Global Ocean Acidification Observing Network (GOA-ON)

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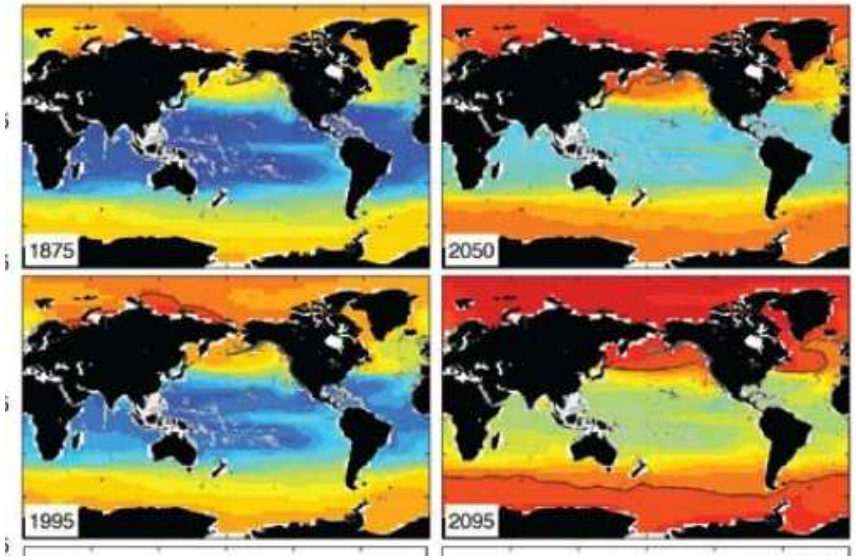
UN ICPOLOS Panel 3, June 18

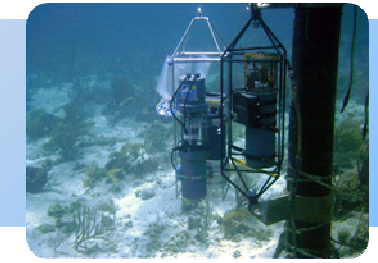


Aragonite Saturation State. Feely et al 2009

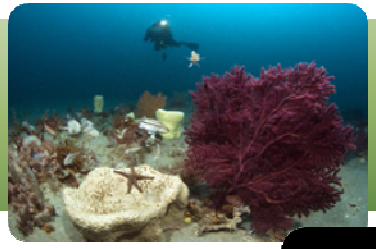
OCEAN ACIDIFICATION PROGRAM

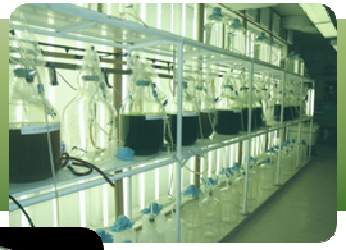
Ocean Acidification Research Agenda

Monitor/Observe trends

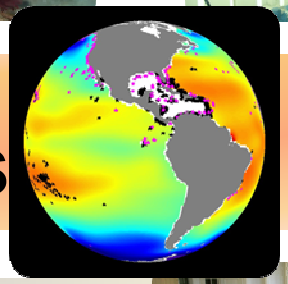


Ecosystem Impacts





Model changes & responses



Develop adaptation strategies

Conduct education and outreach

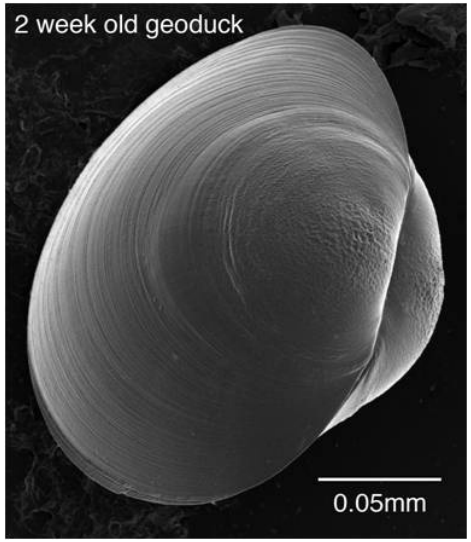
Data management and synthesis

Know your #s!

