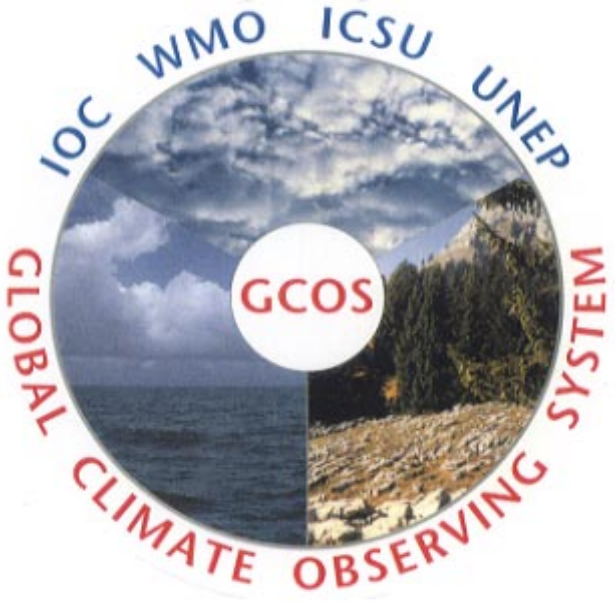
Global Climate Observing System (GCOS)



Presented by Dr. Alan R. Thomas

Director, GCOS Secretariat

THE GCOS MISSION

TO ENSURE THE AVAILABILITY AND QUALITY OF ATMOSPHERIC, OCEANOGRAPHIC, AND TERRESTRIAL DATA NEEDED TO:

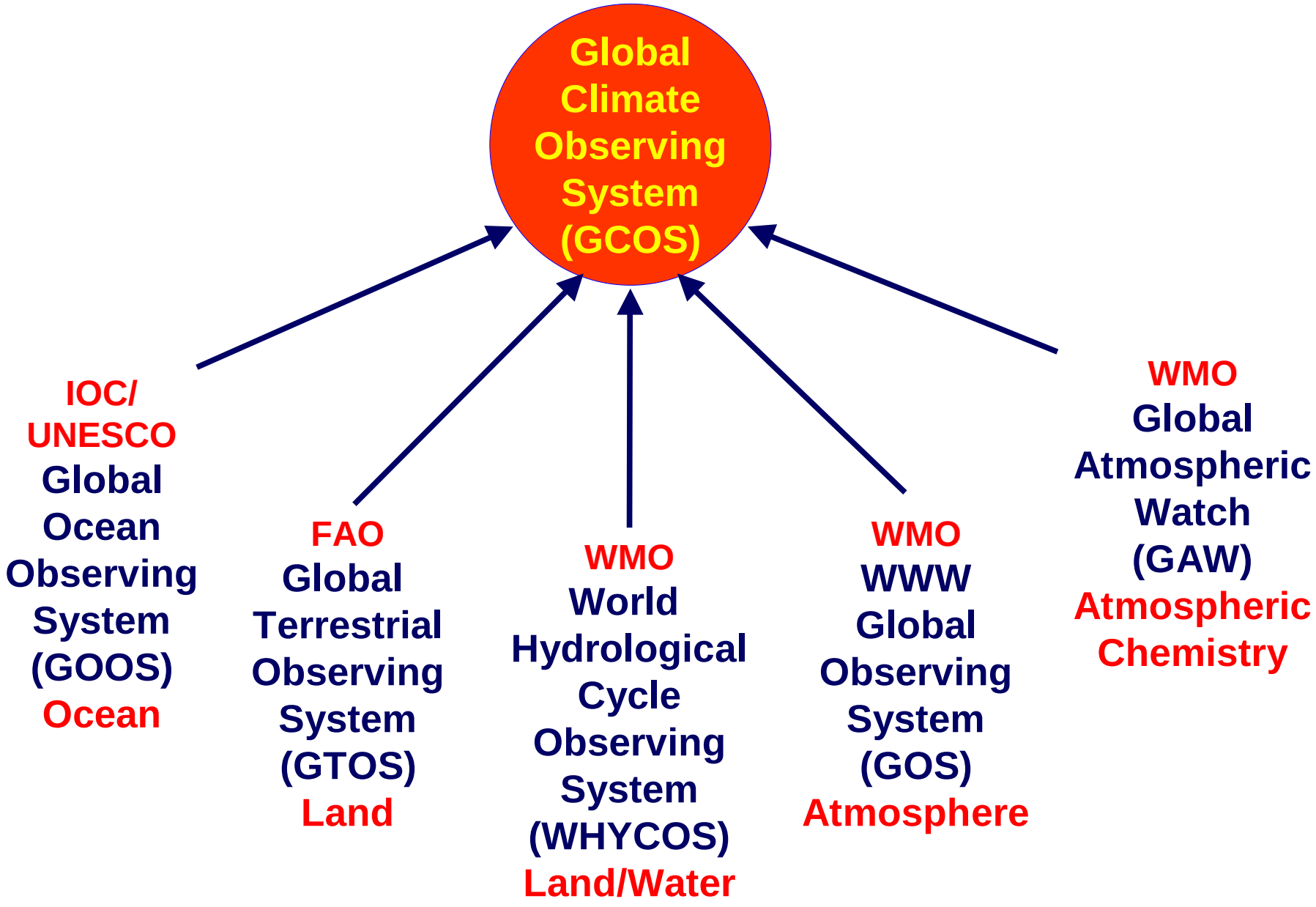
- **Observe and characterise the current climate, including its inherent variability and extremes**
- **Obtain information useful for climate change detection, attribution, and determination of rate of change**
- **Determine climate forcing resulting from changing green-house gas concentrations and other anthropogenic causes**
- **Validate models and assist in prediction of future climate**
- **Understand and quantify impacts of climate change on human activities and natural system, and**
- **Apply to sustainable economic development**

