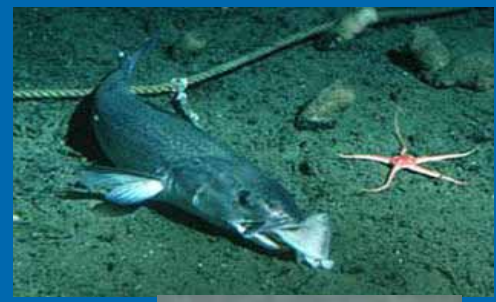


Data requirements for implementing an ecosystem approach to management (EBM or EAM) from a PICES perspective

P.R. Mundy

Alaska Fishery Science Center, Auke Bay Laboratories

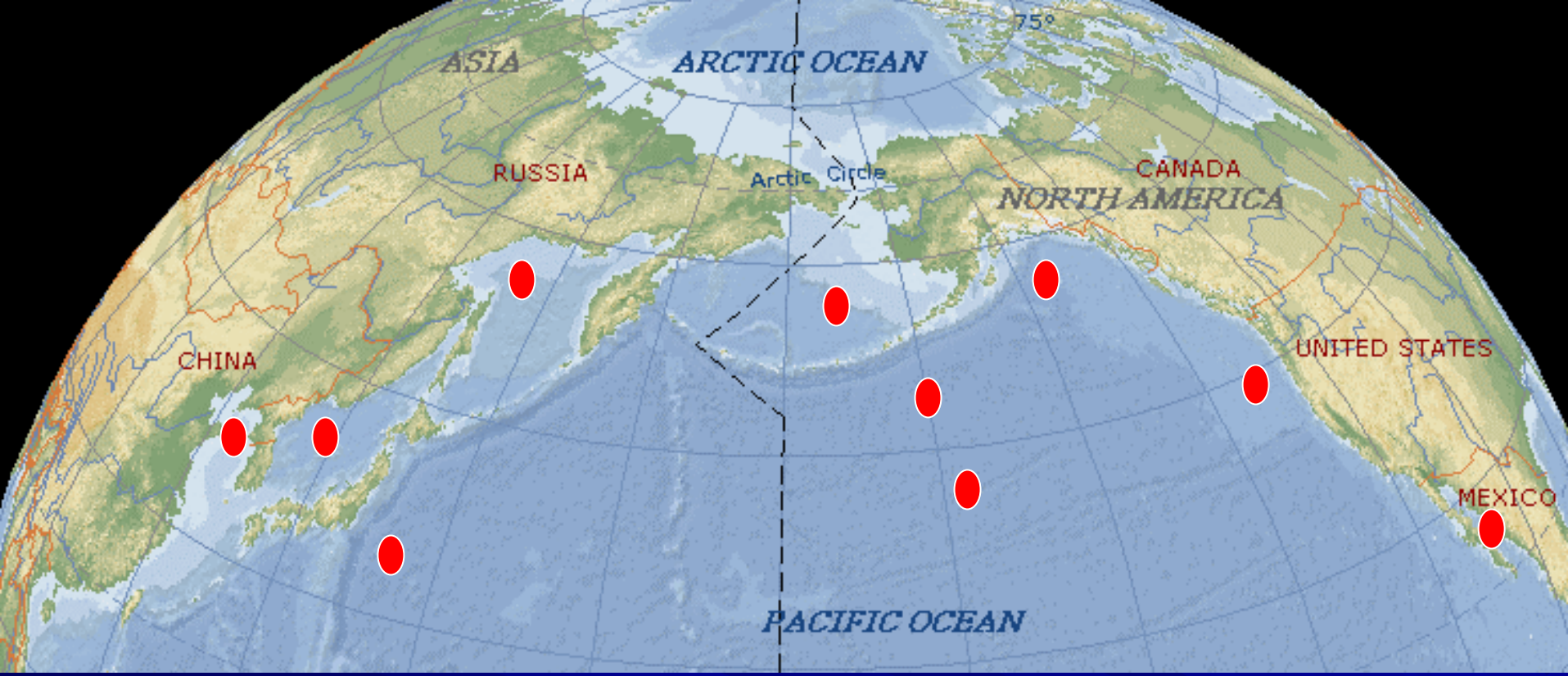
Juneau, Alaska USA

EBM Working Group 19 Workshop

October 26, 2007

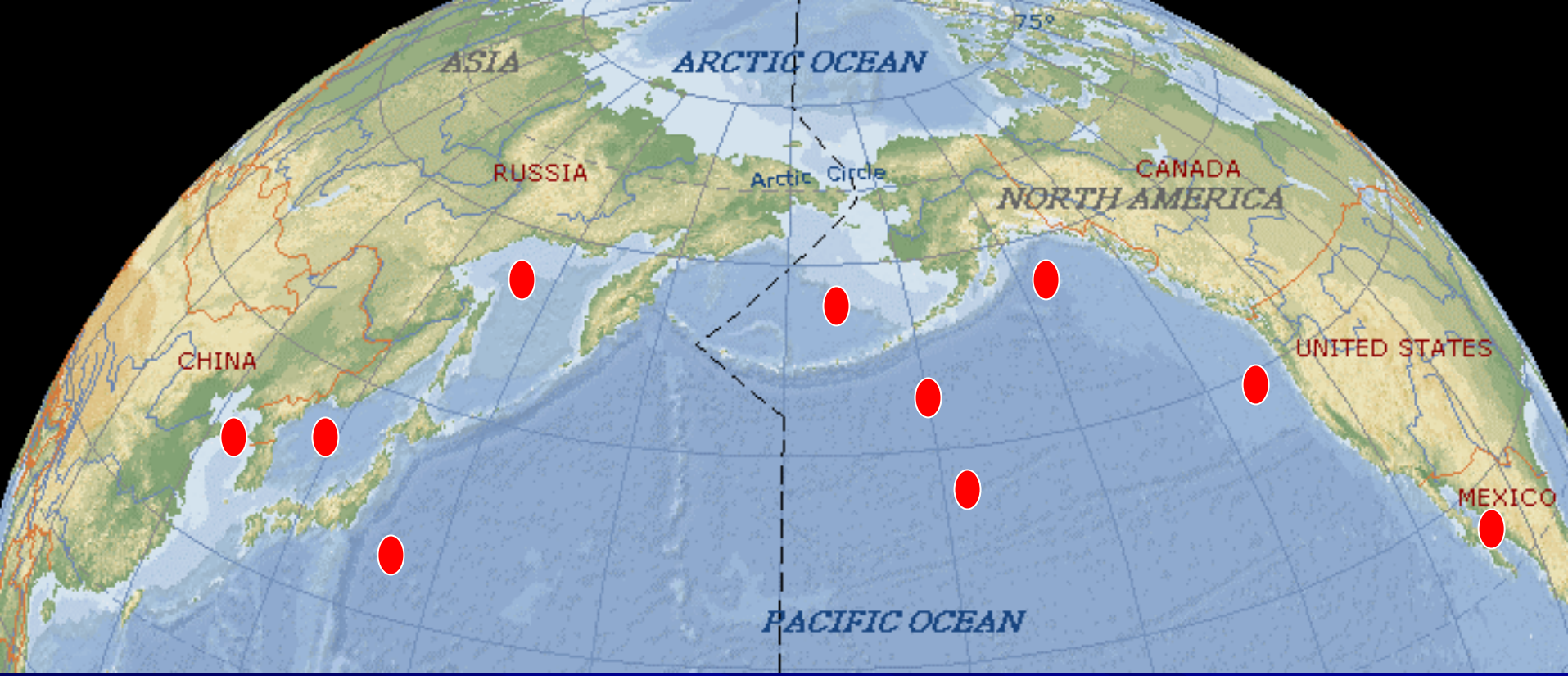
PICES XVI

Victoria, B.C. Canada