- Temperature
- Blood pressure
- Weight

Know our OA #s

- Saturation state: $\Omega_{phase} = \frac{[Ca^{2+}][CO_3^{2-}]}{K^*_{sp,phase}}$
- Atmospheric CO_2 dissolving in water: $H_2O+CO_2 \Rightarrow HCO_3 \Rightarrow H^+ + HCO_2^-$



Geoduck Larvae

King Crab Larvae

Fish Larvae

OBSERVING NETWORK EVOLUTION

OA Observing Buoy

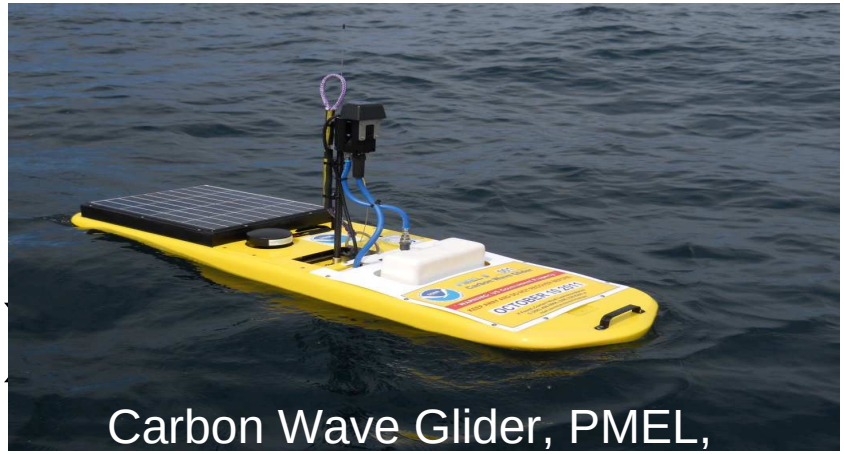
- Global Ocean Acidification Observing Network proposed as project for the newly forming OA International Coordination Centre (OA-ICC)
- Rio+20 highlighted importance of marine scientific research, monitoring and observation of OA. OA-ICC announced.
- First organizational meeting for network held in June 2012 in Seattle (sponsored by NOAA, IOOS, GOOS, IOCCP, University of Washington)
- Second mtg to be held July 24 – 26, 2013 in Edinburgh, Scotland at St Andrews (sponsored by UK, NOAA, ICC, GOOS and IOCCP)
- Network being coordinated with: Global Ocean Observing System, International Ocean Carbon Coordination Project, and Group on Earth Observations.

What does the Global OA Observing Network need to provide?

- **Goal 1** Provide an understanding of **global OA** conditions:
  - Determine status of and spatial and temporal patterns in carbon chemistry, assessing the generality of response to OA;
  - Document and evaluate variation in carbon chemistry to infer mechanisms (including biological mechanisms) driving OA conditions;
  - Quantify rates of change, trends, and identify areas of heightened vulnerability or resilience.
- **Goal 2** Provide an understanding of **ecosystem response to OA**:
  - Track biological responses in concert with physical/chemical changes;
  - Quantify rates of change and identify locations as well as species of heighted vulnerability or resilience.
- **Goal 3** Provide data necessary to **optimize modeling for OA:**
  - Provide spatially and temporally resolved biogeochemical data for use in parameterizing and validating models including initial and boundary conditions;
  - Guide Goals 1 and 2 through improved model outputs in an iterative fashion.