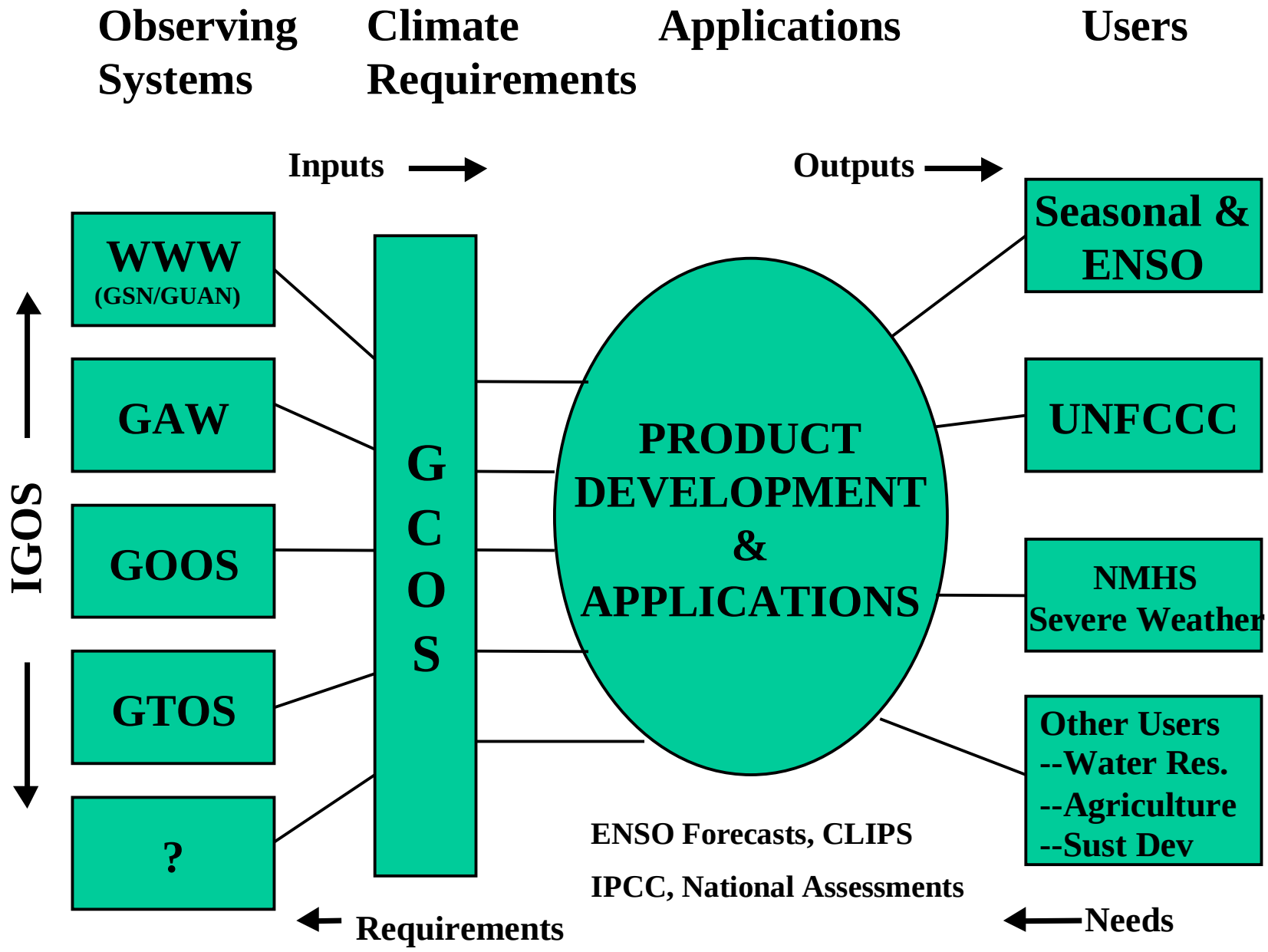
GCOS Implementation Plan

Strategic Framework

- **Build on existing operational and research observing and data systems, as a cost effective strategy**
- **Obtain commitments from national governments to implement the global climate observing system**
  - ✔ **Engagement of governing bodies of GCOS Sponsors**
  - ✔ **National reporting to COP/ UNFCCC**
- **Address deficiencies in IOS at regional level**
- **Keep IOS relevant to users and cost-effective**
  - ✔ **Work with international research programs and national satellite agencies on new techniques.**

The GCOS is comprised of the climate components of the so-called GxOS




Observing Systems
Climate Requirements
Applications
Users
Inputs
Outputs
WWW
(GSN/GUAN)
GAW
GOOS
GTOS
?
IGOS
G C O S
PRODUCT DEVELOPMENT & APPLICATIONS
Seasonal & ENSO
UNFCCC
NMHS
Severe Weather
Other Users
--Water Res.
--Agriculture
--Sust Dev
ENSO Forecasts, CLIPS
IPCC, National Assessments
Requirements
Needs

Global Climate Observing System (GCOS)

- **Role: To promote the development and maintenance of end-to-end systems to provide consistent high-quality data and products**