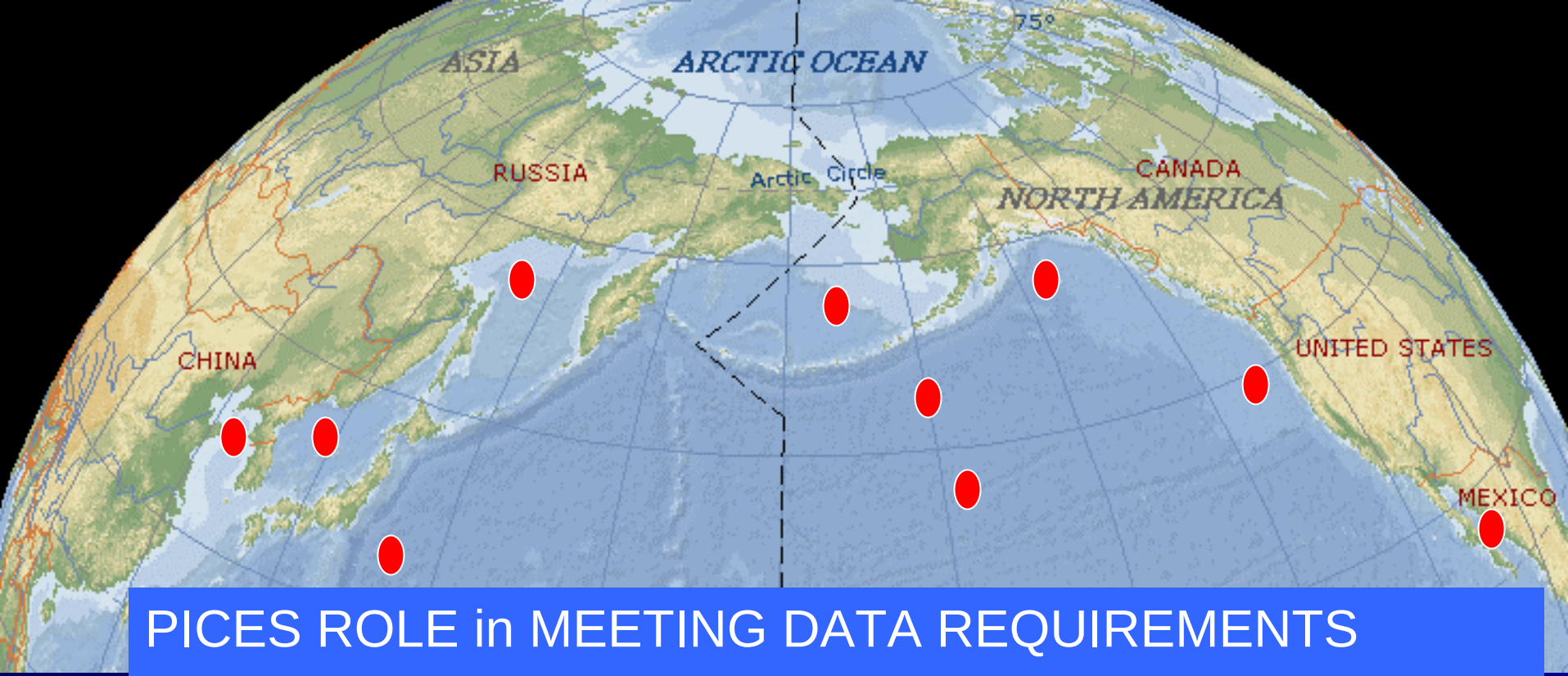
EBM DATA REQUIREMENTS

EBM requires international network of physical, chemical and biological observations that span the region's oceans, atmosphere and food webs.



