The Contribution of LME Indicators to Climate Change Assessments, GEOSS & IOOS

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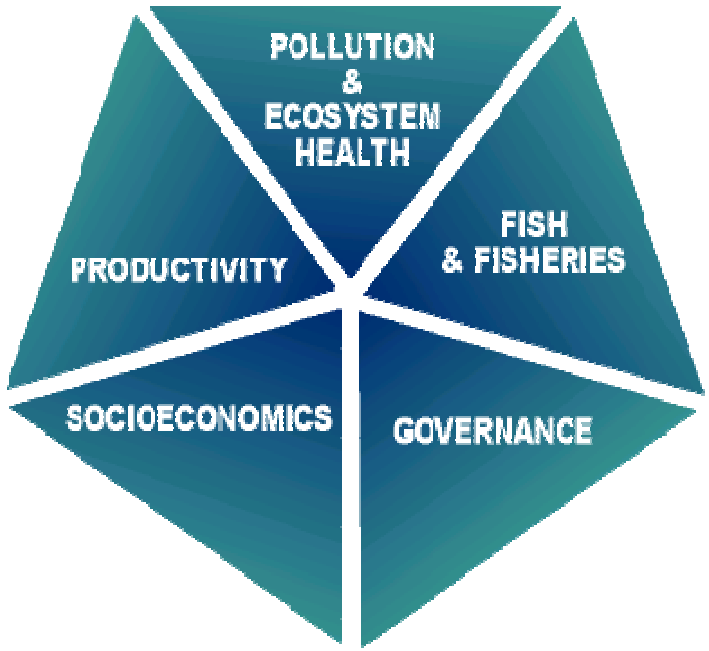
NOAA/NMFS

LME Indicators for Resource Assessment and Management

wesos

Modular Assessments for Sustainable Development



Integrate Science-Based Information into Management Actions

Climate Change and Marine Ecosystems

- Climate change and variability, and ecosystem productivity
- Loss of sea ice
- Coastal response to sea-level rise
- Nutrient-climate interactions
- Coral bleaching
- Ocean Acidification

Ocean Observing Systems – Ecosystem Objectives

- GEOSS
  - Improve the management and protection of terrestrial, coastal, and marine ecosystems.
- GOOS
  - Protect and restore healthy ecosystems more effectively
  - Restore and sustain living marine resources more effectively
- IOOS
  - More effectively protect and restore healthy coastal ecosystems
  - Enable the sustained use of ocean and coastal resources

LMEs and GEOSS/GOOS - Opportunities for Collaboration

- Numerous LME programs underway or developing globally, with approximately $200M committed or anticipated.
- Significant overlap with GOOS objectives, and an opportunity to advancing the implementation of an “operational GOOS.”
- LME Programs operate in those countries most in need of assistance/capacity building to initiate observing programs like GOOS.

Similar Observing Requirements – Example: BCLME

GOOS Observations	BCLME Observations
Top predators (sharks, marine mammals, birds)	Joint surveys and assessments of shared stocks of key species Regional assessment of vulnerable species and habitats
Commercial finfish	Joint surveys and assessments of shared stocks of key species
Pelagic forage	Joint surveys and assessments of shared stocks of non-exploited species
Zooplankton using CPRs and undulators	Towed undulators for ocean physical, chemical and biological monitoring
Phytoplankton	Ocean color and towed undulators (chlorophyll)
Chemistry	Towed undulators with nutrient sensors
Hydrography	Analysis of upwelling and current variability
Pollution	Coastal zone pollution monitoring

GOOS and LMEs – Other Similarities

- Regional focus
- Emphasis on capacity building
- Both programs intended to be permanent structures with sustainable funding by national institutions
- Both programs oriented toward sustainable management of marine ecosystems

Some differences

- LME data products and end users are implicit rather than explicit. These are planned end-to-end in GOOS.