To understand OA

- Temperature
- Salinity
- Pressure (depth)
- Oxygen
- Carbonate-system constraint (pH, pCO2, Alkalinity, DIC – 2 of these)
- Fluorescence (where possible)
- Irradiance (where possible)

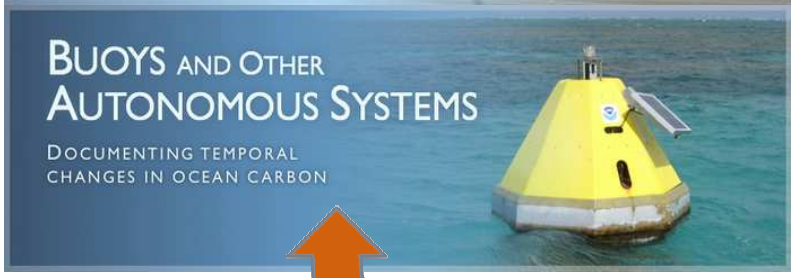


Carbon Wave Glider, PMEL,

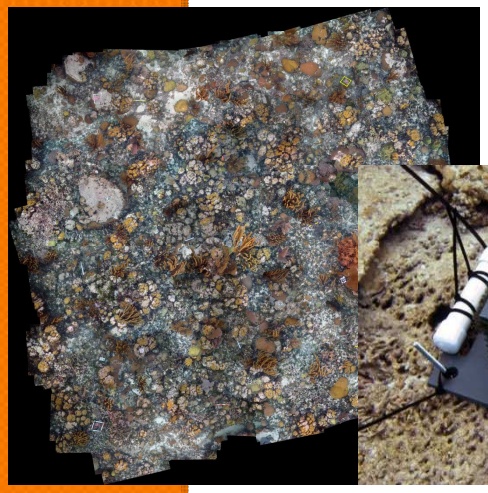
Observing Methods

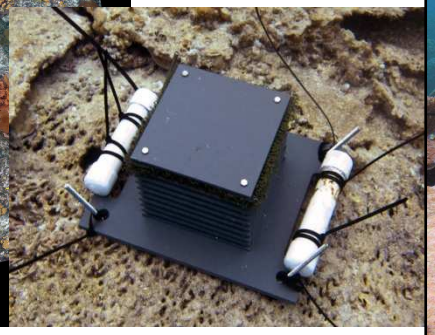
