GOA-ON

Global Ocean Acidification Observing Network

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Co-chair of GOA-ON Executive Council
Pacific Islands OA Workshop. October 2015

NOAA

IOOS INTEGRATED OCEAN OBSERVING SYSTEM

GOOS Global Ocean Observing System

UNESCO United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

UK Ocean Acidification Research Programme

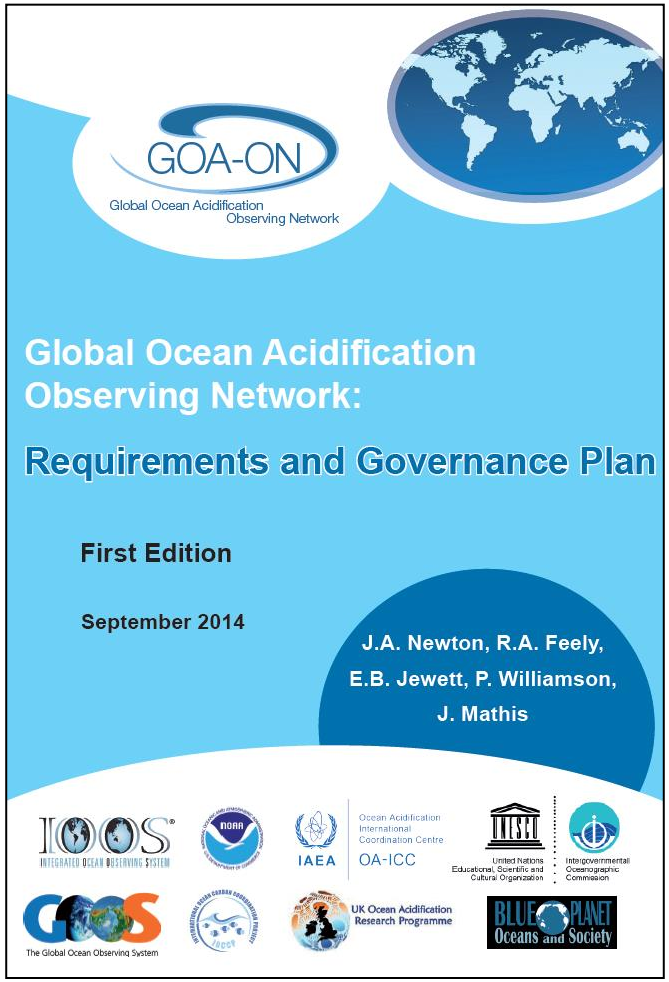
BLUE PLANET Oceans and Society

IAEA

Ocean Acidification International Coordination Centre OA-ICC

INTERNATIONAL OCEAN CARBON COORDINATION PROJECT IOCCP

GOA-ON Plan now available



www.GOA-ON.org

OA is
a global condition with local effects

- We need local through global scale observations **in order to get either correct**

- This issue **demands our coordination**, networked skill, and open analysis

How was GOA-ON made ?

- Two international workshops have been convened to establish a coordinated approach to build an integrated global observing network for ocean acidification
- The first workshop held at the University of Washington in June 2012, was attended by **62 participants from 23 countries**.
- The second workshop, held at St. Andrews, UK, in July 2013 was attended by **87 participants from 26 countries**.
- The third workshop is COMING. May 8- 10, 2016 in Hobart, Australia.

GOA-ON will provide:

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The Global Ocean Acidification Observing Network (GOA-ON) is a collaborative international approach to document the status and progress of ocean acidification in open-ocean, coastal, and estuarine environments, to understand the drivers and impacts of ocean acidification on marine ecosystems, and to provide spatially and temporally resolved biogeochemical data necessary to optimize modeling for ocean acidification.

Home | References/Reports | GOA-ON Activities | Interactive Map | Network Members | Governance/Contact

Approach and Goals

Detailed information about the GOA-ON background, design, implementation, and data strategy can be found here:

Global Ocean Acidification Observing Network: Requirements and Governance Plan (JA Newton, RA Feely, EB Jewett, P Williamson, J Mathis)

GOA-ON high-level goals:

Goal 1 - Improve our understanding of global OA conditions:

- Determine status and spatial / temporal patterns in carbon

Interactive Map of Ocean Acidification Platforms

Building on the existing global oceanic carbon observatory network of repeat hydrographic surveys, time-series stations, floats and glider observations, and volunteer observing ships, the interactive map below offers the best information available on the current inventory of global OA observing platforms. This is a strong foundation of observations of the carbonate chemistry needed to understand chemical changes resulting from ocean acidification.