- GOOS tends to have a global one-size-fits-all approach (at least in the planning phase) whereas LME projects are highly specialized, starting with a TDA and leading to an SAP which is very specific to that LME.

Global LME Projects

Suggestions for Future Cooperation

- Incorporate ongoing LME programs into the GOOS Regional Alliances, or as GOOS Pilot Projects, as appropriate.
- Involve GOOS representatives in the development of regional TDAs and SAPs (where appropriate and feasible), to help ensure that GOOS data needs are met to the extent possible.
- MOU between IOC/GOOS and GEF Implementing Agencies.
- GEOSS AG-06-02: Consult with scientists and experts from the fisheries, aquaculture, coastal zone management and Earth observation communities at international and regional levels to identify opportunities for enhanced utilization of Earth observations in fisheries and aquaculture.

The U.S. Integrated Ocean Observing System (IOOS)

- An integrated system of marine monitoring, data communications and management and data analysis designed to provide the data and information required for more rapid detection and timely prediction of changes occurring in the marine environment that impact U.S. social, economic and ecological systems.

IOOS Goals

- Improve predictions of climate change and variability (weather) and their effects on coastal communities and the nation
- Improve the safety and efficiency of marine operations
- More effectively mitigate the effects of natural hazards
- Improve national and homeland security
- Reduce public health risks
- More effectively protect and restore healthy coastal marine ecosystems, and
- Enable the sustained use of marine resources.

IOOS Phenomena of Interest

Climate & Weather • Variations in sea surface temperature; surface fluxes of momentum, heat & fresh water; sources & sinks of carbon; sea ice

Marine Operations • Variations in water level, bathymetry, surface winds, currents & waves; sea ice; susceptibility to natural hazards

Natural Hazards • Storm surge & coastal flooding; coastal erosion; susceptibility to natural hazards; public safety & property loss

National Security • Nearshore current & wave environment; water clarity & sediment loads; acoustic performance & propagation of electromagnetic waves; nuclear, biological & chemical contamination

