Future Observing of the Earth and Its Environment

WMO INTEGRATED GLOBAL OBSERVING SYSTEM (WIGOS) & WMO Information System (WIS) Implementation

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Outline

I. WIGOS Background

II. WIGOS Imperative

III. WIGOS Concept Development & WIS implementation

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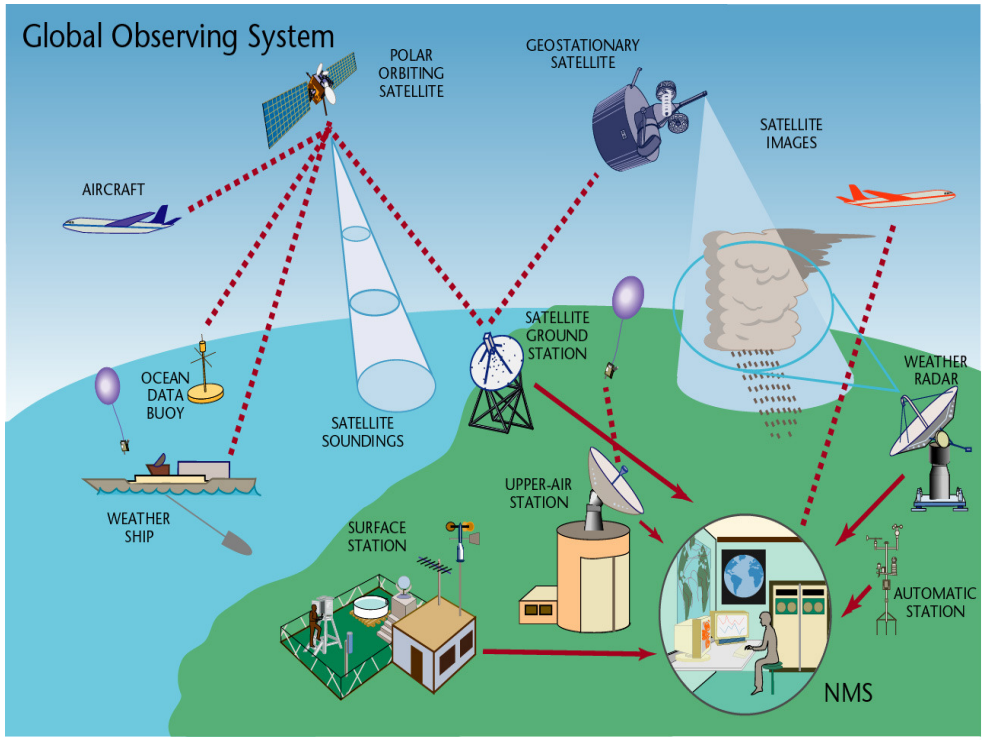
One of the greatest achievements of WMO: WWW (GOS, WIS and GDPFS)

- WMO Global Observing System: The most important infrastructure of WMO
  - Surface networks
  - Upper-air networks
  - Ocean observations
  - Radars networks
  - Airborne observations
  - Satellite constellations
  - ……



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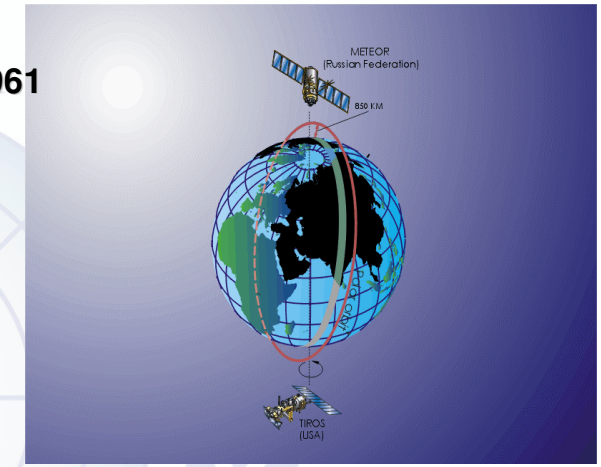
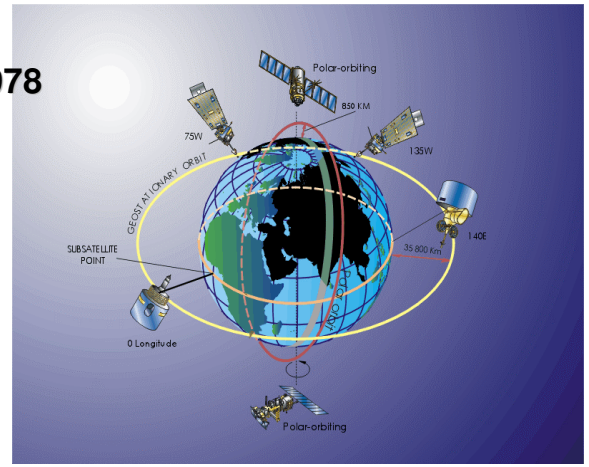
GOS Space-based development

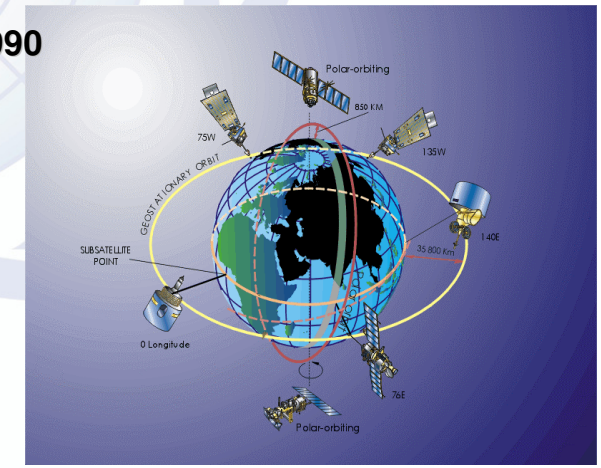
1961



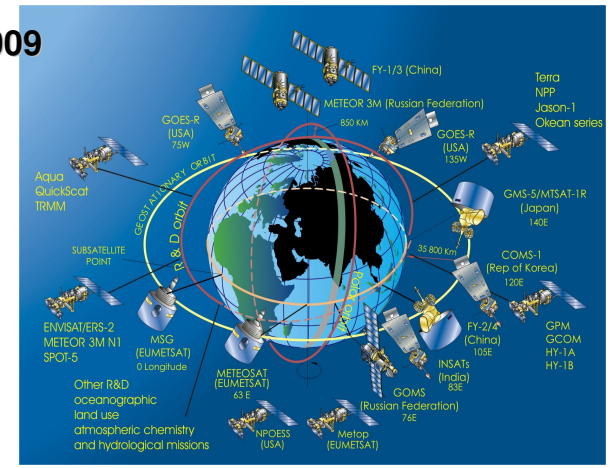
1978



1990



2009



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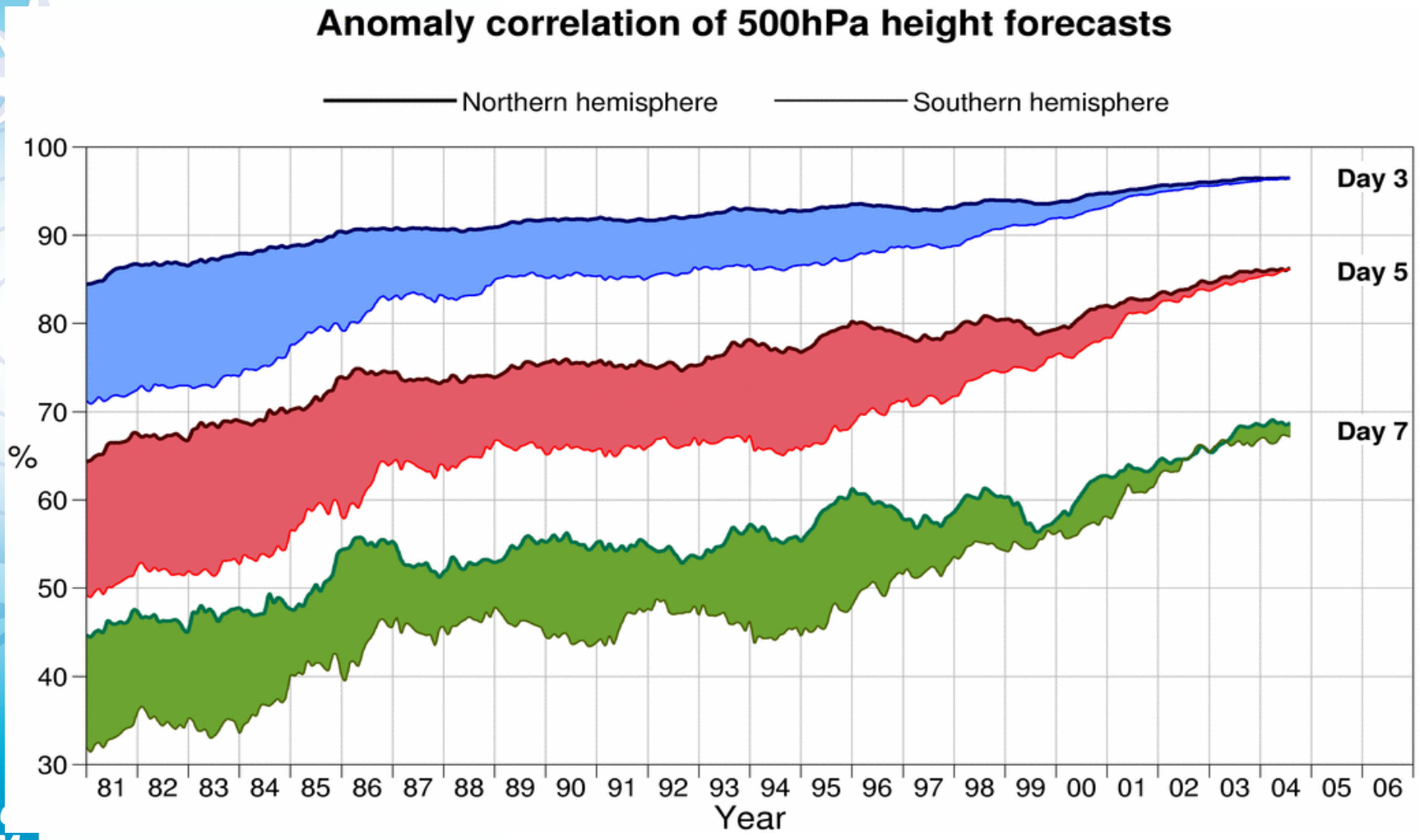
Convergence of N.Hem and S.Hem Medium Range Forecast skill 1981 – 2004



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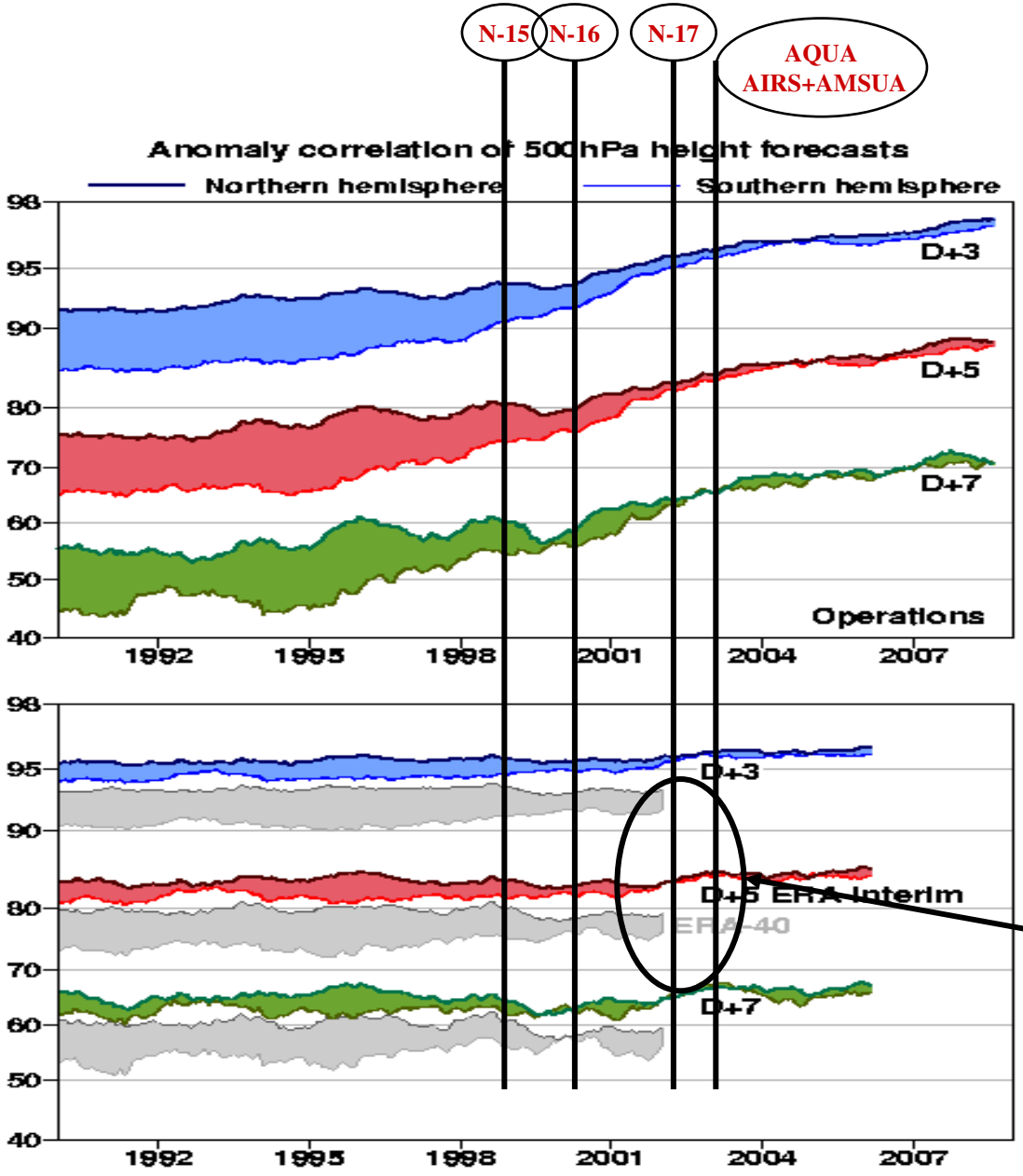
Impact of satellite observations on reanalyses



SH scores = NH scores

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Challenges: Climate Change and severe disasters, increasing society needs for improved services

El Niño

Hot & cold spells

Droughts

River basin flooding

Tropical cyclones

Heavy precipitations (rain or snow)

Storm surges

Ice Storms

Storm (winds)

Dust storms

Wildland fires & haze

Hail&Lightning

Mud & landslides

Flash floods

Avalanches

Tornadoes

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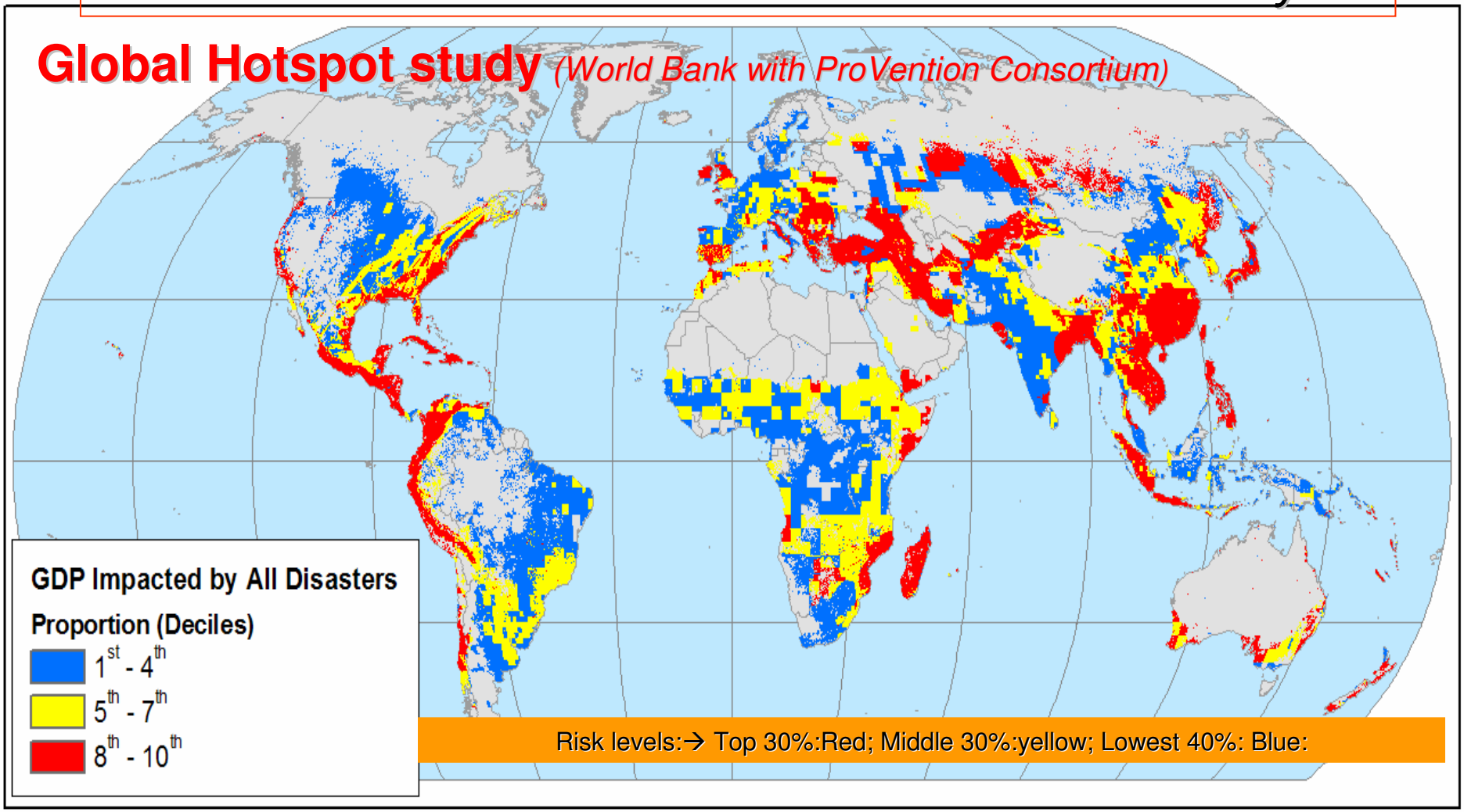
Global Challenges We Share

As society becomes more complex we become more sensitive to natural and human induced variability.

Global Hotspot study *(World Bank with ProVention Consortium)*



35 countries have more than 5% pop in areas at risk from three or more hazards
96 countries have more than 10% pop in areas at risk from two or more hazards
160 countries have more than 25% pop in areas at risk from one or more hazards

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Increasing Risks under a Changing Climate

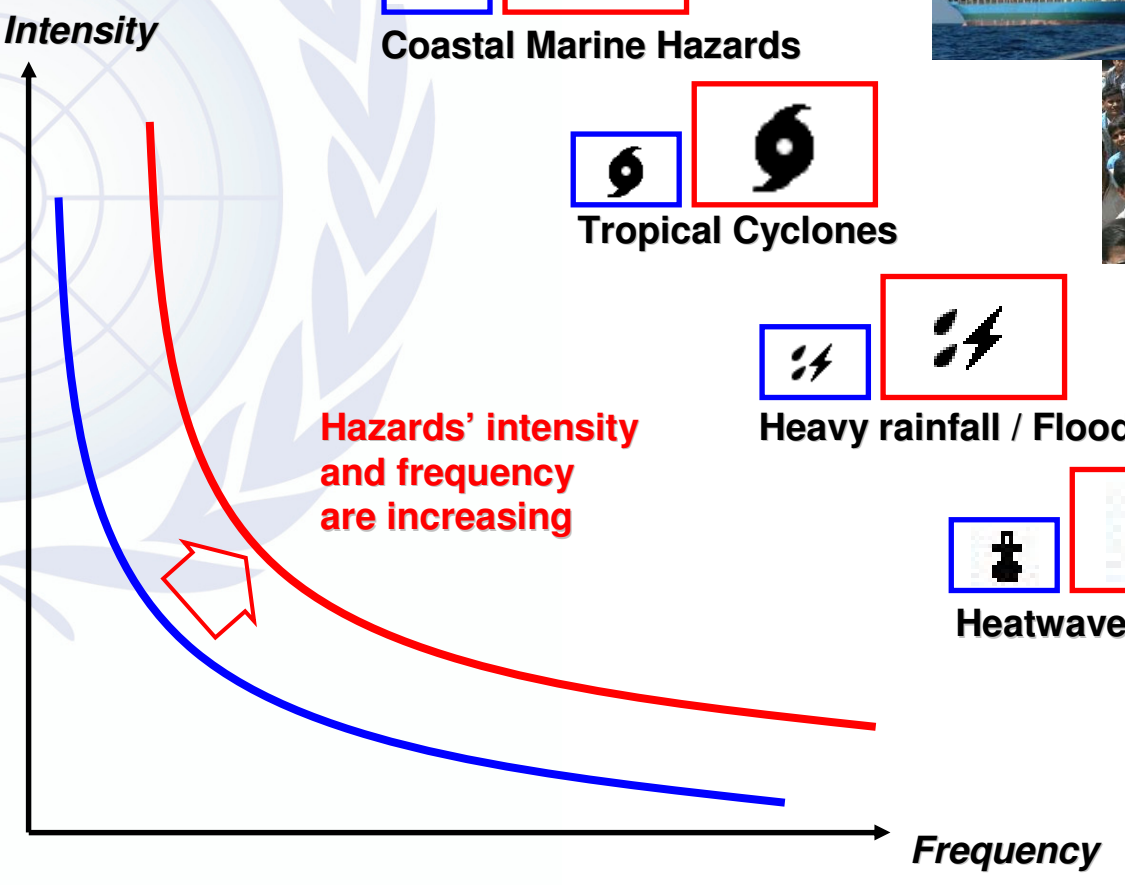
Strong Wind

Coastal Marine Hazards

Tropical Cyclones

Heavy rainfall / Flood

Heatwaves



Exposure is increasing !

Need for disaster risk management

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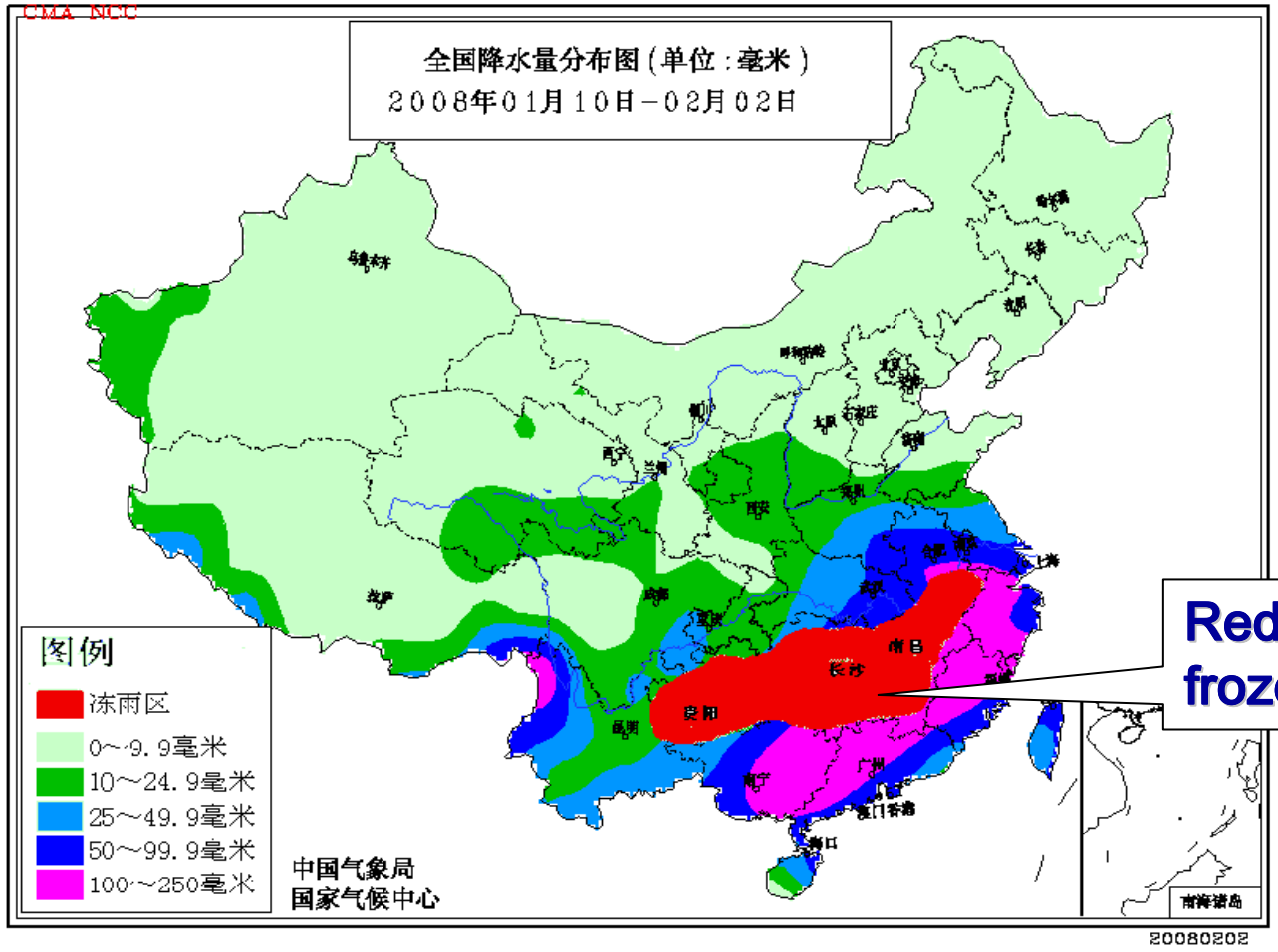
Jan. 10 – Feb 2 , 2008, cold climate and above average rainfall



Red areas is frozen rain

气象灾害呈现多发、并发

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Climate Service Priority

- Due to unable predicting the climate trend (long-lasting cold weather), Direct economic loss exceed 100 Billion RMB, more than 100 people died;
- Similar cases happen every year around the world
- 10 – 30 days forecasts and seasonal to inter-annual climate prediction are WMO Members priorities!

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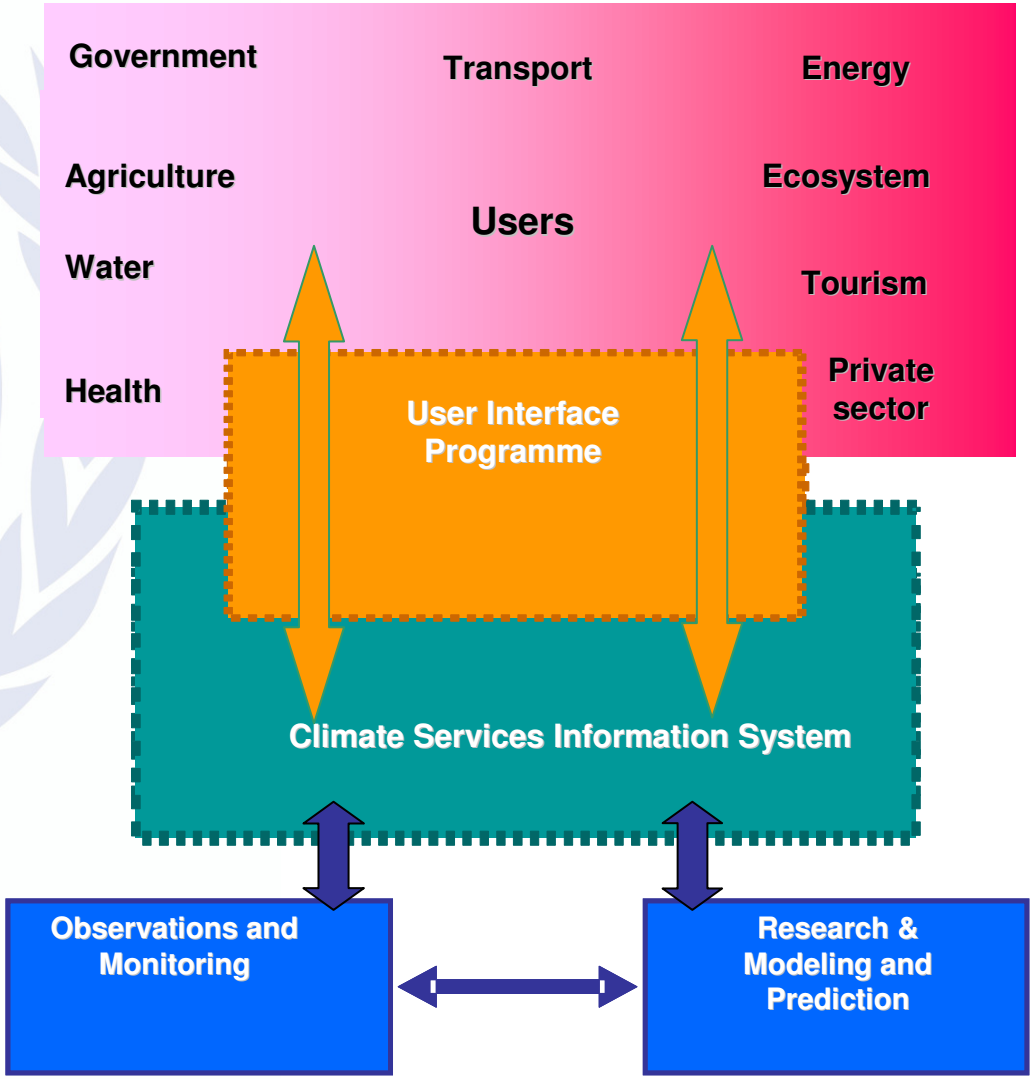
Components of Global Framework for Climate Services



