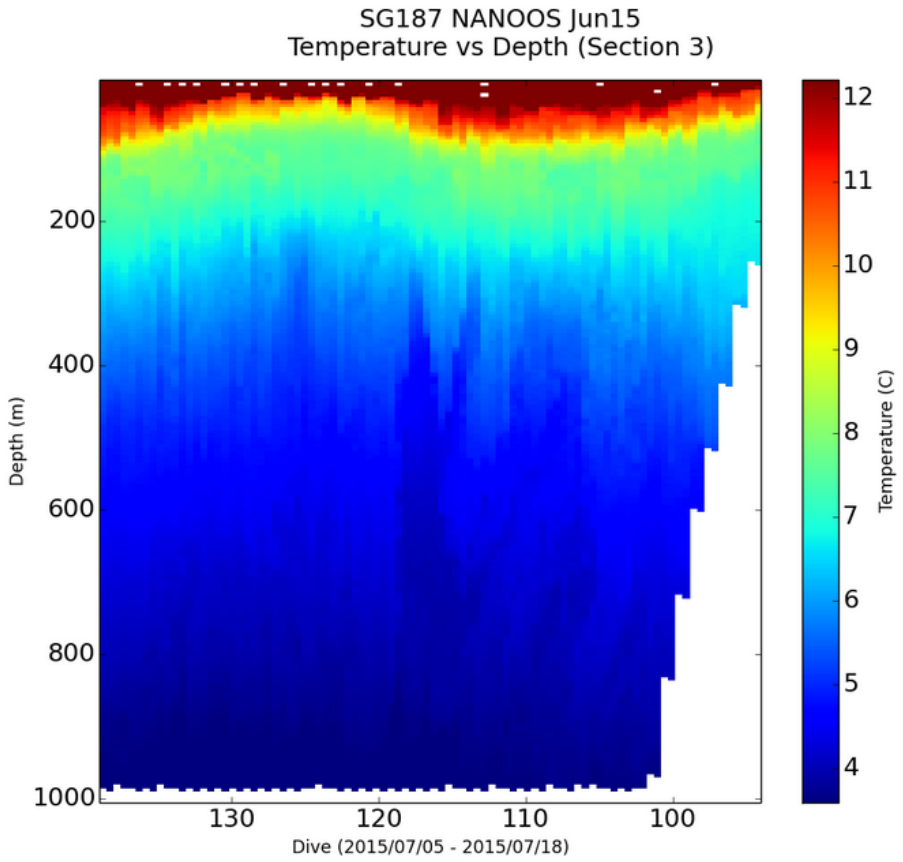
Legend
Retired Platforms
Expand All
Collapse All
Buoy
ICM Marrowstone
ICM PortAngeles
ICM Poulsbo
ICM Sequim
ICM Worden
KC NSGE01
ORCA Duckabush
CDIP Humboldt Bay S
Fixed Shore Platform
NERRS PDBJLWQ
WADOE Mukilteo
WADOE Squaxin
Glider
OSU Bob Glider
OSU Jane Glider
Land Station
NERRS SOSCMMET
Lat: 46.2558
Lon: -138.9111
Terrain
Vancouver Island
Nanaimo
Victoria
Surrey
Salem
Eugene
Bend
Medford
Redding
Sacramento
Google
Map data ©2016 Google, INEGI
100 km
Terms of Use
9
August
2016
9:20 am PDT

Deployment NANOOS 15-16 Type: Seaglider Provider: UW IOP Contact: Craig Lee

Temperature | Salinity | Density | Sound Speed | Dissolved Oxygen

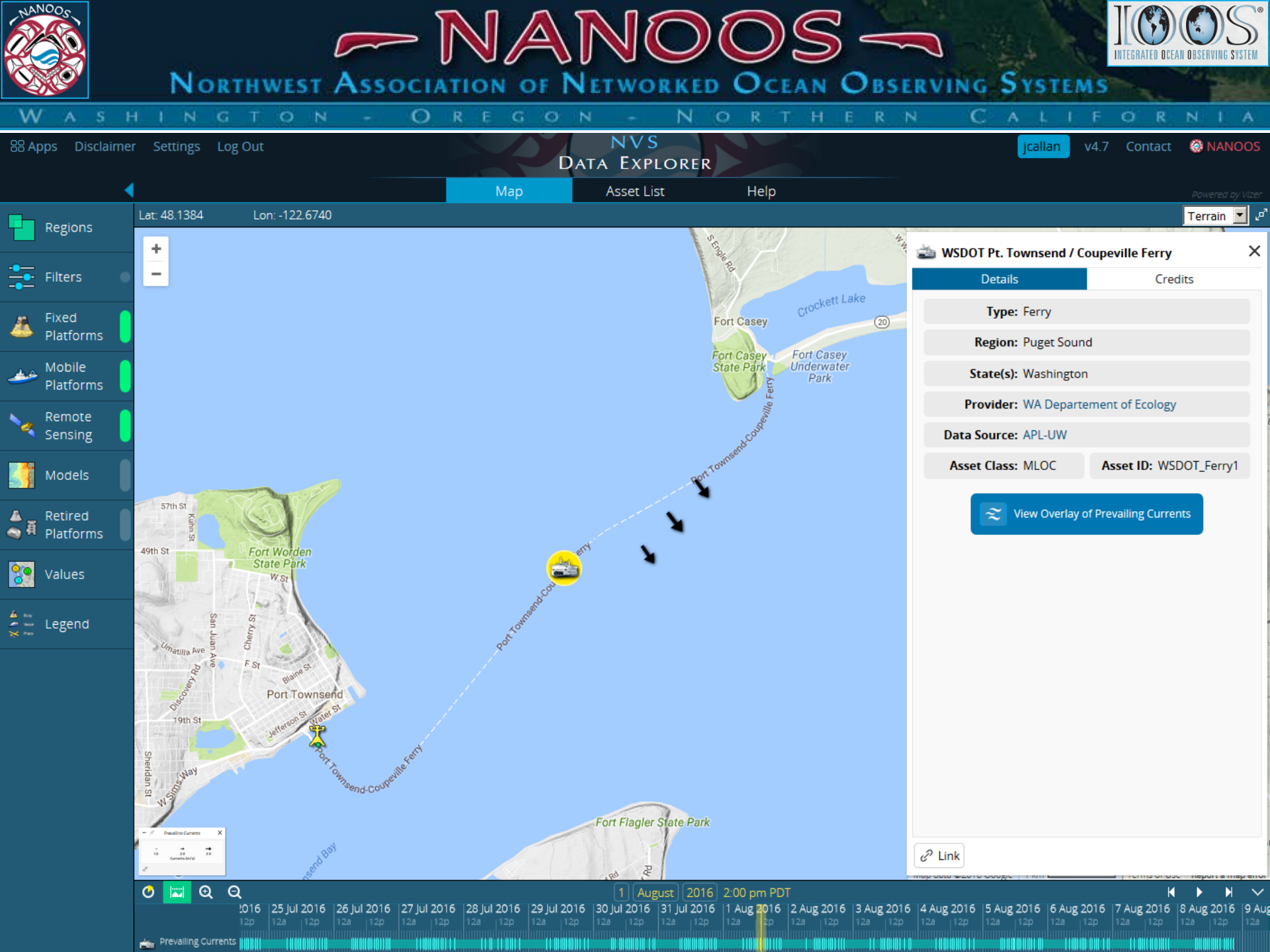




12 July 2015 8:00 pm PDT

Jun 2015 | Jul 2015 | Aug 2015 | Sep 2015 | Oct 2015 | Nov 2015 | Dec 2015 | Jan 2016 | Feb 2016 | Mar 2016