Chemistry

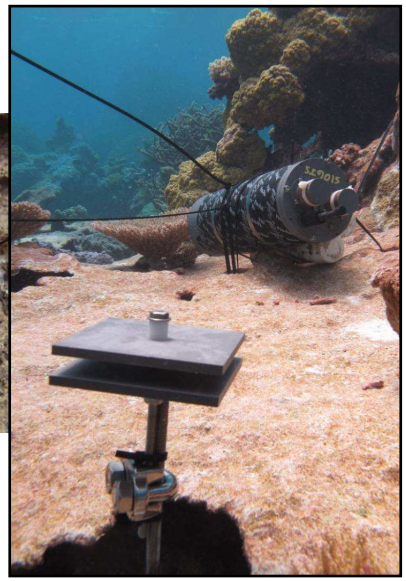
Ecosystem

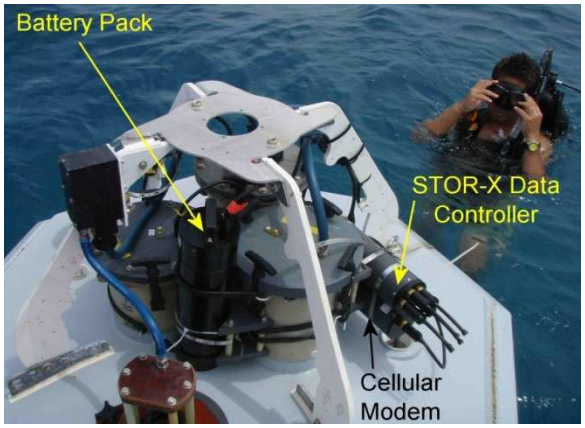


Reef Monitoring Cross-disciplinary





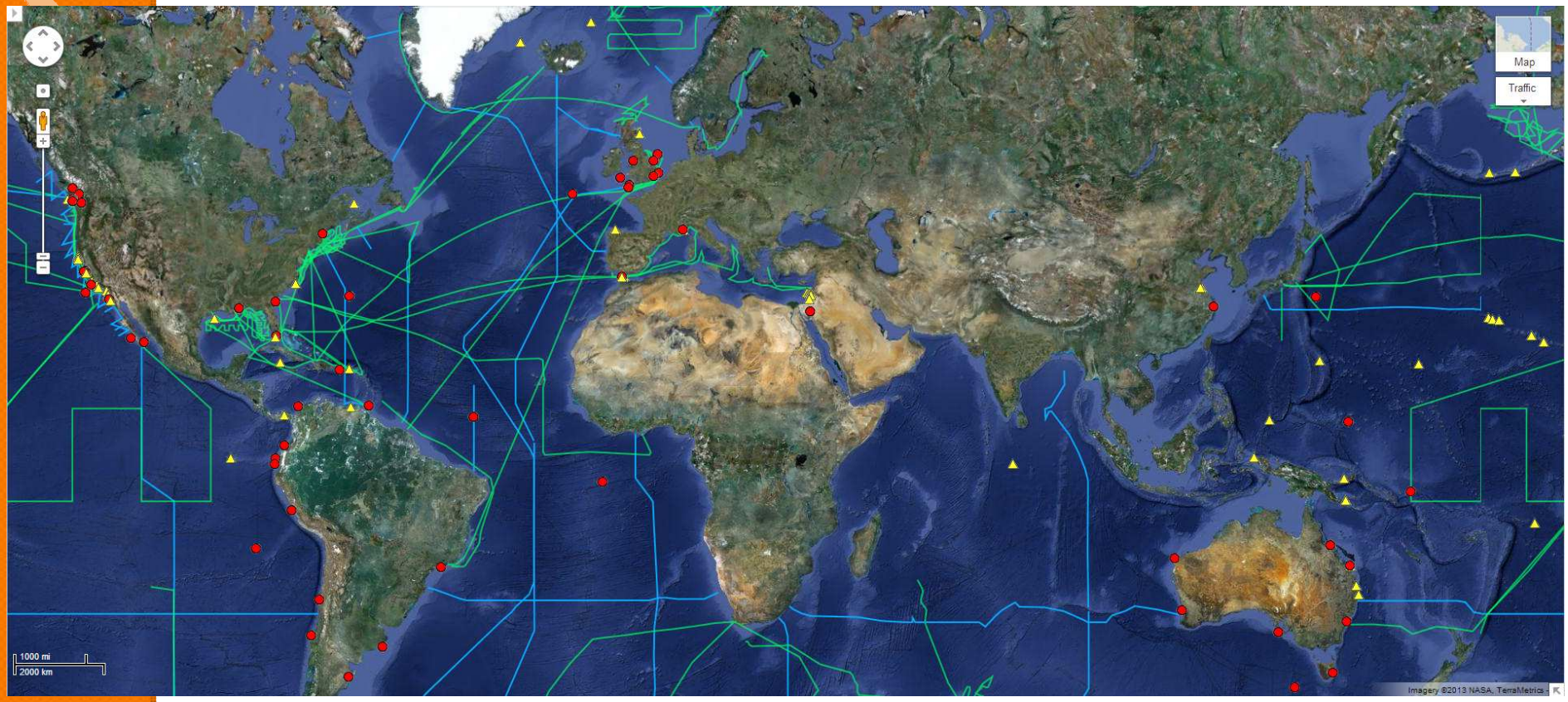




Given world-wide limited economic resources and the pressing need for information about what will happen to the ocean and all the services it provides us, we need to coordinate our approaches.