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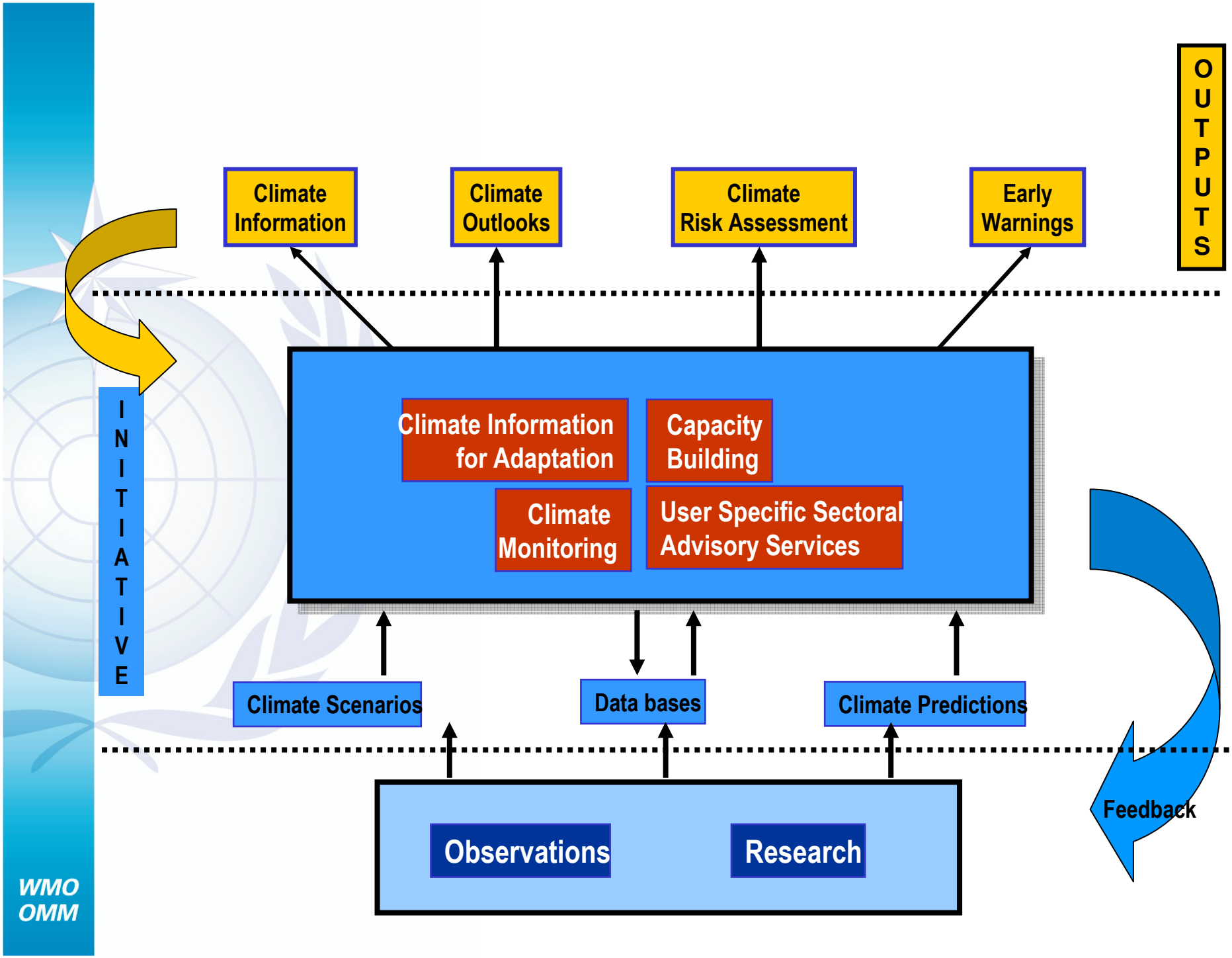
OUTPUTS
Climate Information
Climate Outlooks
Climate Risk Assessment
Early Warnings
INITIATIVE
Climate Information for Adaptation
Capacity Building
Climate Monitoring
User Specific Sectoral Advisory Services
Climate Scenarios
Data bases
Climate Predictions
Observations
Research
Feedback
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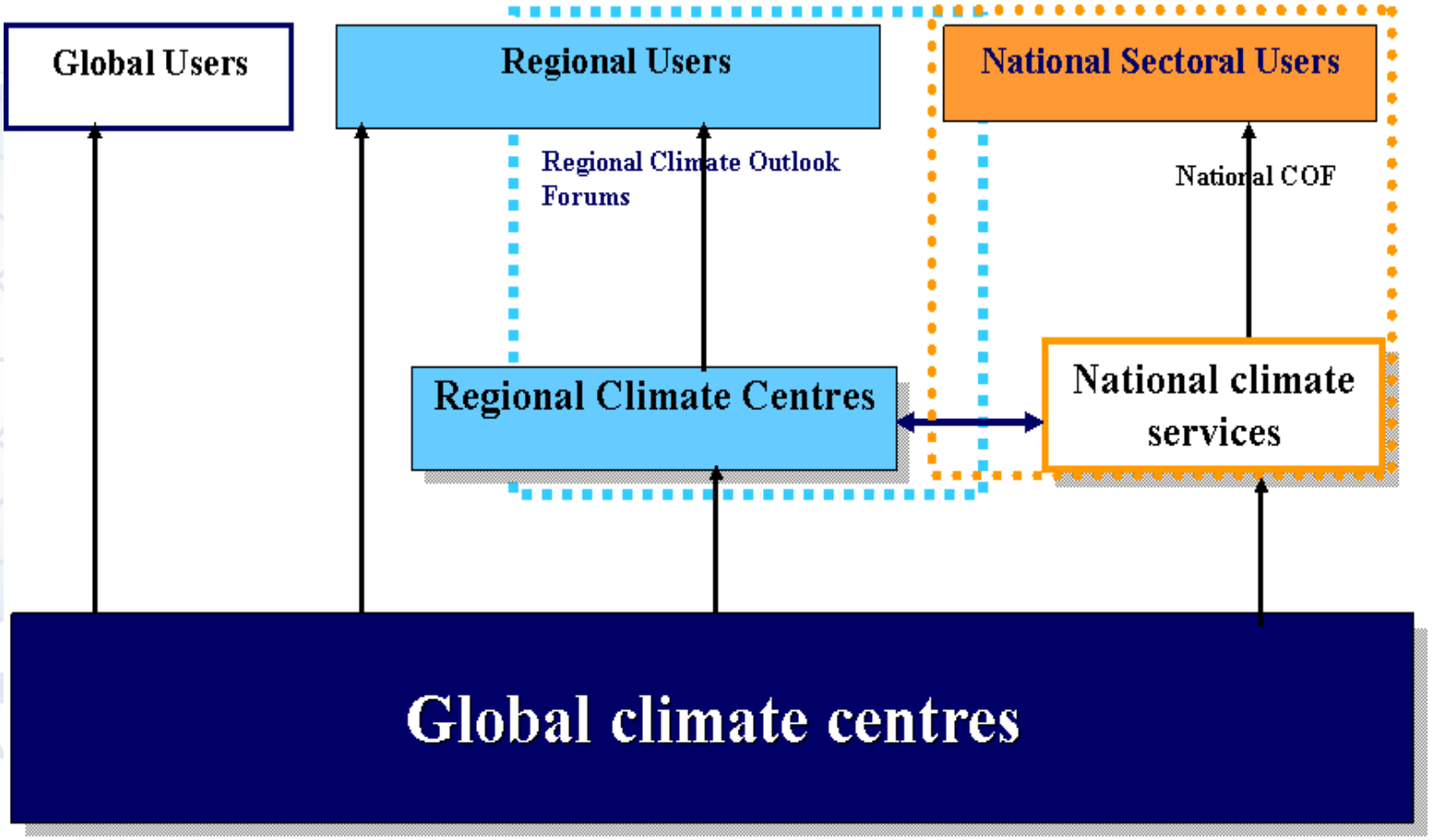
Elements of Climate Services Information System



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Regional Climate Centres (RCCs)

- RCCs will be Centres of Excellence, designated by CBS and CCl, to perform regional-scale climate functions, including:
  - Operational LRF and Climate Monitoring
  - Coordination between RCCs, GPCs and NMHSs in the region
  - Data services
  - Climate Applications
  - Training and capacity building
  - Research and Development
- RCCs will be complementary to and supportive of NMHSs, who will deliver all Warnings and national-scale products
- Establishment of RCCs will be initiated by Regional Associations, based on regional needs and priorities
- Implementation Status:
  - Beijing and Tokyo designated as RCCs in June 2009.
  - Pilot phase of RCC Network launched in Europe.
  - Africa forms a Task Team to guide RCC implementation.

Regional Climate Outlook Forums (RCOFs)

- A key component of WMO Climate Information and Prediction Services (CLIPS) project activities.
- First established in October 1996 at the Workshop on Reducing Climate-Related Vulnerability in Southern Africa (Victoria Falls, Zimbabwe).
- Gained momentum as a regional response to the major 1997–1998 El Niño event.
- RCOF Concept was pioneered in Africa and spread worldwide.
- WMO and a number of national, regional and international organizations (e.g., NOAA, IRI, Meteo France, World Bank, etc.) have supported their growth and expansion.

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WIGOS: Overview

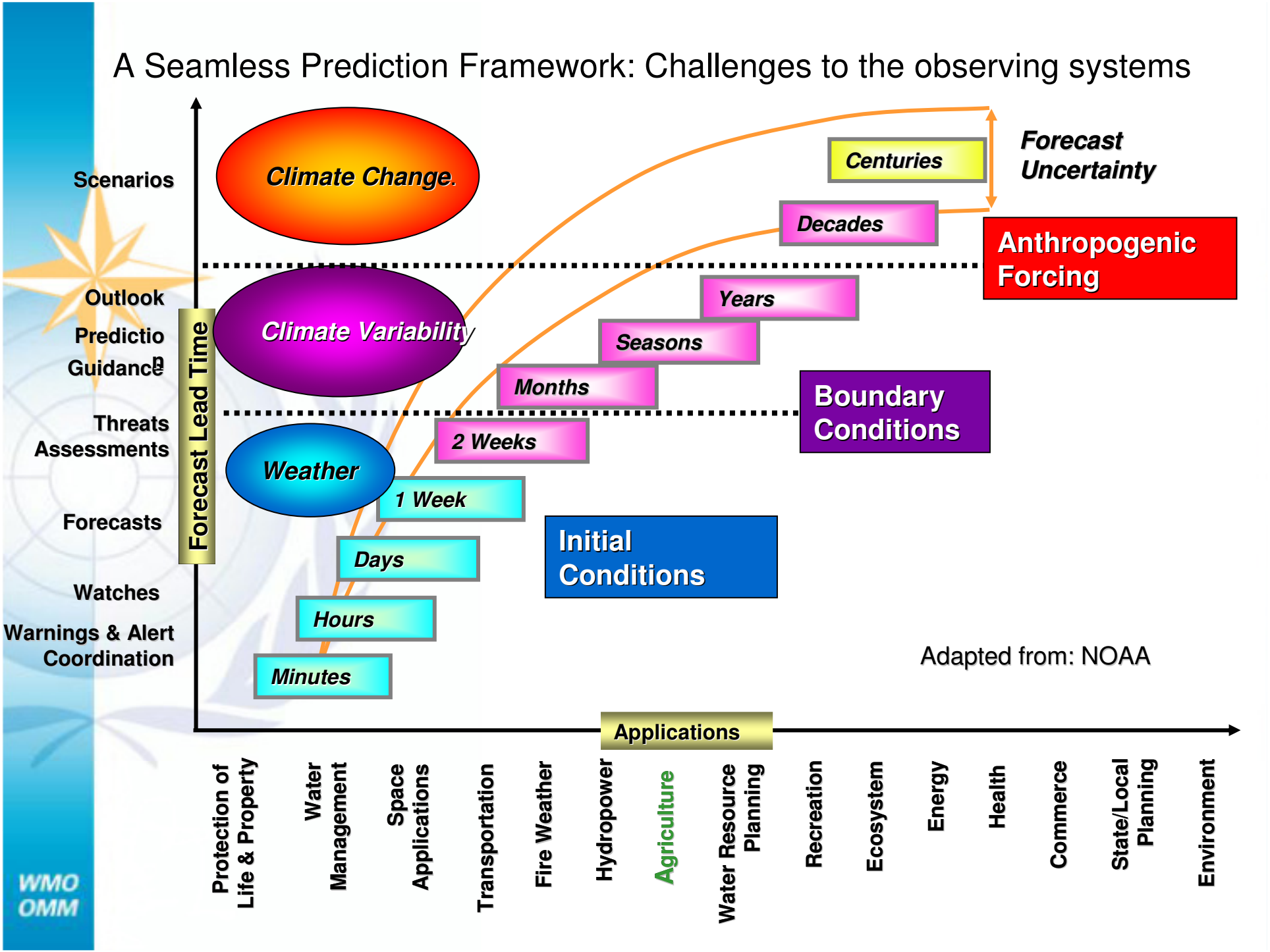
CONGRESS XV (2007)

- High priority -- “Towards Enhanced Integration between the WMO Observing Systems” (WIGOS) to support weather, climate, water and related environmental services

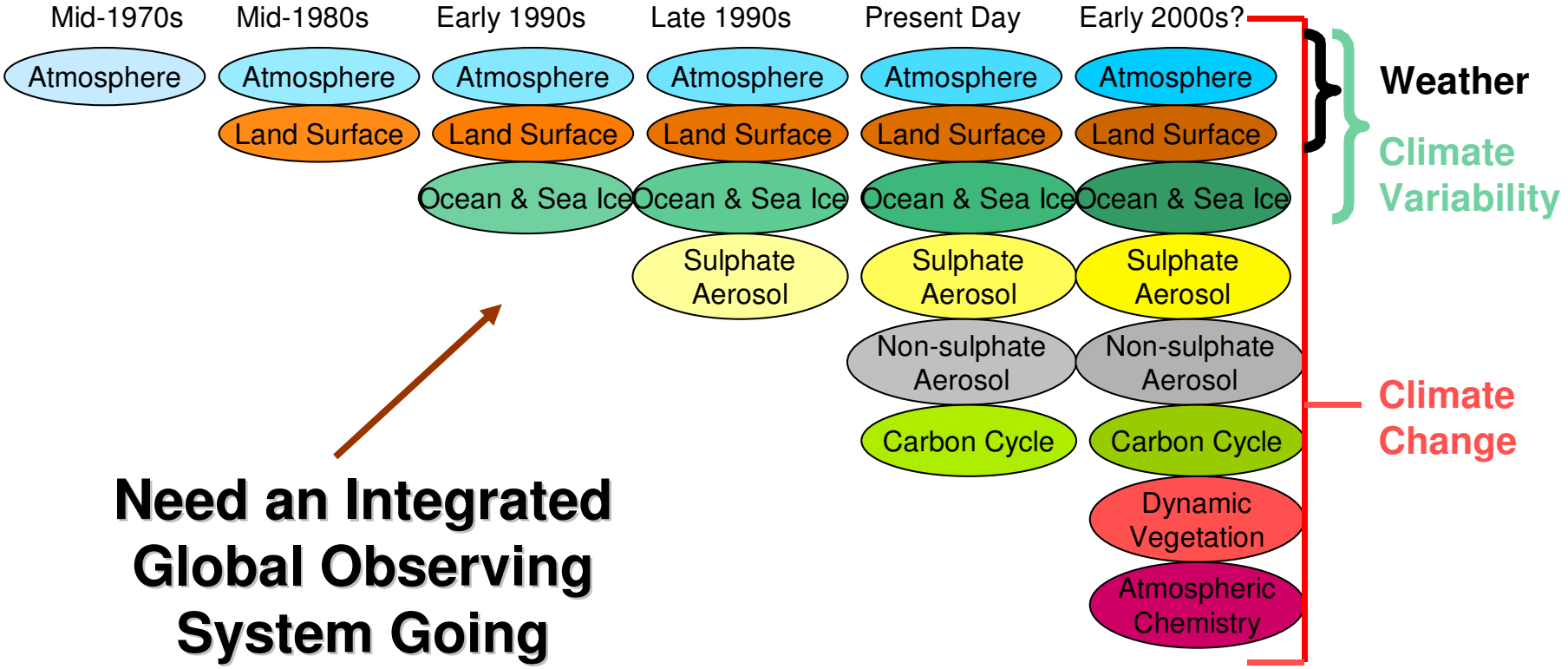
WMO Executive Council

- Established a WG on WIGOS-WIS
  - Develop an WIGOS Implementation Plan
  - Refine the WIS-Implementation Plan
  - Monitor the Progress of the Pilot and Demo projects

A Seamless Prediction Framework: Challenges to the observing systems

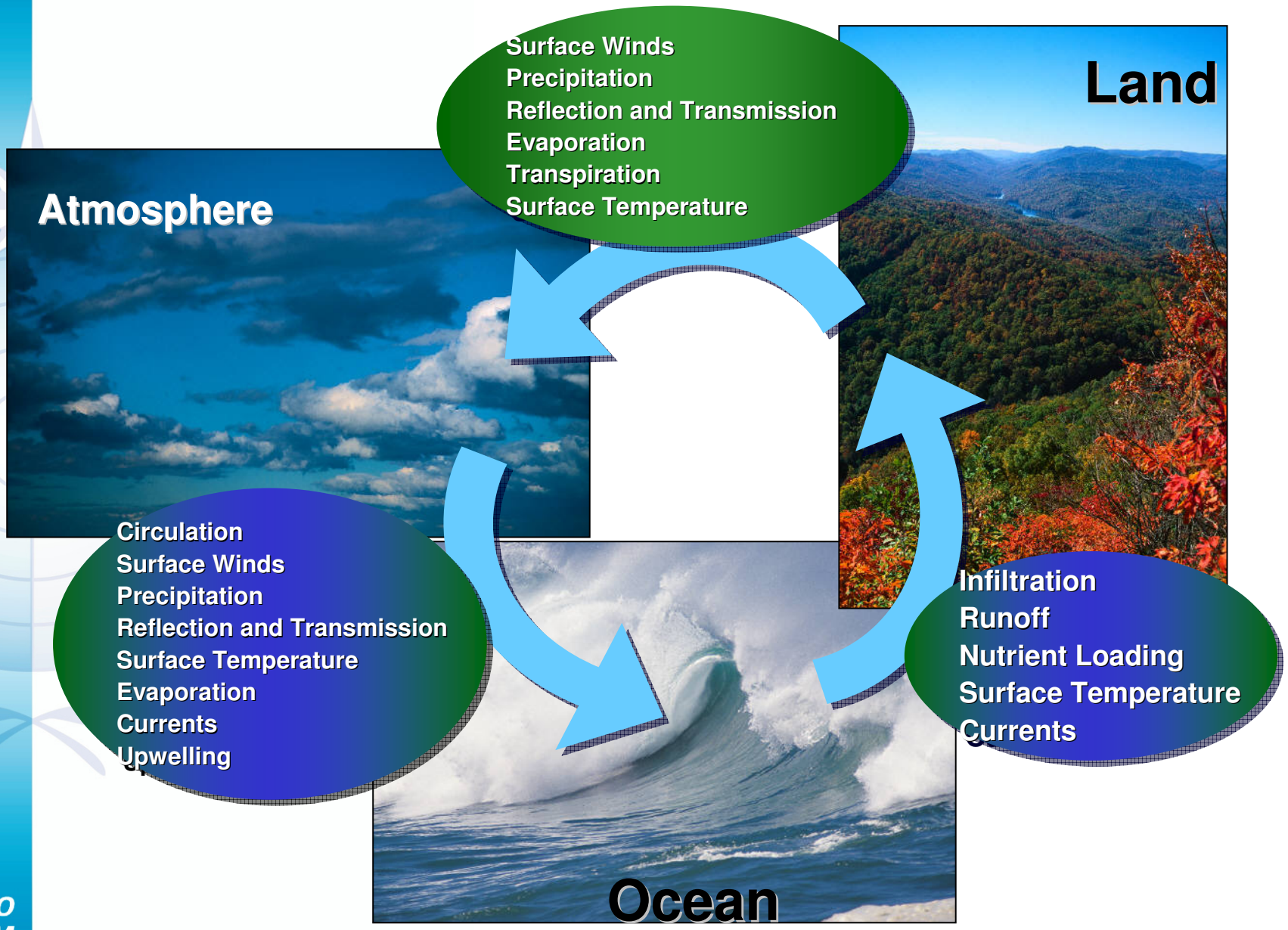


Overview of Weather and Climate Models and the Required Observations



Need an Integrated Global Observing System Going Beyond the WWW

Studying Earth as a Complex System



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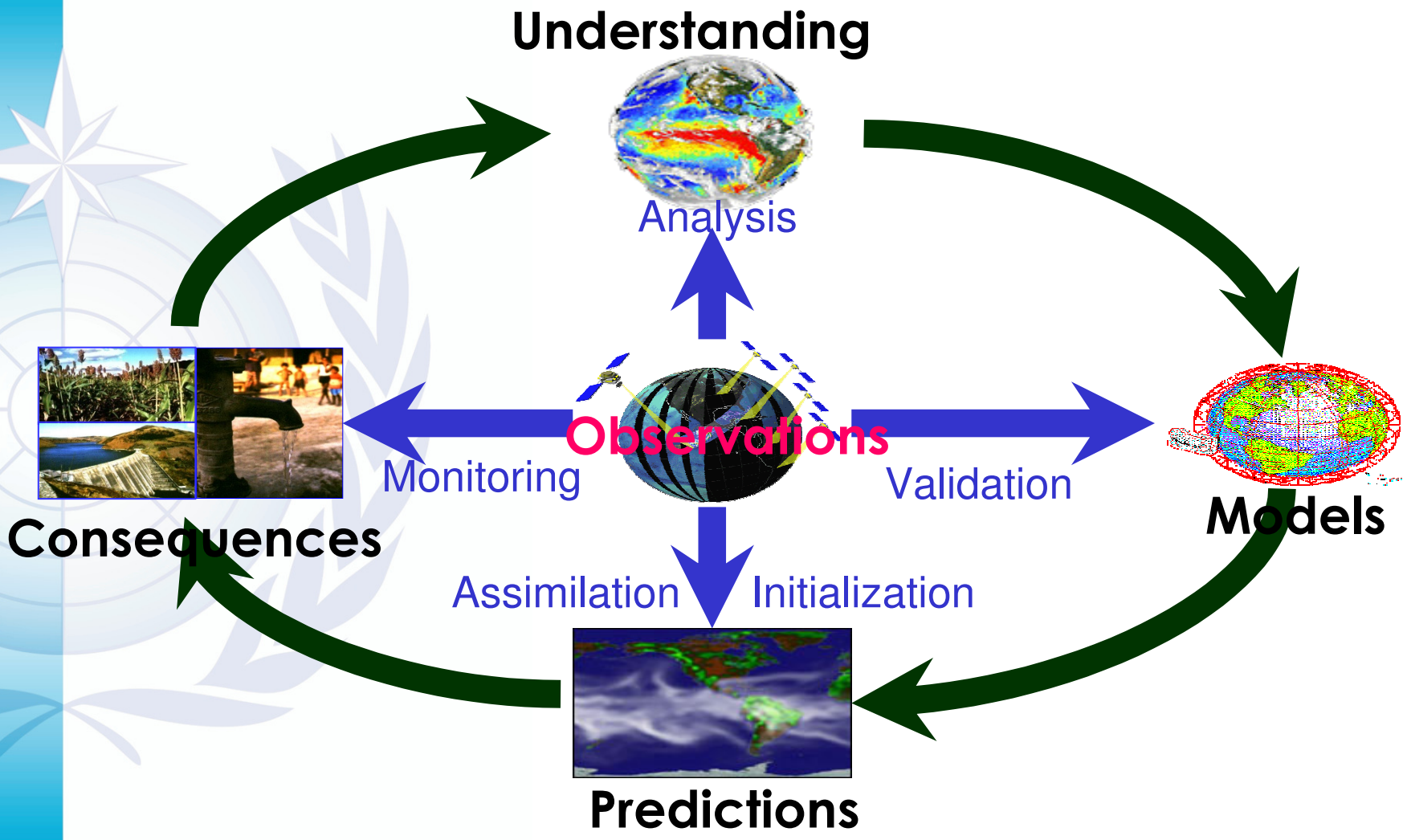
Importance of observations : From Observations to Consequences



The availability of new observations strongly motivates advances in understanding, prediction, and application.

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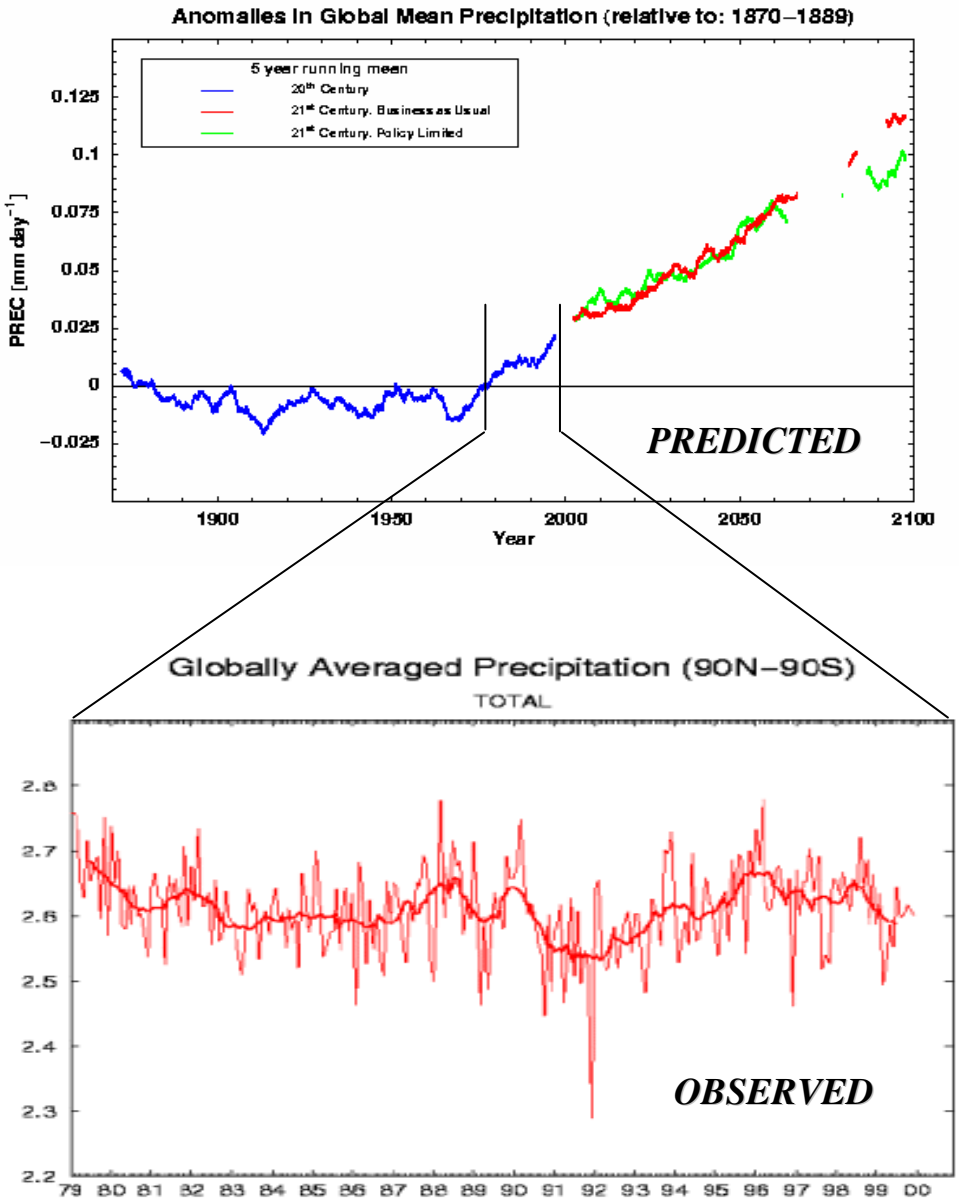
Climate Model vs Observed Precipitation

- **Global Intensification of the hydrological cycle ?**
- **Models indicate trend -- observations don't confirm**
- **Errors don't allow proof**



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WIGOS Priority: Completeness : fill-in observing gaps

Key Areas: How to develop and sustain Ocean and Land (including Polar Regions and Cryosphere) observations on operational basis from both In-situ and space?

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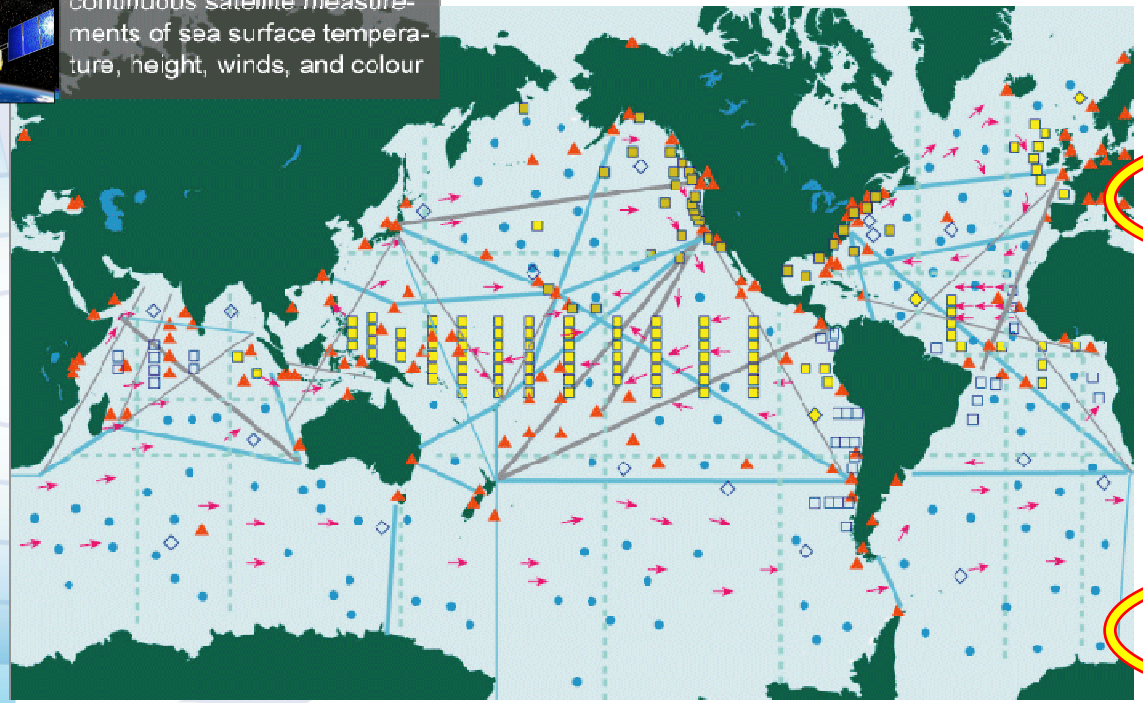
Initial Global Ocean Observing System for Climate

Status against the GCOS Implementation Plan and JCOMM targets

Total *in situ* networks **61%** March 2009

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



87% **Surface measurements** from volunteer ships (VOSclim)

200 ships in pilot project

100% Global **drifting surface buoy** array

5° resolution array: 1250 floats

66% **Tide gauge** network (GCOS subset of GLOSS core network)

170 real-time reporting gauges

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

51 lines occupied

100% **Profiling float** network (Argo)