NANOOS 15-16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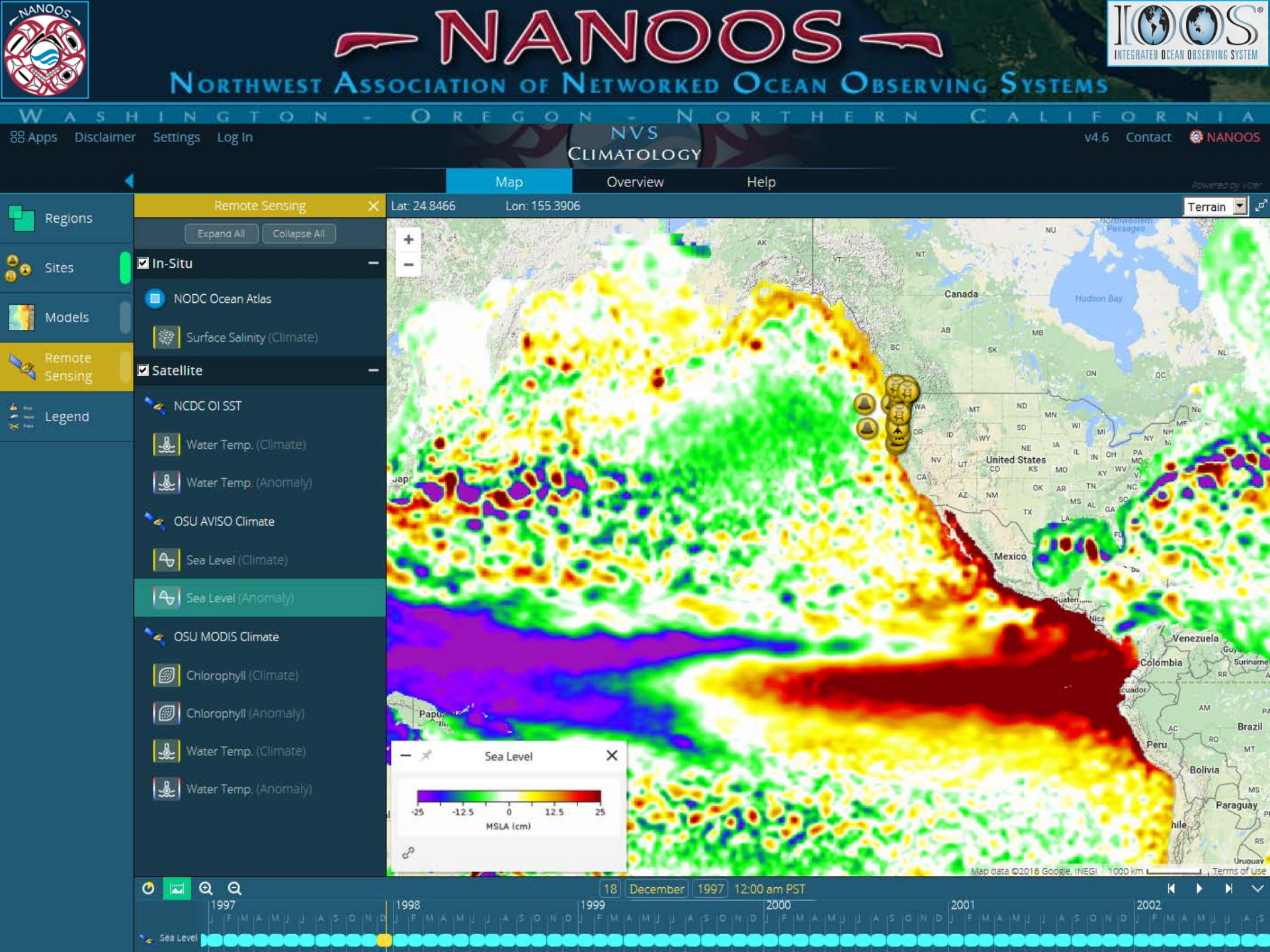
Retired Platforms
Values
Legend
Lat: 48.1384
Lon: -122.6740
Terrain
WSDOT Pt. Townsend / Coupeville Ferry
Details
Credits
Type: Ferry
Region: Puget Sound
State(s): Washington
Provider: WA Departement of Ecology
Data Source: APL-UW
Asset Class: MLOC
Asset ID: WSDOT_Ferry1
View Overlay of Prevailing Currents
Link
Fort Casey
Crockett Lake
Fort Casey State Park
Fort Casey Underwater Park
Port Townsend-Coupeville Ferry
Fort Worden State Park
Port Townsend
Fort Flagler State Park
1 August 2016 2:00 pm PDT
25 Jul 2016
26 Jul 2016
27 Jul 2016
28 Jul 2016
29 Jul 2016
30 Jul 2016
31 Jul 2016
1 Aug 2016
2 Aug 2016
3 Aug 2016
4 Aug 2016
5 Aug 2016
6 Aug 2016
7 Aug 2016
8 Aug 2016
Prevailing Currents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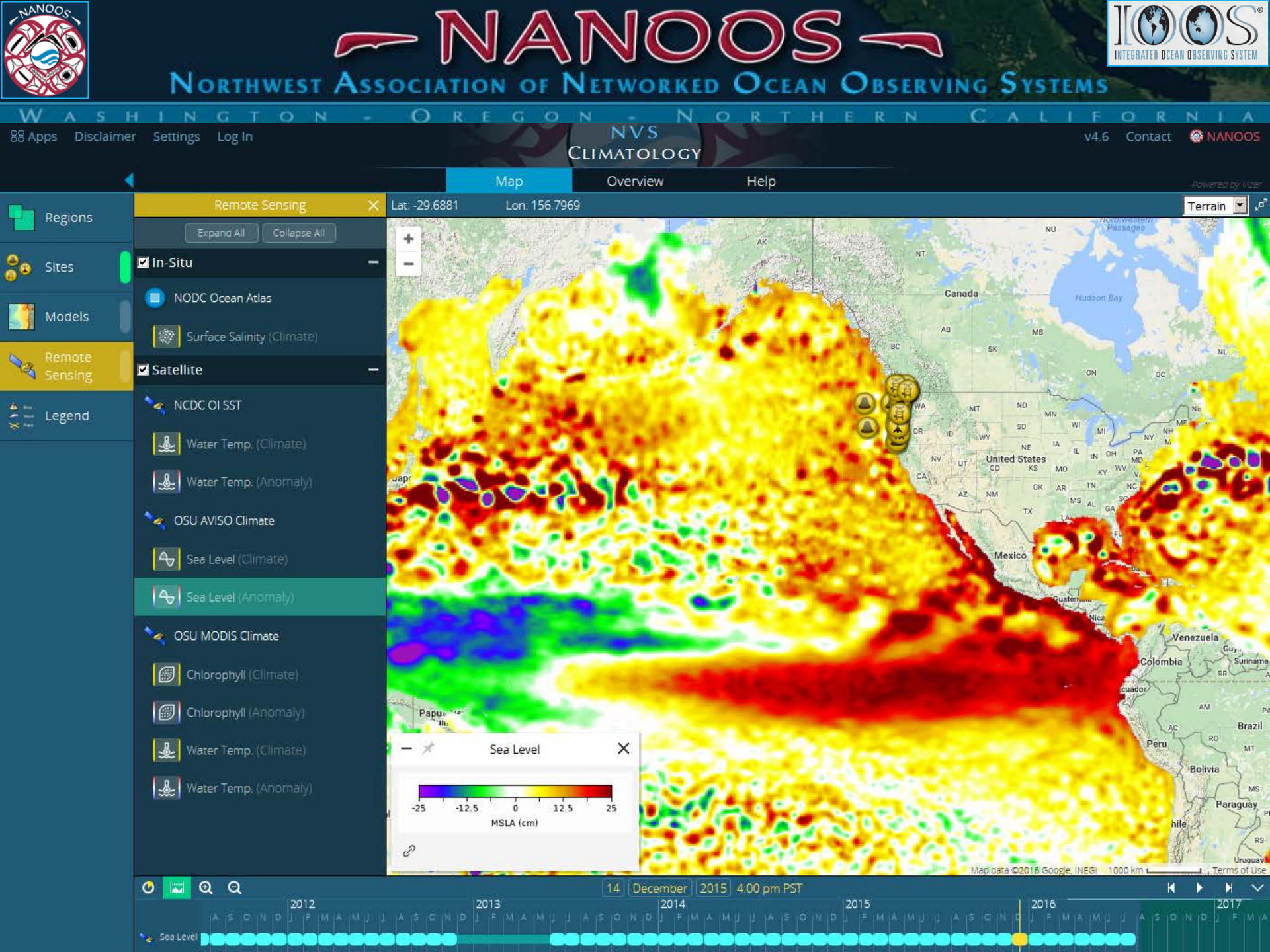
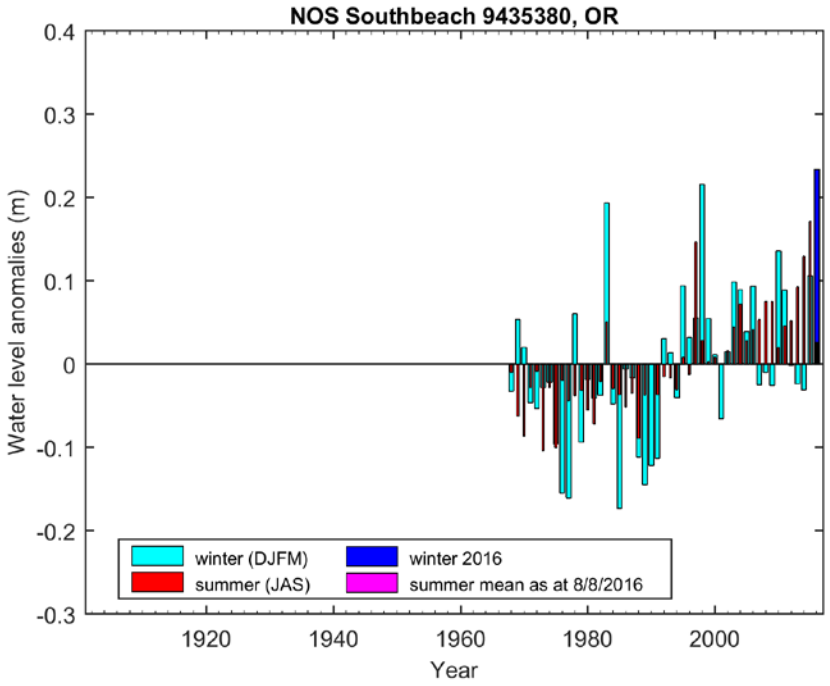
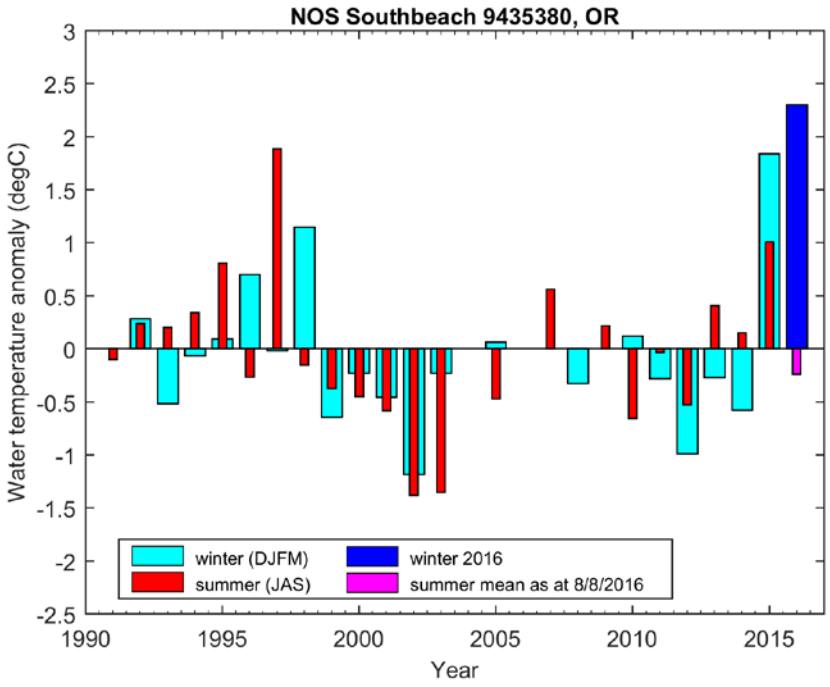
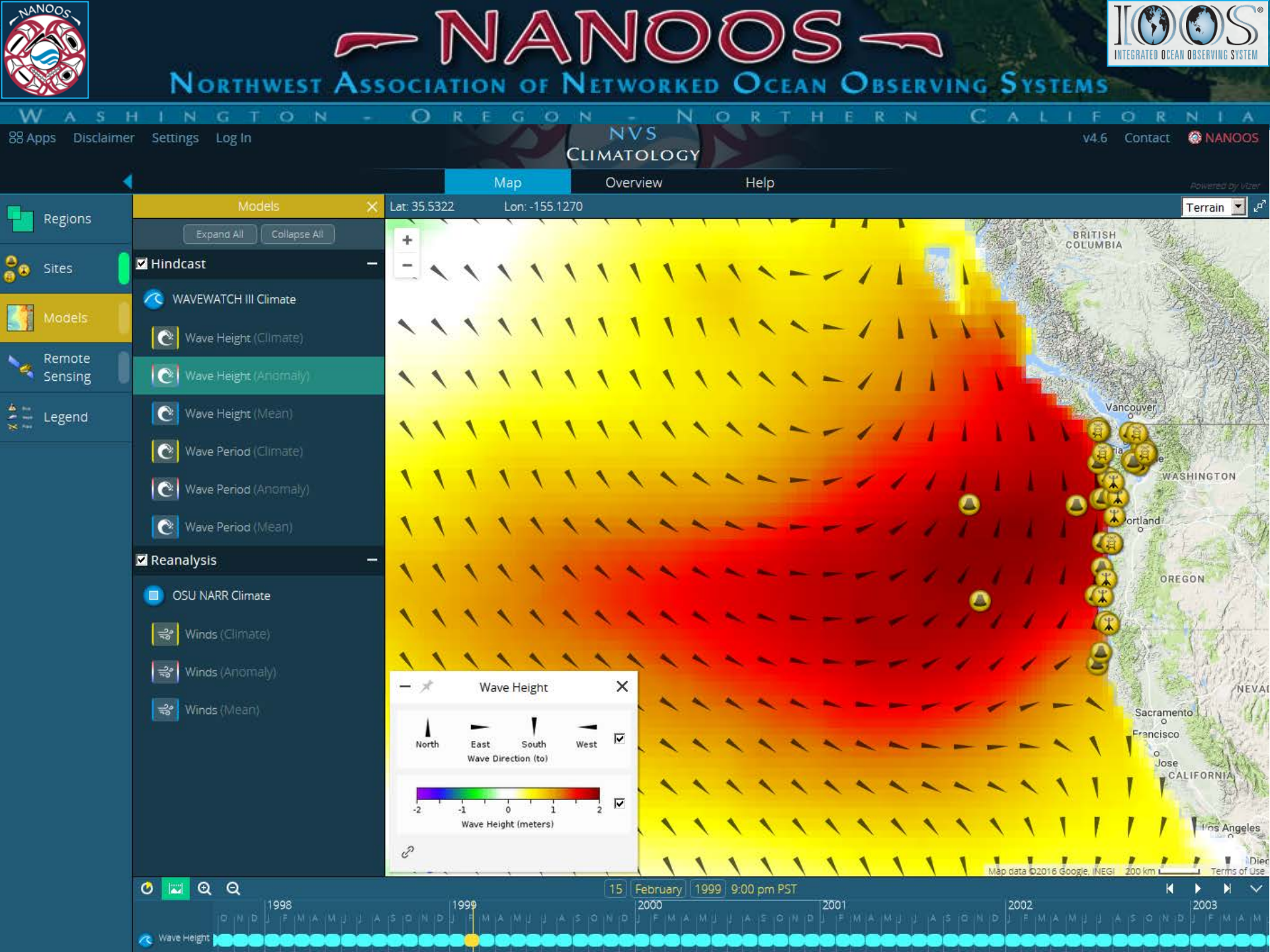
Remote Sensing
Expand All
Collapse All
In-Situ
NODC Ocean Atlas
Surface Salinity (Climate)
Satellite
NCDC OI SST
Water Temp. (Climate)
Water Temp. (Anomaly)
OSU AVISO Climate
Sea Level (Climate)
Sea Level (Anomaly)
OSU MODIS Climate
Chlorophyll (Climate)
Chlorophyll (Anomaly)
Water Temp. (Climate)
Water Temp. (Anomaly)
Lat: 24.8466
Lon: 155.3906
Terrain
Canada
United States
Mexico
Sea Level
-25
-12.5
0
12.5
25
MSLA (cm)
Map data ©2016 Google, INEGI
1000 km
Terms of Use
18
December
1997
12:00 am PST
1997
1998
1999
2000
2001
2002
Sea Level