An International Effort

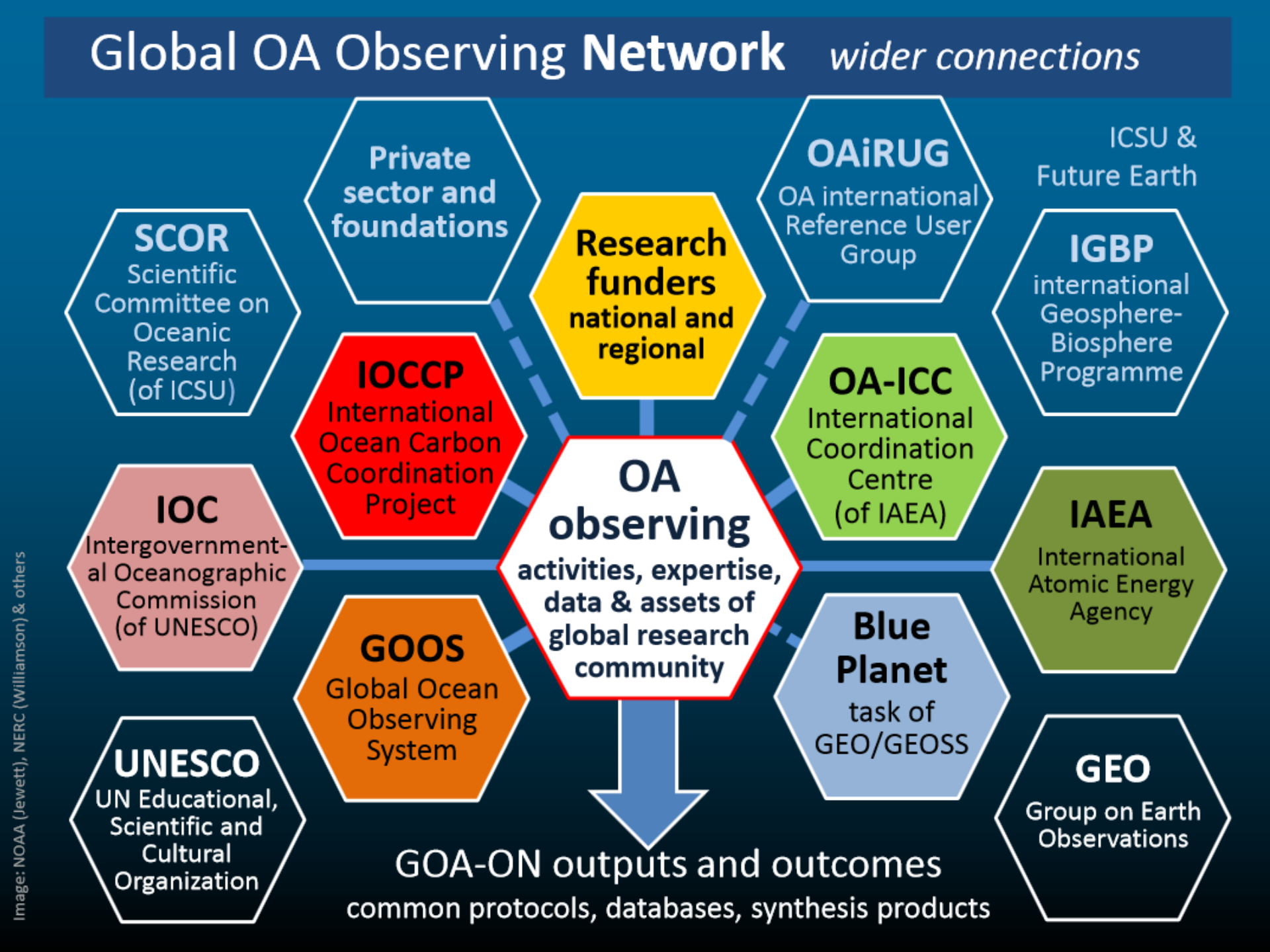
Network Members - Scientists from 30 countries are currently participating in the GOA-ON.

Workshops/Activities

- GOA-ON 2012 Workshop, University of Washington ,Seattle, WA attended by 62 participants from 22 countries
- GOA-ON 2013 Workshop, St. Andrews, UK attended by 87 participants from 26 countries
- GOA-ON Side Event at the GEO-X Plenary Session & 2014 Geneva Ministerial Summit