3° resolution array: 3000 floats

59% Repeat **hydrography** and **carbon** inventories

Full ocean

Reference time series 54%

58 sites

48% Global **reference mooring** network

29 moorings planned

79% Global tropical **moored buoy** network

119 moorings planned

Milestones
Drifters 2005
Argo 2007

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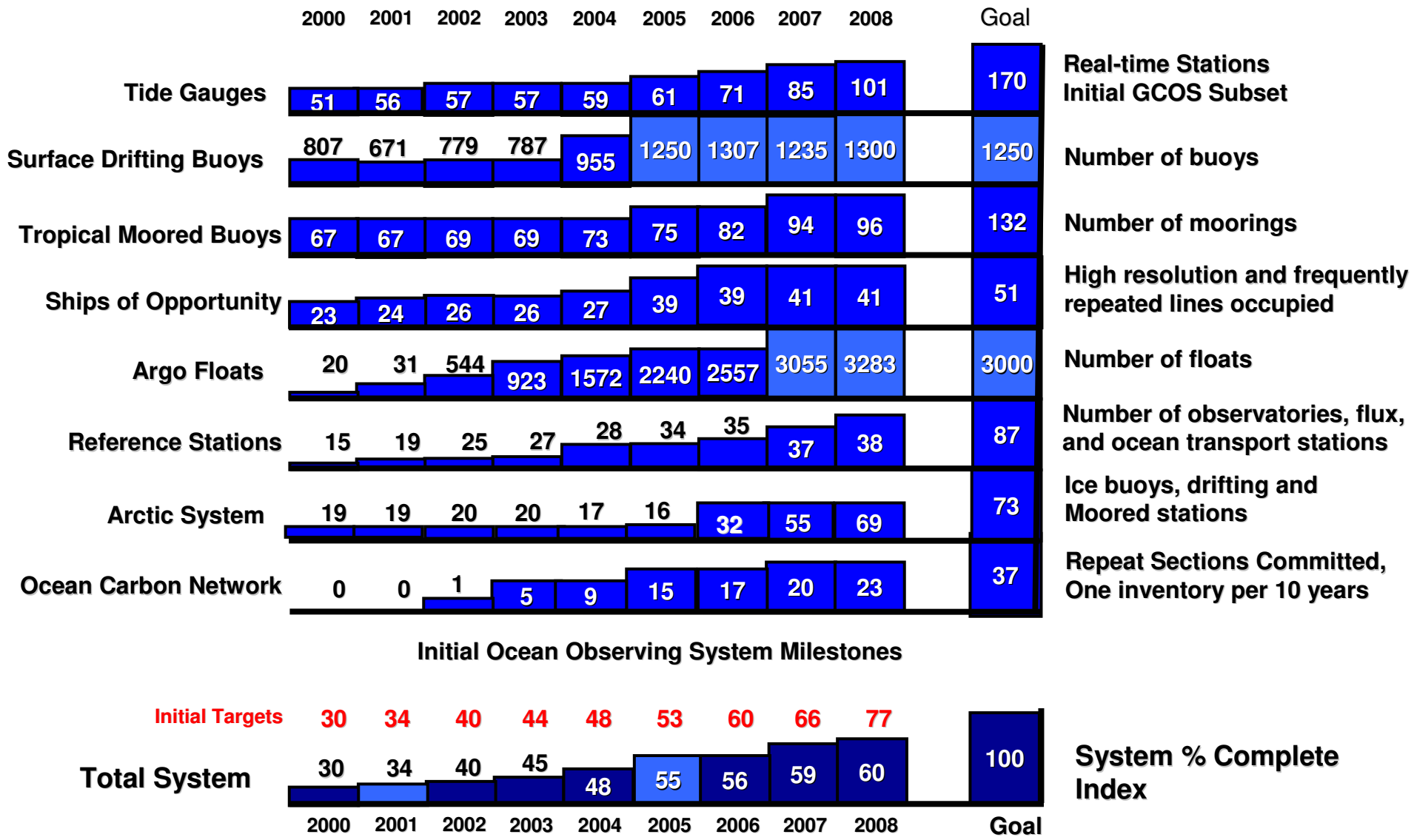
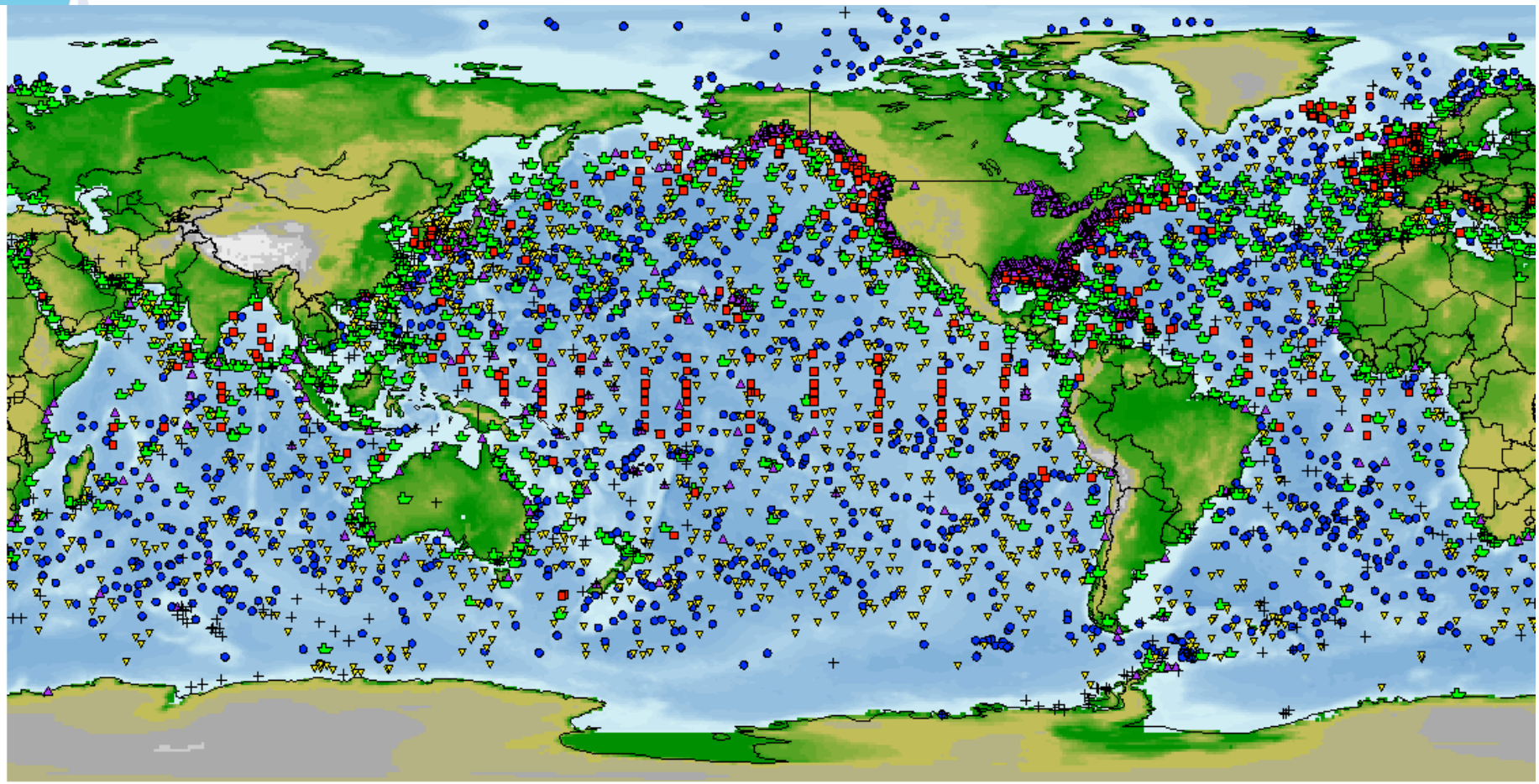
Progress Toward Global Coverage (representative milestones)



Status of the System
8055 Platforms reporting in February



Suppressing ship observations for most recent 48 hours

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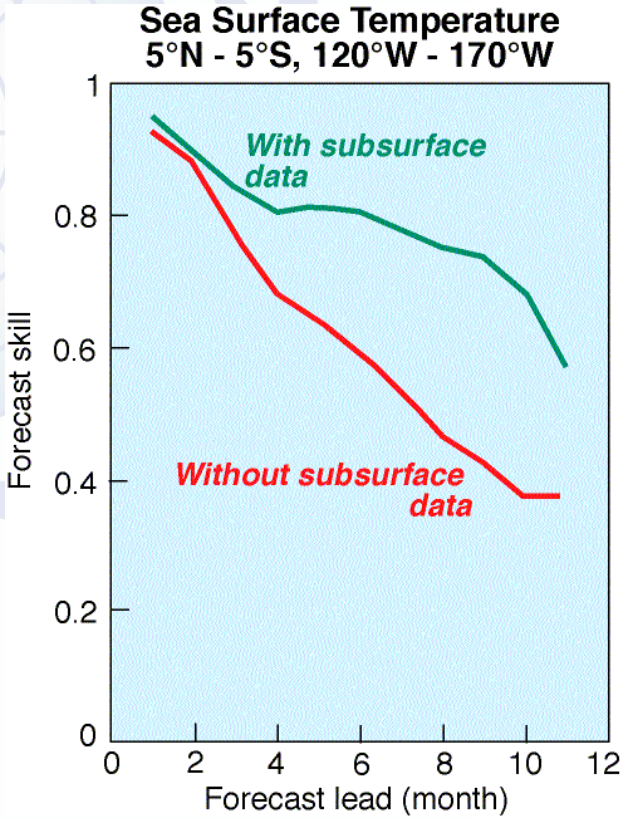
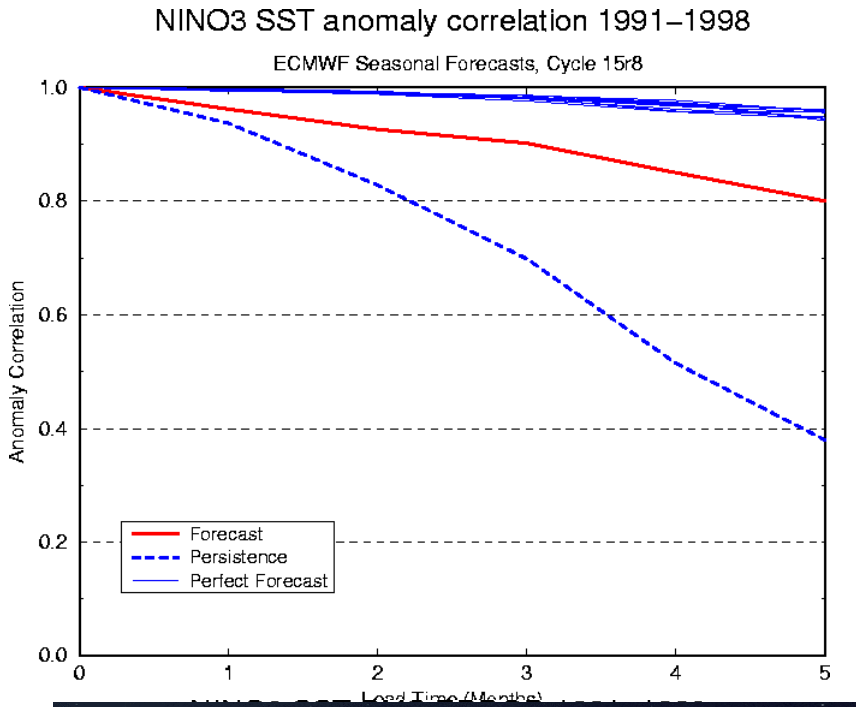
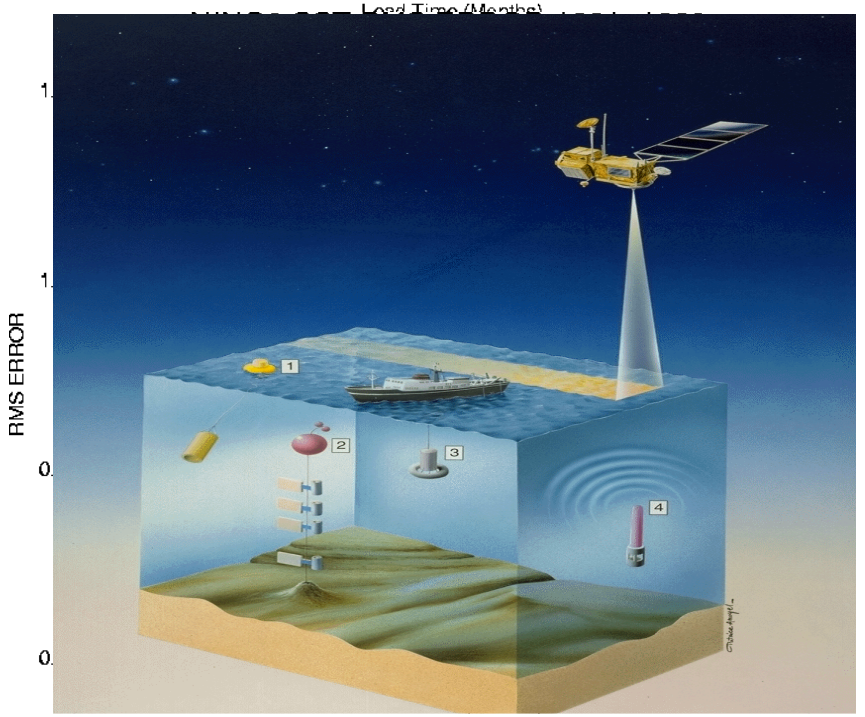
METEO FRANCE

The ENSO

- The predictability rely on sub-surface data
- Satellite can not observe sub-surface now







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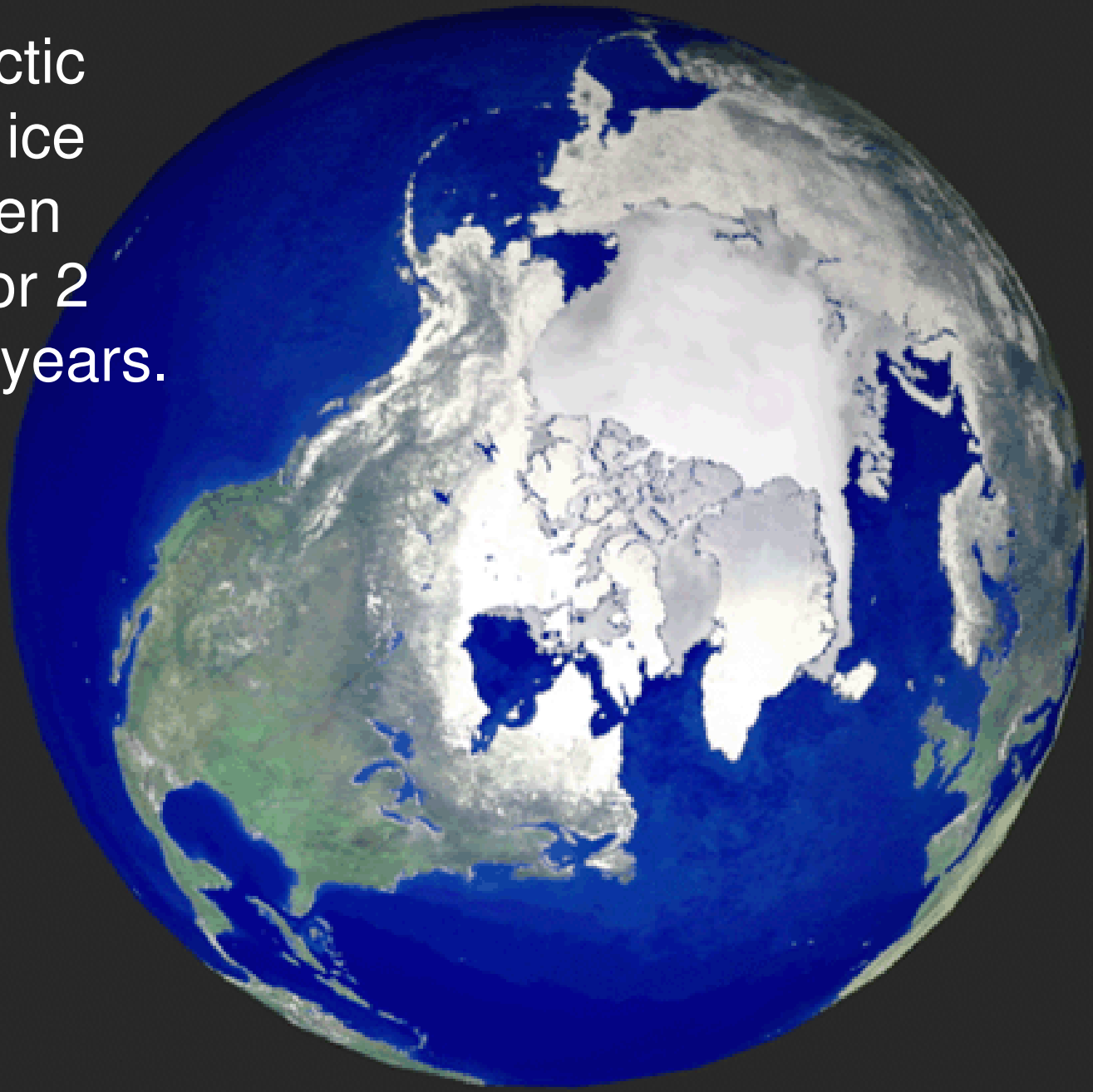
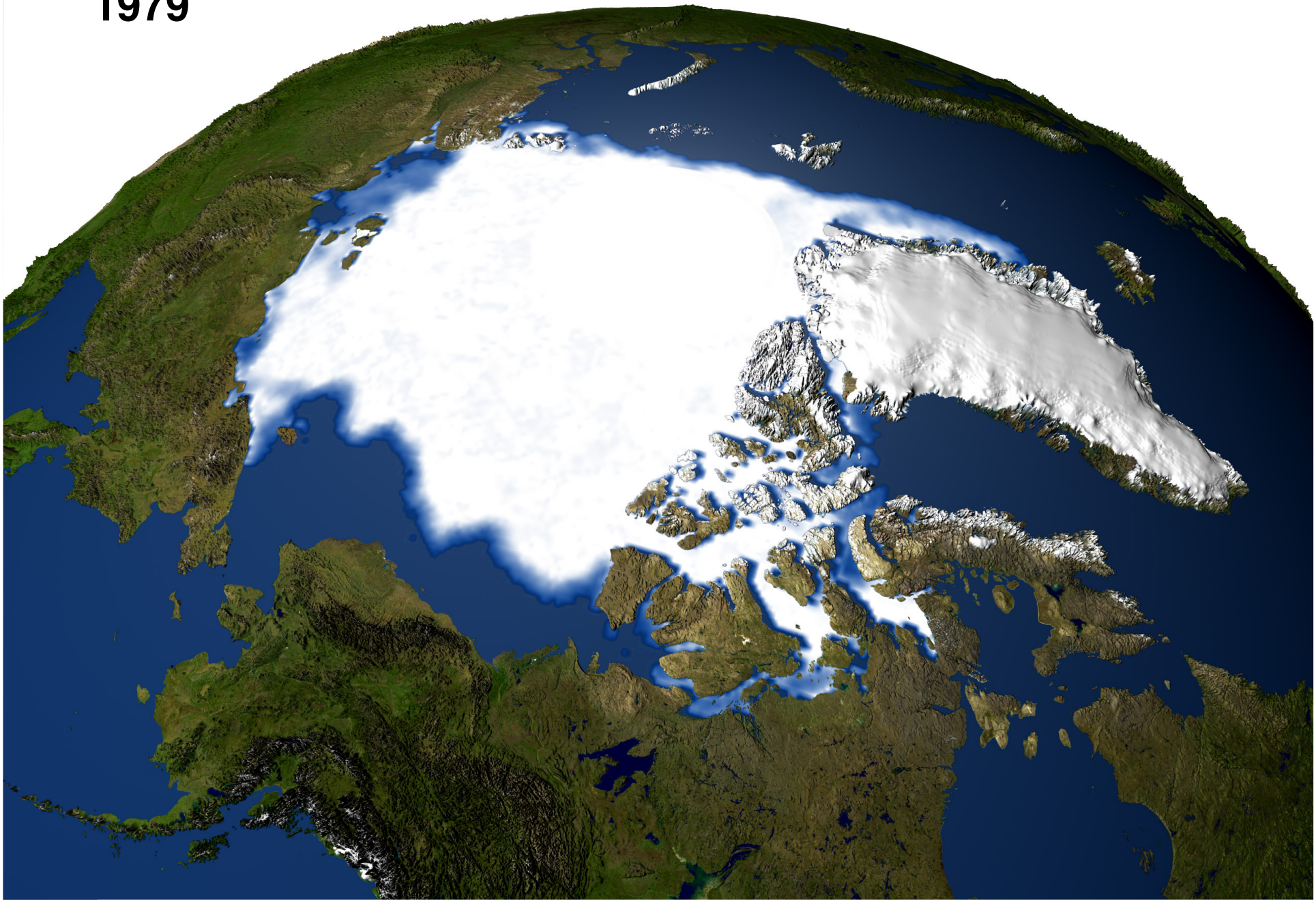
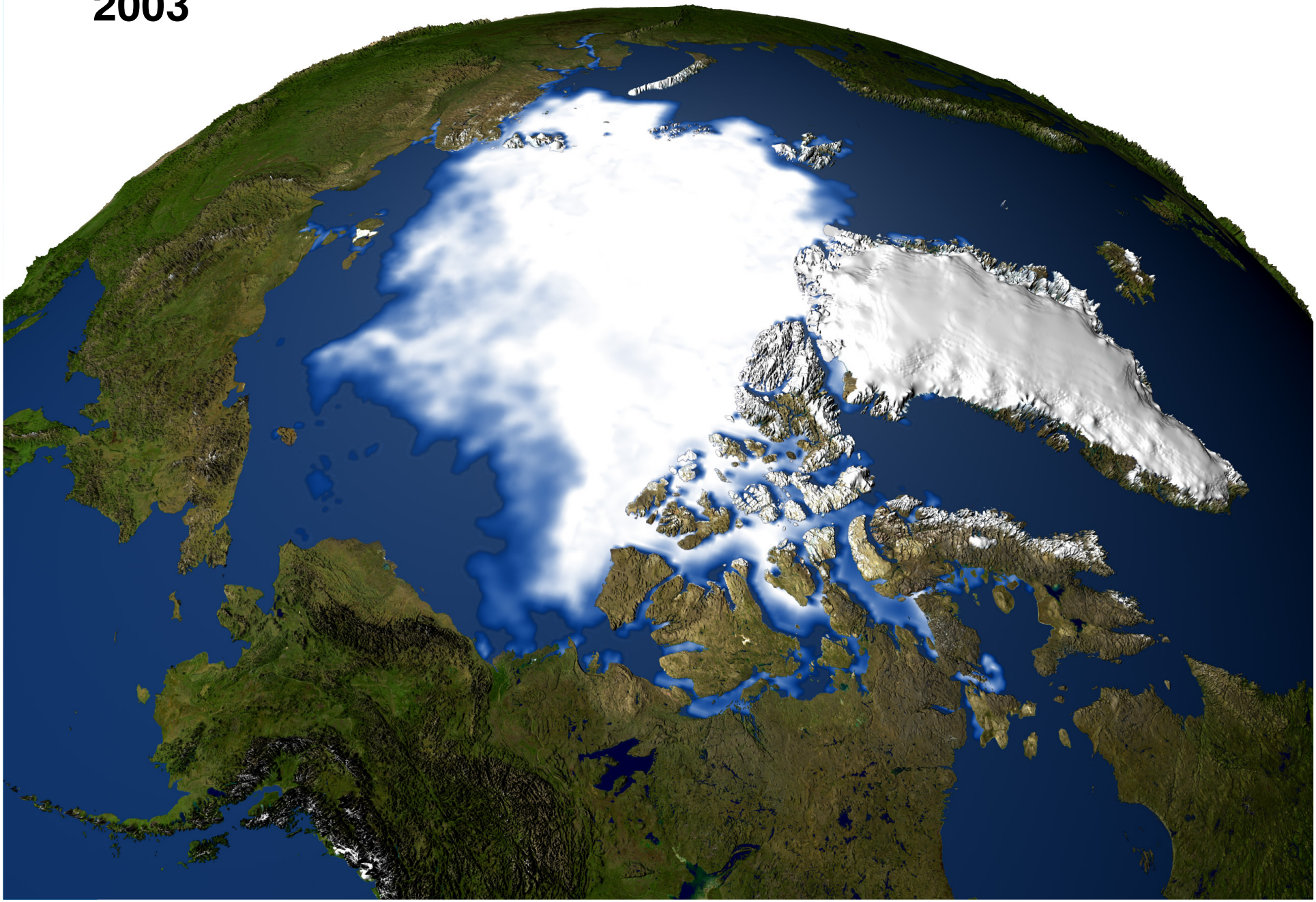
The Arctic Ocean ice has been there for 2 million years.



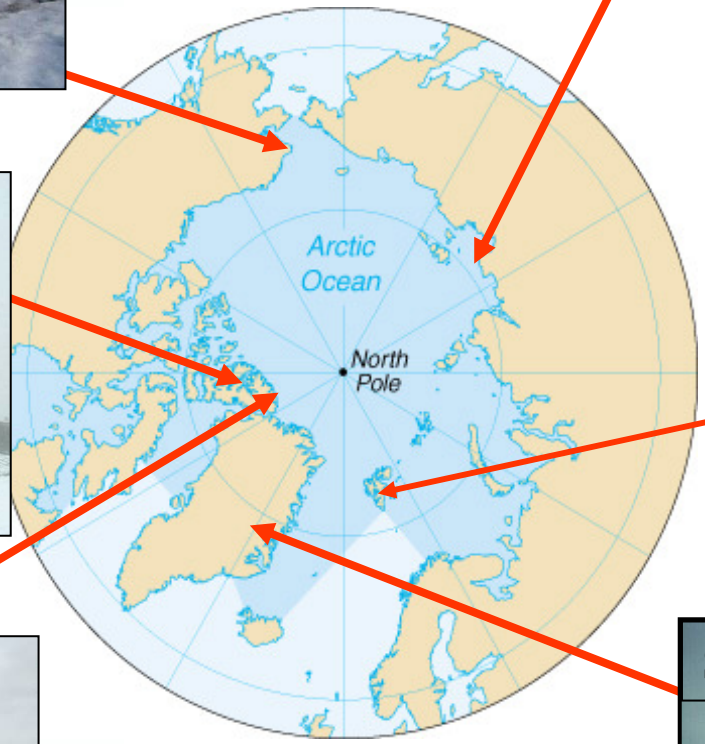

1979

2003



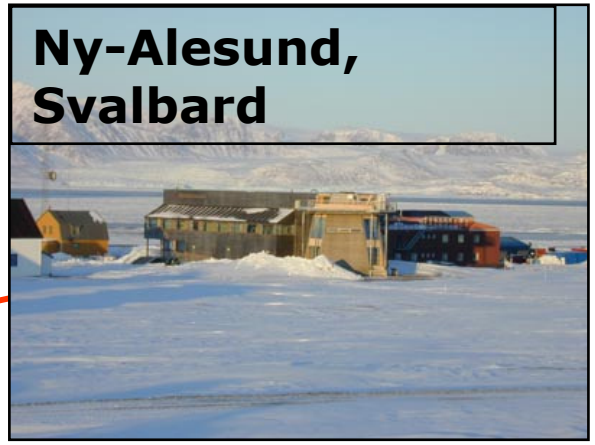
Barrow, Alaska

Tiksi, Russia



Eureka, Canada

Ny-Alesund, Svalbard

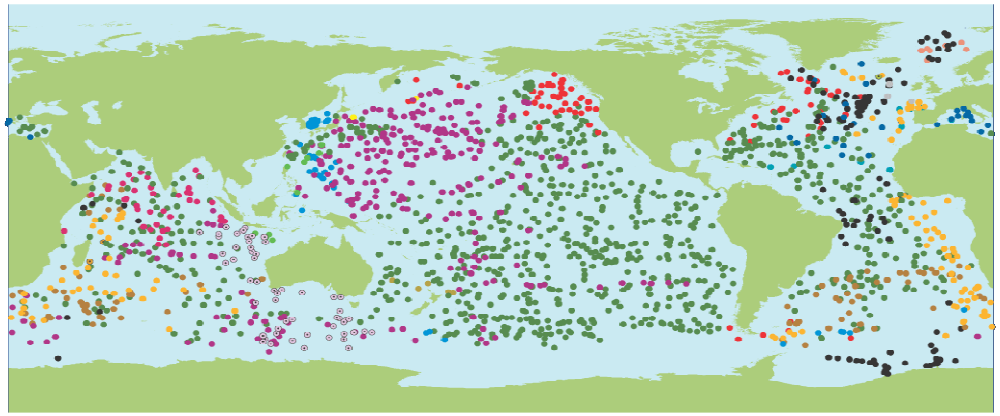


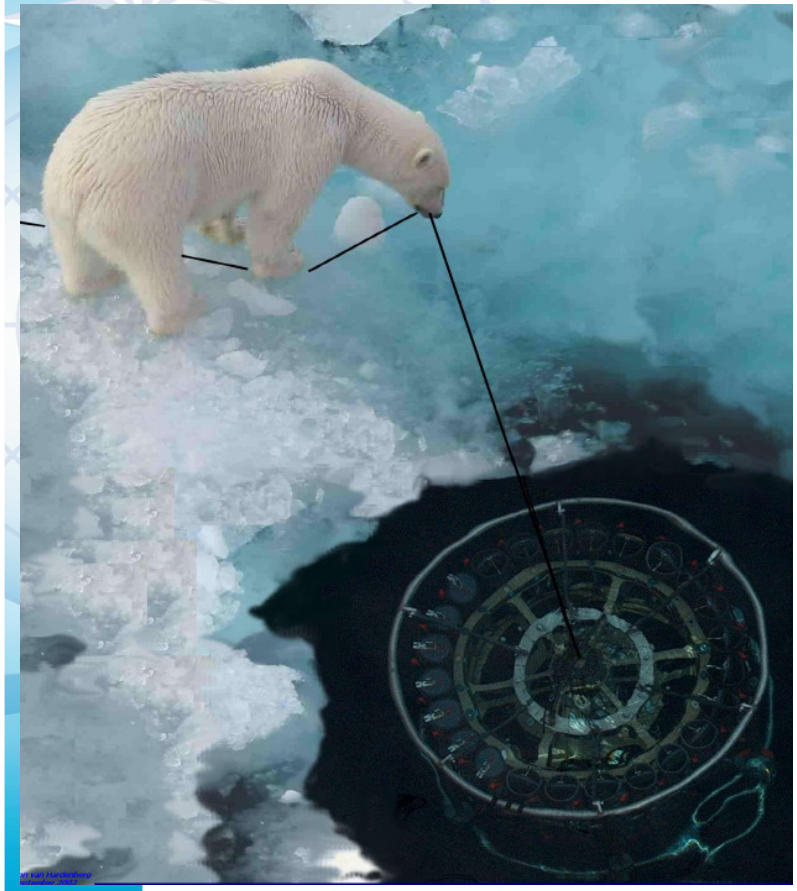
Alert, Canada

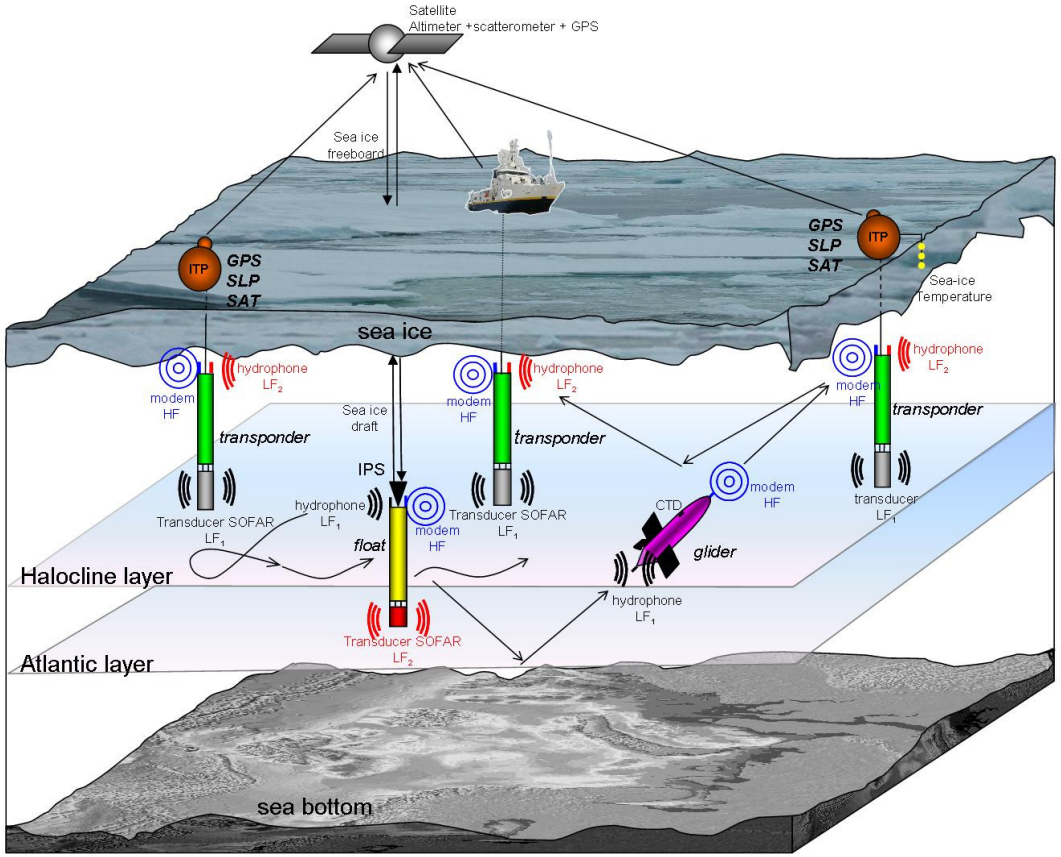
Summit, Greenland

Establishing Intensive Atmospheric Observatories In the Arctic is the component of NOAA/SEARCH being directed by ESRL

Temperature-salinity observations under ice







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WIGOS Priority: Ensure the quality of the observations to meet climate requirements

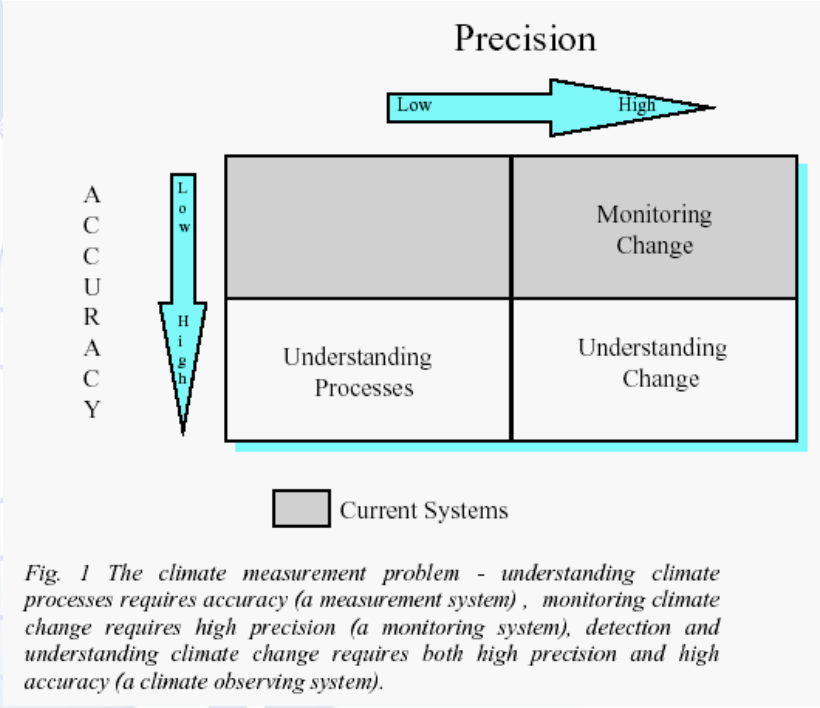
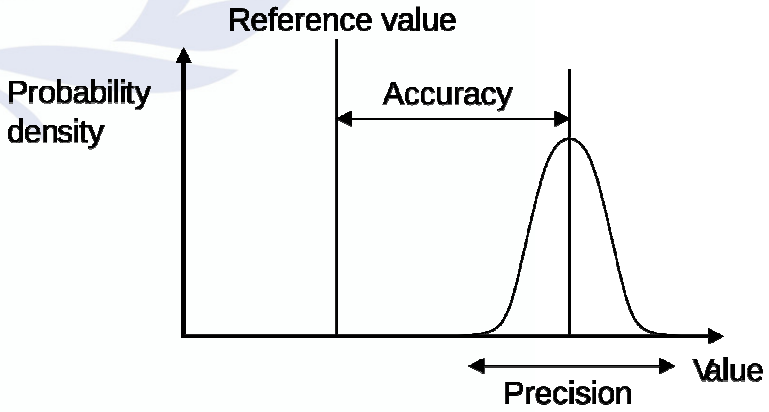
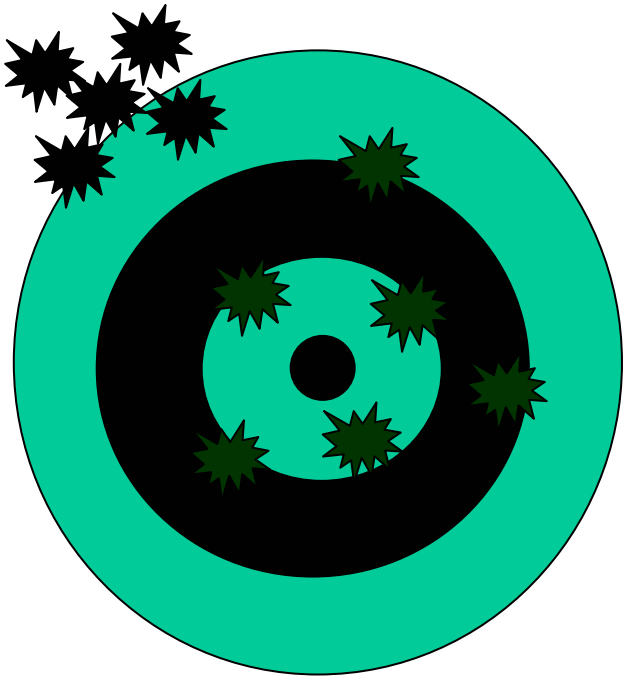


Fig. 1 The climate measurement problem - understanding climate processes requires accuracy (a measurement system) , monitoring climate change requires high precision (a monitoring system), detection and understanding climate change requires both high precision and high accuracy (a climate observing system).