NANOOS
Northwest Association of Networked Ocean Observing Systems
Washington - Oregon - Northern California
IOOS
Integrated Ocean Observing System
Apps
Disclaimer
Settings
Log In
NVS
Climatology
v4.6
Contact
NANOOS
Map
Overview
Help
Regions
Sites
Models
Remote Sensing
Legend
Remote Sensing
Expand All
Collapse All
In-Situ
NODC Ocean Atlas
Surface Salinity (Climate)
Satellite
NCDC OI SST
Water Temp. (Climate)
Water Temp. (Anomaly)
OSU AVISO Climate
Sea Level (Climate)
Sea Level (Anomaly)
OSU MODIS Climate
Chlorophyll (Climate)
Chlorophyll (Anomaly)
Water Temp. (Climate)
Water Temp. (Anomaly)
Lat: -29.6881
Lon: 156.7969
Terrain
Canada
United States
Mexico
Sea Level
-25
-12.5
0
12.5
25
MSLA (cm)
Map data ©2016 Google, INEGI
1000 km
Terms of Use
14
December
2015
4:00 pm PST
2012
2013
2014
2015
2016
2017
Sea Level


NOS Southbeach 9435380, OR
Water level anomalies (m)
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
1920
1940
1960
1980
2000
Year
winter (DJFM)
summer (JAS)
winter 2016
summer mean as at 8/8/2016


NOS Southbeach 9435380, OR
Water temperature anomaly (degC)
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
1990
1995
2000
2005
2010
2015
Year
winter (DJFM)
summer (JAS)
winter 2016
summer mean as at 8/8/2016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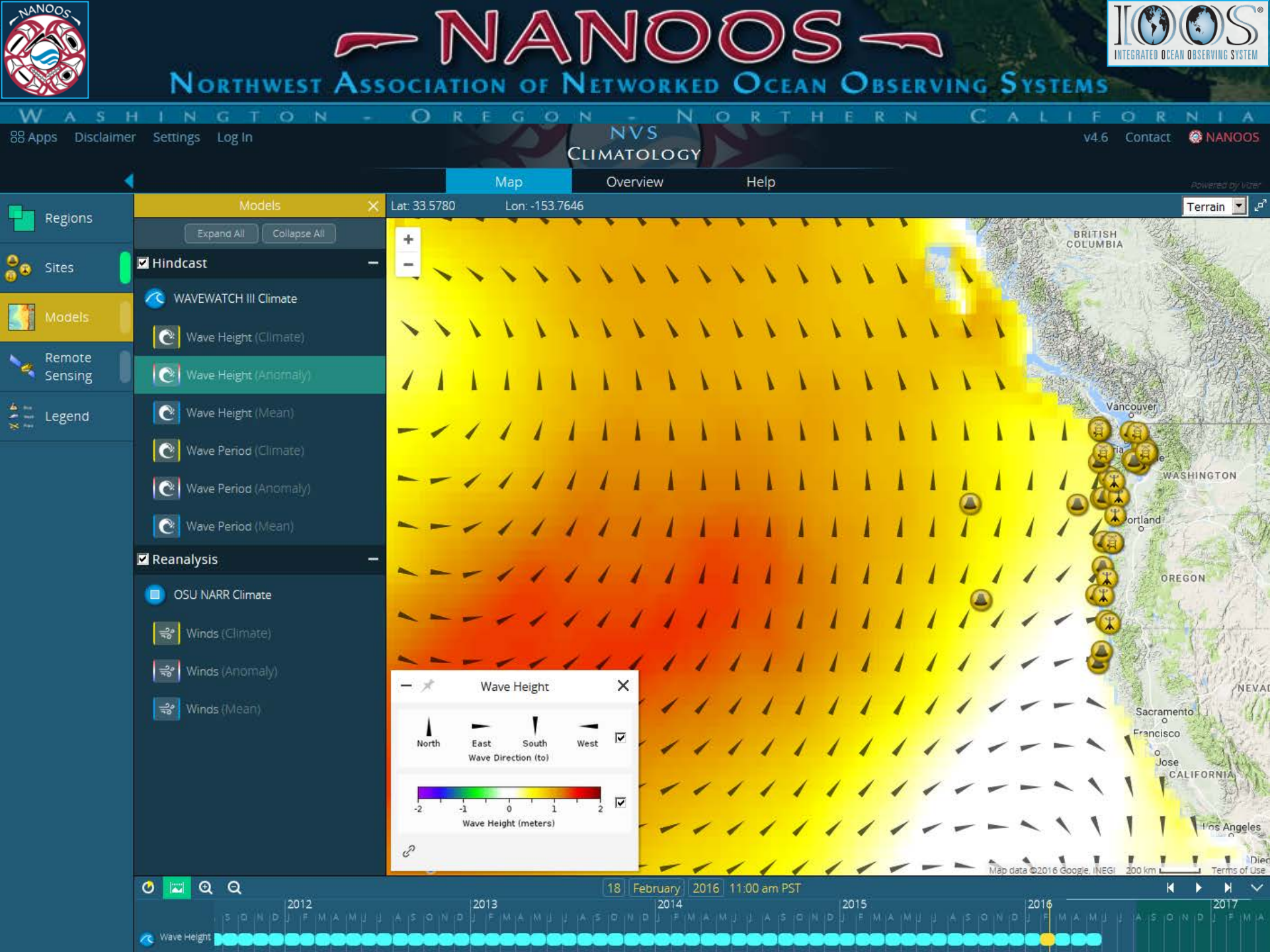
Legend
Models
Expand All
Collapse All
Hindcast
WAVEWATCH III Climate
Wave Height (Climate)
Wave Height (Anomaly)
Wave Height (Mean)
Wave Period (Climate)
Wave Period (Anomaly)
Wave Period (Mean)
Reanalysis
OSU NARR Climate
Winds (Climate)
Winds (Anomaly)
Winds (Mean)
Lat: 35.5322
Lon: -155.1270
Terrain
Wave Height
North
East
South
West
Wave Direction (to)
-2
-1
0
1
2
Wave Height (meters)
BRITISH COLUMBIA
Vancouver
WASHINGTON
Portland
OREGON
Sacramento
Francisco
Jose
CALIFORNIA
Los Angeles
Map data ©2016 Google, INEGI
200 km
Terms of Use
15
February
1999
9:00 pm PST
1998
1999
2000
2001
2002
2003
Wave Height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Wave Height (Climate)
Wave Height (Anomaly)
Wave Height (Mean)
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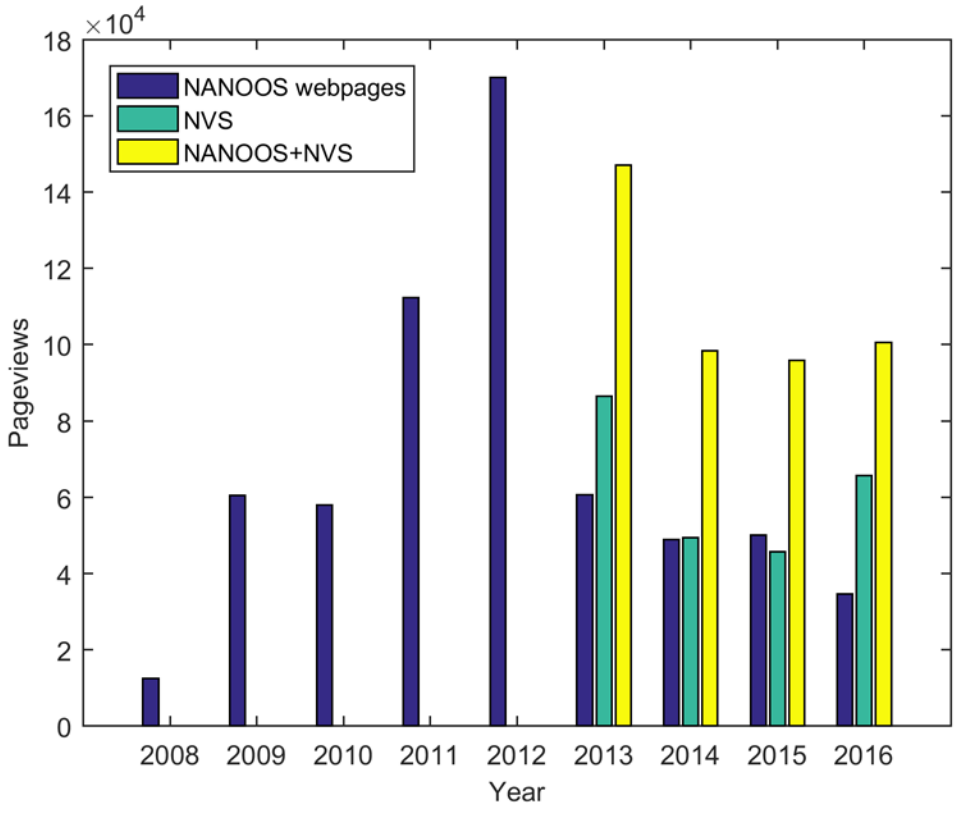
Wave Period (Anomaly)
Wave Period (Mean)
Reanalysis
OSU NARR Climate
Winds (Climate)
Winds (Anomaly)
Winds (Mean)
Lat: 33.5780
Lon: -153.7646
Terrain
Wave Height
North
East
South
West
Wave Direction (to)
-2
-1
0
1
2
Wave Height (meters)
BRITISH COLUMBIA
Vancouver
WASHINGTON
Portland
OREGON
Sacramento
Francisco
Jose
CALIFORNIA
Los Angeles
Map data ©2016 Google, INEGI
200 km
Terms of Use
18
February
2016
11:00 am PST
2012
2013
2014
2015
2016
2017
Wave Height