PICES ROLE in MEETING DATA REQUIREMENTS

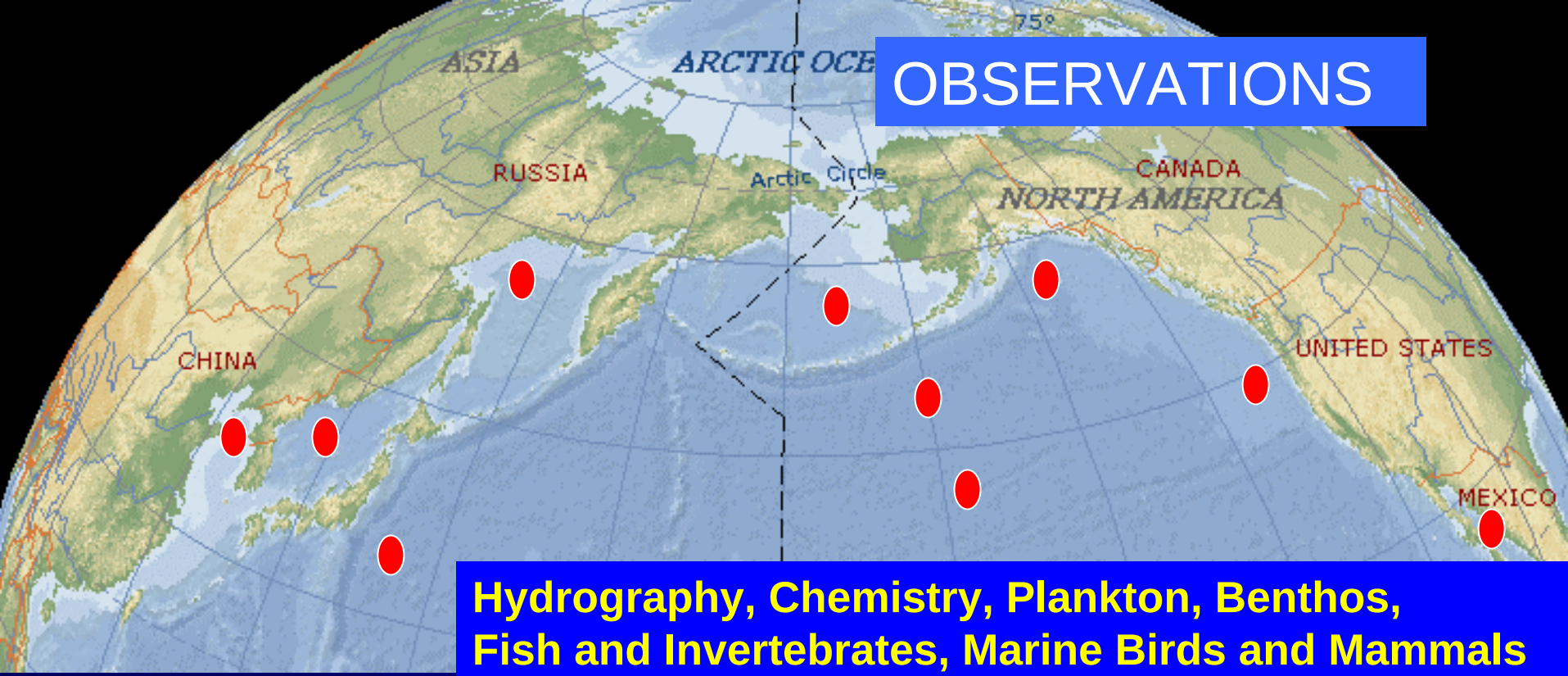
Fostering the international cooperation in the interdisciplinary sciences necessary to meet the data requirements of EBM with help from all committees: MONITOR, TCODE, BIO, FIS, POC, MEQ



PICES ROLE in MEETING DATA REQUIREMENTS

Three means of facilitating development of data network:

- OBSERVATIONS
- COMMUNICATIONS
- ANALYSIS



OBSERVATIONS

Hydrography, Chemistry, Plankton, Benthos, Fish and Invertebrates, Marine Birds and Mammals

Yellow Sea
Japan/East Sea
Sea of Okhotsk
Oyashio / Kuroshio
Transition Zone 32N-42N

Western Subarctic Gyre
Bering Sea
California Current
Gulf of Alaska
Gulf of California

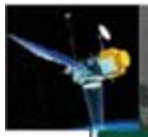
PICES MONITOR North Pacific Ecosystem Status Report