Accuracy
Precision
Representativeness
Long-time series consistence
……





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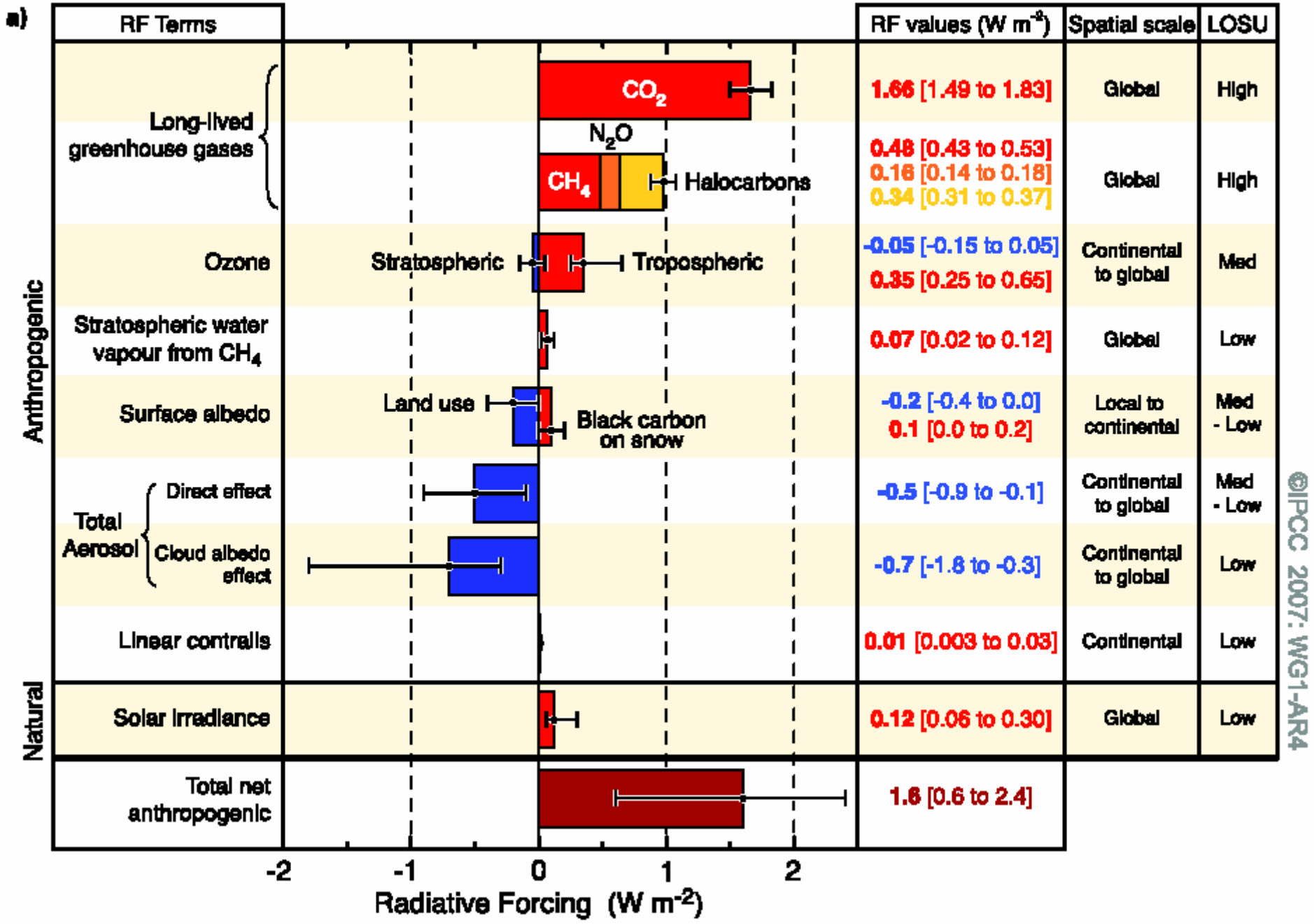
Global Mean Radiative Forcings



WMO Guidelines on:

"Climate Observation Networks & Systems"

"Metadata and Homogeneity"

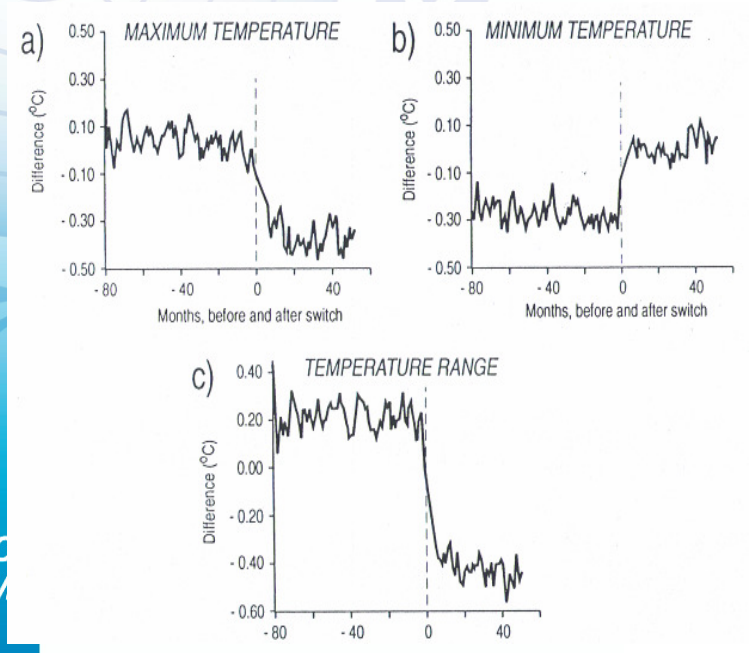
"Data Rescue"

"Data Management"

Guidelines on maintaining national climate networks

Length (>>10 years) and homogeneity of data records

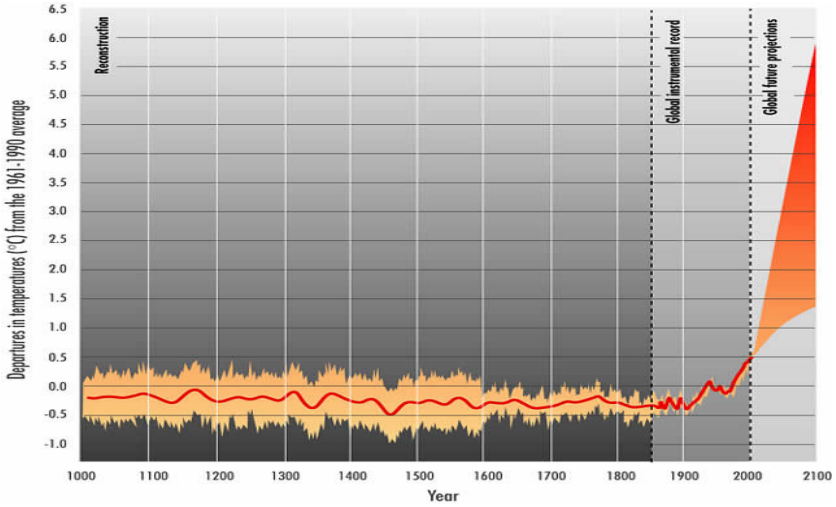
change of sensors



Climate scenarios….

-> baseline climatologies

with scenarios



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I. Climate example

II. Nowcasting example

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WIGOS Vision

- **WIGOS will establish an integrated, comprehensive and coordinated observing system to satisfy in a cost-effective and sustained manner the evolving observing requirements of WMO Members and enhance coordination with partners for the benefit of society.**

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Scope: WIGOS will

- Build upon the existing observing components:
  - **WWW Global Observing System (GOS)**
  - **Global Atmospheric Watch (GAW)**
  - **World Hydrological Cycle Observing System (WHYCOS)**
- and will capitalize on existing, new and emerging technologies.
- Improve access to and utilization of surface-based observations and products from co-sponsored systems such as **GTOS, GOOS and GCOS** through enhanced coordination with partner organizations.

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WIGOS Concept is about:

- Improve governance & management & cooperation of WMO observing systems
- Improve Observing Systems Interoperability
- Enhance Observational Metadata, Data & Product availability & Compatibility
- Guarantee Standards and documented (traceable) observation procedures & Quality

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Improving Value and Availability of Information

- WIGOS will address improved value and availability of information via three areas of integration and standardization:
  - At the Instruments and Methods of Observation Level
  - At the Data, Product & Metadata Exchange Level (WIS)
  - At the Data Utilization Level - QMF principles
- WIGOS Success rely on Observing and information science and technology: Great Challenge

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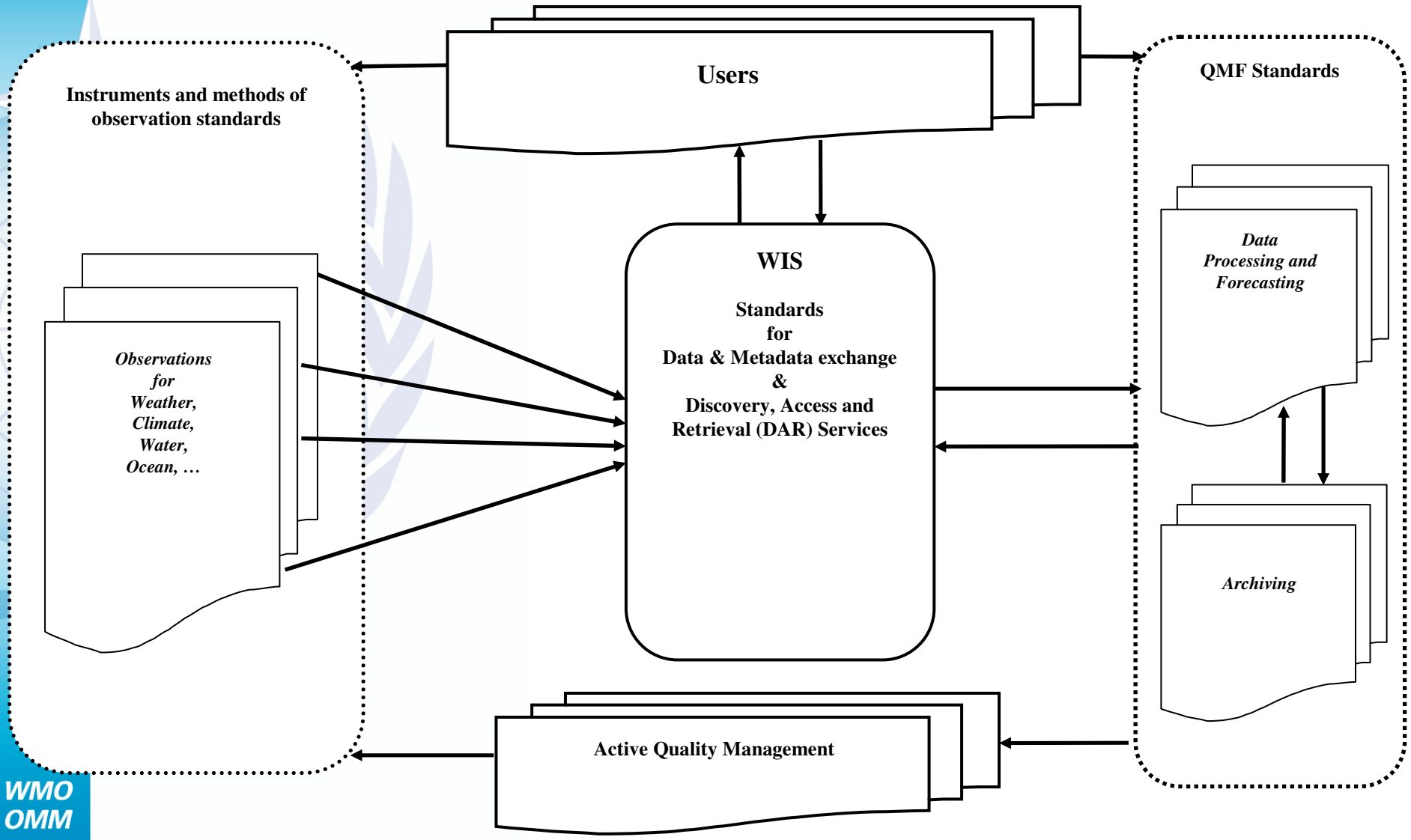
Three areas of Integrations/Standardizations



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Climate example

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Integration of different systems

- **Integration of different satellite systems**
- **Integration of ground-based and space-based observations**
- **Integration of observation and information systems**

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Global Satellite Inter-Calibration System (GSICS)

-an excellent example and the most important issues for global satellites integration.

- To improve the use of satellite global observations.
- To provide for the ability to create stable long-term climate data sets.
- To ensure instruments meet specification, pre-launch tests are traceable to SI standards.

Simultaneous Nadir Overpass (SNO)

Next step: Global satellite products validation

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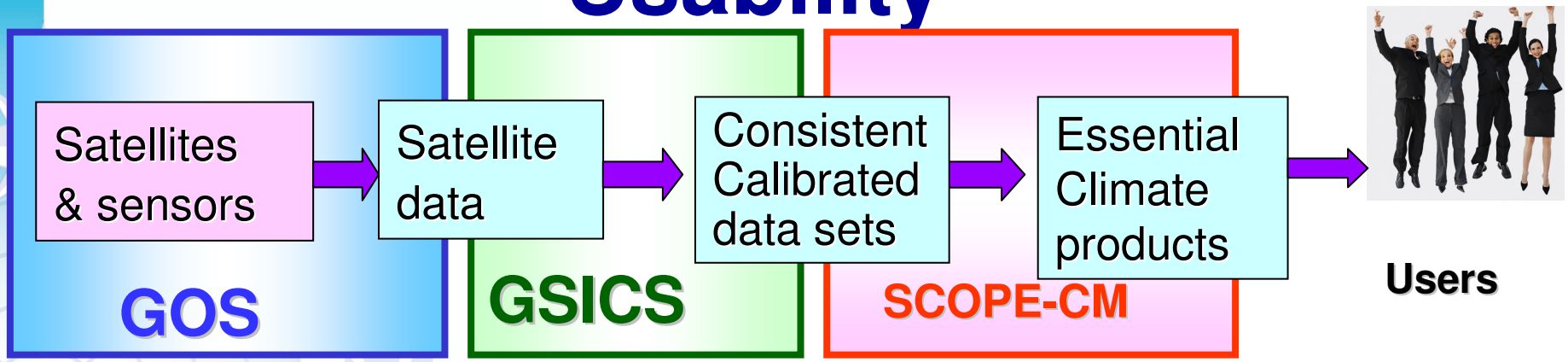
Maximizing Data Quality and Usability



- **Sustained CO-ordinated Processing of Environmental satellite data for Climate Monitoring (SCOPE-CM)**
  - **Global products**
  - **Sustained into the future**
  - **Coordinated globally**

SCOPE-CM Pilot Projects

	Sensors	*Parameters and topics*	*Lead*	*Contributors*
1	AVHRR	Clouds and Aerosols	NOAA	CM SAF
2	SSM/I	Water vapour, clouds, precipitation	CM SAF	NOAA
3	GEO	Surface albedo, clouds and aerosols	EUMETSAT	EUMETSAT, NOAA
4	GEO	Winds and clear sky radiances	EUMETSAT	EUMETSAT
5	GEO	Upper tropospheric humidity	NOAA	EUMETSAT, CM SAF

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Integration of space-based and ground-based observations: (talking each other)

- Ground- and space-based system can be complementary and supplementary by design and operation
- **Integration with ground observations can remove satellite biases and ensure consistency;**
- **Ground observations can support process studies, satellite products validation, and algorithm /model development.**

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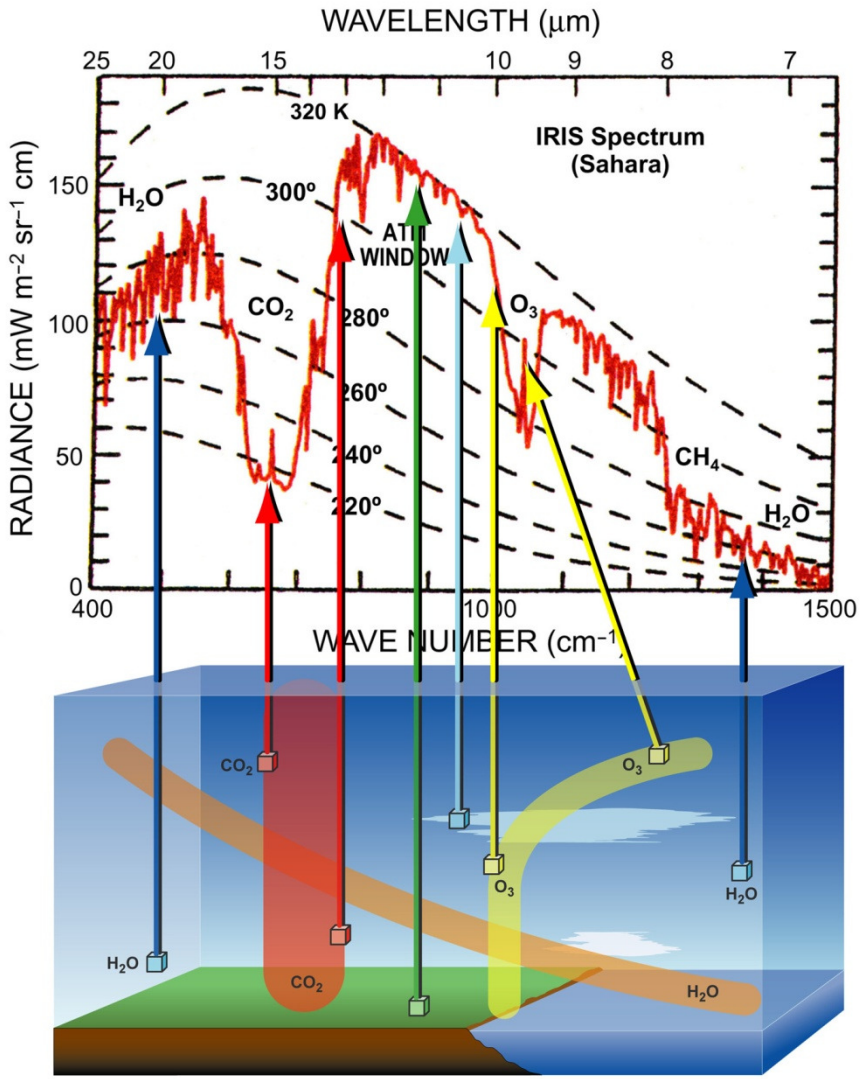
WIGOS need Turning Observations into Knowledge and Information

- Translating raw observations of Earth into useful information
- The decadal vision are:
  - (1) sustained observations from space for research and monitoring
  - (2) surface-based and airborne observations that are necessary for a complete observing system
  - (3) models and data assimilation systems that allow effective use of the observations to make useful analyses and forecasts, and
  - (4) planning and other activities that strengthen and sustain the Earth observation and information system.

data → products → information → knowledge

- **Great challenges:**
  - Sciences
  - Technologies
  - Coordination
  - Collaboration
  - Cooperation
  - Resources
  - ….



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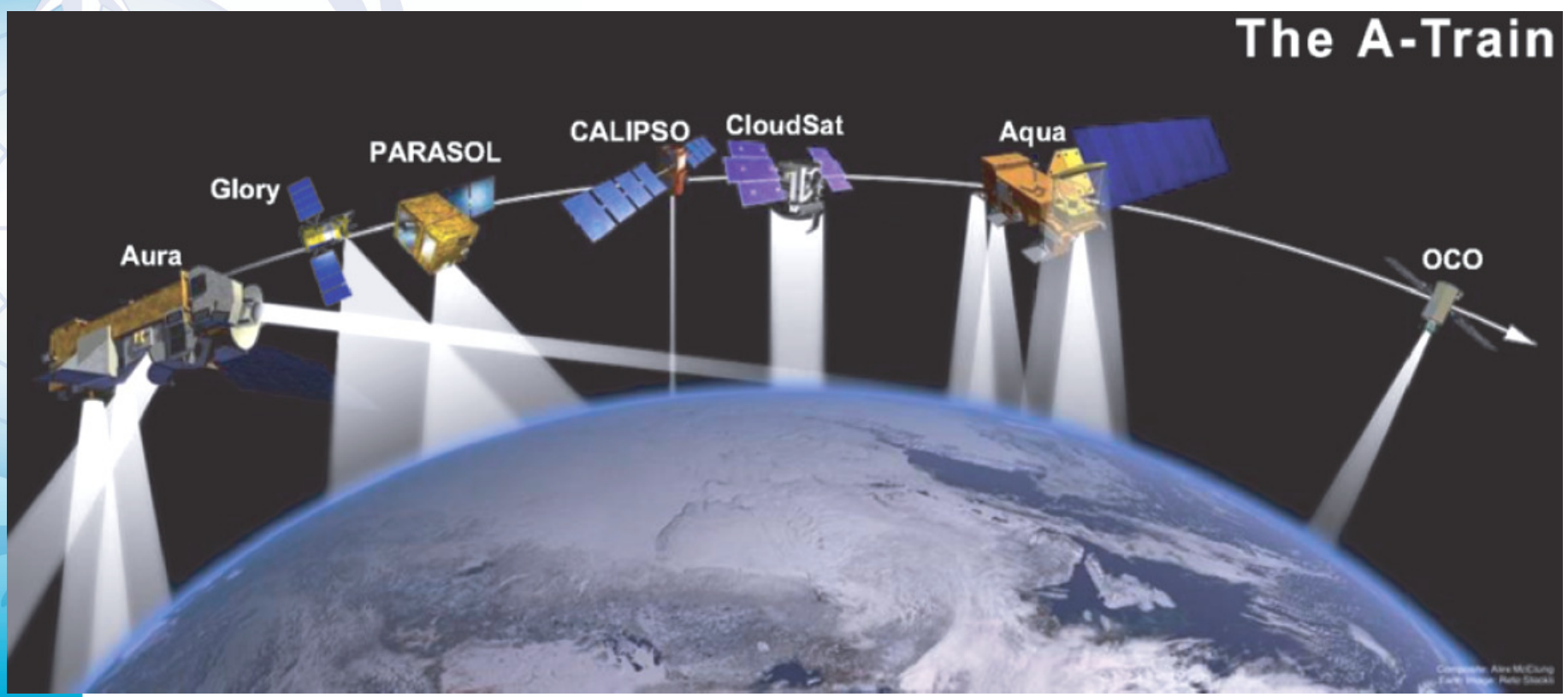
A-Train instruments:
Very useful for aerosols, clouds, temperature and water vapor



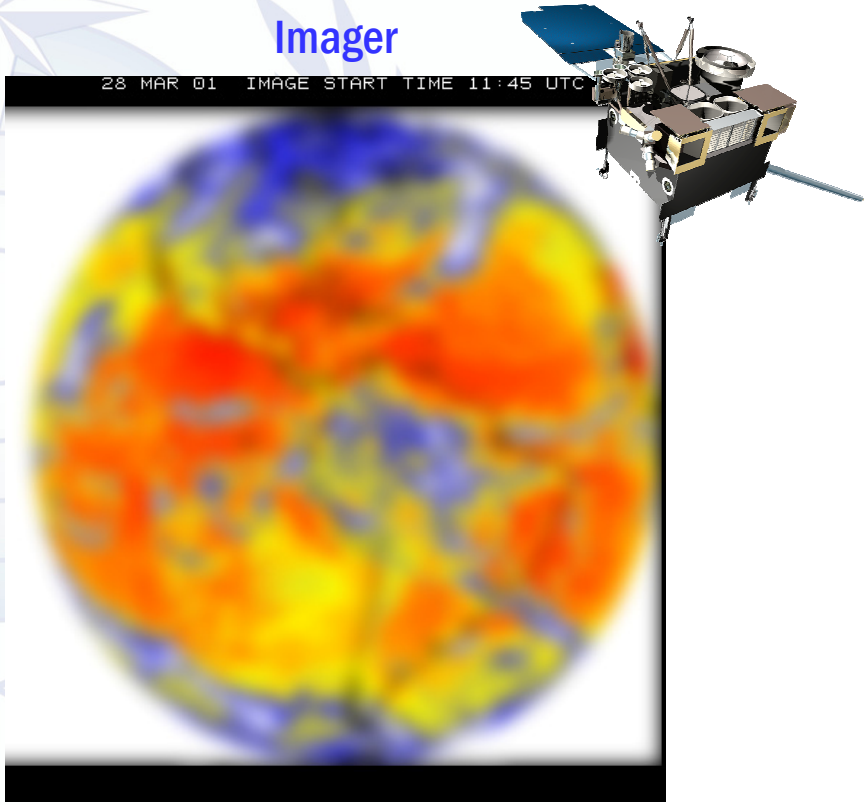
Different Ways To Carry Out Cross-Comparison In Terms of Platform(s)

Future of Global Earth Observations

Technical Innovation

GOES-I/P Instruments

Imager



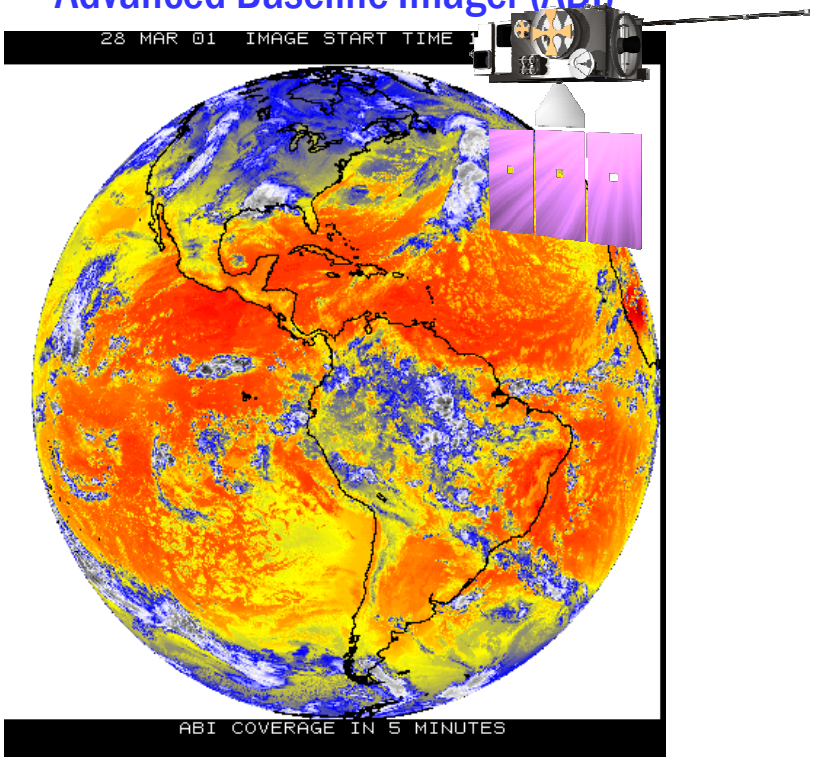
5 Channels

1km Visible, 4km IR

Full Disk Image: Every 28 minutes - 3 hours

GOES-R Baseline

Advanced Baseline Imager (ABI)