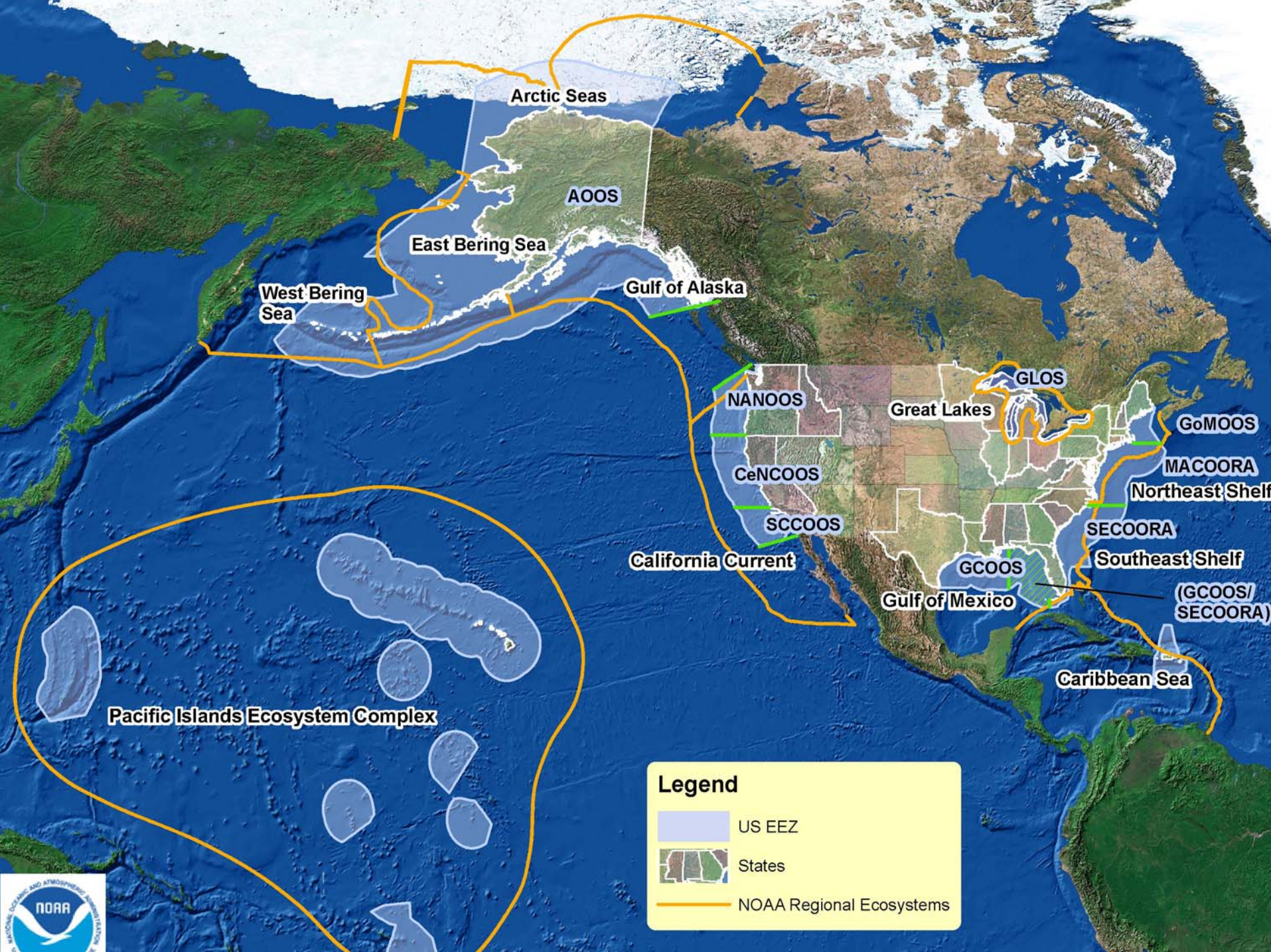
Public Health • Risk of exposure to human pathogens, chemical contaminants, and biotoxins (contact with water, aerosols, seafood consumption)

Healthy Ecosystems • Habitat modification, loss of biodiversity, cultural eutrophication, harmful algal events, invasive species, diseases in & mass mortalities of marine organisms

Living Marine Resources • Fluctuations in spawning stock size, recruitment & natural mortality; changes in areal extent & condition of essential habitat; food availability & hydrographic conditions

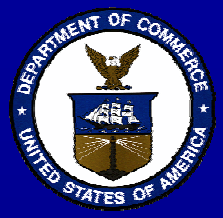
IOOS Regional Observing Networks

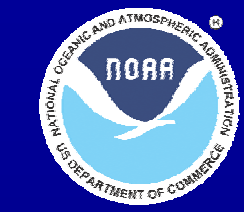
- Alaska
- Pacific Islands
- Pacific Northwest
- Central California
- Southern California
- Great Lakes
- Gulf of Maine
- Mid-Atlantic
- Gulf of Mexico
- Southeast U.S.


Arctic Seas
AOOS
East Bering Sea
West Bering Sea
Gulf of Alaska
NANOOS
GLOS
Great Lakes
GoMOOS
CeNCOOS
MACOORA
Northeast Shelf
SCCOOS
SECOORA
California Current
GCOOS
Southeast Shelf
Gulf of Mexico
(GCOOS/ SECOORA)
Caribbean Sea
Pacific Islands Ecosystem Complex
Legend
US EEZ
States
NOAA Regional Ecosystems

IOOS Implementation

- Link existing regional observing systems and programs at LME scale
- Coordinate data management and communications
- Fill prioritized observing gaps
- Intended to become permanent infrastructure