- **Strategy: Dual Stream Approach**

  - ✔ **Baseline Networks - e.g., GSN, Argo, GTN-P**

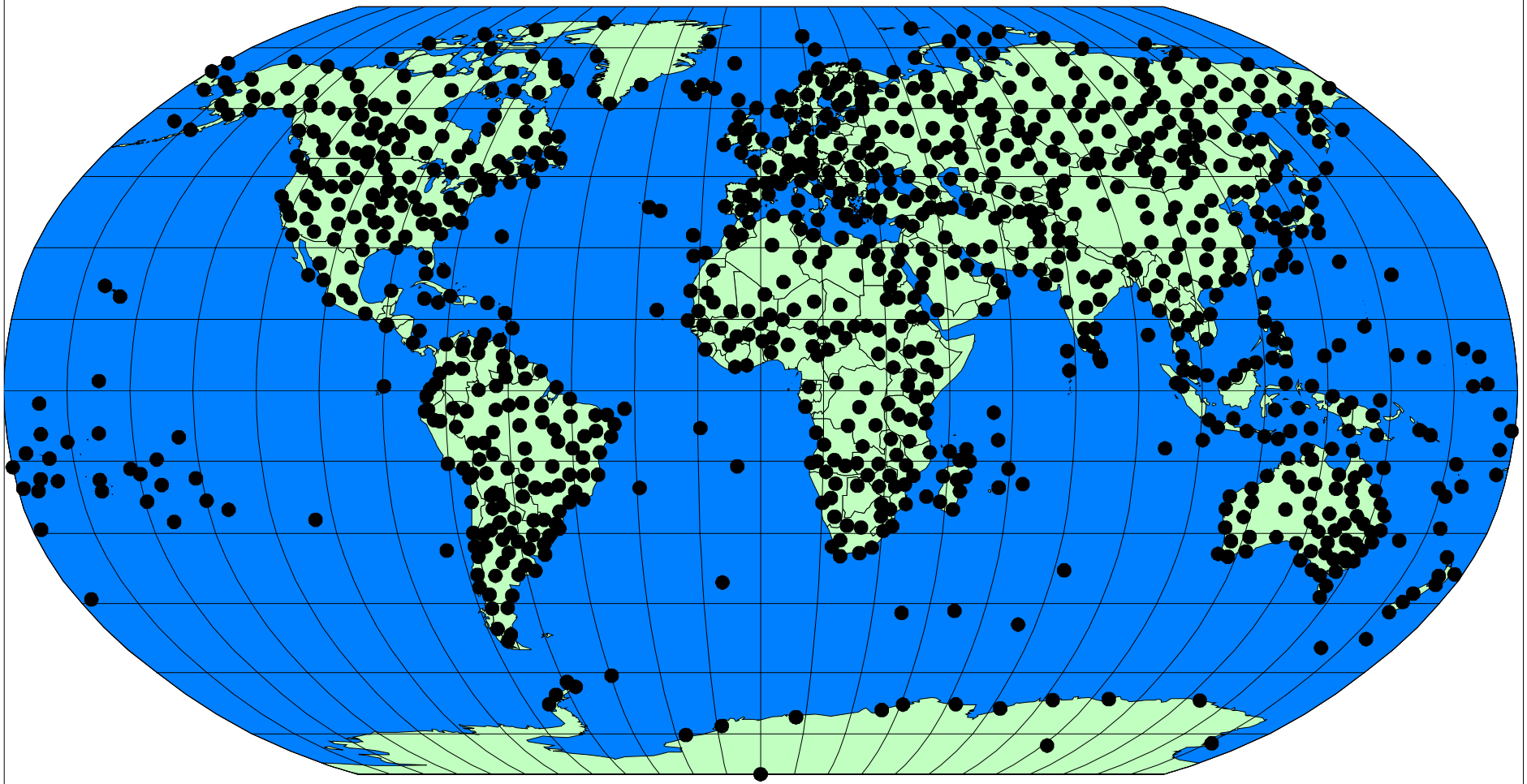
  - ✔ **Comprehensive Observations - e.g., IGOS Carbon or Water Cycle Themes, Regional Networks, Satellite Continuity, etc.**

GCOS Baseline Networks

- **Atmospheric**
  - ✓ **GCOS Surface Network (GSN)**
  - ✓ **GCOS Upper Air Network (GUAN)**
  - ✓ **Global Atmosphere Watch (GAW)**
- **Oceanographic**
  - ✓ **ENSO - e.g., TOGA TAO**
  - ✓ **Reference Stations, e.g., Sea Level**
  - ✓ **Argo / Drifters / VOS / XBT**
- **Terrestrial**
  - ✓ **Glaciers / Permafrost**
  - ✓ **Carbon Flux**
  - ✓ **Hydrology** (Under development)