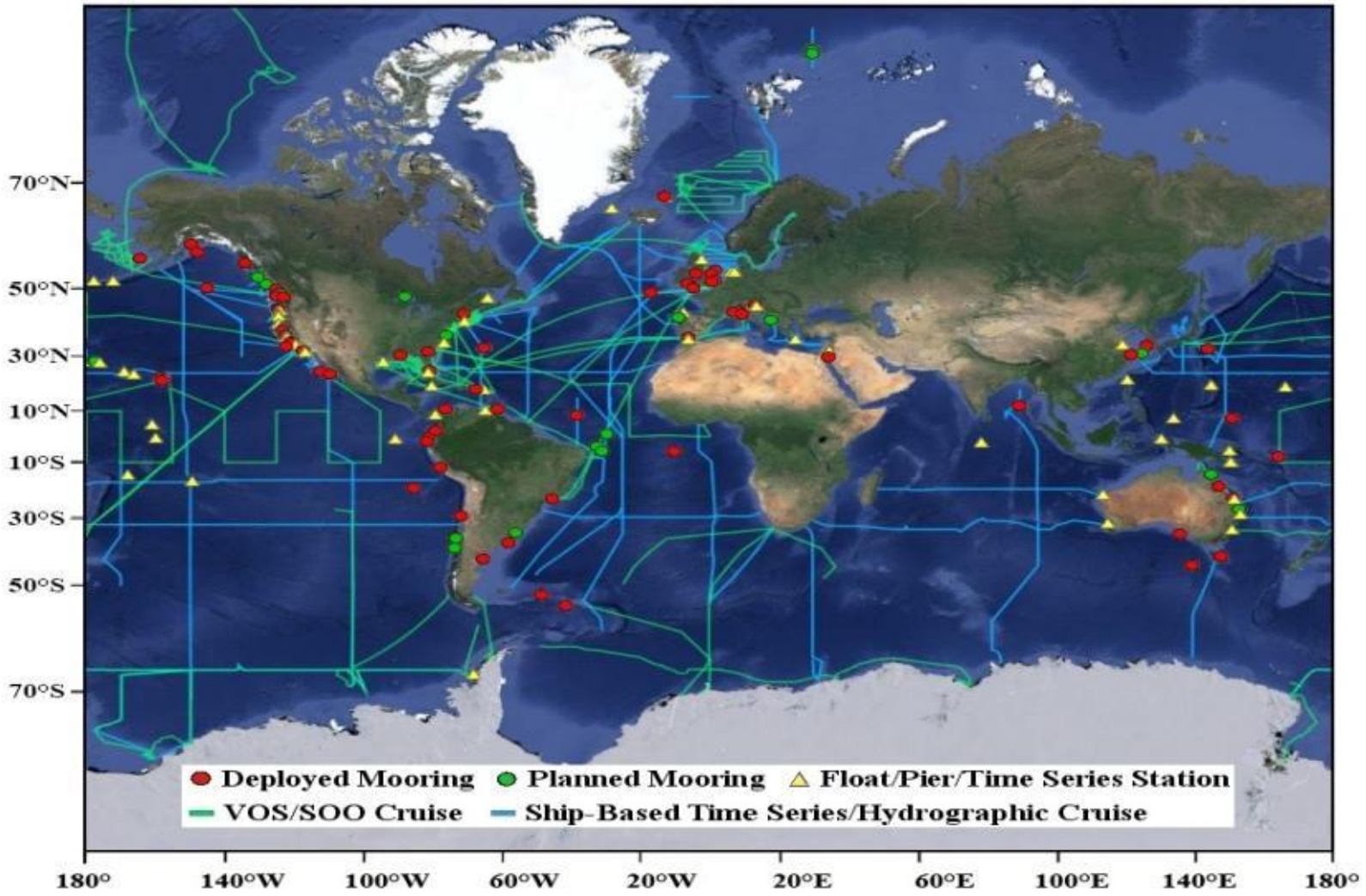
Flyer Leaflet

www.GOA-ON.org

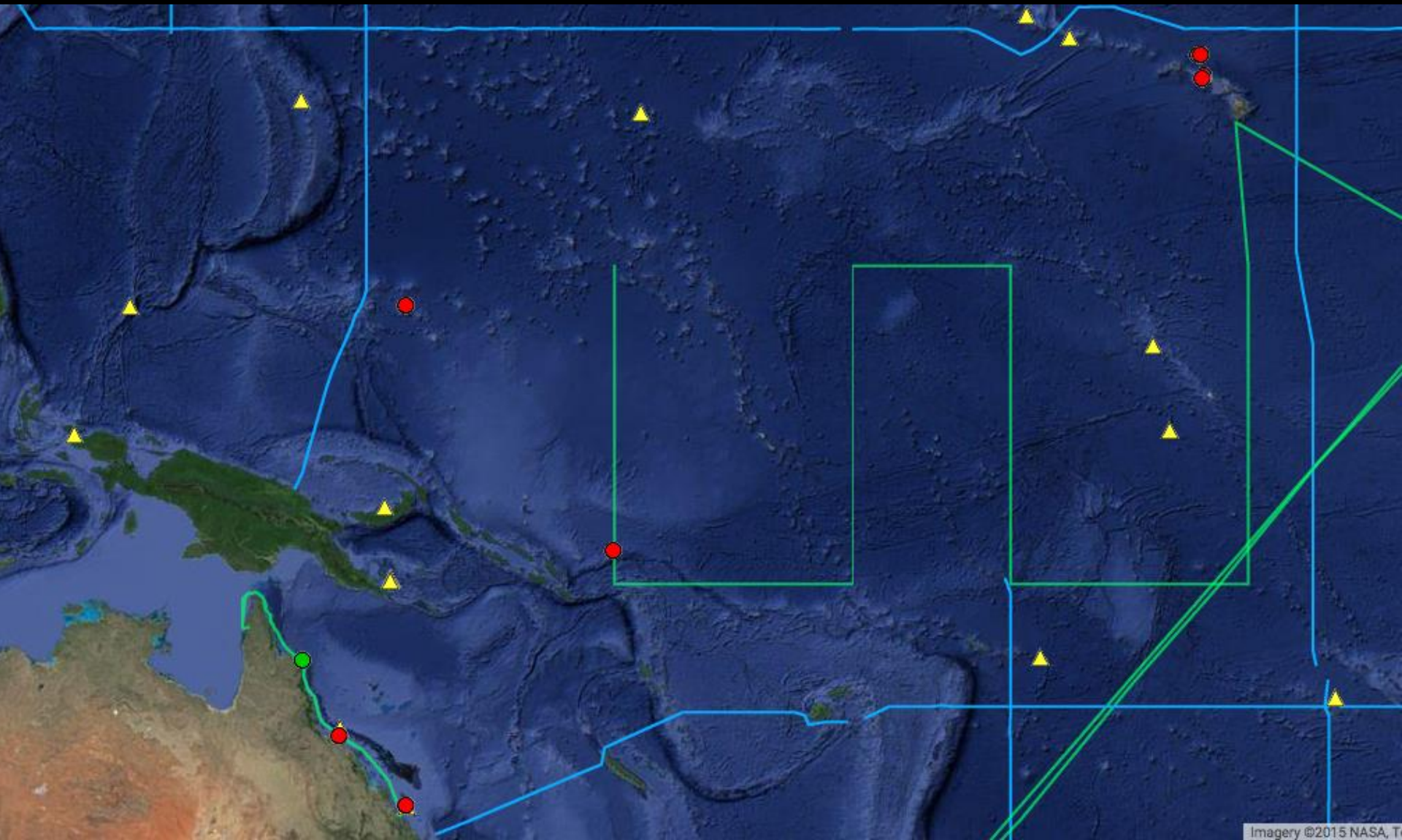

Global OA Observing Network wider connections
Private sector and foundations
OAiRUG
OA international Reference User Group
ICSU & Future Earth
SCOR
Scientific Committee on Oceanic Research (of ICSU)
Research funders
national and regional
IGBP
international Geosphere-Biosphere Programme
IOCCP
International Ocean Carbon Coordination Project
OA-ICC
International Coordination Centre (of IAEA)
OA observing
activities, expertise, data & assets of global research community
IOC
Intergovernment-al Oceanographic Commission (of UNESCO)
IAEA
International Atomic Energy Agency
GOOS
Global Ocean Observing System
Blue Planet
task of GEO/GEOSS
UNESCO
UN Educational, Scientific and Cultural Organization
GEO
Group on Earth Observations
GOA-ON outputs and outcomes
common protocols, databases, synthesis products
Image: NOAA (Jewett), NERC (Williamson) & others