How are we doing & which apps?



Apps	Pageviews	%
Tunafish	61997	25.06
TsunamiEvac	55618	22.48
Explorer	38021	15.37
Shellfish Growers	3359	1.36
Climatology	3246	1.31
Boaters	2912	1.18
BeachMapping	2487	1.01
Prism Cruise	2423	0.98
Maritime Ops	2284	0.92
Gliders	1959	0.79
HF Radar	1353	0.55
Misc (individual assets)	7605	3.07
Misc (settings etc)	64102	25.91

247366 pageviews in NVS as of 08/08/16
+ 607491 in NANOOS

Future Goals

1. Roll out situational awareness capability;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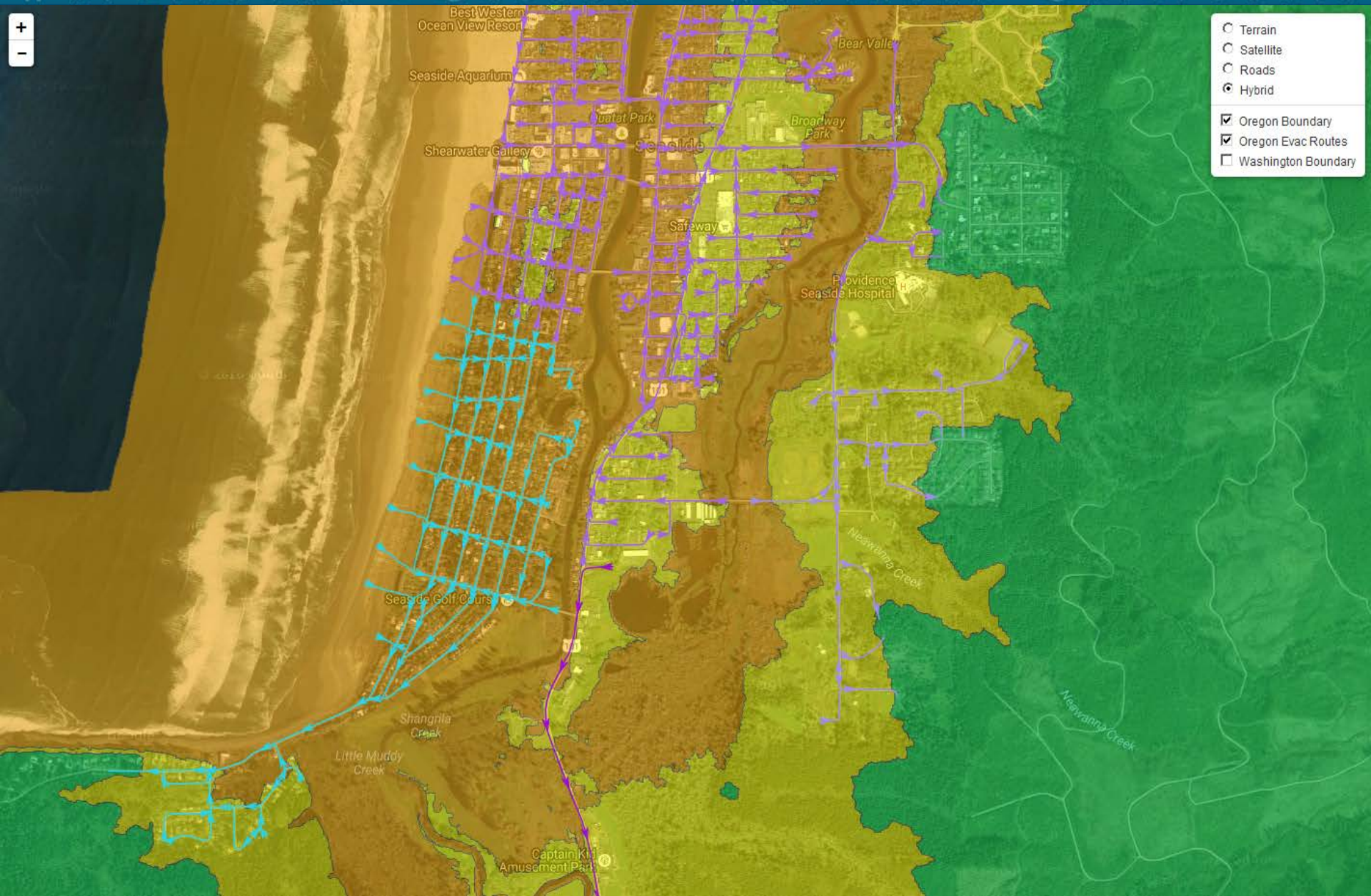
Settings
Log Out
NVS
Data Explorer
jcallan
v4.7
Contact
NANOOS
Map
Asset List
Help
Regions
Filters
Fixed Platforms
Mobile Platforms
Remote Sensing
Models
Retired Platforms
Values
Legend
Values
Air Temperature
Barometric Pressure
Water Temperature
Waves
Winds
Lat: 50.3595
Lon: -117.2021
Terrain
16 °C
17 °C
13 °C
16 °C
9 °C
Vancouver Island
Vancouver
Nanaimo
Surrey
Victoria
Kelowna
Kootenai National Forest
Mt. Baker-Snoqualmie National Forest
Spokane
Coeur d'Alene
WASHINGTON
Yakima
Kennewick
Salem
Eugene
Bend
OREGON
Boise
Nampa
Medford
Redding
Reno
NEVADA
5 August 2016 4:00 pm PDT
Jul 2016
Aug 2016
Water Temperature
Map data ©2016 Google, INEGI
100 km
Terms of Use

Future Goals

1. Roll out situational awareness capability;
2. Improvements to the tsunami evacuation app. New layers that include:
    a. Detailed evacuation routes
    b. Evacuation communities
    c. Make your own evacuation map (print to pdf). Funding from NTHMP in 2016


Terrain
Satellite
Roads
Hybrid
Oregon Boundary
Oregon Evac Routes
Washington Boundary
Best Western Ocean View Resort
Seaside Aquarium
Bear Valley
Broadway Park
Shearwater Gallery
Safeway
Providence Seaside Hospital
Seaside Golf Course
Shangrila Creek
Little Muddy Creek
Neawanna Creek
Captain Kid Amusement Park

Future Goals

1. Roll out situational awareness capability (very soon);
2. Improvements to the tsunami evacuation app. New layers that include:
    a. Detailed evacuation routes
    b. Evacuation communities
    c. Make your own evacuation map (print to pdf). Funding from NTHMP in 2016
3. NVS Explorer mobile app for iPhone and Android (very soon)
    - Update TsunamiEvac app (2017?)
4. Create plotting tool for dealing with variable/depth/time plots
5. Continue with NVS updates and enhancements (e.g. user route maps, bathy contour overlay, lat/long graticules, visualization of mobile platforms, etc.)
6. Hold a stakeholder meeting in 2017 (anticipate holding such a meeting on the central Oregon coast (probably Newport) and/or Coos Bay. Goal:
    a. Inform our stakeholders… we have much to show!
    b. We need input on what's working and what's not;

Questions?