16 channels: Higher Spatial & Temporal Resolution

1/2km Visible, 2km IR

Full Disk Image: Every 5 - 15 minutes

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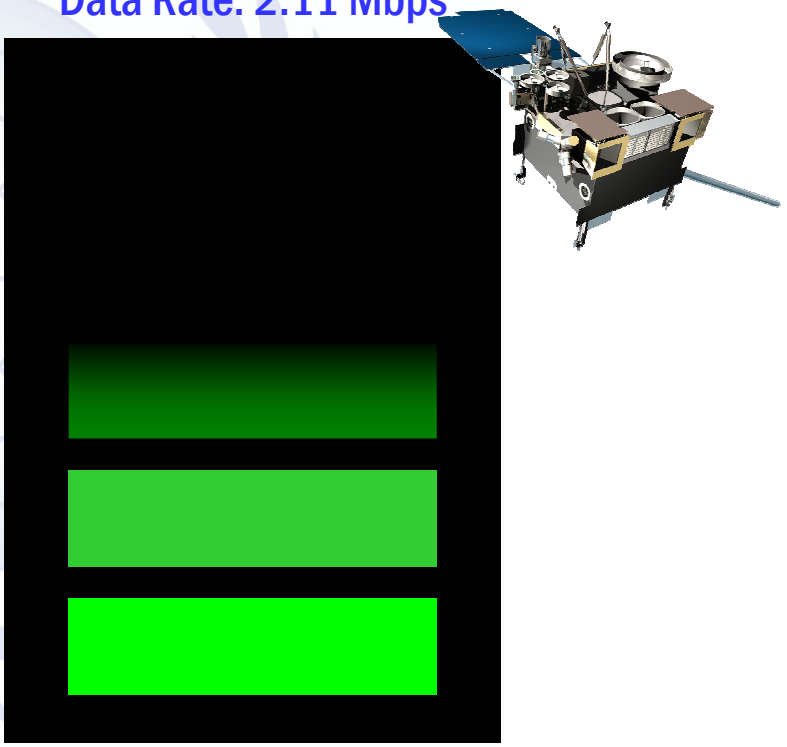
Future of Global Earth Observations

Technical Innovation

GOES-I/P Instruments

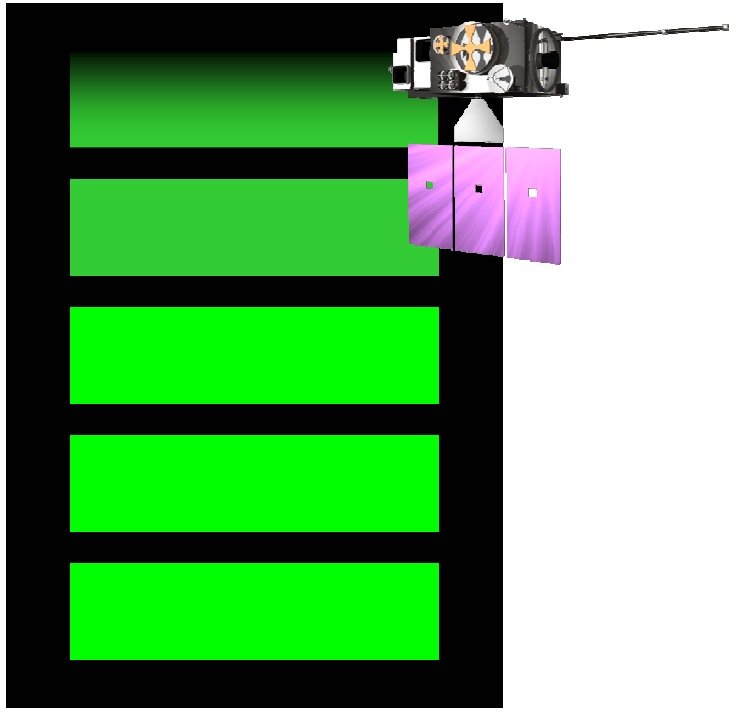
Data Rate: 2.11 Mbps



Daily Output: 181 Gb

GOES-R Baseline

Daily Rate: 132.0 Mbps



Daily Output: 16,000 Gb

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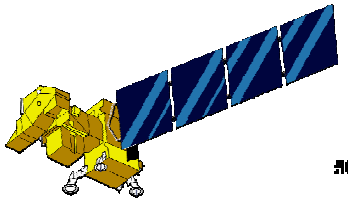
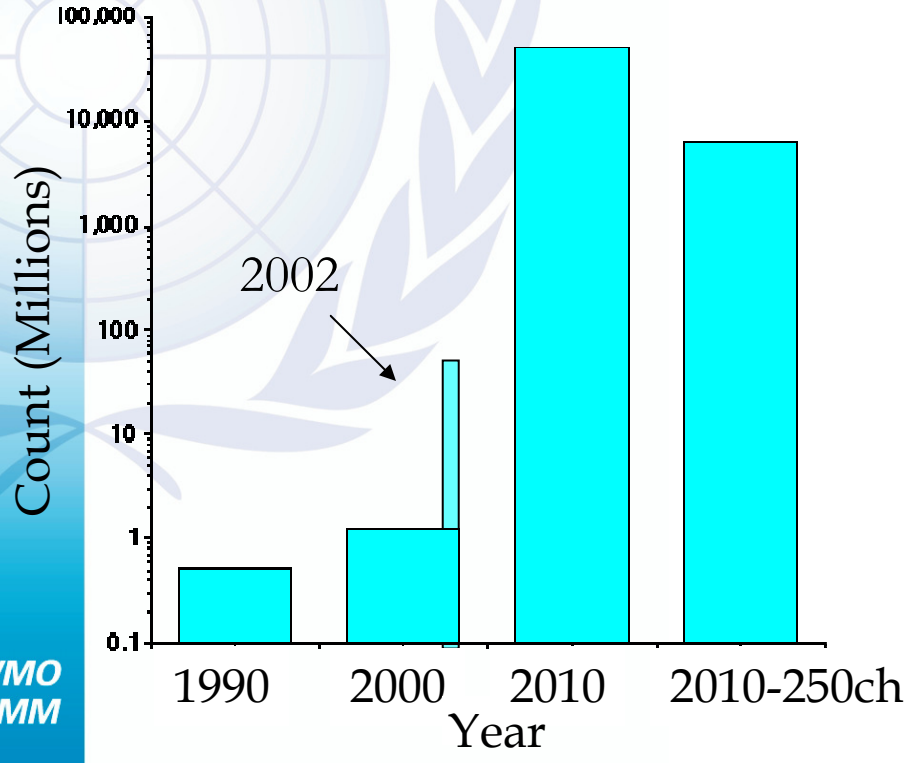
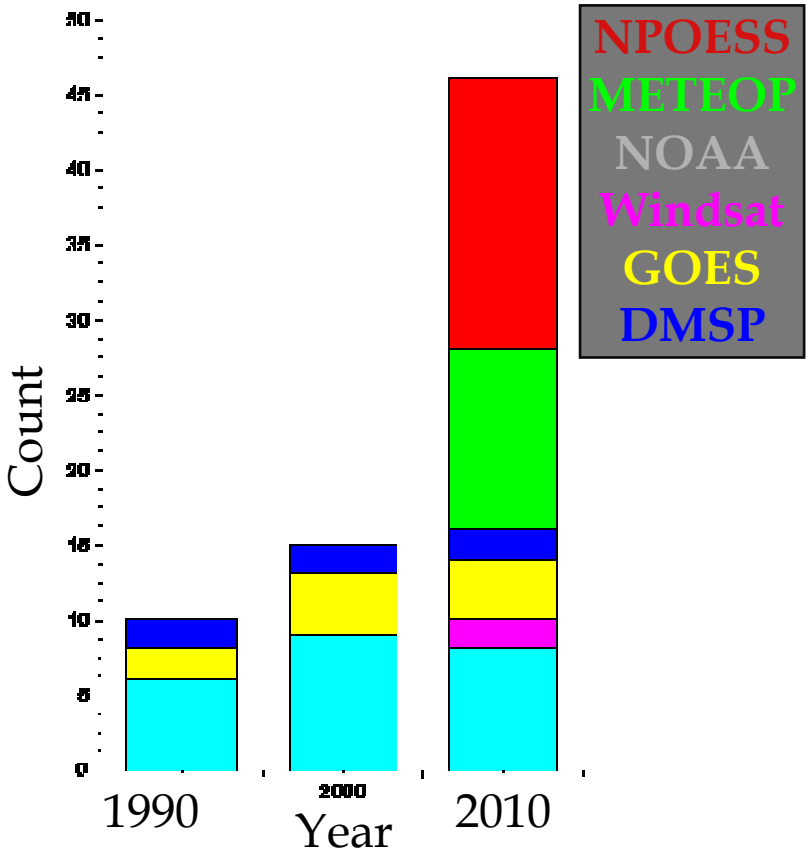
5-Order Magnitude Increase in Satellite Data Over 10 Years

Daily Upper Air Observation Count





Satellite Instruments by Platform



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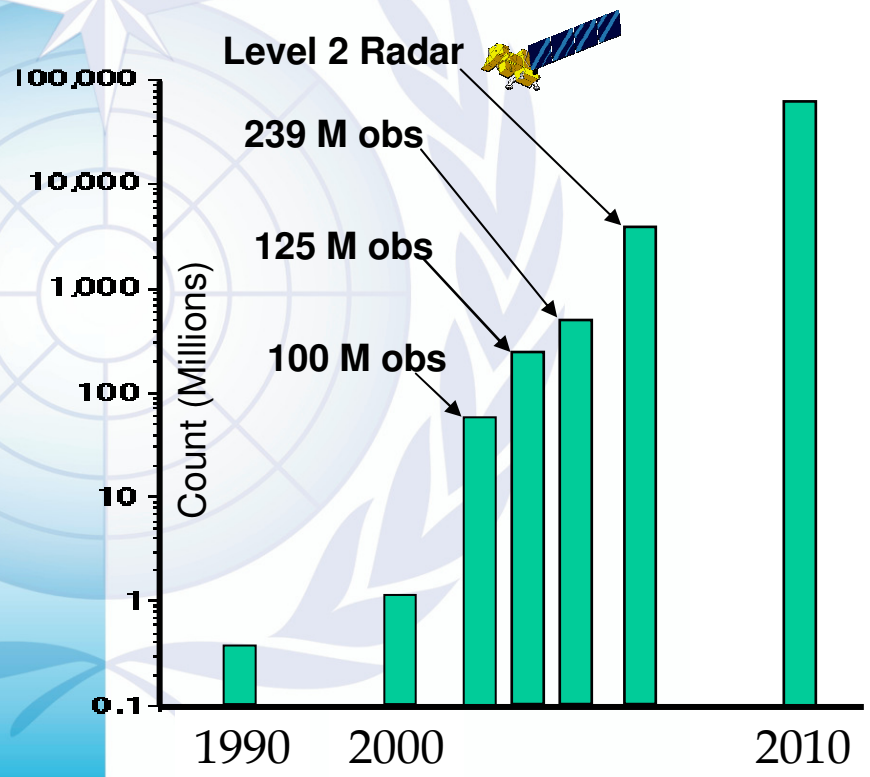
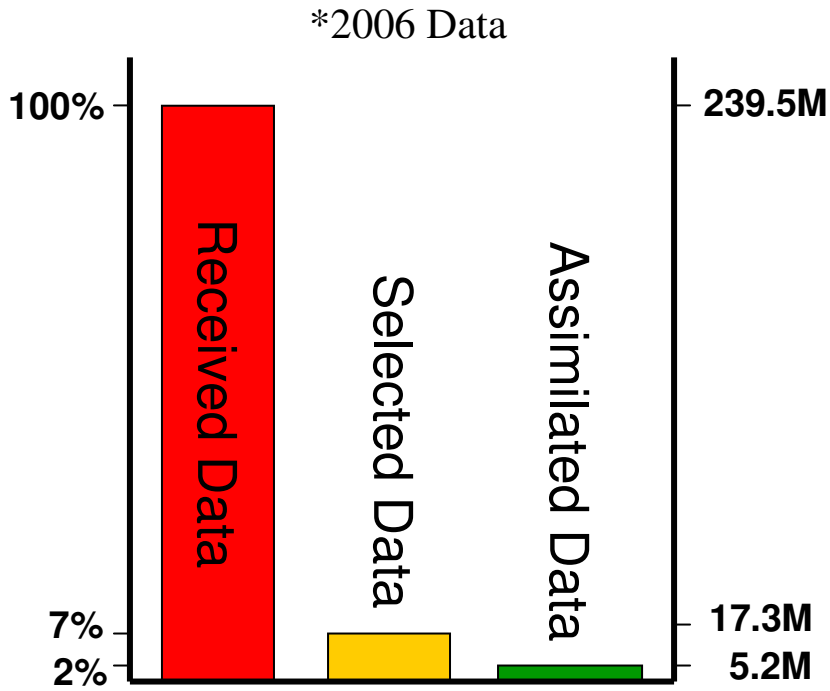
Satellite Data Ingest

Daily Satellite & Radar Observation Count



Five Order of Magnitude Increases in Satellite Data Over Ten Years (2000-2010)

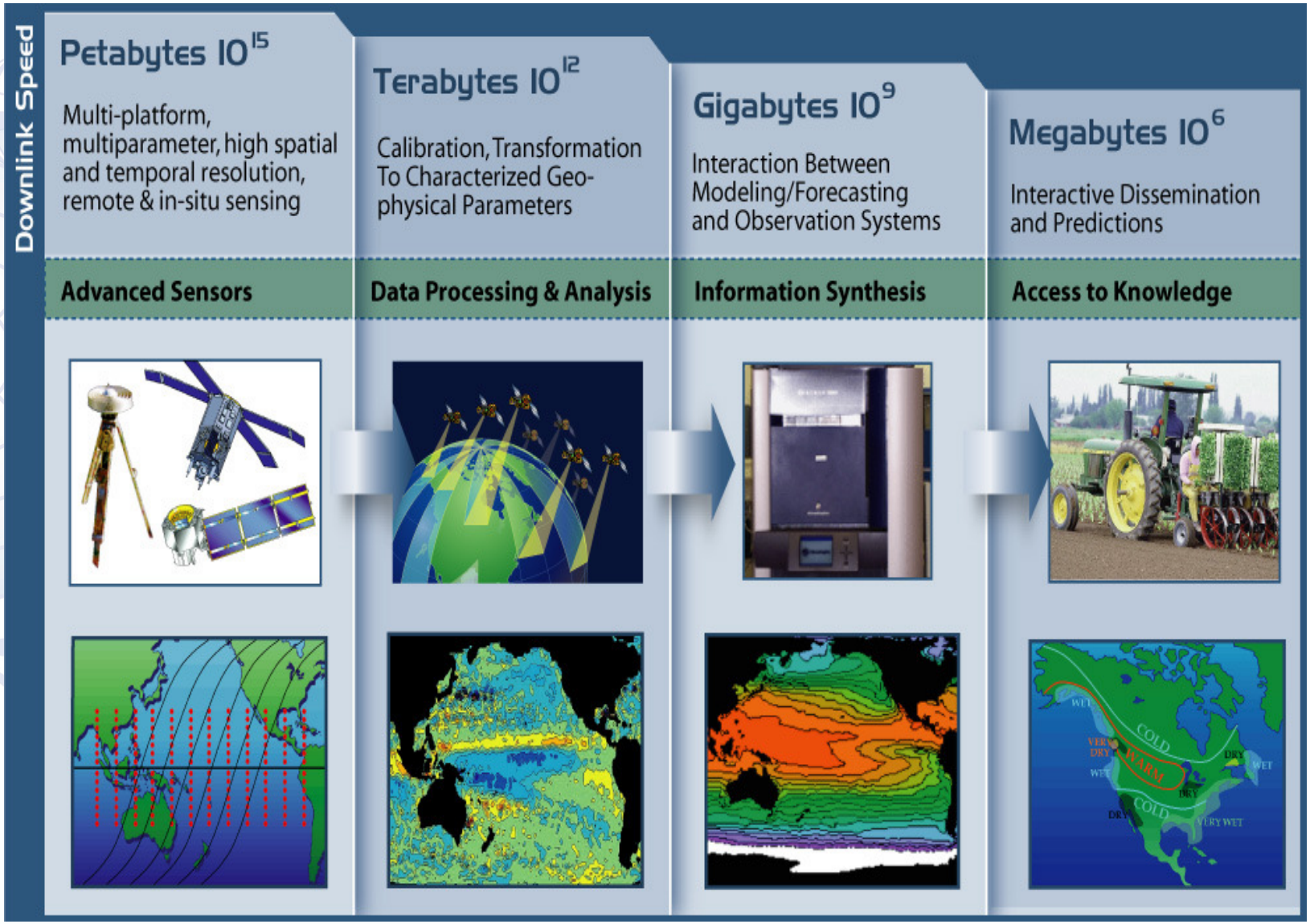
Daily Percentage of Data Ingested into Models



Received = All observations received operationally from providers
Selected = Observations selected as suitable for use (cloud free, …)*
Assimilated = Observations actually assimilated into models

*Science, data resolution, computer issues,… need to be addressed

Need Great Global Consolidation Efforts



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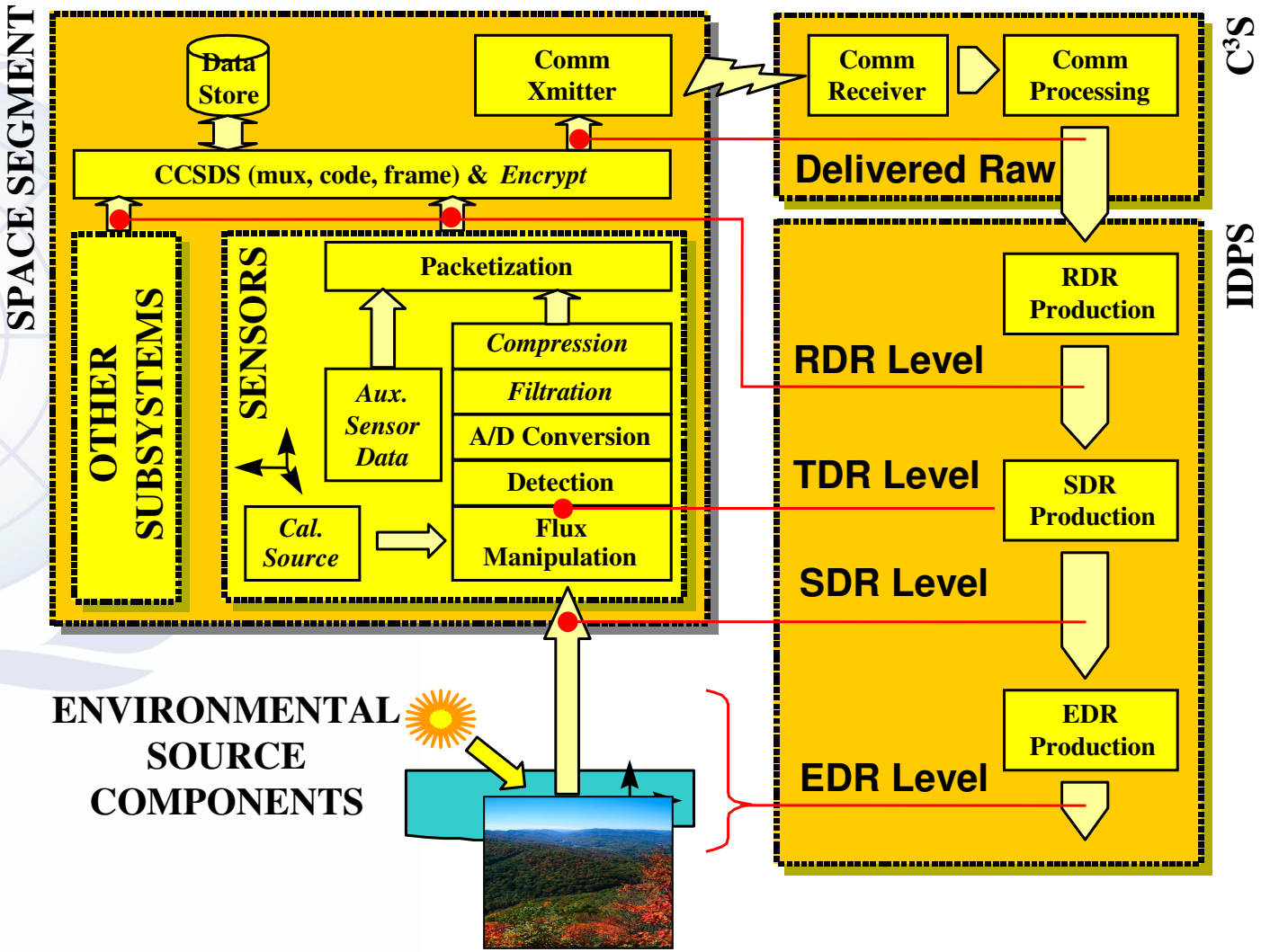
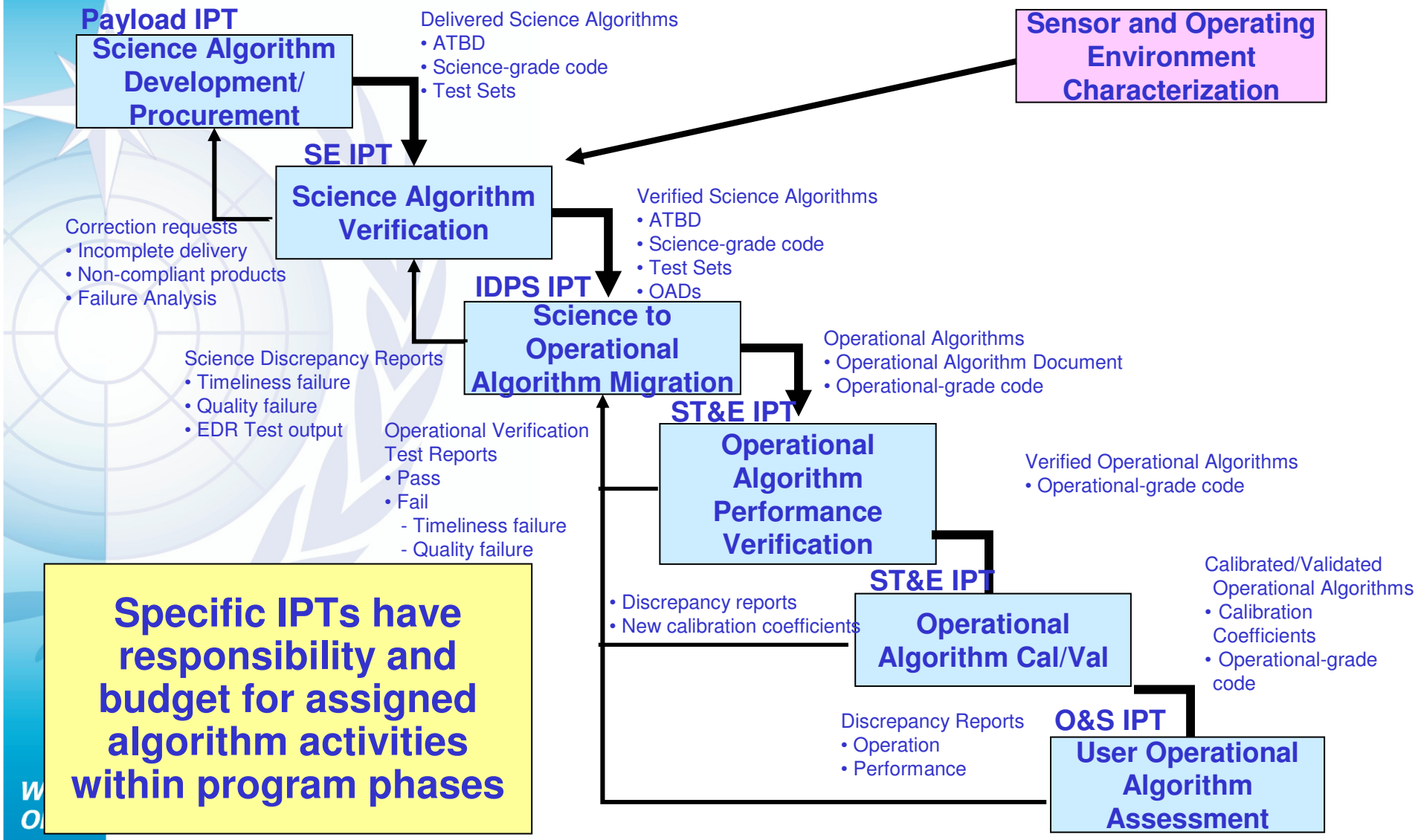
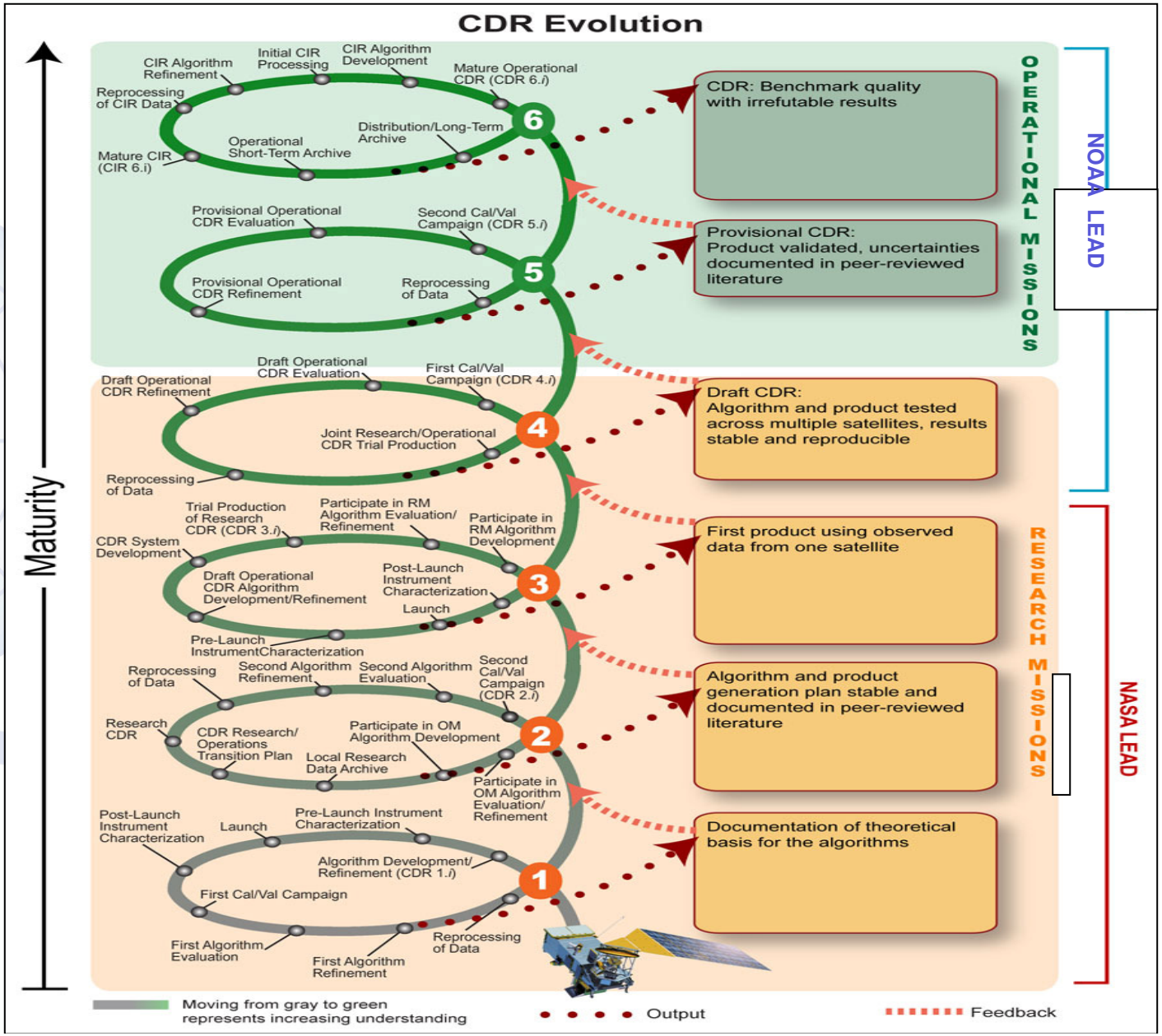
NPOESS products delivered at multiple levels



Satellite products Algorithms as Key Inputs to User Models



CRD Maturity Research-Operations



R-O

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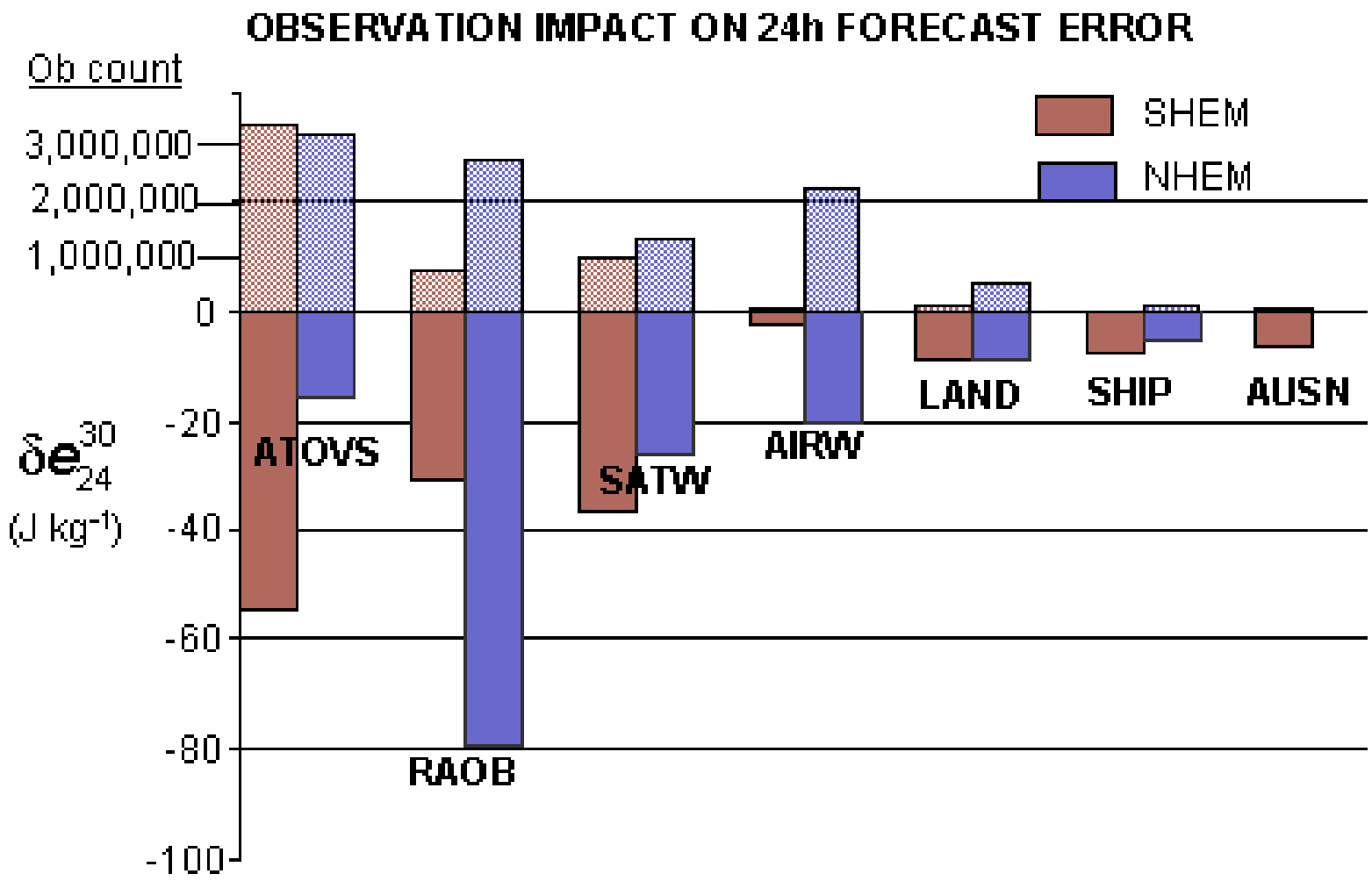
Observing systems development need guidance from user communities

Impact study from NWP: How about climate



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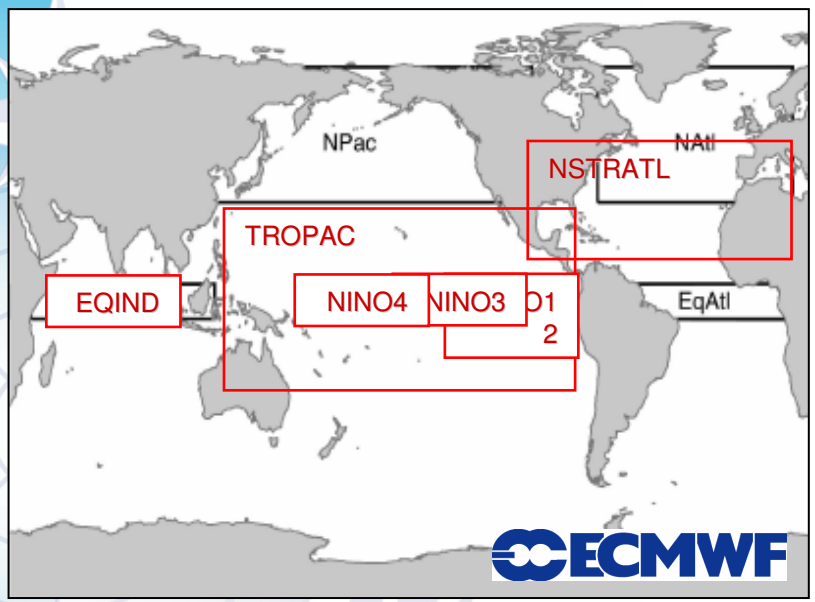
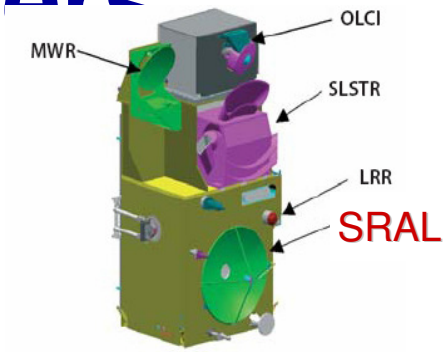
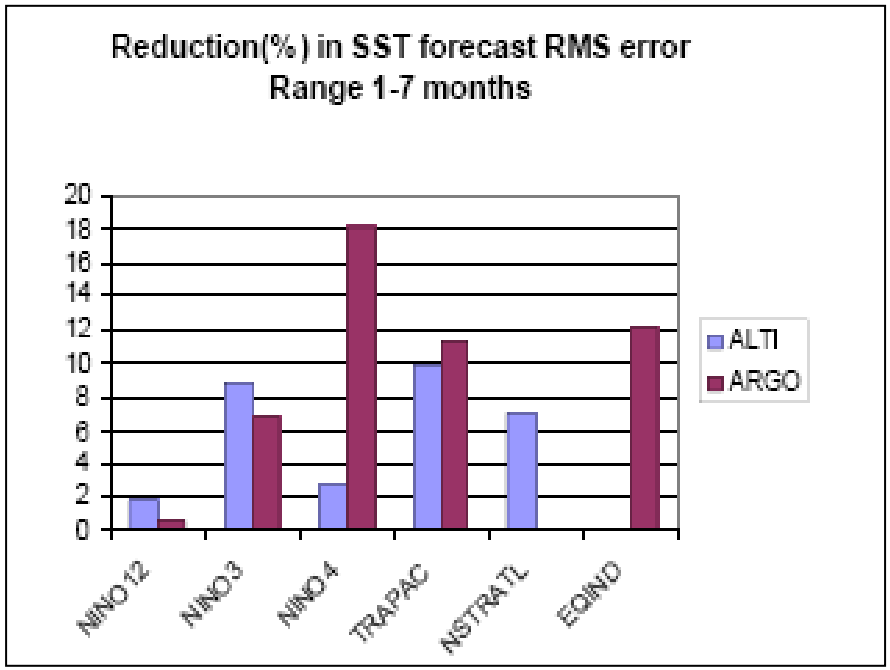
Seasonal Forecasting ECMWF: Buoys and Altimeters



OSTM/JASON-2





- Observing systems are complementary:
- • Altimeter has largest impact in Eastern Pacific and Atlantic
- •Argo has largest impact in Western Pacific/Indian Ocean

Courtesy. M. Balmaseda (ECMWF), 2007

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Why Data utilization in NWP so successful ?