DEPARTMENT OF COMMERCE
UNITED STATES OF AMERICA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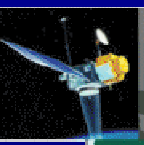
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
US DEPARTMENT OF COMMERCE

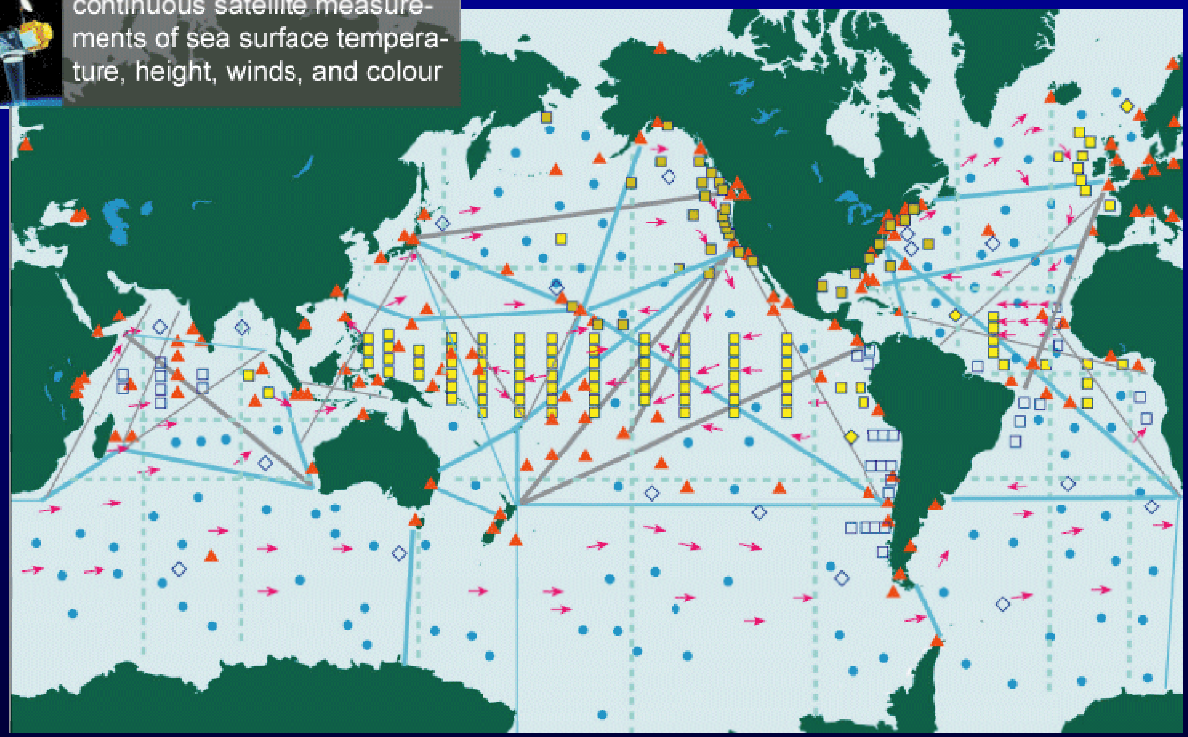
Thank you.

Initial Global Ocean Observing System for Climate Status against the GCOS Implementation Plan and JCOMM targets

Total *in situ* networks **55%** September 2005



continuous satellite measurements of sea surface temperature, height, winds, and colour



57% Surface measurements from volunteer ships (VOSclim)

200 ships in pilot project

95% Global drifting surface buoy array

5° resolution array: 1250 floats

40% Tide gauge network (GCOS subset of GLOSS core network)

170 real-time reporting gauges

82% XBT sub-surface temperature section network

71 lines occupied

67% Profiling float network (Argo)

3° resolution array: 3000 floats

Reference time series 21%

5% sites

48% Global reference moo ring network

28 moorings planned

72% Global tropical moored buoy network

118 moorings planned

43% Repeat hydrography and carbon inventory

Full ocean survey in 10 years