Global OA Observing Network

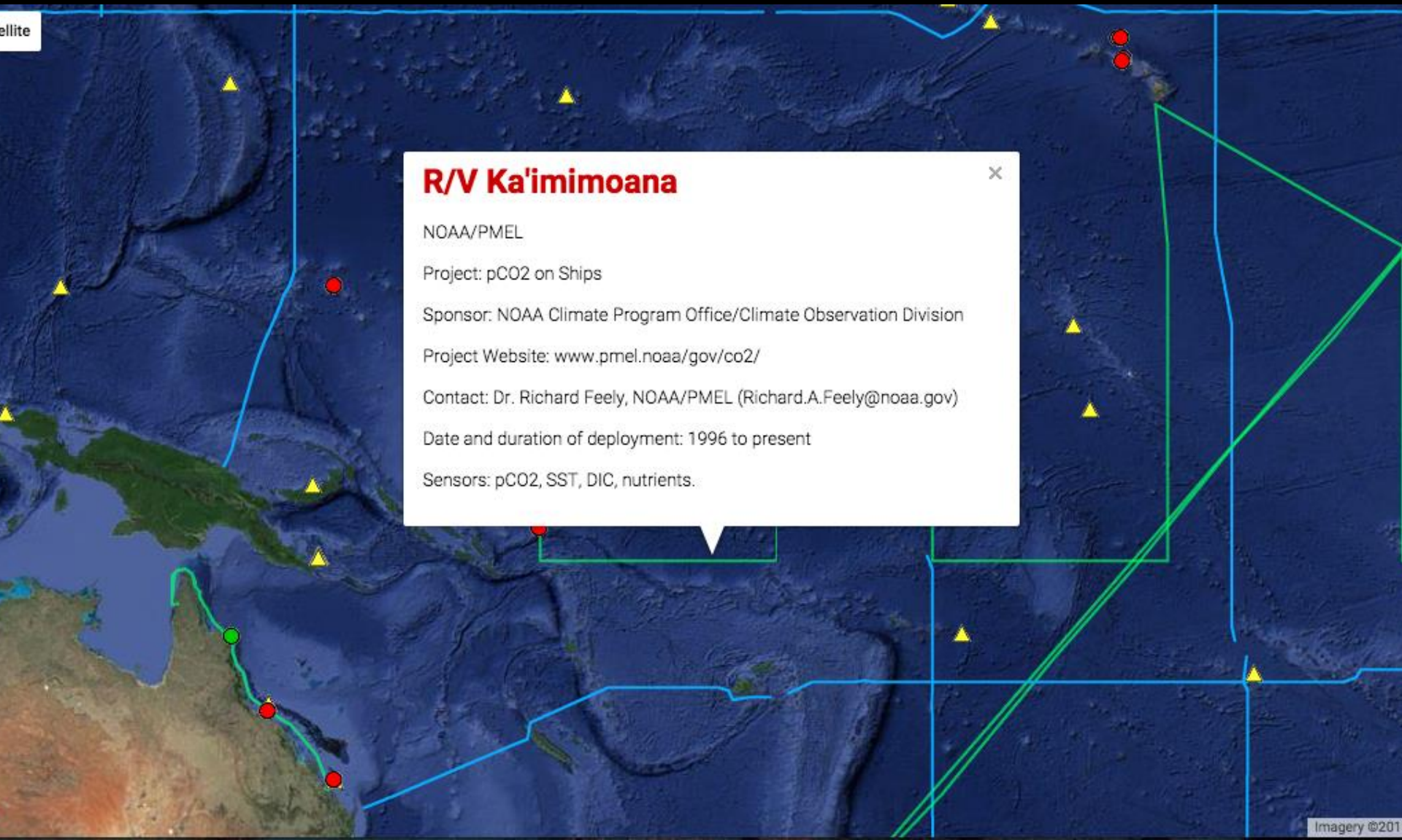
WWW.GOA-ON.ORG



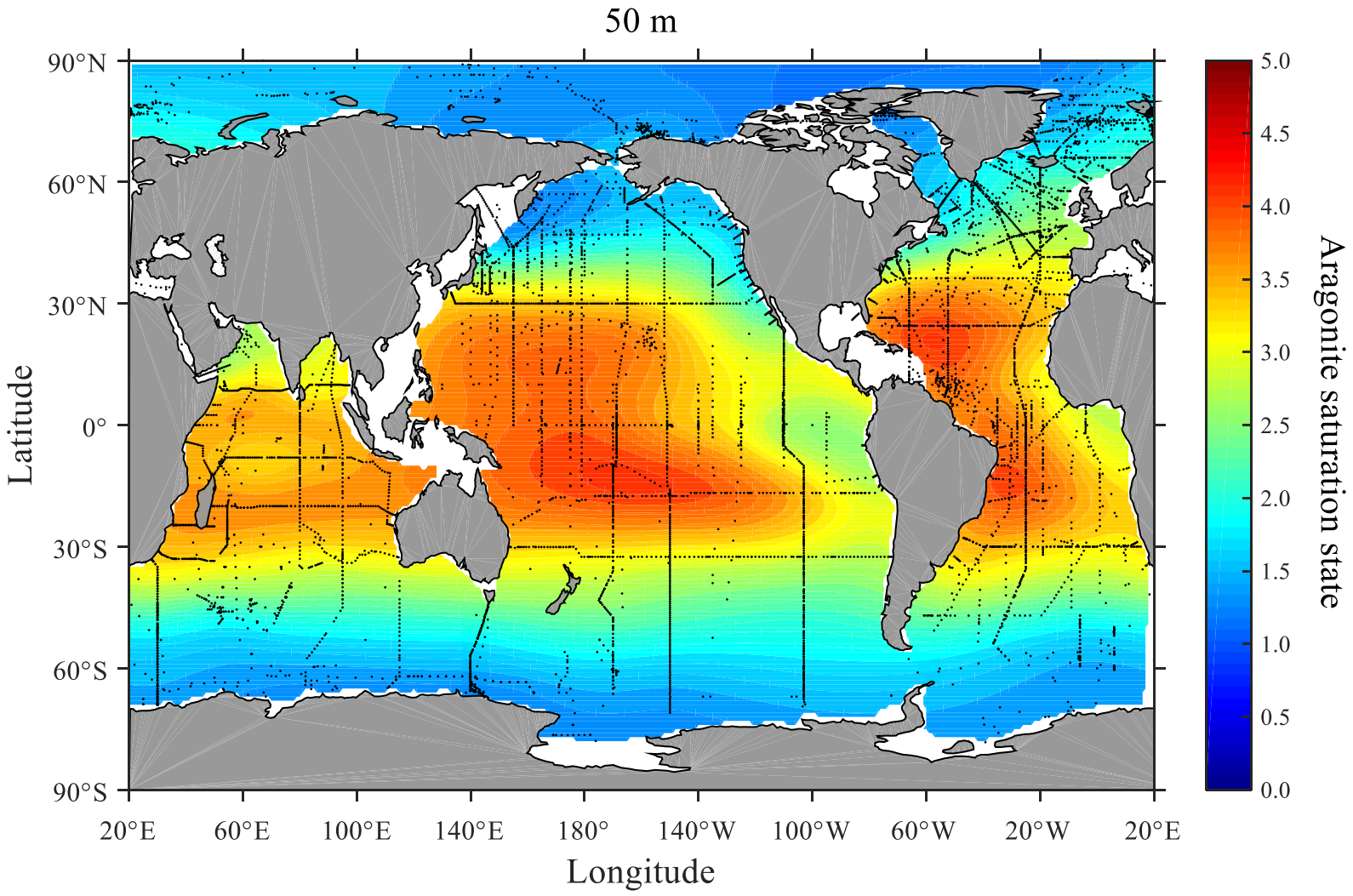