- Thanks to NWP community (ECMWF, NCEP,)
  - Fast and robust Observing systems development, esp. Satellites
  - Scientists play important role
  - Science and Technology transfer into operations
- WIGOS need fully engage research (science and technology) community for data utilizations

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Nowcasting Example

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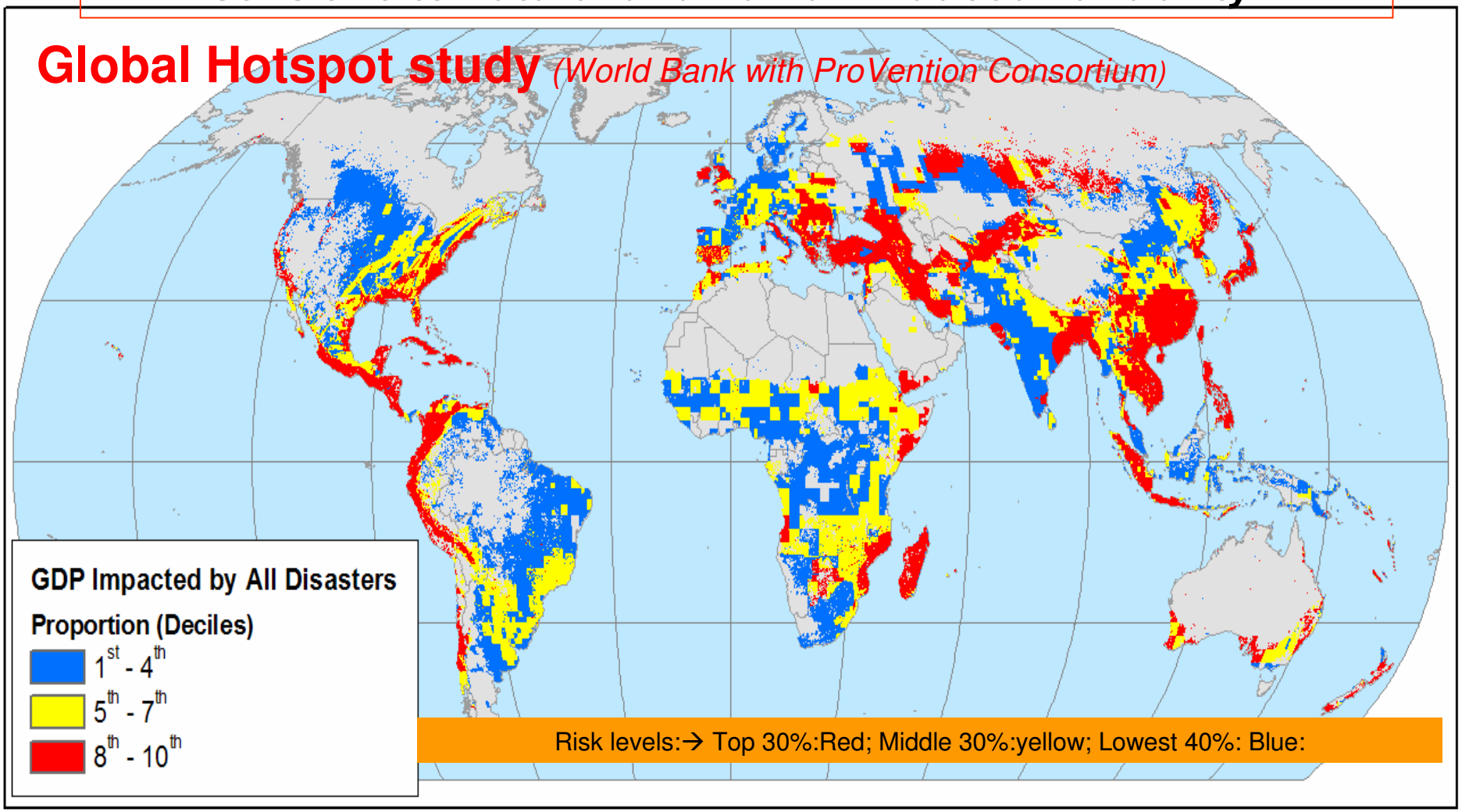
Global Challenges We Share

As society becomes more complex we become more sensitive to natural and human induced variability.

Global Hotspot study *(World Bank with ProVention Consortium)*



35 countries have more than 5% pop in areas at risk from three or more hazards
96 countries have more than 10% pop in areas at risk from two or more hazards
160 countries have more than 25% pop in areas at risk from one or more hazards

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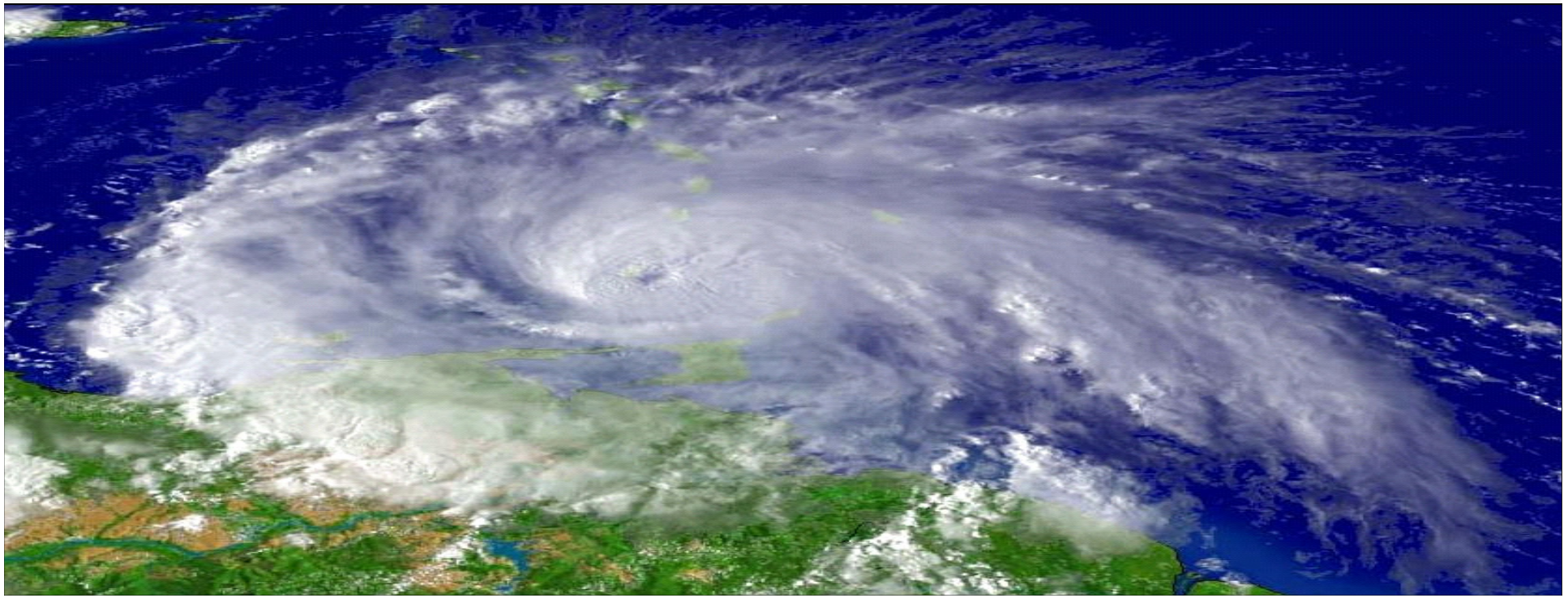
World Bank Group

Southeast Europe: Disaster Risk Mitigation and Adaptation Program

Alison Cave
Disaster Risk Mitigation Coordinator
Europe and Central Asia Region

WMO RA VI Technical Conference September 16, 2009



Weather Radars example in RA VI

- **OPERA 1** (Operational Programme for the Exchange of weather RAdar information) , EUMETNET project (1999-2003)
- ***Planned Tasks***
  - **Agree on a common specification for radar sensor harware and software**
  - Establish common standards for data acquisition methods
  - Develop and standardise appropriate quality procedures
  - Agree on data and products for international exchange
  - Agree on the use of existing compression methods
  - Evaluate and recommend suitable transmission links
  - Develop and maintain a platform independent common software library for processing data, BUFR encoding and decoding, image processing
  - Establish an archiving strategy for international use

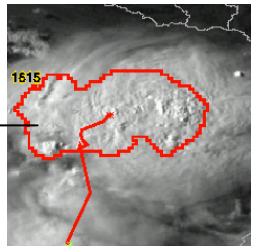

European Weather Radars
operational radars
planned radars
http://www.chmi.cz/OPERA/
Update: 3.1.2007

EUCOS benefits to members

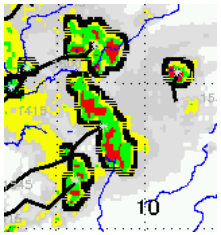
- Delivering a centralised quality monitoring service
  - –with increased network performance through fault correction procedures;
  - –with improved efficiency and cost-effectiveness for EUCOS Members;
- Within WIGOS Framework, Possible promotion of RICs to Regional Quality Monitoring Centers?

WxFUSION

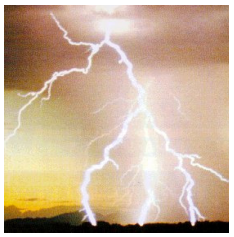
Weather **F**orecast **U**ser-oriented **S**ystem **I**ncluding **O**bject **N**owcasting



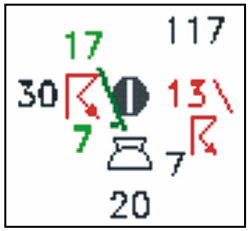
cloud tracker



radar tracker

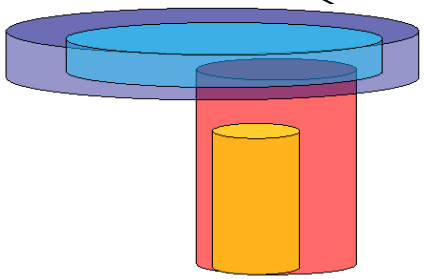


lightning



surface observations

POLDIRAD



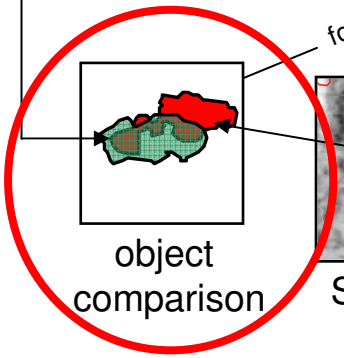
Fusion

TWO

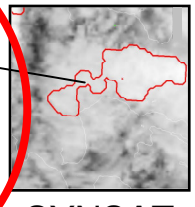
Tracking
Nowcast (0 -1 hrs)
Forecast (1 - 6 hrs)

forecast validation

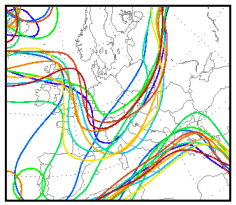
forecast validation



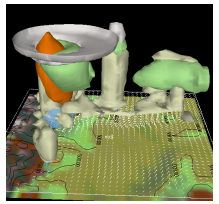
object comparison



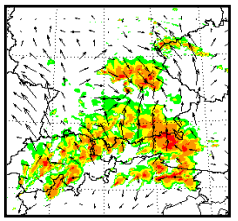
SYNSAT



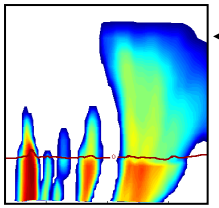
ensemble forecast



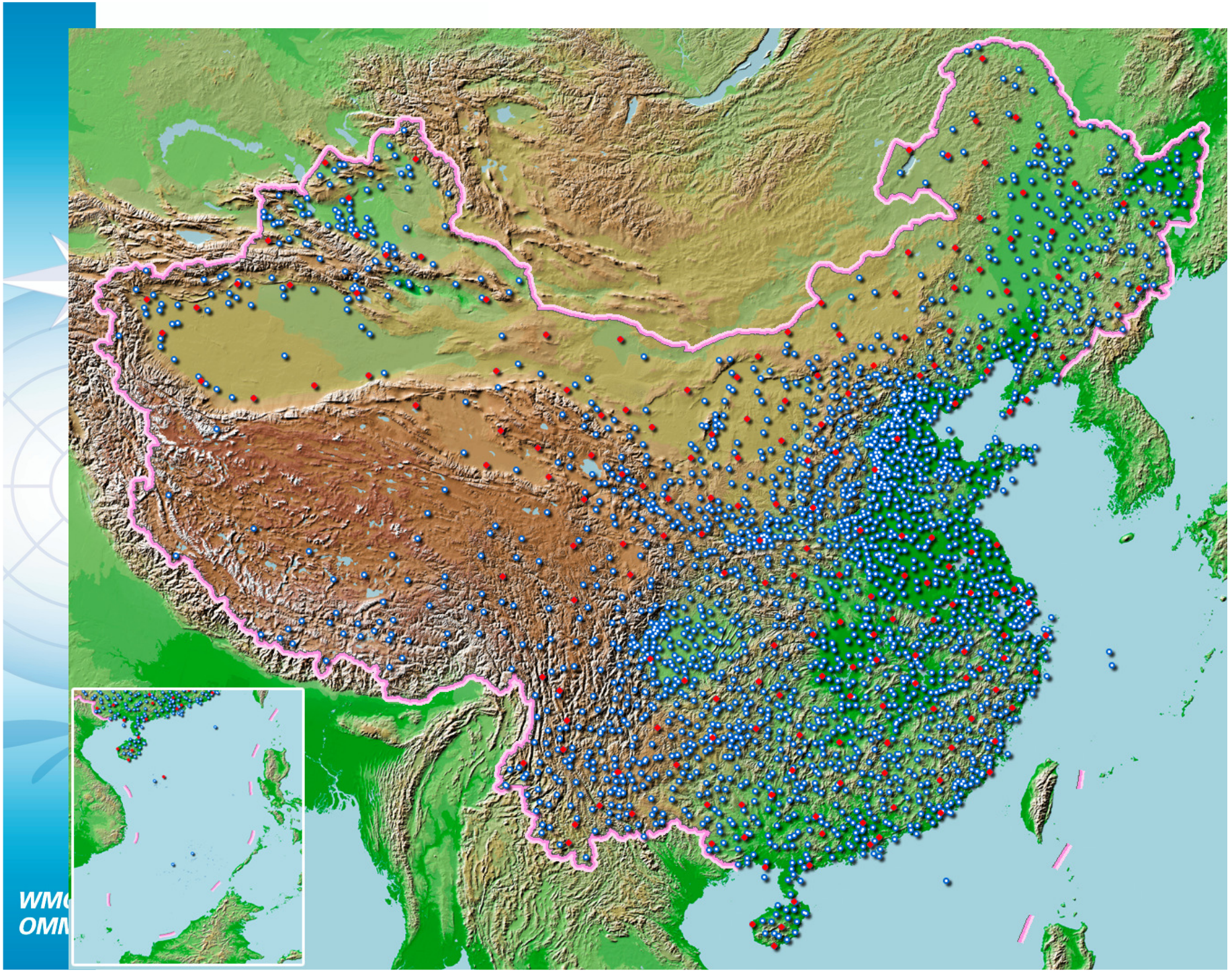
local forecast



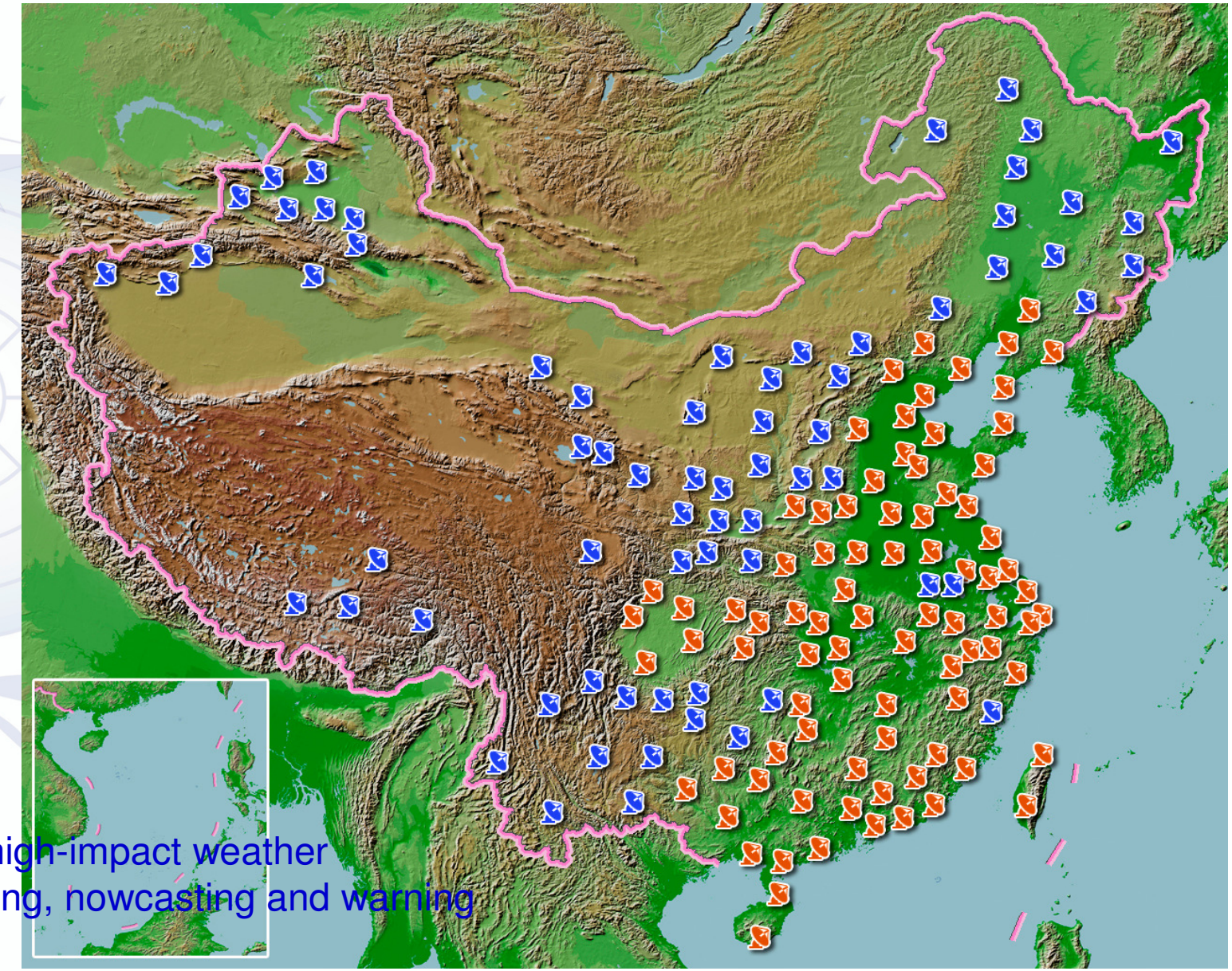
SYNRAD



SYNPOLRAD



Highest priority: optimum coverage of radar network



Vital to high-impact weather forecasting, nowcasting and warning

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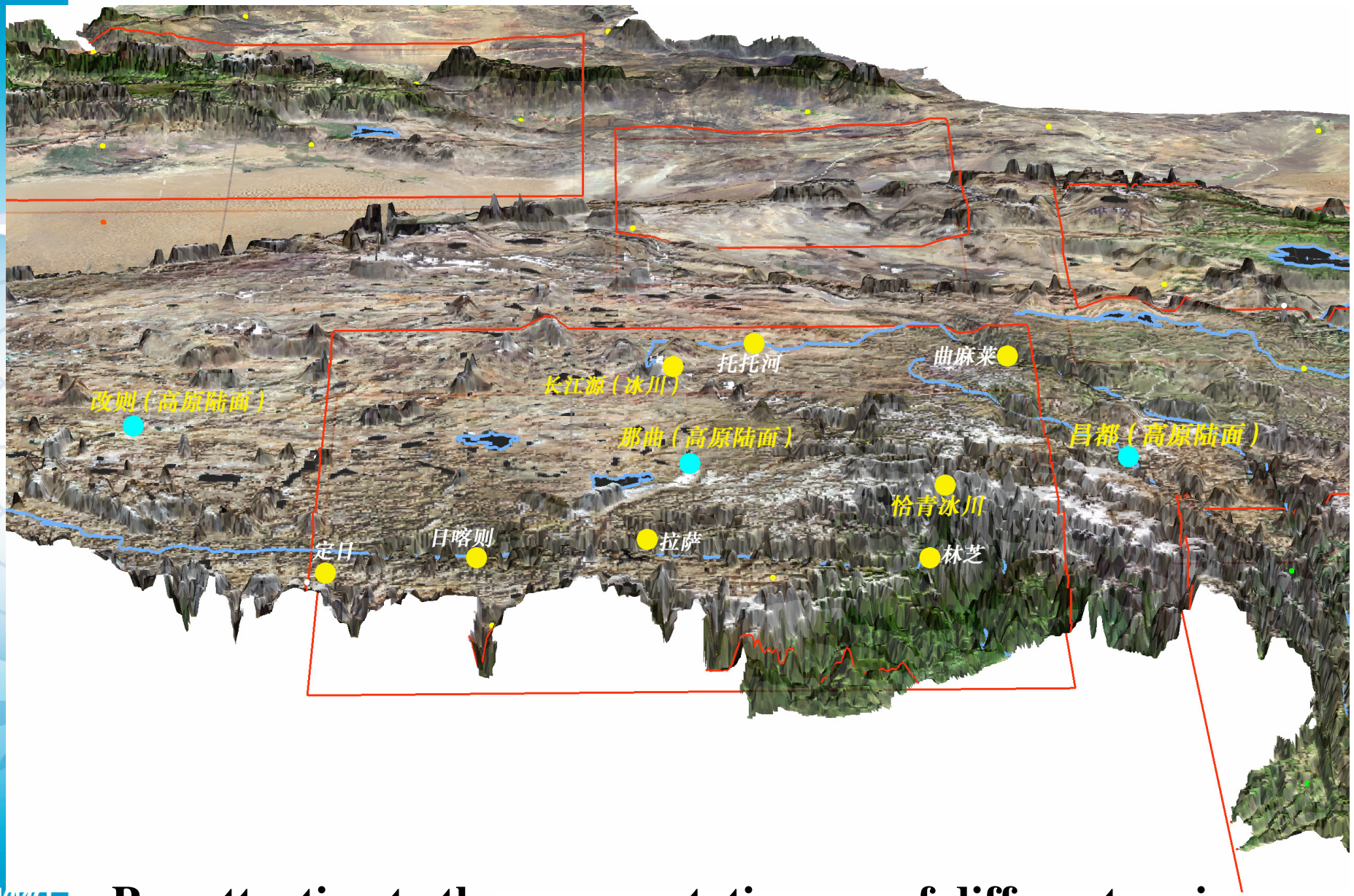

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Pay attention to the representativeness of different regions

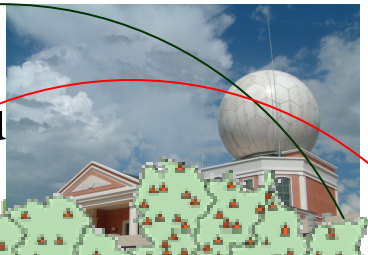
Shaoguan

Yangjian

Guangzhou

Shenzhen

Shantou



韶关

广州

汕头

湛江

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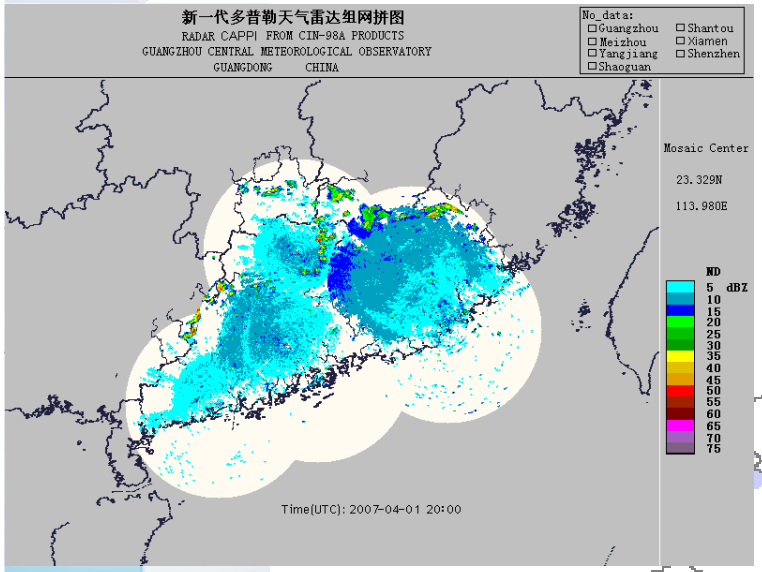
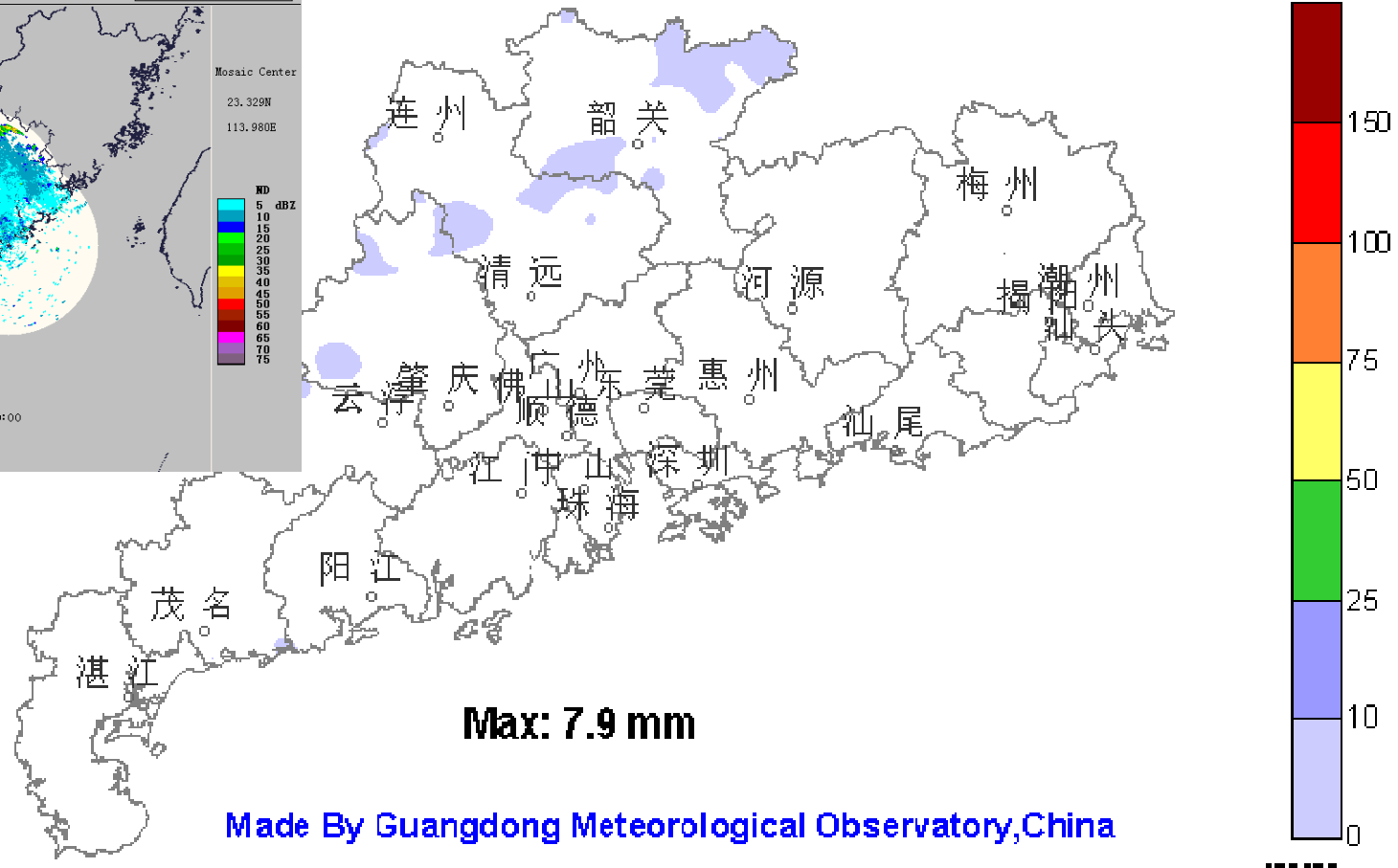
Data are used:1) improving forecasting; 2) real time warning 3) satellite rainfall algorithm development, CAL/VAL; 4) information services to the local information networks (citizen, farmers, etc.)