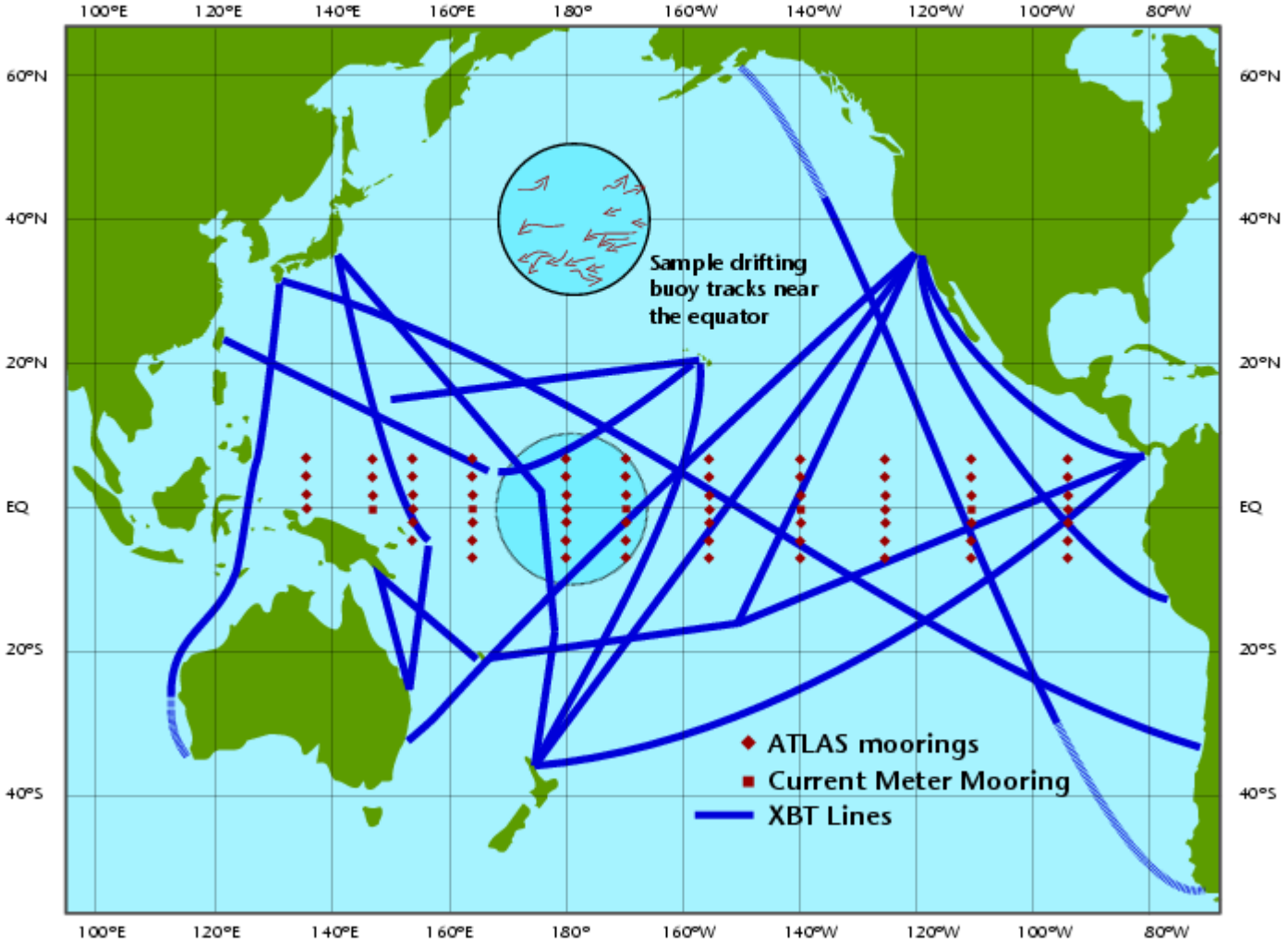
GCOS Surface Network (GSN)

989 Stations



GCOS Secretariat 26 May 1999

PACIFIC OCEAN OBSERVING ARRAY



The ARGO Project

- Array for Real-time Geostrophic Oceanography

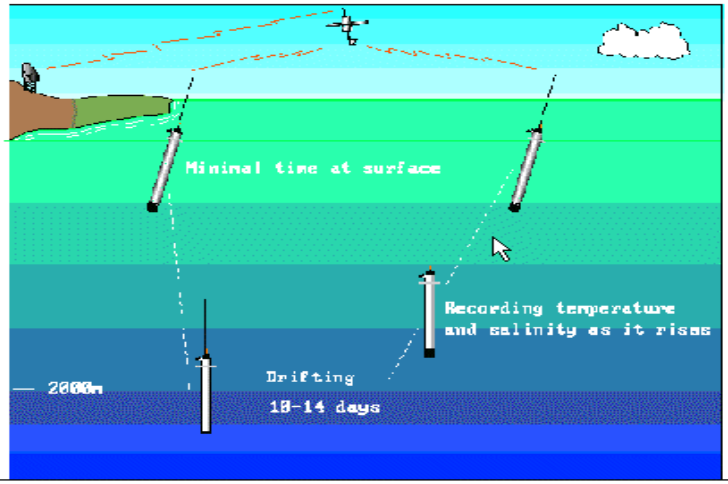


Fig 1: Schematic of a single cycle in the mission of a profiling float. Float lifetime is expected to be about 200 cycles. Note that the parking depth may be shallower than the profiling depth.