Close up of the Region



Interactive Map



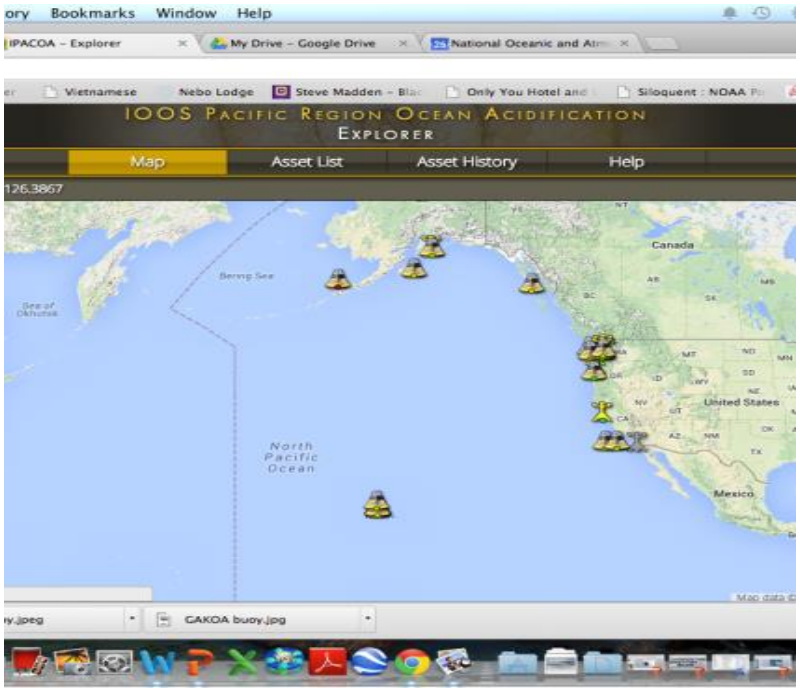
Creating Global and Regional Data Products