NANOOS
Data Management and Communications (DMAC)
presentation to NANOOS Principal Investigators & Governing Council
August 11, 2016

NANOOS DMAC chair:
Emilio Mayorga –
UW-APL

NANOOS DMAC Focus Team:

Emilio Mayorga – UW/APL, Chair
Craig Risien – OSU
Charles Seaton – OHSU/CMOP
(Don Setiawan – UW/APL)

Part of broader DMAC-UPC-Web-Outreach team. But with focused interactions to give sustained attention to "low-level" DMAC issues and IOOS DMAC compliance.

- Close interactions with: Jon Allan (DOGAMI) & Troy Tanner (UW/APL)
- Also: Sky Bradley & Alex Dioso – UW/APL (System Administration, software development support); and others, ad hoc

DMAC Events, Broader engagement

- (Monthly) NANOOS DMAC calls (Emilio, Craig & Charles)
- Annual NANOOS “Tri-Com” meeting (March 2016, Seattle)
- IOOS DMAC Workshop (June 2016)
- Community engagement:
  - QARTOD: DMAC Implementation Working Group; QA/QC workshop at CERF (Nov, Portland); Glider DAC Manual for T & Salt. Data (Beth Curry)
  - MEOPAR Data Management Forum (“Canadian IOOS”, Nov, Montreal)
  - Global Ocean Acidification Observation Network meeting (May, Australia)
  - OOI (Craig & Emilio; data integration engagement)
  - Continued WCGA Ocean Data Network engagement

New or Enhanced Assets

http://nvs.nanoos.org/AssetHistory

- **In situ, fixed**
  - Quilcene, Dabob Bay (Penn Cove Shellfish, WA DNR & UW FHL)
  - Se'lhaem Bellingham Bay (NANOOS, NWIC)
  - CDIP buoy at Humboldt Bay
  - Quadra Island, Strait of Georgia ("Burkolator" from Hakai Institute)
  - NEMO ESP, HABs monitoring (NANOOS, NOAA NWFSC, UW)
  - 3 new WADOH sites, Puget Sound
  - OOI Coastal Endurance Array, 6 moorings
- **Mobile platforms**
  - Port Townsend - Coupeville Ferry, overlays (WA Ecology/DOT, UW; new capability)
  - Victoria Clipper, plots (WA Ecology; new capability)
  - La Push Seaglider, via greatly enhanced App
- **Overlays (remote sensing, models, reanalysis)**
  - *Many* updates – new variables, extended temporal and spatial domains, anomalies, recalculated climatologies
  - OSU ROMS enhancements
  - WaveWatch3 climatology, anomalies, means

Ocean Acidification Data Activities

- **IPACOA** (http://www.ipacoa.org)
  - NERRS sites across the region.
  - Integrated CariCOOS OA assets in Puerto Rico (PMEL, NERRS)
  - Ongoing maintenance, extension. Engagement and technical support, collaboration, with SCCOOS, CeNCOOS, AOOS.
- Ongoing support for OA monitoring in **NANOOS region**.
- NANOOS lead role in **international** "GOA-ON" global adaptation of IPACOA approach, tools.

NANOOS DMAC presence

- NVS!
- Active code collaborations and discussions via “github” open-source code engagement system
- Centralized services: http://data.nanoos.org. Consistent, stable organization of web services for programmatic access
  - http://data.nanoos.org/52nsos/sos
  - http://data.nanoos.org/geoserver
  - http://data.nanoos.org/metadata
  - *More coming, including more user friendly presentations*
- Distributed services: Compliant THREDDS services at OSU and OHSU/CMOP. Currently mainly model output, but expanding soon to in-situ observations.
- At National & Regional Catalogs, Resources
  - IOOS Registry, Catalog and new Viewers (but changing systems ...)
  - NOAA SWFSC CoastWatch ERDDAP
  - NDBC
  - WCGA Ocean Data Portal catalog
  - IPACOA

IOOS Catalog

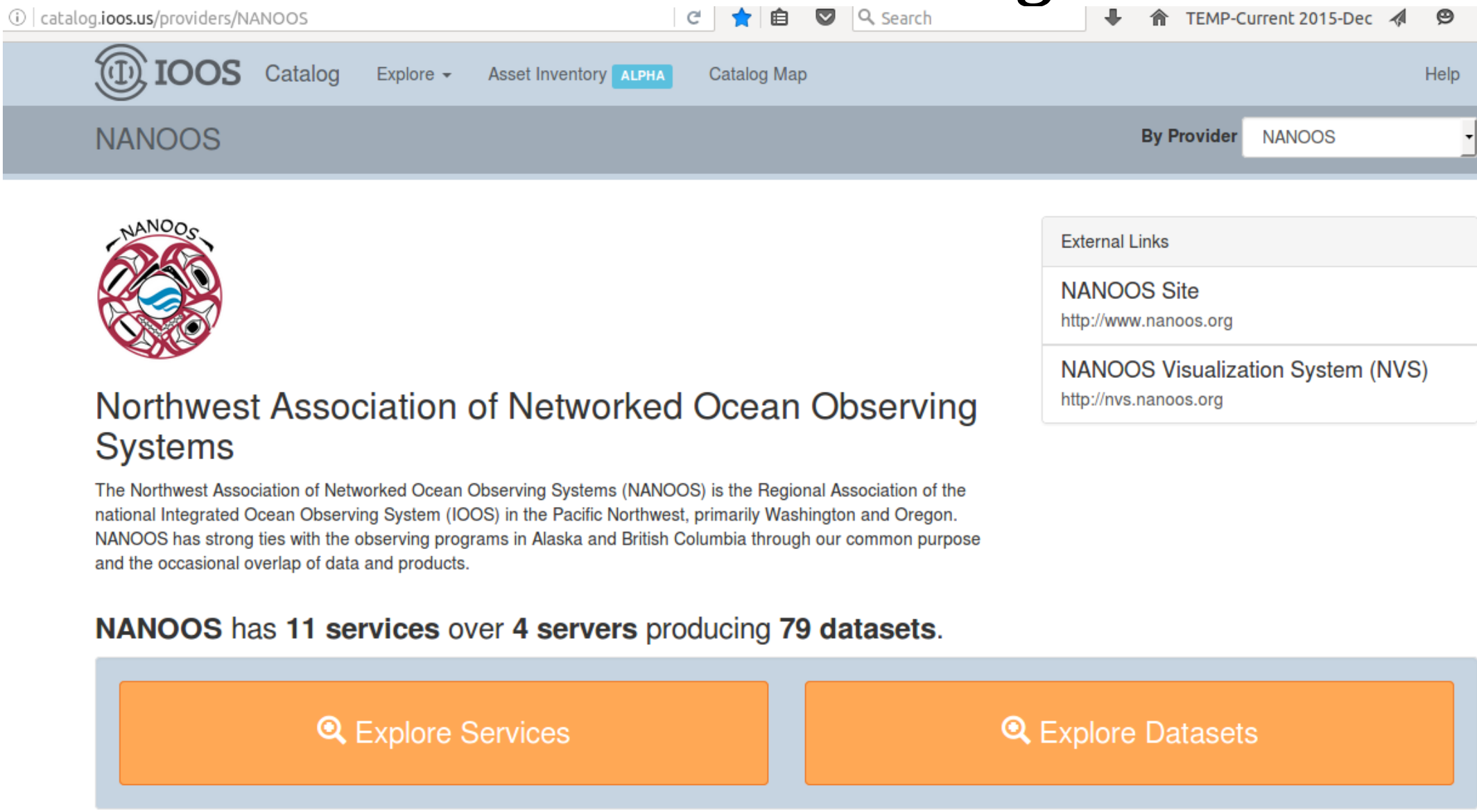
- Expanding, improved NANOOS registration, metadata for IOOS DMAC compliant data services for **observations** ("NVS-based" SOS service, at UW/APL), **models** (OSU ROMS model and CMOP SELFE model, at OSU & CMOP THREDDS servers), and **climatologies/anomalies** (OSU/NOAA SWFSC).
- Glider DAC:
  - OSU NANOOS-CeNCOOS glider (current and previous deployment)
  - CMOP glider (complete archive submitted in 2015)
  - UW-APL La Push glider: development work, ready to submit deployment archive **next week**

NANOOS

Northwest Association of Networked Ocean Observing Systems

Washington - Oregon - Northern California

"Old" IOOS Catalog, Now "IOOS Monitoring"?