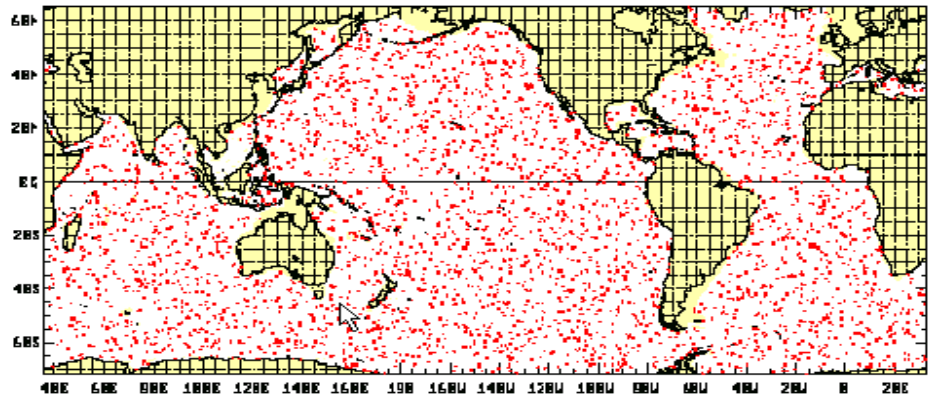
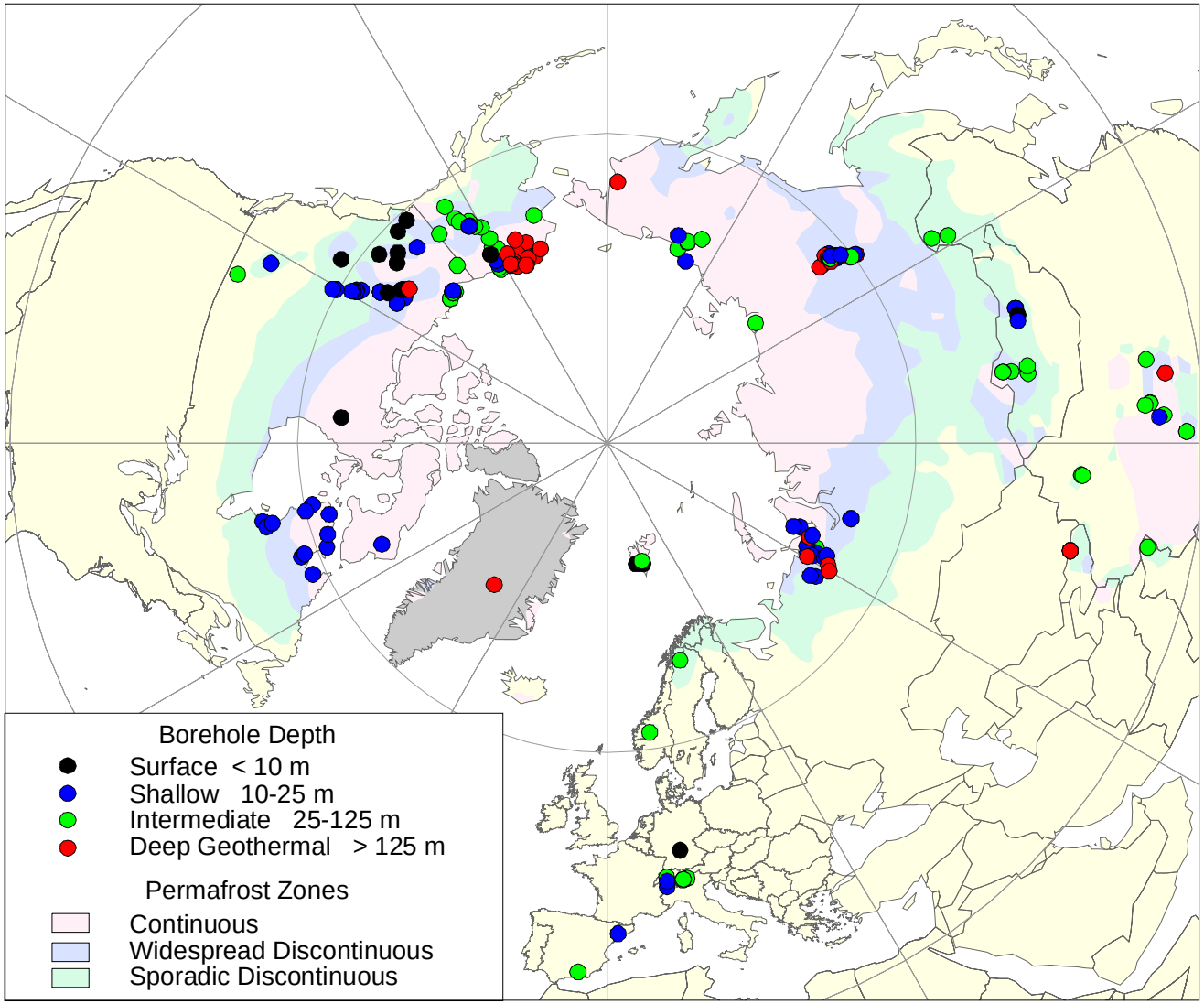