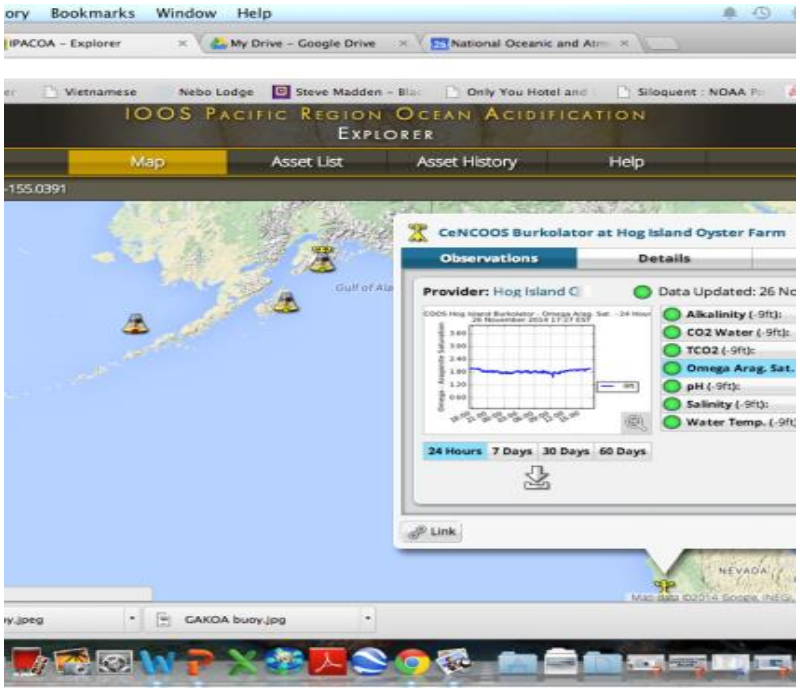


Reference Year: 2000

Li-Qing Jiang et al., Biogeosciences 2015

Share Regional Data
US West Coast OA Portal





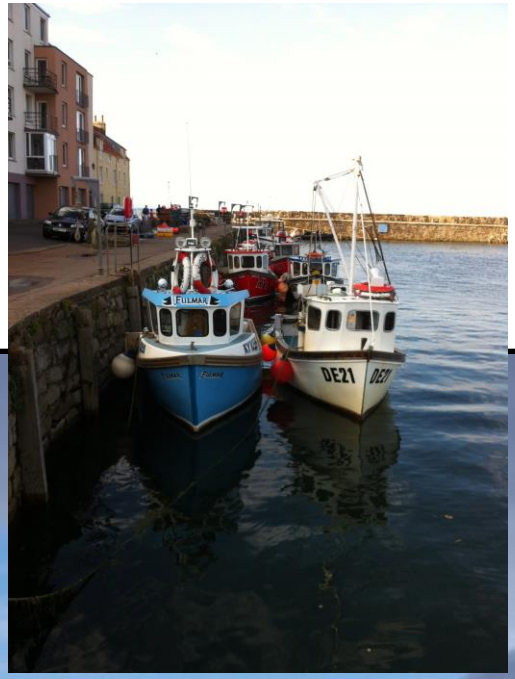
http://www.ipacoa.org/

To build the GOA-ON, the community has defined:

- The ***rationale, design, and locations of components for an international ocean acidification observing network,*** taking into account existing activities
- A ***minimum suite of measurement parameters***
- A ***strategy for data quality assurance*** and ***for data distribution***
- The ***requirements for international programme integration***

Observations across various ecosystems:

- Tropical Seas
- Polar Seas
- Temperate Seas
- Shallow Coral Reefs
- Estuarine and Nearshore Systems



Utilizing various platforms:

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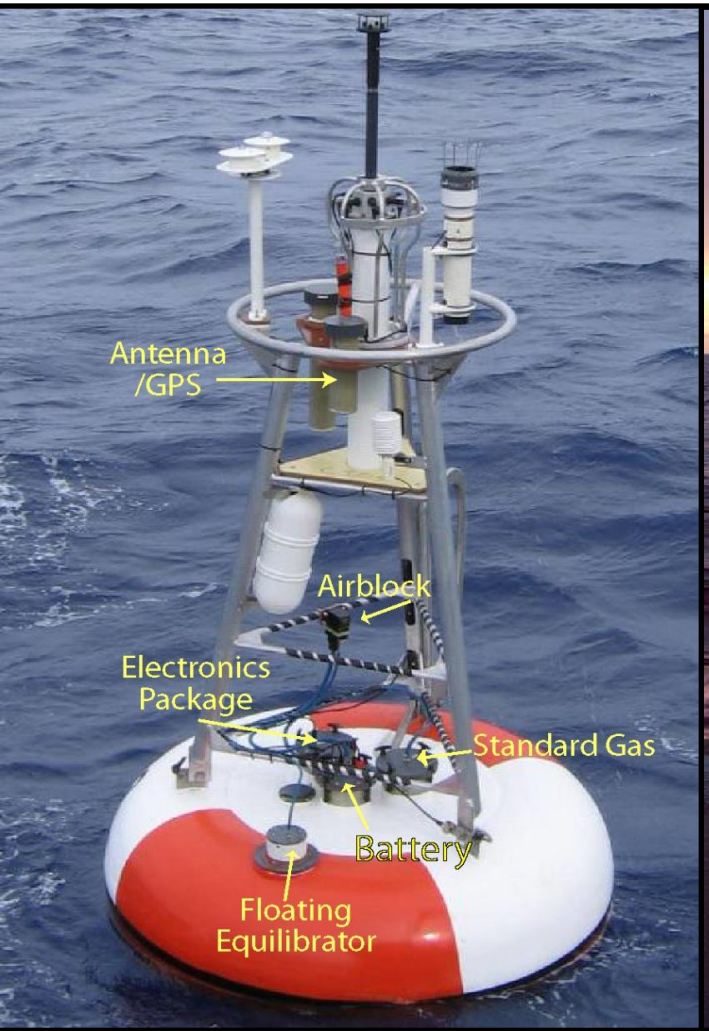
- Ship-based surveys & volunteer observing ships
- Moorings & piers
- Gliders & floats