Why Take a Global Approach

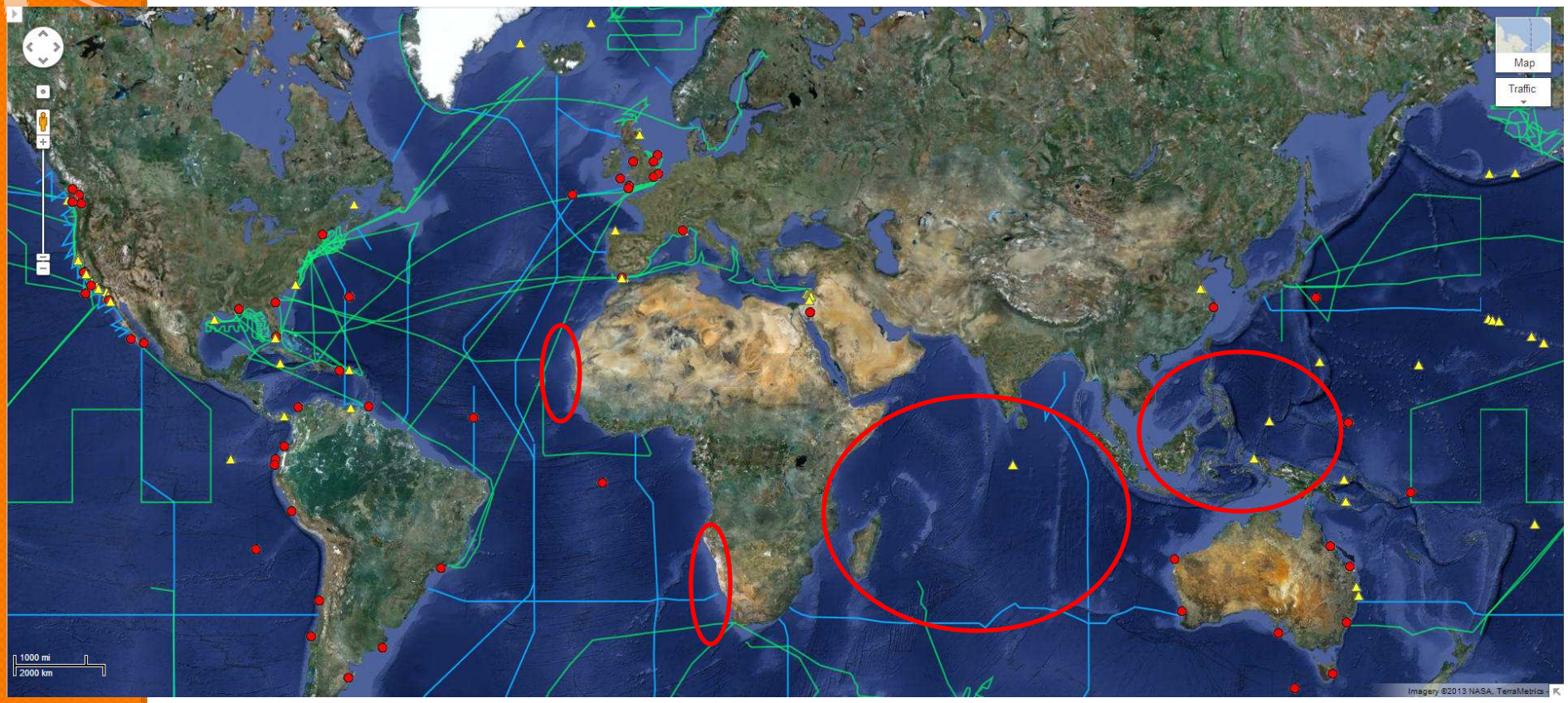
Current Status of Global OA Observing Network