Fig 2: Schematic of the Argo float array. Positions of 3000 mid-depth floats are shown 3 years after deployment at 3° latitude and longitude spacing in the NRL global eddy-resolving model (courtesy H. Hurlburt). The mid-depth flow shows no tendency to produce clumps or gaps.

Boreholes Eligible for GTN-P



Map prepared by S.L. Smith, Geological Survey of Canada

GCOS and UNFCCC/COP

RESEARCH AND SYSTEMATIC OBSERVATION

- **Decision 5/CP.5 requests Parties to provide detailed reports on global climate observing systems by Nov 2001**
  - ✔ **Reports in accordance with UNFCCC reporting guidelines, developed by GCOS**
  - ✔ **UNFCCC/GCOS to develop synthesis / analysis process**
- **GCOS Secretariat to organize regional workshops to identify deficiencies and priority capacity-building needs**
- **Urges Parties to address deficiencies in observing systems, capacity building needs and funding options**

GCOS Regional Workshops

Goals

- Understand the guidelines for reporting on systematic observation to the UNFCCC
- Assess the contribution of the region to the GCOS Baseline Networks, e.g., GSN
- Identify national and regional needs and deficiencies in climate data
- Initiate development of a regional Action Plan for improving observing systems

Regional Action Plans

- **Summary of Regional Capacities for Climate Observations**
  - ✔ **GCOS Networks (IOS)**
  - ✔ **National Programs**
- **Consensus on needs / deficiencies and priorities in climate observing and related systems**
  - ✔ **Regional Action Plans**
- **Strategy for addressing the “priority” needs**
  - ✔ **Proposal for funding**

Global Environment Facility and Systematic Observation

- **Decision 2/CP.4 decided that GEF should "provide funding to developing country Parties to build capacity for participation in systematic observational networks to …")**

- **Expedited financing is available for capacity-building measures in 5 priority areas in Decision 2/CP.4.**
  - ✔ **Systematic observations - Para 1(c);**
  - ✔ **Preparing national communications - Para 1(d);**
  - ✔ **Improvement of emission factors - Para 1(e);**
  - ✔ **National activities for public awareness and education and for access to information - Para 1(f); and**
  - ✔ **Technology needs - Para 1(g);**

- **Non-Annex I countries can apply for up to 100,000USD in total for one or more of these priority areas.**

GCOS Principles

- Overlap instrument changes
- Document processing methods
- Document station history
- Maintain long records
- Calibrate & maintain facilities
- Backup high-tech systems
- Install new facilities in priority regions
- Maintain effective data archive & access facilities
- Transfer from research to operations
- Include GCOS needs in design

GCOS BASELINE NETWORKS