Accumulative Precipitation 04Z-05Z2April2007 Guangdong,China





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WIGOS Implementation: 2 Phases

WIGOS Test of Concept (Project) & Development Phase:

- Implementation of more effective management of the WMO observing systems, including improved governance, as well as consideration of the mechanism and framework for enhanced collaboration and cooperation with WMO Partners
- Implementation of the WIGOS organizational global framework for integration, coordination and optimization of multiple observing systems owned by WMO and its partners (co-sponsors) - expected to be principally conducted between Cg-XVI and Cg-XVII

WIGOS Operational Phase:

- Implementation of WIGOS constituent observing systems and networks will evolve continuously to expand and improve services delivery and decision making, in response to evolving users' needs and opportunities

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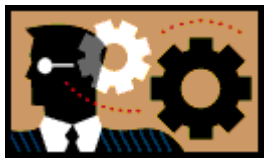
WIGOS Expectations and requirements

Expectations

- Benefits
- Qualitative

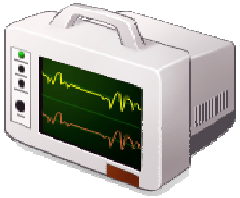
Requirements

- Design drivers
- Factual features
- Quantitative



Specifications

- Design
- Solutions



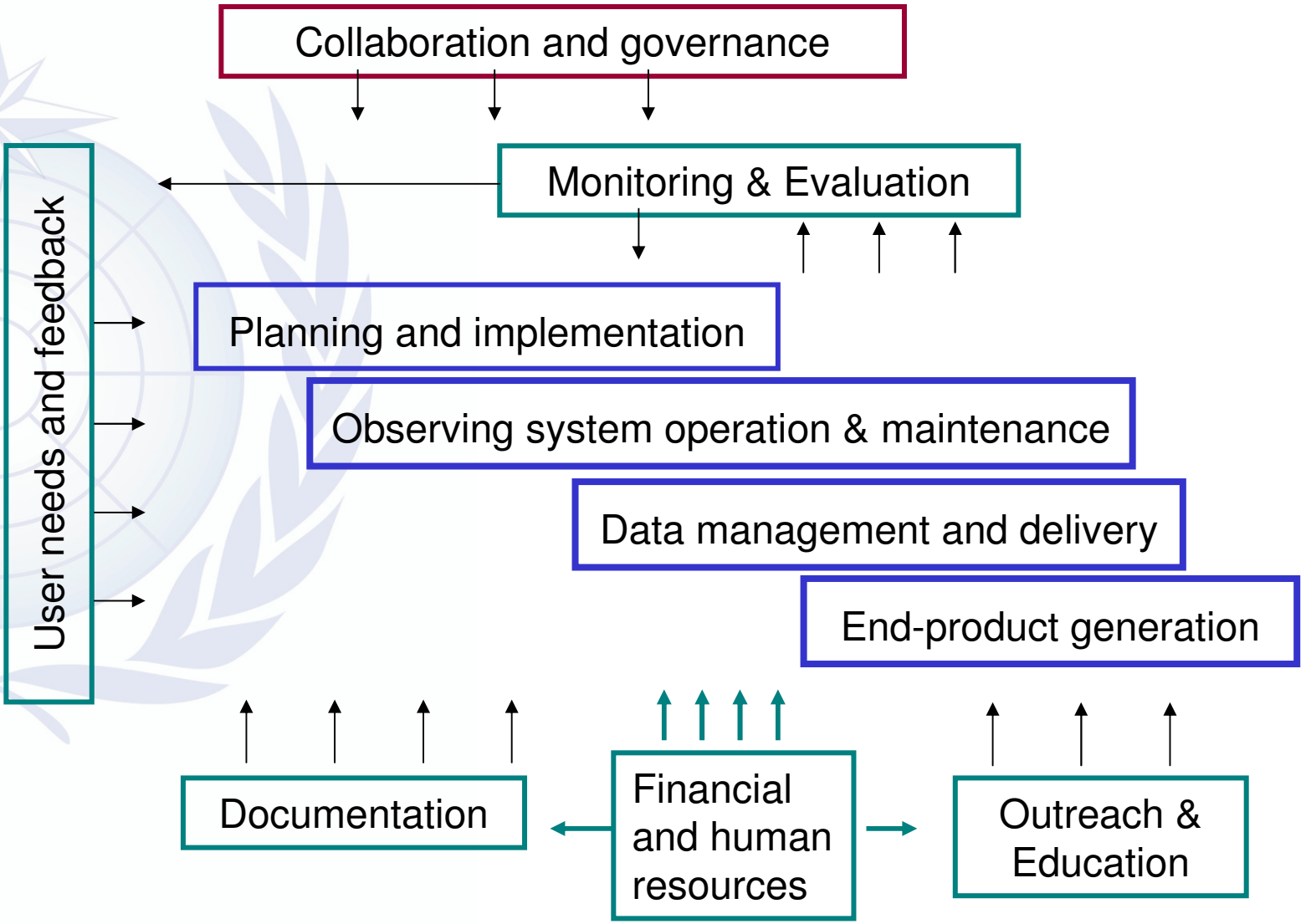
Performances

Compliance

Satisfaction

Structuring the WIGOS Requirements

Major WIGOS processes



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Quality Assurance Framework for Earth Observation (QA4EO)

- Developed by the CEOS Working Group on Cal/Val (WGCV)
- Part of GEO Task DA-09-01: Data Management (a) GEOSS Quality Assurance Strategy

- It is proposed by GEO that *GEOSS data set registration include associated quality assurance information to enable interoperability and harmonization, which could be (..) a declaration of compliance with respect to QA4EO and/or its underlying principles.*

- Version 1 « endorsed » by CEOS plenary in 2008
  Version 2 reviewed by GSICS Chairman (May 2009)
  Version 3 available now
  http://qa4eo.org/documentation.html

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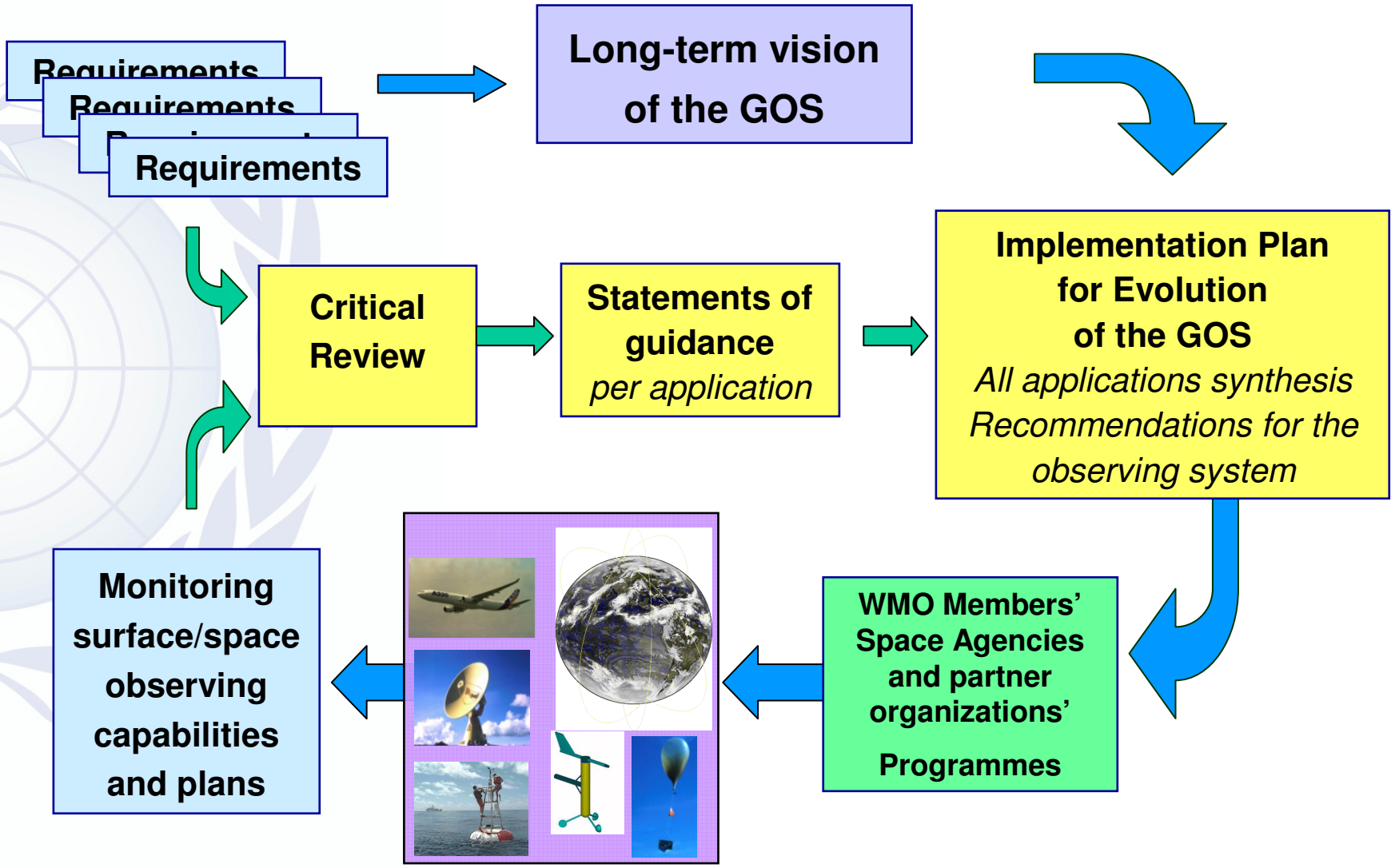
The GOS evolution process



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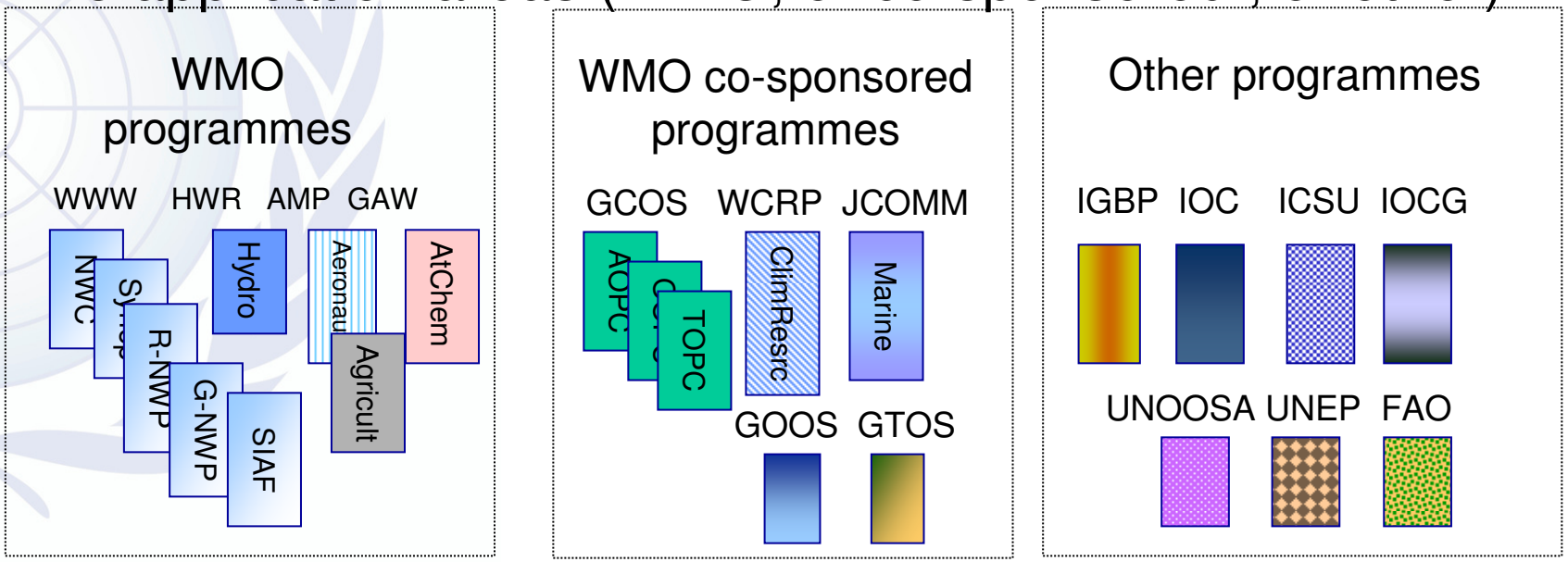
User Requirements

- Expressed for >120 geophysical parameters
- Different domains (horiz. layers, sea/land, …)
- For each requirement: 5 criteria (H/Vresol, accuracy, obs cycle, timeliness)
  x 3 values (ideal "goal"/ optimal "breakthrough"/ minimum "threshold")
  + 3 attributes (confidence, approval date & authority)
- 23 application areas (WMO, or co-sponsored , or other)



- Total: 632 requirements recorded (parameter x domain x application)
  - 11376 fields recorded

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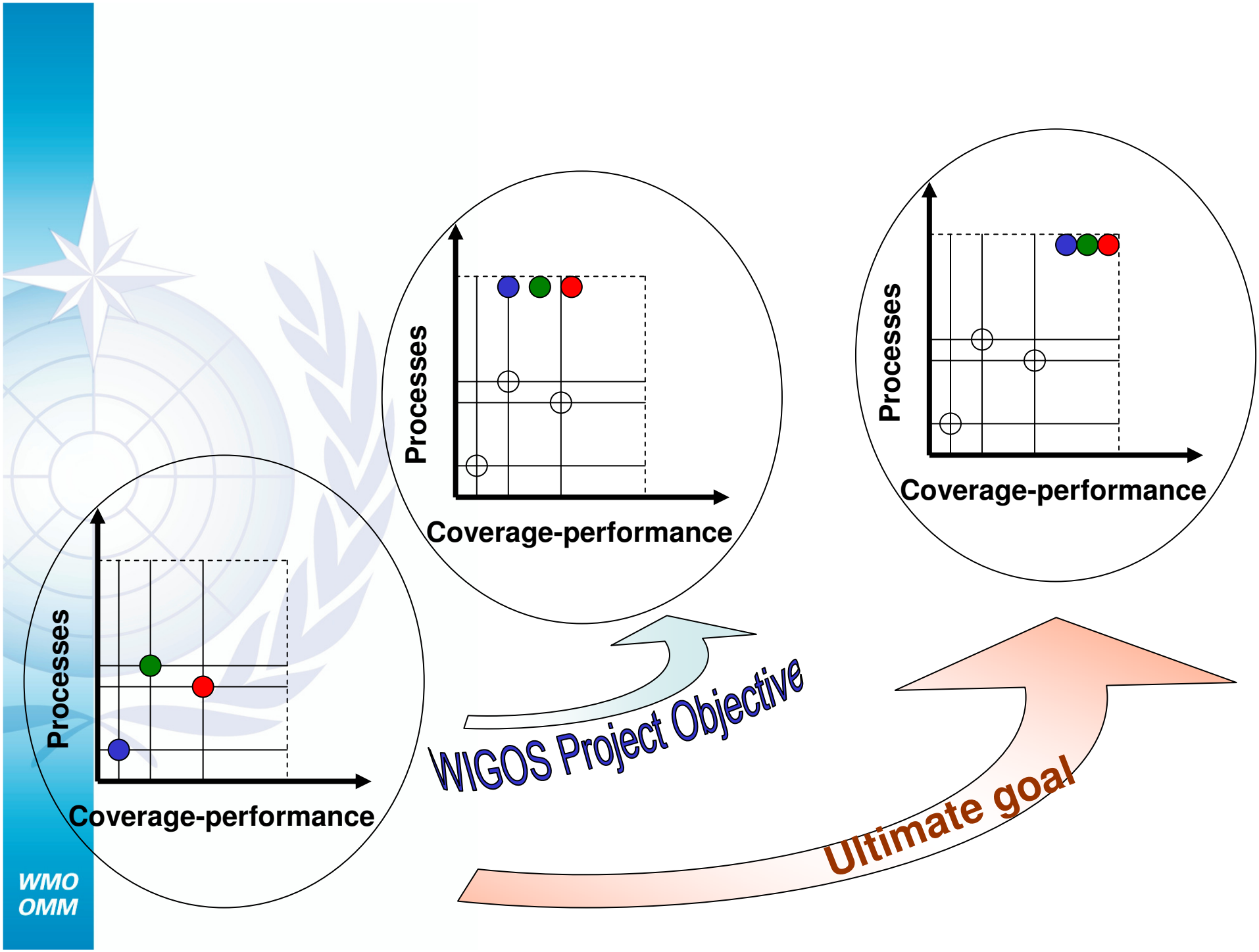
Processes
Coverage-performance
Processes
Coverage-performance
Processes
Coverage-performance
WIGOS Project Objective
Ultimate goal
WMO
OMM

WIGOS Project Implementation and System Operation

Expectations

- **Improved observations and services**

WIGOS Requirements

Development

Benefits

Implications

WIGOS Project Deliverables

Outcome of WIGOS Operation

Continuous improvement of observations and service delivery

- Management processes (QMF)
- Common data management standards
- Common set of observation standards (different levels/scope)
- …

- Processes implemented & controlled
- Standards applied
- …

Compliance

Satisfaction

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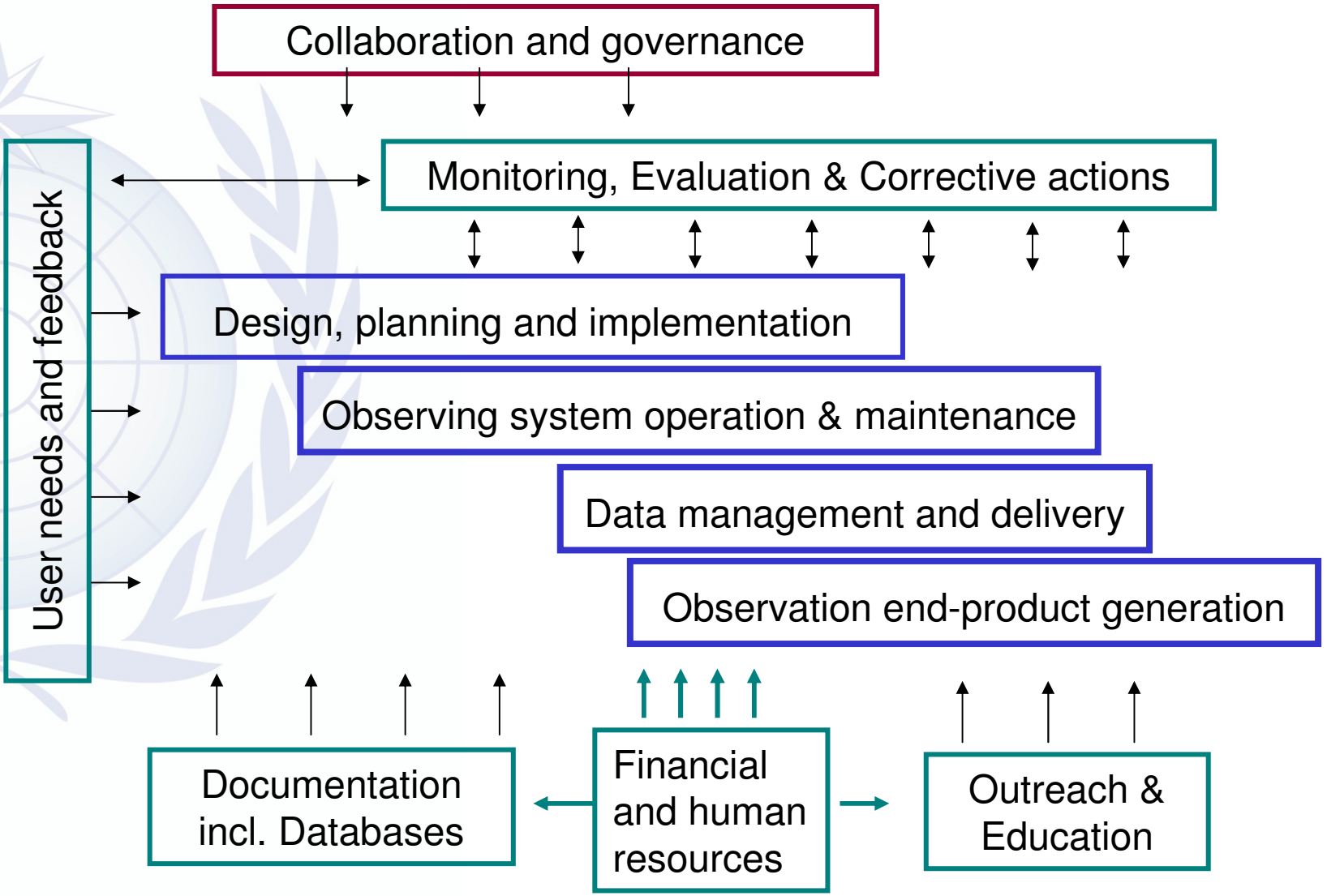
WIGOS Processes



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WIGOS Pilot & Demo Projects (On-going)

- WIGOS Pilot Projects for:
  - CIMO
  - JCOMM
  - AMDAR
  - GAW
  - Global Hydrological Network
  - Satellite Systems integration (GSICS)
  - **GCOS Reference Upper-Air Network** (GRUAN)
- WIGOS Regional Demonstration Projects

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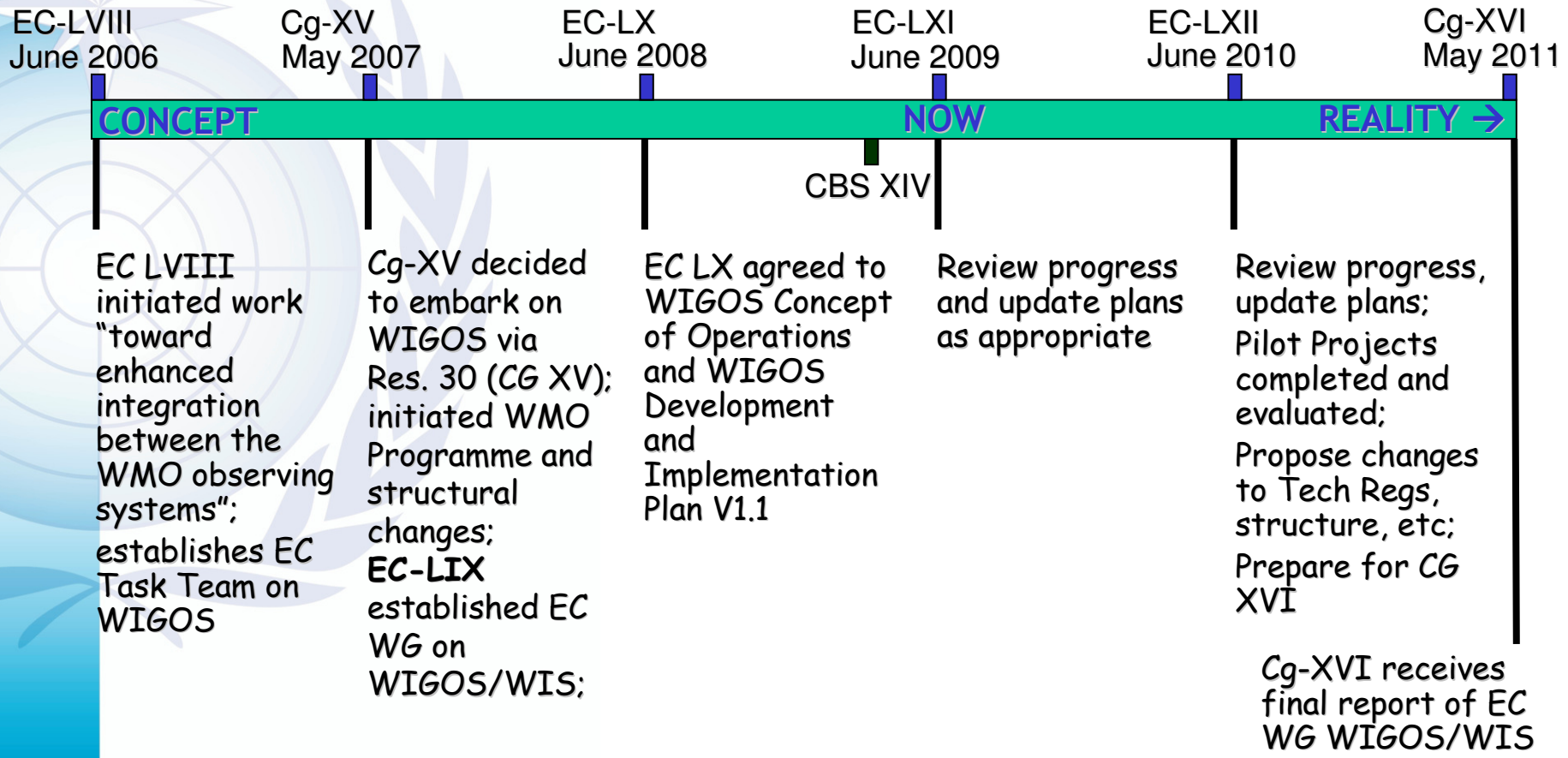
Timeline - WDIP



WMO Information System (WIS)

Direction from WMO Congress (2003)

- *Develop:*
  - *Over-arching approach for solving data management problems for all WMO and related international programmes*
  - *A **single,** coordinated global infrastructure, **the WMO Information System (WIS)** for the collection and sharing of information*

Overall Progress and Plan of WIS

- WIS Implementation Plan
- Identification of GISC and DCPC potential centres
- Consolidation by CBS of demonstration process for designation of GISC and DCPC centres
- Timelines

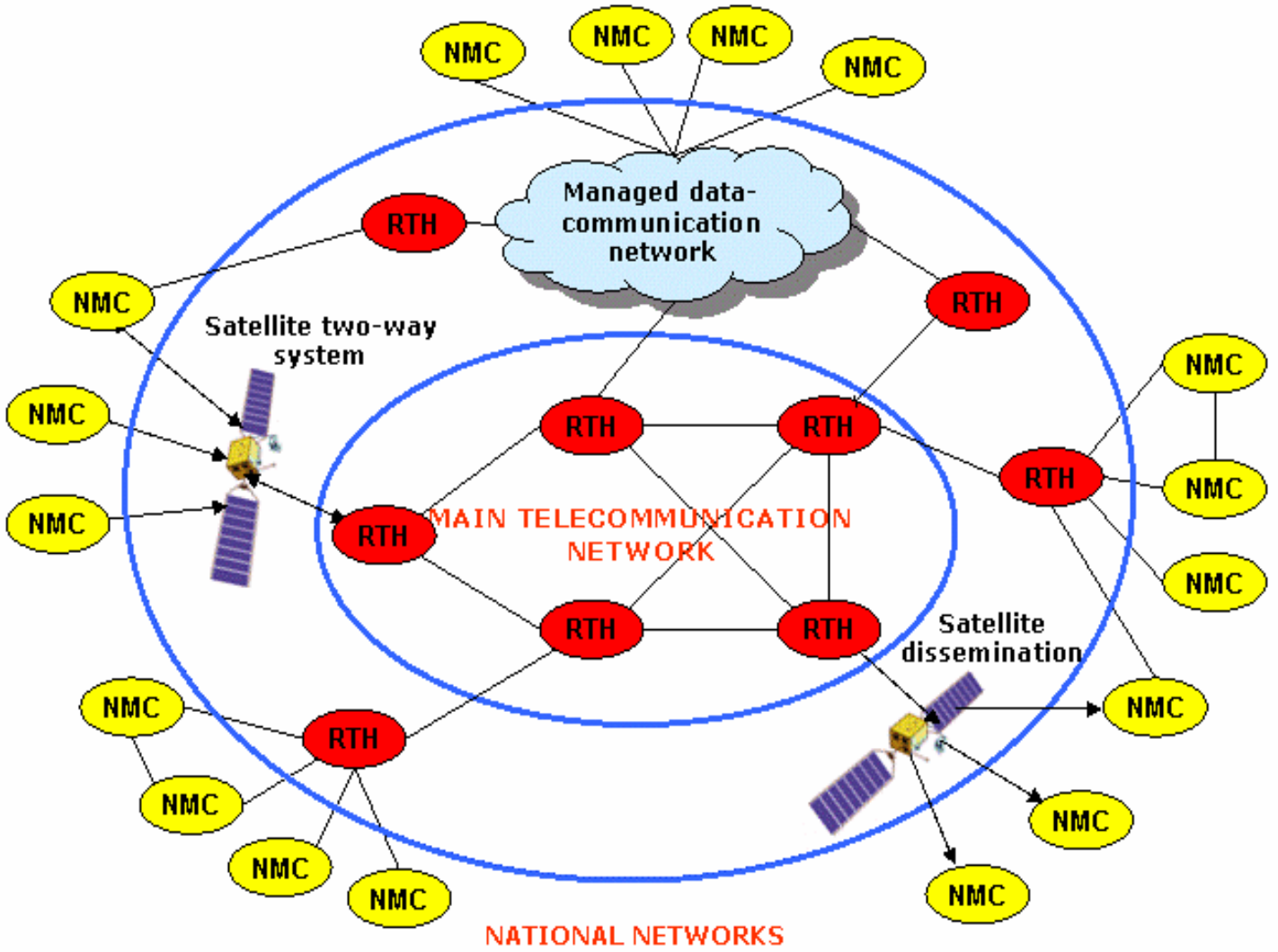
WIS Implementation Plan

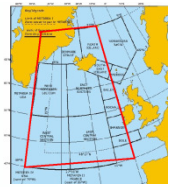
Two parallel parts:

Part A: Further improvements of the GTS for time-critical and operation-critical data for all WMO Programmes *on-going*

Part B: Extension of services through flexible data discovery, access and retrieval services (DAR) essentially through the Internet – *initial start of operation end 2009*

Part A – Improvement of GTS





GISC – DAR service

Search Request

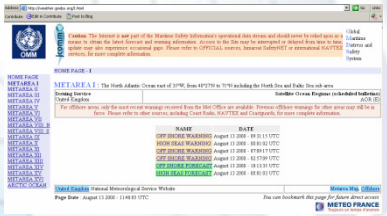
marine warnings in area bounded by 40W to 10W and 45N to 70N

Search Results

User searches for metadata then retrieves information from data custodian

Information request to custodian

http://weather.gmdss.org/I.html



Retrieve information

Centre publishes metadata to GISC DAR catalogue

Security/authentication/authorization and even charging is managed by each service provider

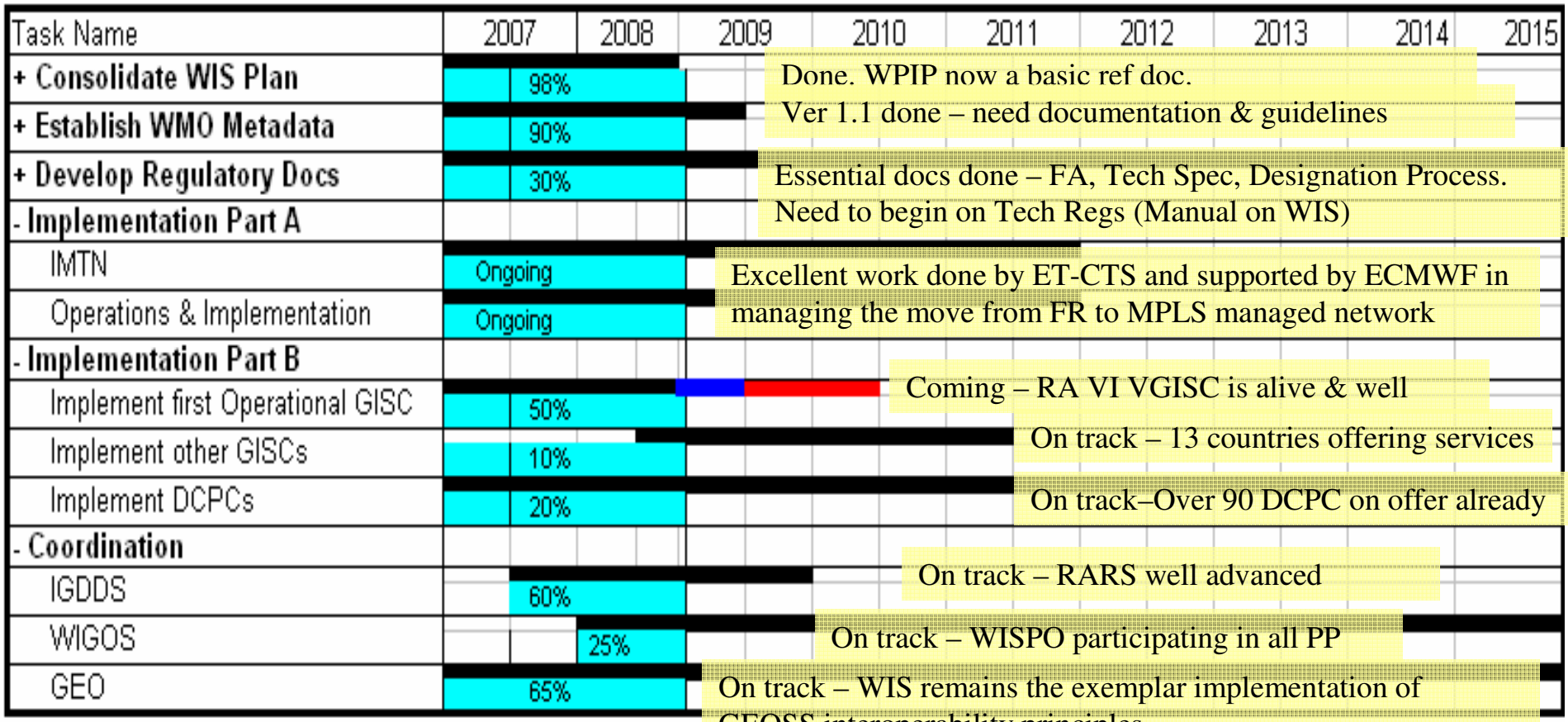
Part B – New functionality

NC/DCPC information access service

Identification of WIS Centres

- ICG-WIS 8th Session established group to identify potential WIS centres as requested for EC-LXI:
- Circular letter sent to PRs and TCs mid Oct 2008
- ICG-WIS group assessed responses, and results can be found online at http://www.wmo.int/wis under meetings
- Demonstrations of capabilities of candidate WIS centres at the CBS Ext (2010), with a view to a formal designation by Cg-XVI in 2011.