Deployed Mooring — VOS Cruise — Hydrography Cruise

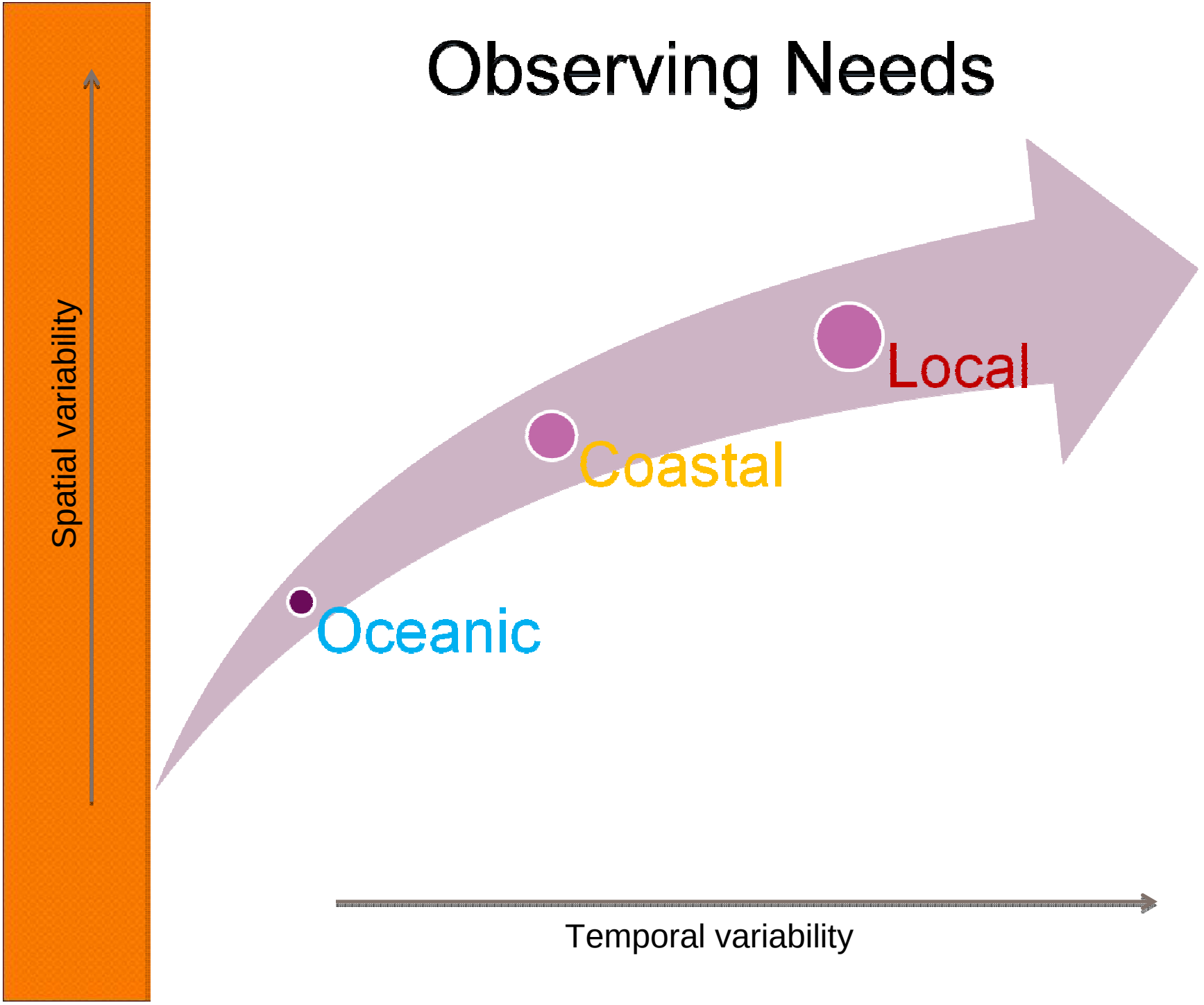
Float / Pier / Ship-Based Time Series

Some Observing Gaps



Deployed Mooring VOS Cruise Hydrography Cruise
Float / Pier / Ship-Based Time Series