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GOA-ON defined two data quality objectives:

- '**Climate data**': of sufficient and defined quality to assess long term trends with defined level of confidence

  Detection of changes in OA state over multi-decadal timescales

- '**Weather data**': of sufficient and defined quality to identify relative spatial patterns and short-term changes

  Mechanistic interpretation of the ecosystem response to local, immediate OA dynamics

Nested system design

- To address network goals, GOA-ON observations will be based on a **nested design**:

  Level 1: critical minimum measurements

  Level 2: measurements for integrated assessment to enhance interpretation

  Level 3: measurements that are not yet fully ready for standardization; in development or evaluation

- Ecosystem responses will only be measured in a subset of total OA observation stations

GOA-ON has a nested system design

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Coral reefs

Coasts & shelf seas

Open ocean

Goal 1 OA conditions	Goal 2 Ecosystem response	Goal 3 OA modeling
L1: carbonate-system constraint, T, S, O, *fluorescence, irradiance*	*L1:* biomass/abundance of functional groups (phytoplankton, zooplankton & microbes)	Inputs to models
L2: nutrients, bio-optics, transport, meteorology, trace metals…	*L2:* species; processes incl. growth, grazing & respiration	

Goal 2: Tropical Seas

- Phytoplankton and zooplankton biomass/abundance;
- sunlight (PAR);
- turbidity;
- colored dissolved organic material (CDOM, including via remote sensing)
- size fractionated chlorophyll;

Goals 1&2: Coral Reefs

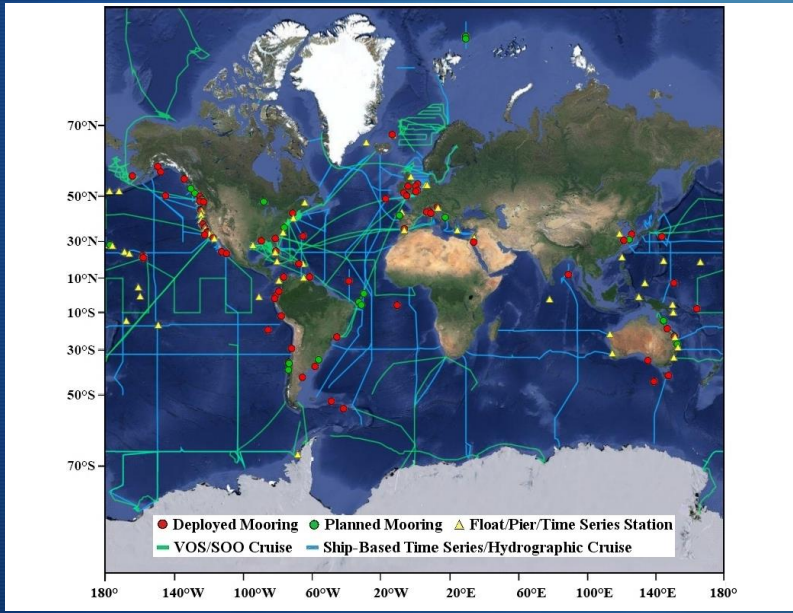
How biology affects the Chemistry

- Biomass of biota
  - Corals or coralline algae, other photosynthesizers (macro-algae, seagrasses)
- Changes in net ecosystem processes
  - Calcification/dissolution (NEC: net ecosystem calcification)
  - Production/respiration (NEP: net ecosystem production).

How Chemistry affects the Biology

- Biota:
  - population structure of corals, macroalgae, urchins
  - biomass, population and trophic structure of cryptobiota
  - architectural complexity
- Processes: The NEP:NEC ratio, food supply rate and quality and bioerosion rates at specific sites.
- Habitat: Further characterization of the chemical habitat through sediment mineralogy/composition; organism mineral content; alkalinity anomalies; and the vertical profiles of saturation state over time (for cold-water corals)

Future Directions



- Scientific capacity in under served regions (people and equipment)
  - NZ/ SPREP investment in Pacific Islands.
  - South Africa and Mozambique
  - International Coordination Centre Capacity Building
- Developing Regional Networks
  - Latin America
  - Pacific Islands
  - Western Pacific
  - Africa
  - Pilot nodes where training can occur

Latin American OA Network

Next Steps?

- Come to the Hobart Workshop. More information is on the Oceans in High CO2 World website.
- Visit us at: www.GOA-ON.org
- Create the Pacific Islands OA Network