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

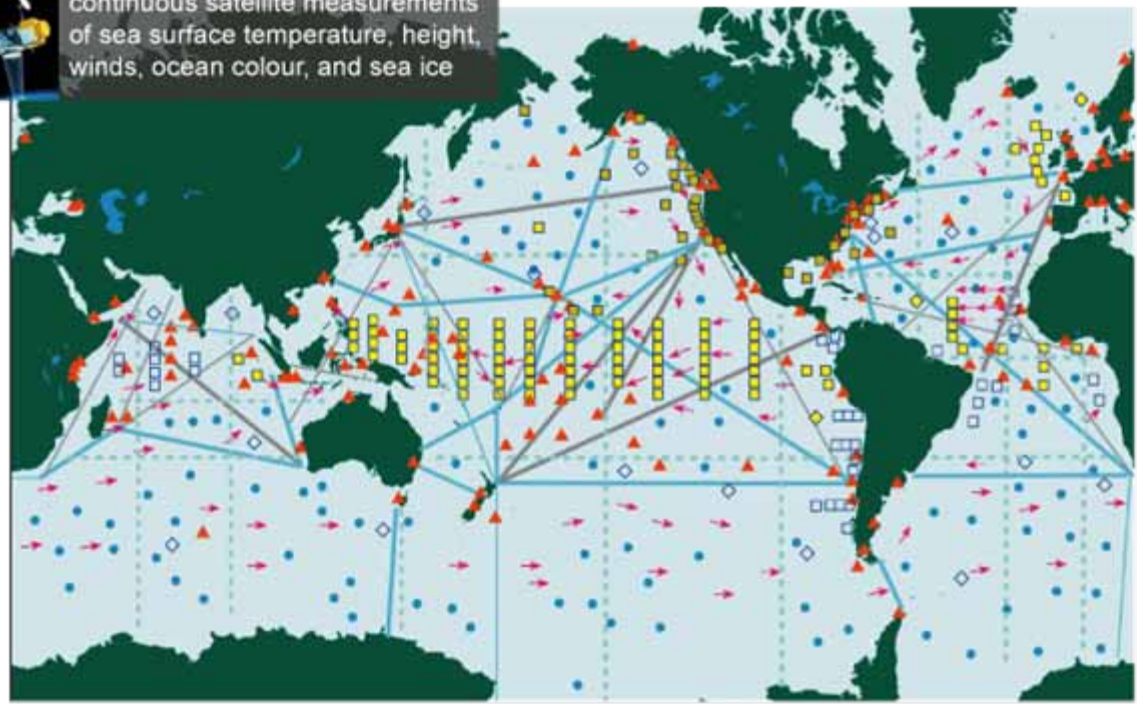
OBSERVATIONS

GOOS

Total *in situ networks* **56%** April 2006



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



57% **Surface measurements** from volunteer ships (VOSclim)

200 ships in pilot project

100% Global **drifting surface buoy** array

5° resolution array: 1250 floats

42% **Tide gauge** network (GCOS subset of GLOSS core network)

170 real-time reporting gauges

81% **XBT** sub-surface temperature section network

51 lines occupied

81% Argo **profiling float** network

3° resolution array: 3000 floats

43% Repeat **hydrography** and **carbon inventory**

Full ocean survey in 10 years

Reference time series 21%

58 sites

48% Global **reference mooring** network

29 moorings planned

66% Global tropical **moored buoy** network

119 moorings planned

- **A total of 5635 platforms are maintained globally.**

A COMMUNICATIONS MODEL

IOOS

Data Management and Communications Plan for Research and Operational Integrated Ocean Observing Systems
WWW.OCEAN.US

Communications methods & protocols for data sharing

- **Live Access Server – LAS**
- **OPeNDAP: Open-source Project for a Network Data Access Protocol**

OPEN SOURCE SOFTWARE

DMAC

EBM Data Requirements: ANALYSIS

Models of
Physics to
Fish, Birds, Mammals

Spatially explicit models of the abundance of fish, birds and mammals as functions of their biomass, predators, prey, and oceanographic and atmospheric forcing factors

California Sardine
SST based harvest control rule

- HG2007 = (BIOMASS2006 - CUTOFF) • FRACTION • DISTRIBUTION;
- FRACTION or Fmsy = 0.248649805(T2) - 8.190043975(T) + 67.4558326

Lluch-Belda et al. (1991) , Jacobson and MacCall (1995)