NANOOS

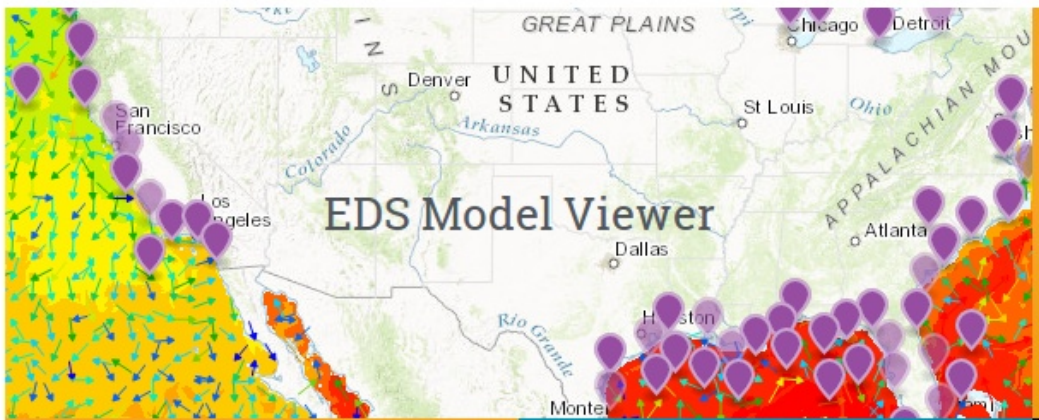
NORTHWEST ASSOCIATION OF NETWORKED OCEAN OBSERVING SYSTEMS

WASHINGTON - OREGON - NORTHERN CALIFORNIA

IOOS DMAC, Changing Landscape of Visible Resources, Applications

IOOS | Integrated Ocean Observing System

IOOS DATA VIEWERS DACS REGIONAL ASSOCIATIONS ABOUT



IOOS By The Numbers

Data Discovery

Coastal and Ocean Modeling Testbed

NANOOS

data.ioos.us

Search

TEMP-Current 2015-Dec

Log in | Register

IOOS Integrated Ocean Observing System

Datasets Organizations Groups About

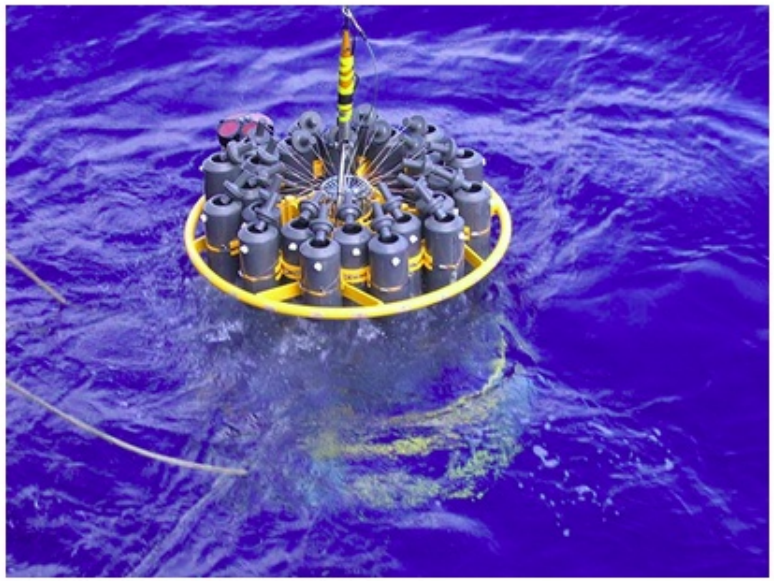
Search

Search data

E.g. environment

Popular tags: longitude, latitude, time

Welcome to the IOOS Catalog



IOOS Catalog statistics

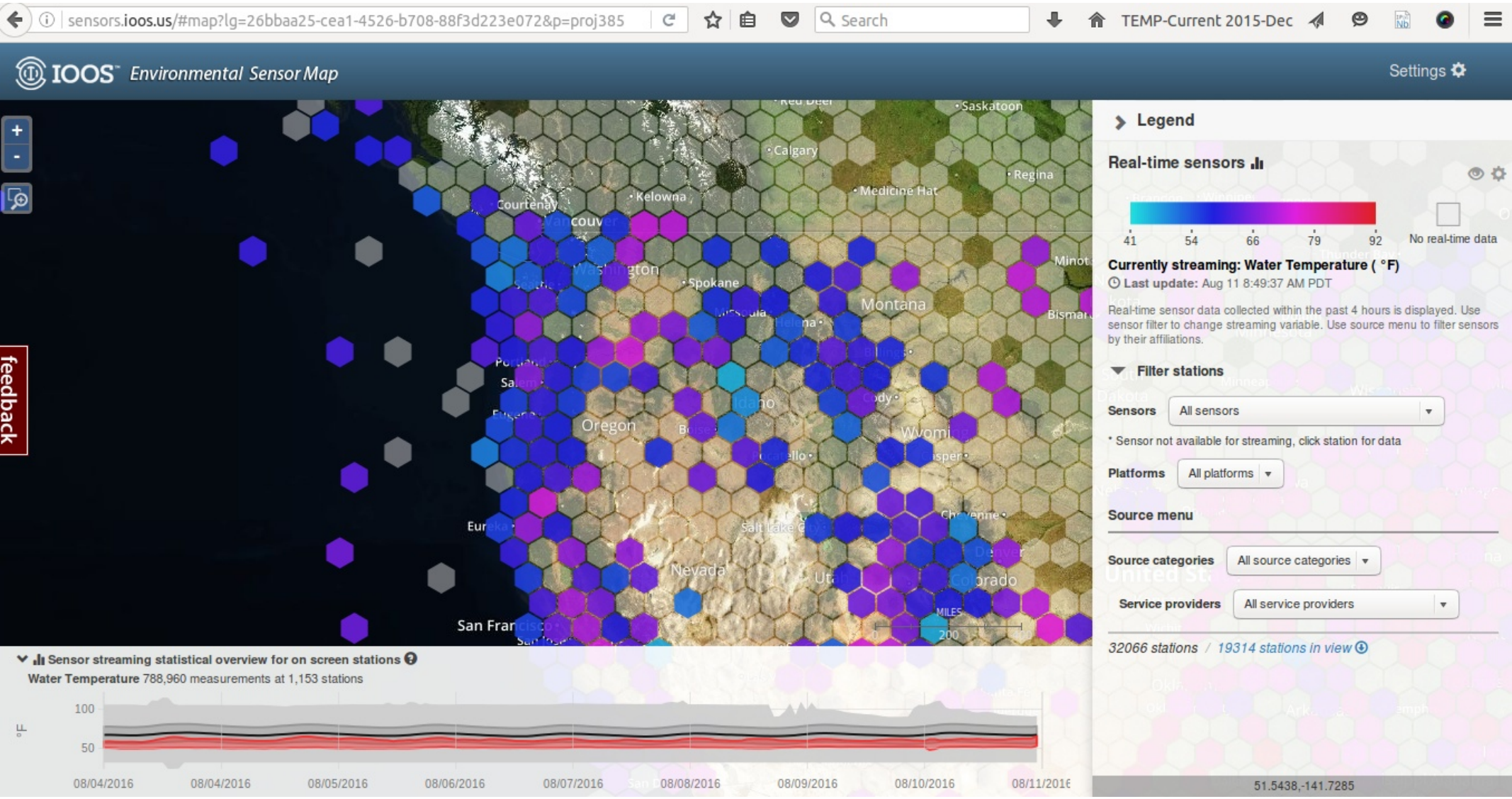
1.8k	20	0
datasets	organizations	groups

AOOS

Alaskan Ocean Observing System http://aoos.org/

Aquarius Level 3 Wind Speed Standard Mapped Image

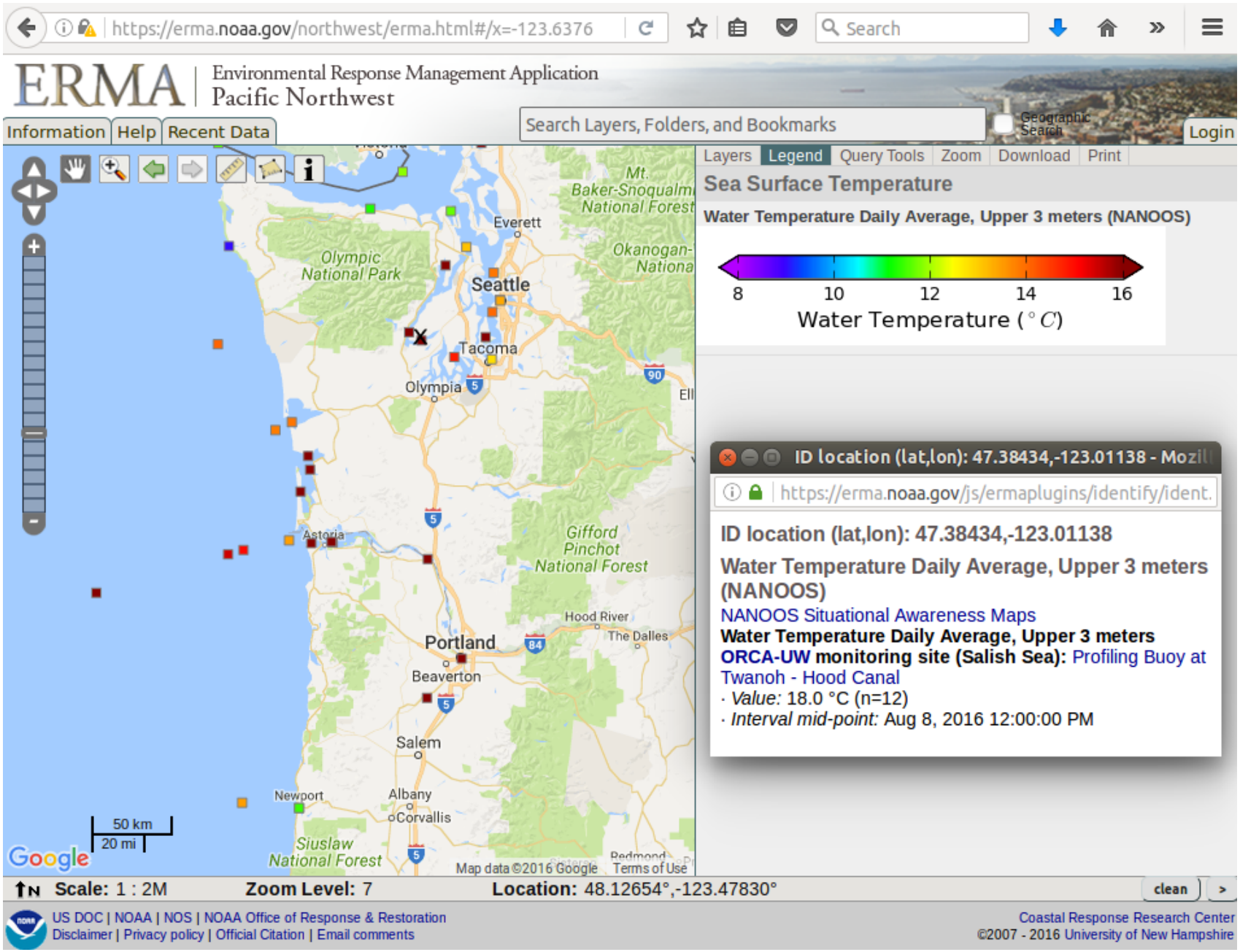
IOOS Environmental Sensor Map



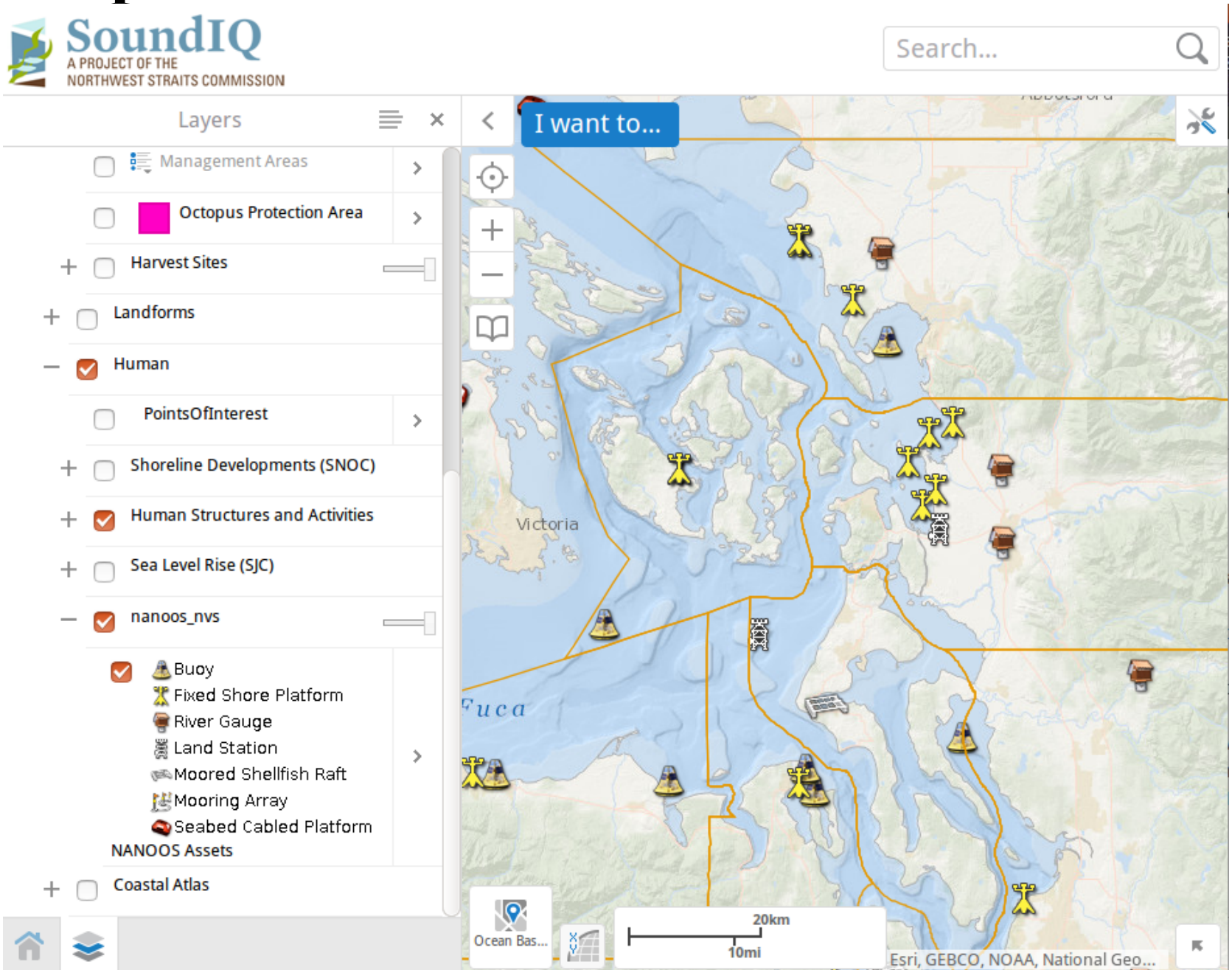
Expanding DMAC capabilities, compliance

- **Ongoing enhancements to NANOOS web services, registration with IOOS Catalog.** Expand integration of observation data, models, data products.
- **Long time series**. Big push last 12 months to develop data storage conventions for multiple use. *Goal to make data available via IOOS DMAC services and accessible to NVS*. Initial implementation within next 6 months.