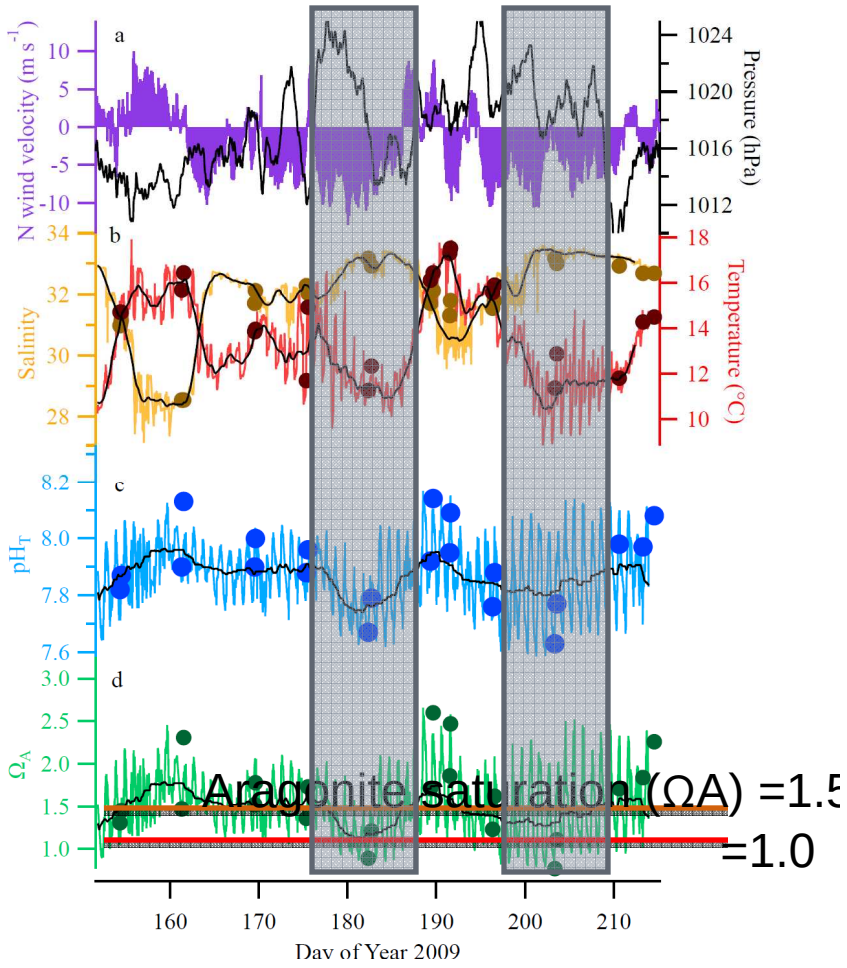
Observing Needs



From Observing to Adaptation

Oyster hatcheries use data from observing system to inform their day to day management

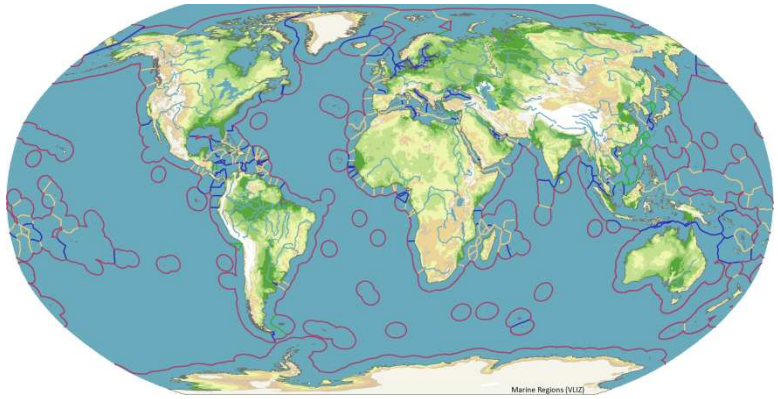
Whisky Creek Hatchery, Oregon, US



Barton et al 2012

Data Management

- Open Data Sharing is an important component of this network
- National Oceanographic Data Center (NOAA) will likely coordinate observing data streams provided by participants
- The OA – International Coordination Centre will focus on data sharing for biological data



Opportunities and Challenges

- Opportunities: growing recognition of the issue; broad international cooperation and networks exist;
- Challenges: international data sharing; lack of data synthesis products…data alone won't tell the story; how to develop scientific capacity in all regions of globe; piracy; funding challenges; ship expenses; this is HARD work

Questions?