Analysis, Modeling

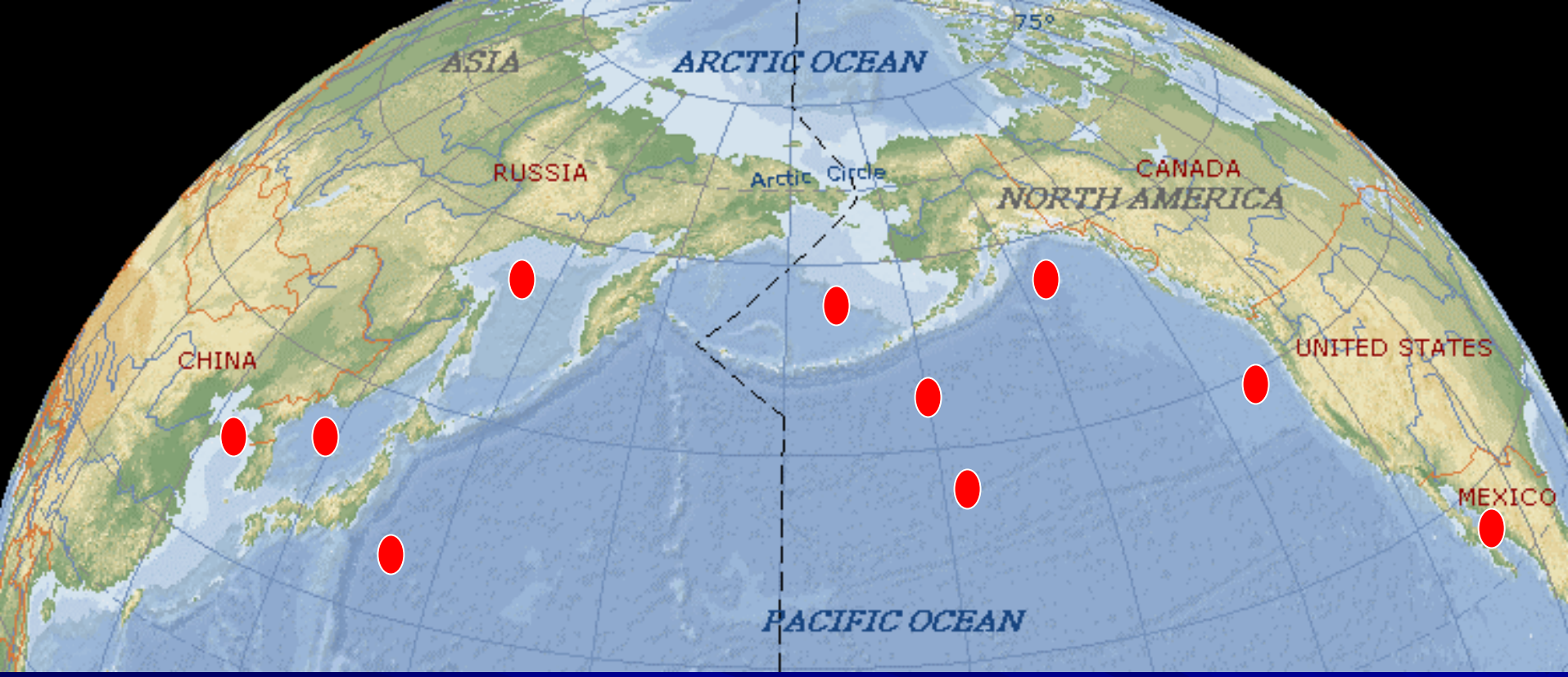
- Need to assemble the right data to effectively produce coupled biophysical models – much work to do
- TIME SCALES
- SPACE SCALES

PICES can help build an observing system that supports biophysical models of fish, bird and mammals production

CONCLUSIONS

- **PICES has roles in meeting data requirements of EBM**
  - Observations, MONITOR, NPESR
  - Communications, TCODE
  - Analysis, NEMURO, CCCC, FUTURE?

- Physical observations are well developed on scales suitable for climate modeling – GCOS
- Upper Trophic observations are somewhat well developed for certain species; fish, mammals, birds
- Primary productivity via remote sensing (?) but not for coastal areas, and lacks species composition
- Secondary productivity routinely sampled but very low density samples
- Small fish, secondary tertiary production, only recently routinely sampled (BASIS) but low density and limited species coverages



PICES ROLE in MEETING DATA REQUIREMENTS

- Observations, MONITOR (NPESR), BIO, FIS, MEQ
- Communications, TCODE
- Analysis, NEMURO, CCCC, FUTURE?

- The End

Thanks to NOAA, National Marine Fisheries Service, Alaska Fisheries Science Center for supporting this presentation