- **Data Archiving with NCEI.** Pilot project with CMOP, to be completed this Fall.
- **Glider data:**
  - Expanded Glider DAC presence (La Push glider soon)
  - Distribution via IOOS DMAC services, accessibility to NVS as standardized data and via new Glider App.
- **QARTOD near-real-time QA/QC.** Ongoing participation in IOOS QARTOD webinars, discussions. Pilot NANOOS implementation next 6-12 months.

Geospatial and other web services in action

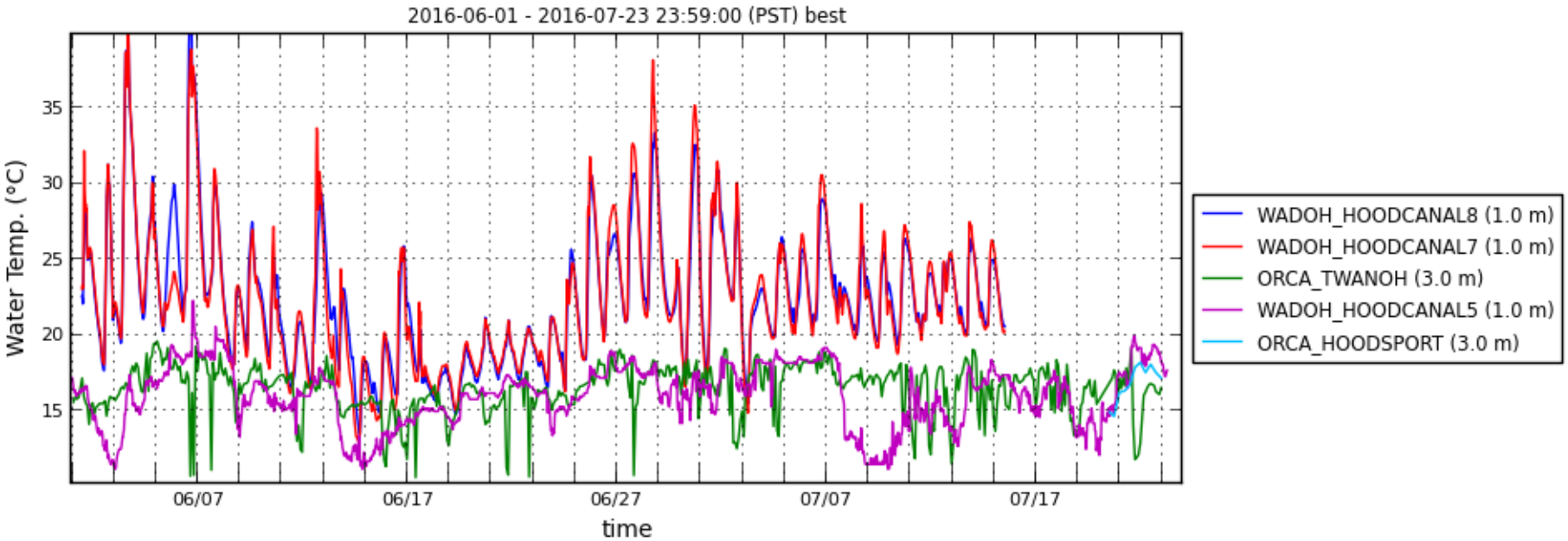


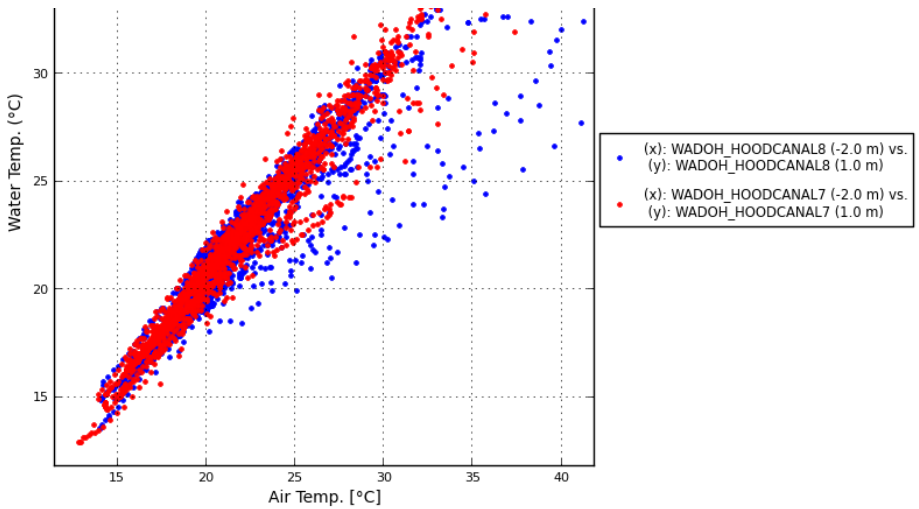
Geospatial and other web services in action



Geospatial and other web services in action

"CMOP Data Explorer with NANOOS/NVS Data"





NANOOS Education & Outreach Update

NANOOS Joint PI and Governing Council Meeting
August 11, 2016

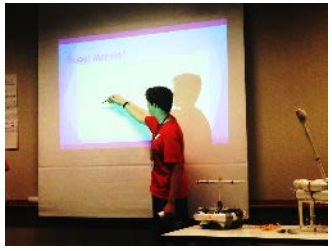
Amy Sprenger, Education & Outreach Coordinator
Rachel Wold, Outreach Specialist

Scope of Work

Product Development	Work with DMAC and User Products Committees on tailored product development, increase usability of NVS
User Engagement	Conduct outreach and trainings to select user groups as resources permit
Networking	Maintain existing and build new relationships with NANOOS priority area users and the education community

Education:

NANOOS goal remains increasing ocean literacy







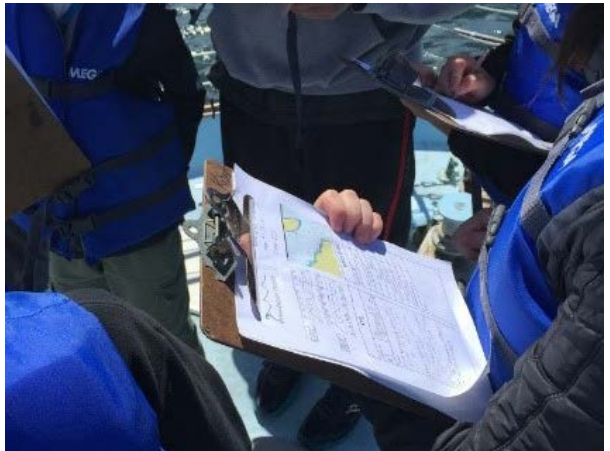


- NW Aquatic & Marine Educators Conferences
- Classroom Visits
- Educators and UG students on OA & Buoy cruises
- "Oregon Coast Education Program" Teacher Workshops
- MS & HS Summer Science Camps
- Outreach @ informal learning centers

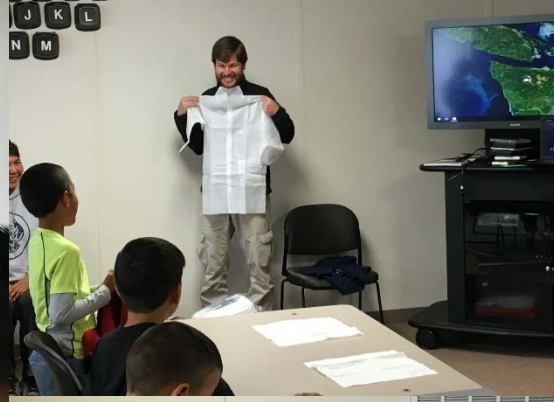
Oregon Coastal Education Program (OCEP)
Teacher Workshops and Curriculum Modules

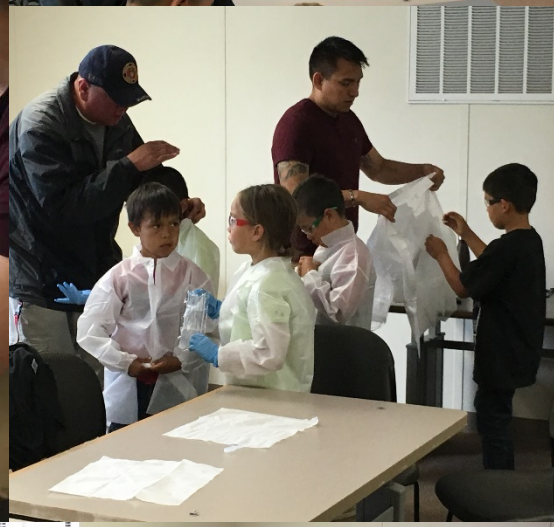
Cha'ba & NEMO cruise volunteers
Field experiences for undergraduates and educators

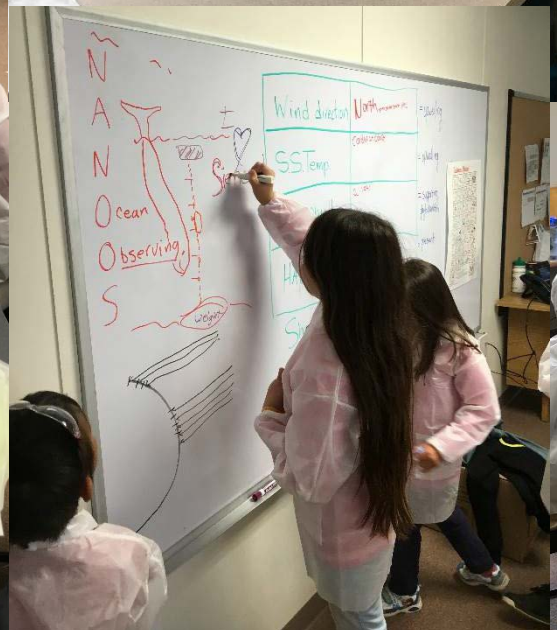
South Whidbey Ocean Observing Station (SWOOS)
Student participation in ocean observing



Quileute Tribal School
Summer School with
Northwest Indian College and
NANOOS
28-29 June 2016





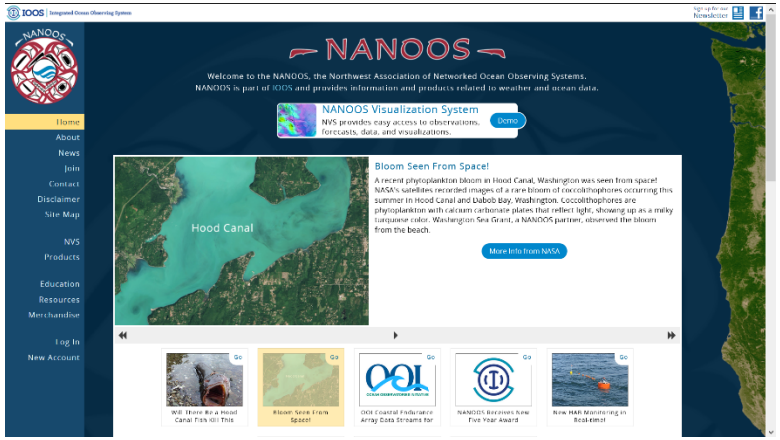


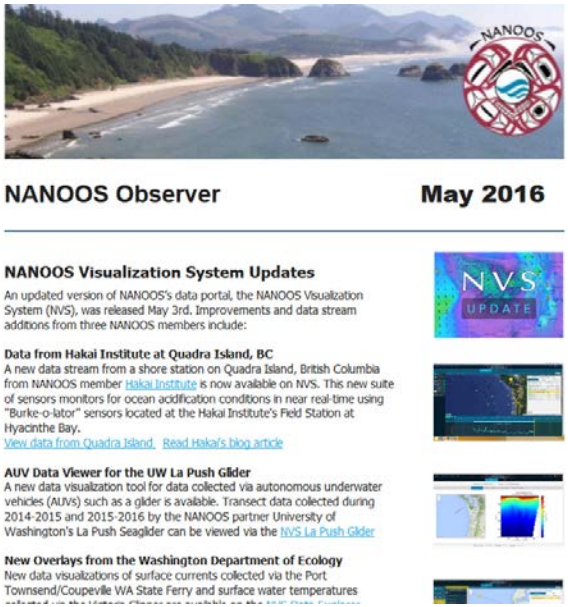
Outreach: targeted user groups

NANOOS goal to link user groups with data products

- Coastal & Estuarine Research Federation Conference
- Salish Sea Ecosystem Conference
- Pacific Coast Shellfish Growers Association Meeting
- Saltwater Sportsman's Show
- Pop-up Science Ocean Acidification event
- Coastal Marine Resources Summit
- Pacific Anomalies Workshop 2

Outreach: public





Plan for Upcoming Year

Education Efforts

- Continue to support NANOOS education partners
- Continue to support student built buoy and similar STEM projects

Outreach Efforts

- Continue to assist with development of web and mobile apps
- Continue outreach to current users groups, adding recreational boaters

6. GC Business

NANOOS business

- Fill vacancies/changes re elected NANOOS GC Board

- Identify how NANOOS pays annual $500 non-federal dues to IOOS Association
  - We thank Sea-Bird Scientific for $500 commitment, but dues went up to $1000

2013-17 NANOOS GC Board

Status prior to 2016 GC meeting:

Academic:

- David Martin, Governing Council Board Member for UW **(CHAIR)**
- Mike Kosro, Governing Council Board Member for OSU **(VICE CHAIR)**
- Antonio Baptista, Governing Council Board Member for OHSU

State:

- Carol Maloy, Governing Council Board Member for Washington State Agencies
- Jon Allan, DOGAMI, Governing Council Board Member for Oregon State Agencies

Tribes:

- Paul McCollum, Governing Council Board Member for Tribes
- Joe Schumacker, Governing Council Board Member for Tribes

Federal:

- John Stein, Governing Council Board Member for Washington Federal Offices
- Andy Lanier, Governing Council Board Member for Oregon Federal Offices

Industry:

- Margaret Barrette, PCSGA, Governing Council Board Member for Industry
- Andrew Barnard, WetLabs, Governing Council Board Member for Industry

NGO:

- Fritz Stahr, Governing Council Board Member for Non-Governmental Organizations
- Paul Dye, TNC, Governing Council Board Member for Non-Governmental Organizations

At Large:

- Vacant, Governing Council Board Member At-Large
- Chris Mooers, Governing Council Board Member At-Large

2013-17 NANOOS GC Board

Status after 2016 GC election:

Academic:

- David Martin, UW, Governing Council Board Member for UW **(CHAIR)**
- Mike Kosro, OSU, Governing Council Board Member for OSU **(VICE CHAIR)**
- Antonio Baptista, OHSU, Governing Council Board Member for OHSU

State:

- Carol Maloy, WA Ecology, Governing Council Board Member for Washington State Agencies
- Jon Allan, DOGAMI, Governing Council Board Member for Oregon State Agencies

Tribes:

- Paul McCollum, Port Gamble S'Klallam Tribe, Governing Council Board Member for Tribes
- Joe Schumacker, Quinault Indian Nation, Governing Council Board Member for Tribes

Federal:

- John Stein, NOAA, Governing Council Board Member for Washington Federal Offices
- Andy Lanier, ODLCD Governing Council Board Member for Oregon Federal Offices

Industry:

- Margaret Barrette, PCSGA, Governing Council Board Member for Industry
- Andrew Barnard, WetLabs, Governing Council Board Member for Industry

NGO:

- Fritz Stahr, OIP, Governing Council Board Member for Non-Governmental Organizations
- Gus Gates, Surfrider, acting Governing Council Board Member for Non-Governmental Organizations

At Large:

- Paul Dye, WA Sea Grant, Governing Council Board Member At-Large
- Chris Mooers, PSU, Governing Council Board Member At-Large

7. Round Table for announcements and feedback from GC members

8. Wrap-up and Adjourn