Timelines on critical path



Done. WPIP now a basic ref doc.
Ver 1.1 done – need documentation & guidelines

Essential docs done – FA, Tech Spec, Designation Process.
Need to begin on Tech Regs (Manual on WIS)

Excellent work done by ET-CTS and supported by ECMWF in managing the move from FR to MPLS managed network

Coming – RA VI VGISC is alive & well

On track – 13 countries offering services

On track–Over 90 DCPC on offer already

On track – RARS well advanced

On track – WISPO participating in all PP

On track – WIS remains the exemplar implementation of GEOSS interoperability principles

Priority now is the critical work started by ET-GDDP on demonstration process and by the ICG-WIS on a WIS Manual

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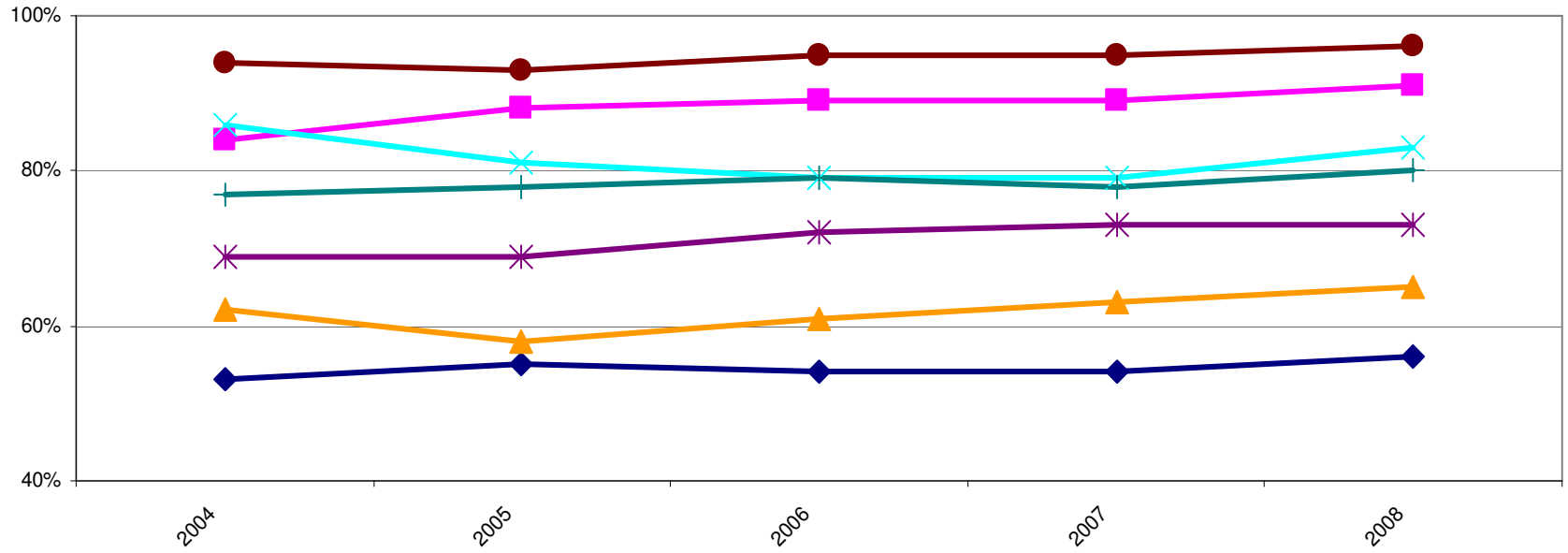
Real-time Data exchange

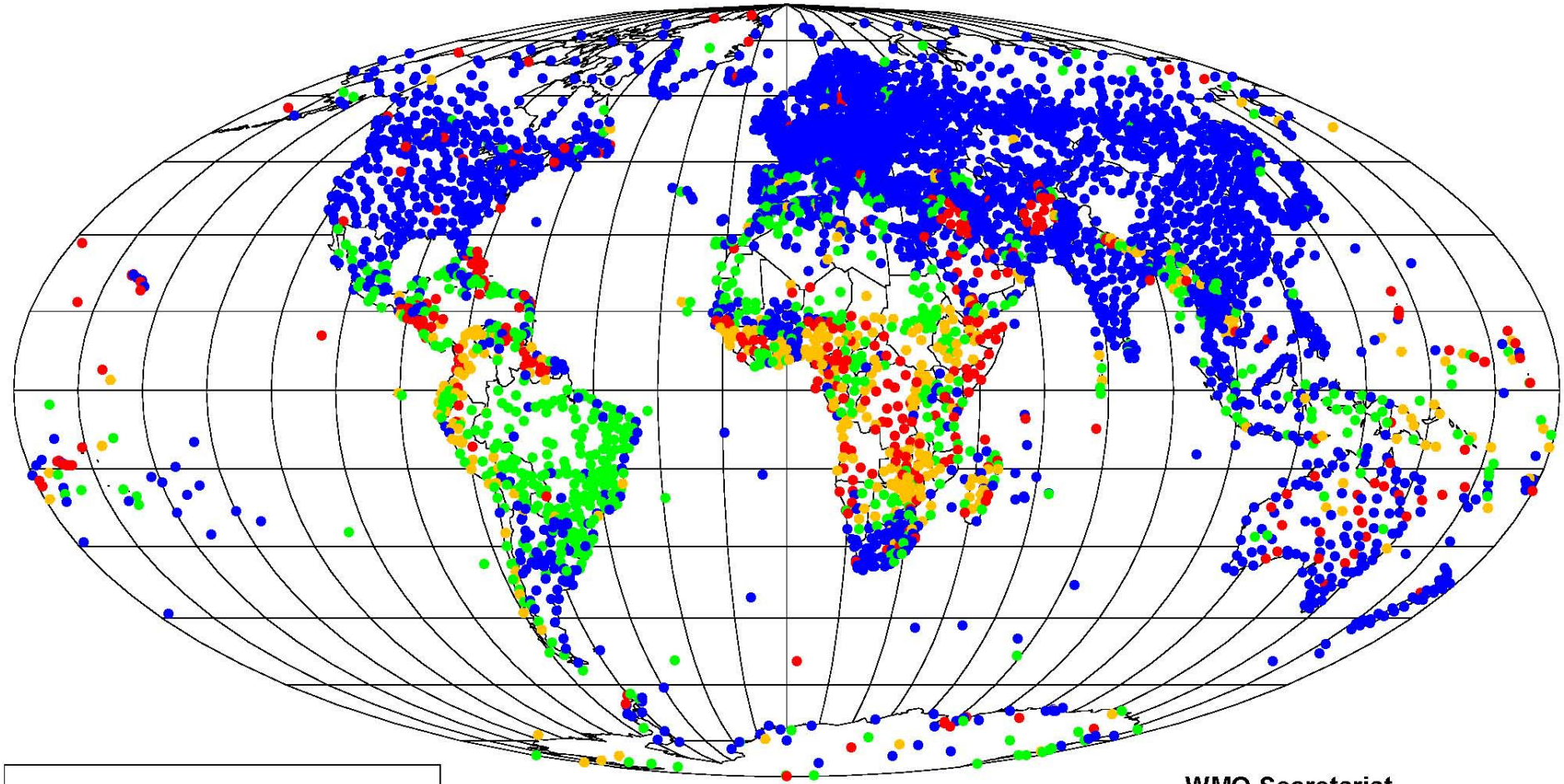
Percentage of SYNOP reports received during the 2004 to 2008 October AGM in comparison with the numbers of reports required from the RBSN stations



	Oct-04	Oct-05	Oct-06	Oct-07	Oct-08
Region I	53%	55%	54%	54%	56%
Region II	84%	88%	89%	89%	91%
Region III	62%	58%	61%	63%	65%
Region IV	86%	81%	79%	79%	83%
Region V	69%	69%	72%	73%	73%
Region VI	94%	93%	95%	95%	96%
Total	77%	78%	79%	78%	80%

Annual Global Monitoring 1-15/10/2008

SYNOP reports made at 00, 06, 12 and 18 UTC at RBSN stations



Percentage of reports received:

- 90 to 100 per cent (2912 stations)
- 45 to 90 per cent (697 stations)
- Less than 45 per cent (325 stations)
- Silent stations (350 stations)

WMO Secretariat

Expansion of the RMDCN

The Association:

- noted that the current RMDCN includes five sites outside RA VI and new requests to join are expected.
- noted that the ECMWF Council had approved in 2008 the criteria for the expansion of RMDCN, to include centres in the following categories of Members:
  - ECMWF Member States and Cooperating States;
  - RA VI Members not yet connected to RMDCN;
  - IMTN centres, including future GISCs;
  - Centres outside RA VI with GTS connection to RA VI centres, upon request of RA VI Member concerned.

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Summary:
Towards the reality of WIGOS

- Many challenges remain
  - Clarity of definition – WIGOS scope and value-add
  - Coordination, collaboration, communication
  - Technical level, at the management level within WMO and at a structural level – including programmes, TCs
- Achieving 'reality' will require WMO to
  - Develop, resource and communicate a coherent and resourced implementation strategy (not just a plan)
  - Confirm and elaborate the composite 'system of systems' approach to integration
  - Build confidence and collaboration with Members, partners, and amongst programmes
- RAs and TCs must take a leadership role in all of the above
  - EC WG on WIGOS and WIS & CBS will lead the WIGOS development
  - WIGOS & WIS Regional Implementation Plan shall be an Important component of RA operation Plan in next FP
  - WIGOS Regional Demo Project shall be the urgent start now

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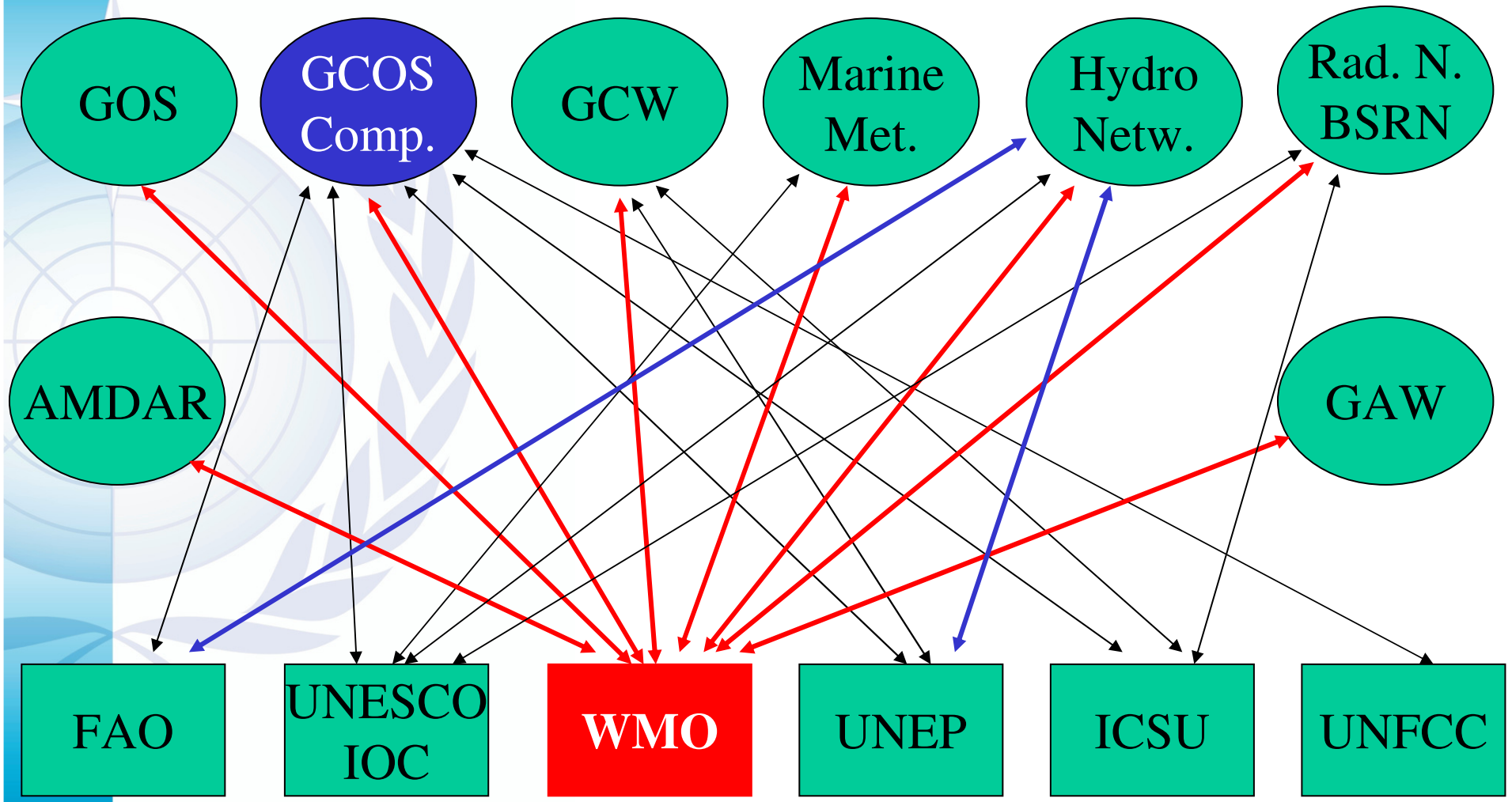
WIGOS Data Policy
PERTNERSHIP



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WIGOS Benefits

- Improved observing networks operations
- Increased access to observational data and products with improved quality
- More efficient use of all available resources (cost-effectiveness)
- Better preparedness to incorporate new observing systems and to interface with WMO co-sponsored observing systems
- Allowing Members to more efficient and effectively respond to new challenges and evolving user service requirements. Setting the WMO Foundation-WIGOS in the Next Decade

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WIGOS Web Page

http://www.wmo.int/pages/prog/www/wigos/index_en.html

WMO Integrated Global Observing Systems (WIGOS)

Programmes > WWW > WIGOS

The **WMO Integrated Global Observing Systems (WIGOS)** is a concept for a comprehensive, coordinated and sustainable system of observing systems. WIGOS is based on all WMO Programmes' observational requirements. It ensures availability of required data, products and information and facilitates access through the WMO Information System (WIS) according to identified requirements.

Benefits of WIGOS to Members and partner organizations will be improved services, increased quality, consistency and access to multi disciplinary observations, more efficient use of resources, better preparedness to incorporate new observing systems.

Principal Documents

- Cg governance
- EC guidance
  - EC-LIX
  - EX-LX
- Concept of Operations (CONOPS)
- WIGOS Development and Implementation Plan (WDIP)

EC WG on WIGOS and WIS

- EC WG on WIGOS and WIS
- Subgroup on WIGOS

Overview

- Purpose
- Objectives
- Aims
- Roadmap
- WIGOS Components
- Characteristics

Levels of Integrations

- Concept of Integration
- Observational standards
- Information infrastructure
- Quality assurance of products

WIGOS

- Overview
- Levels of Integration
- Projects
- Relationships
- Upcoming meetings
- Reports of meetings
- Secretariat Support

Cross-cutting

- Global Observing System (GOS)
- Global Atmospheric Watch (GAW)
- Hydrology and Water Resources Programme (HWRP)
- AMDAR
- Instruments and Methods of Observation Programme (IMOP)
- Marine Meteorology and Oceanography Programme (MMOP)
- WMO Space Programme (WSP)
- WMO Information System (WIS)

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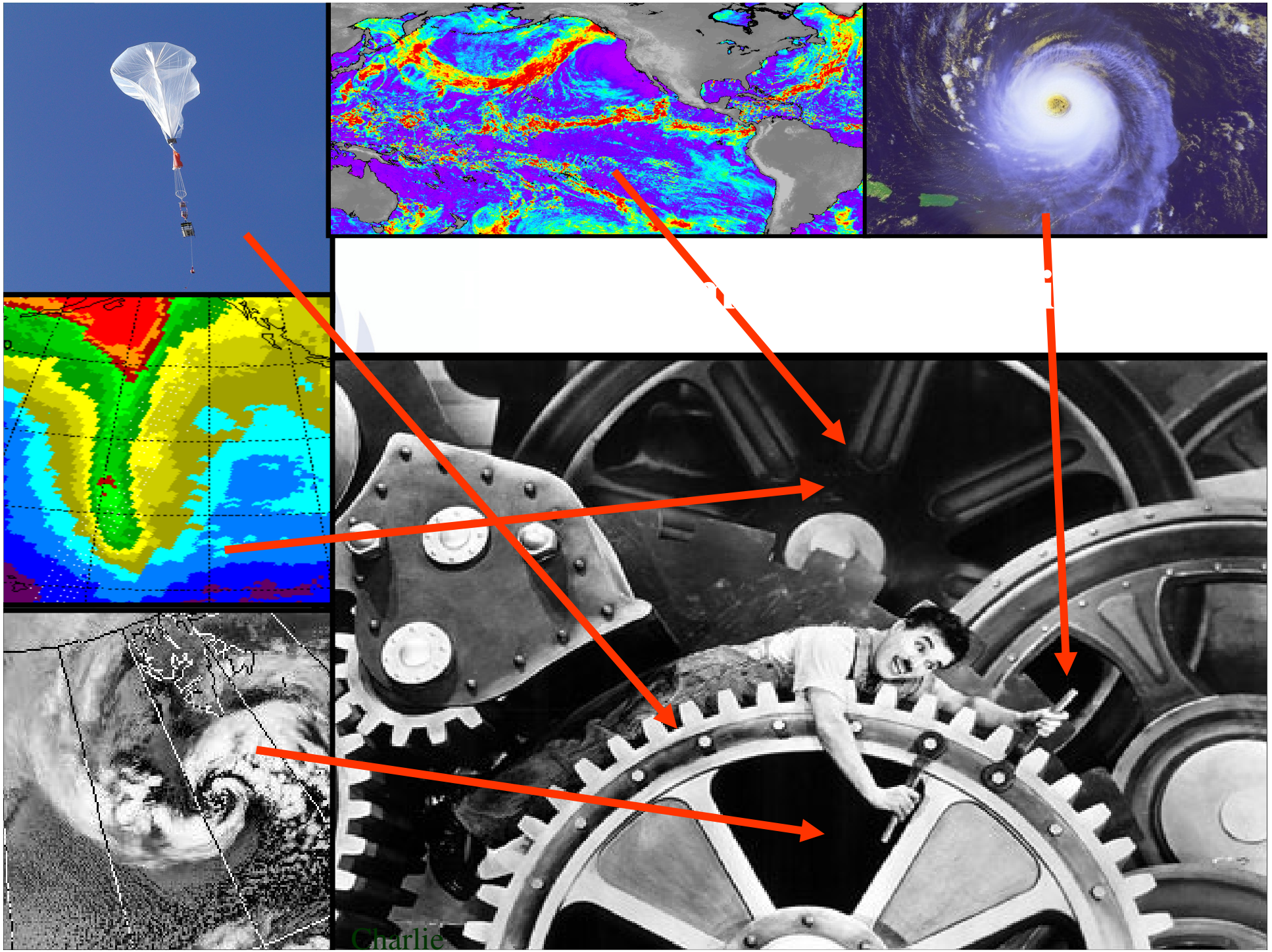
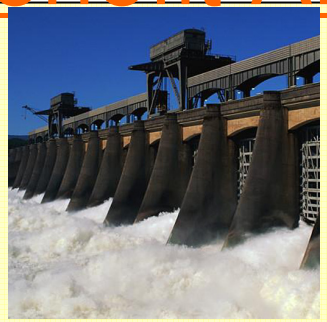
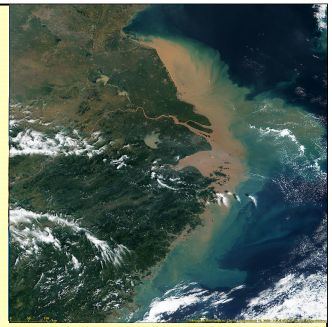

Charlie

Improved Met services can serve more Societal Benefit Areas

Natural & Human Induced Disasters



Water Resources

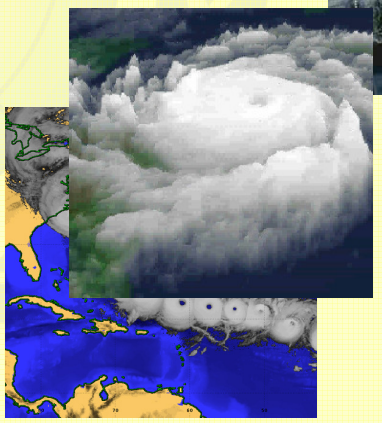


Terrestrial, Coastal & Marine Ecosystems

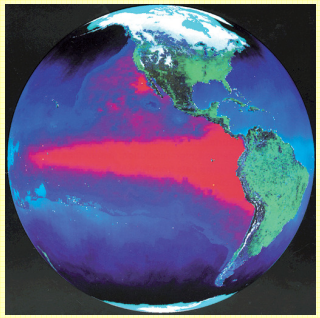
Human Health & Well-Being

Energy Resources

Sustainable Agriculture & Desertification



Weather Information, Forecasting & Warning



Climate Variability & Change

Biodiversity

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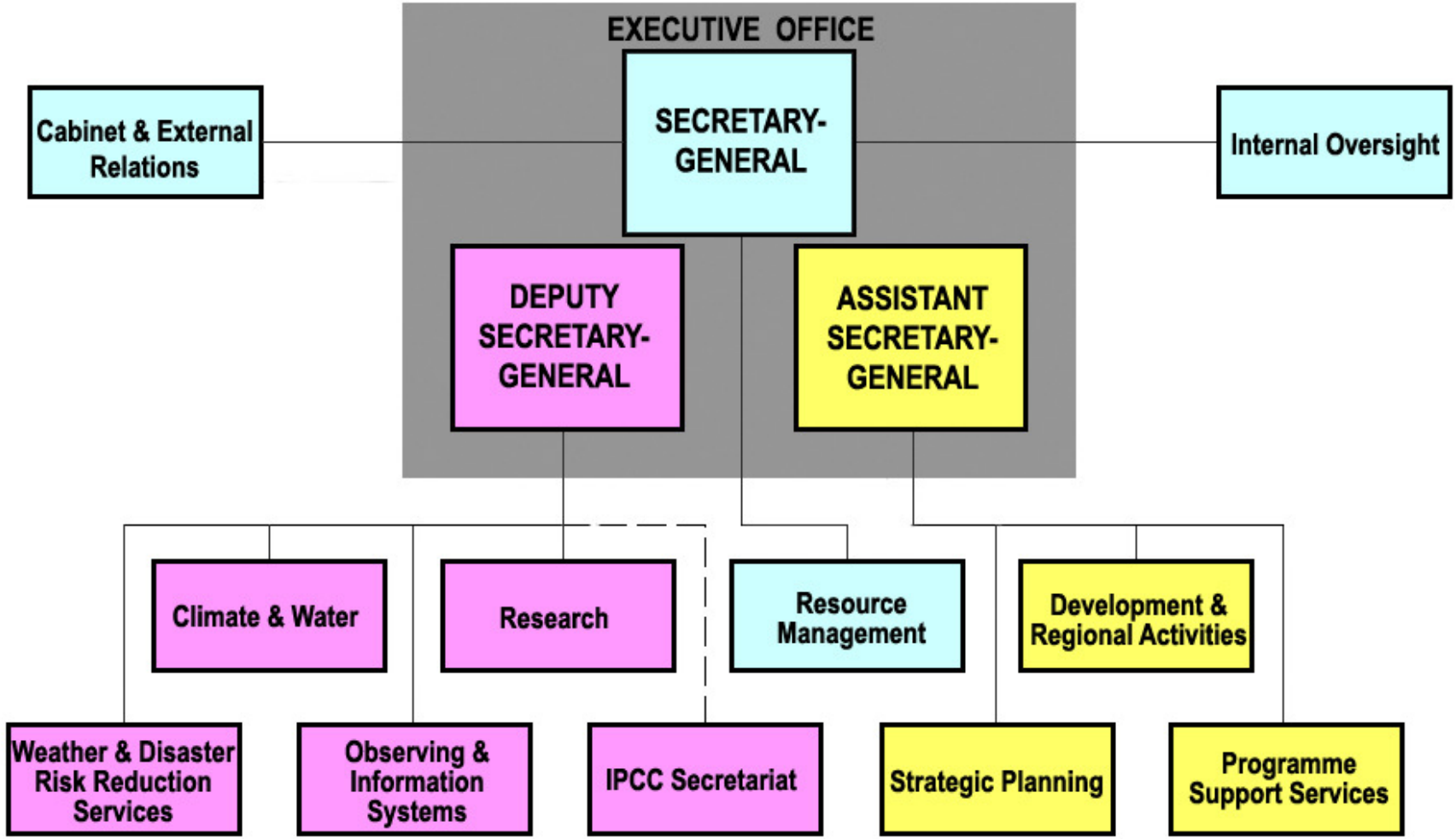
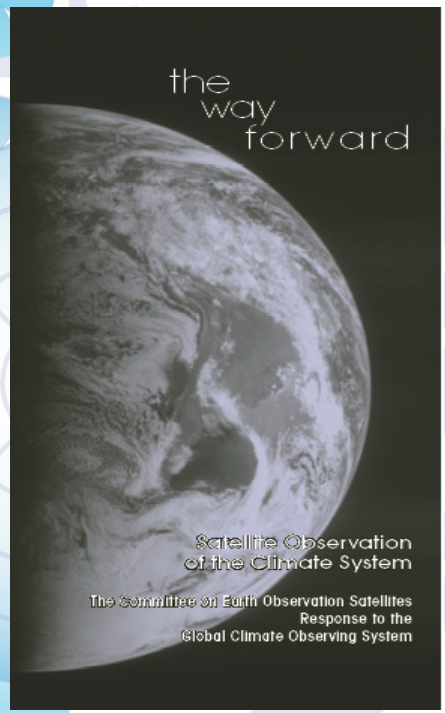
WMO Secretariat structure: rational clustering



WIGOS and WIS need stronger
Joint efforts among all of us



Collaborations and cooperations (Partnership) are essential:

Building Synergy

Old proverb:

If you want to go quickly, go alone,

if you want to go far, go together.

If you want to quickly and far ??

My answer: go with your family

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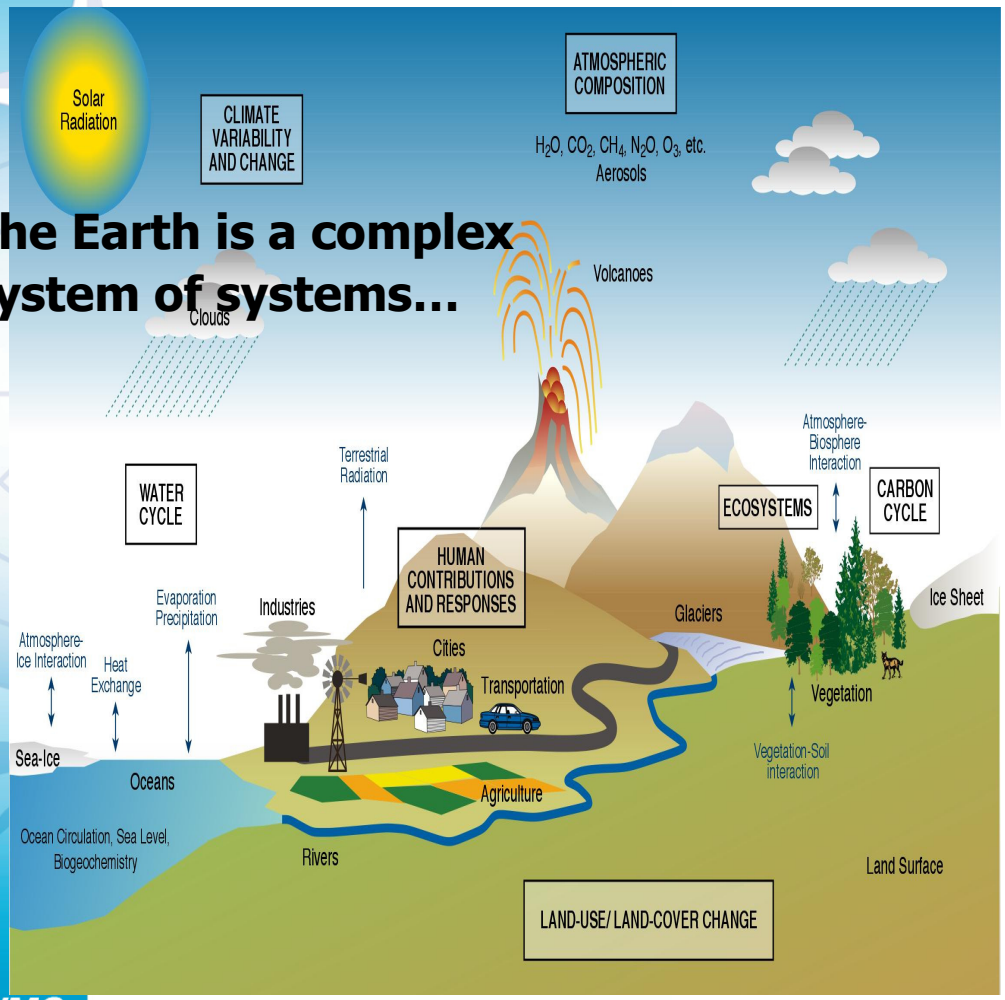
SEE = Observations



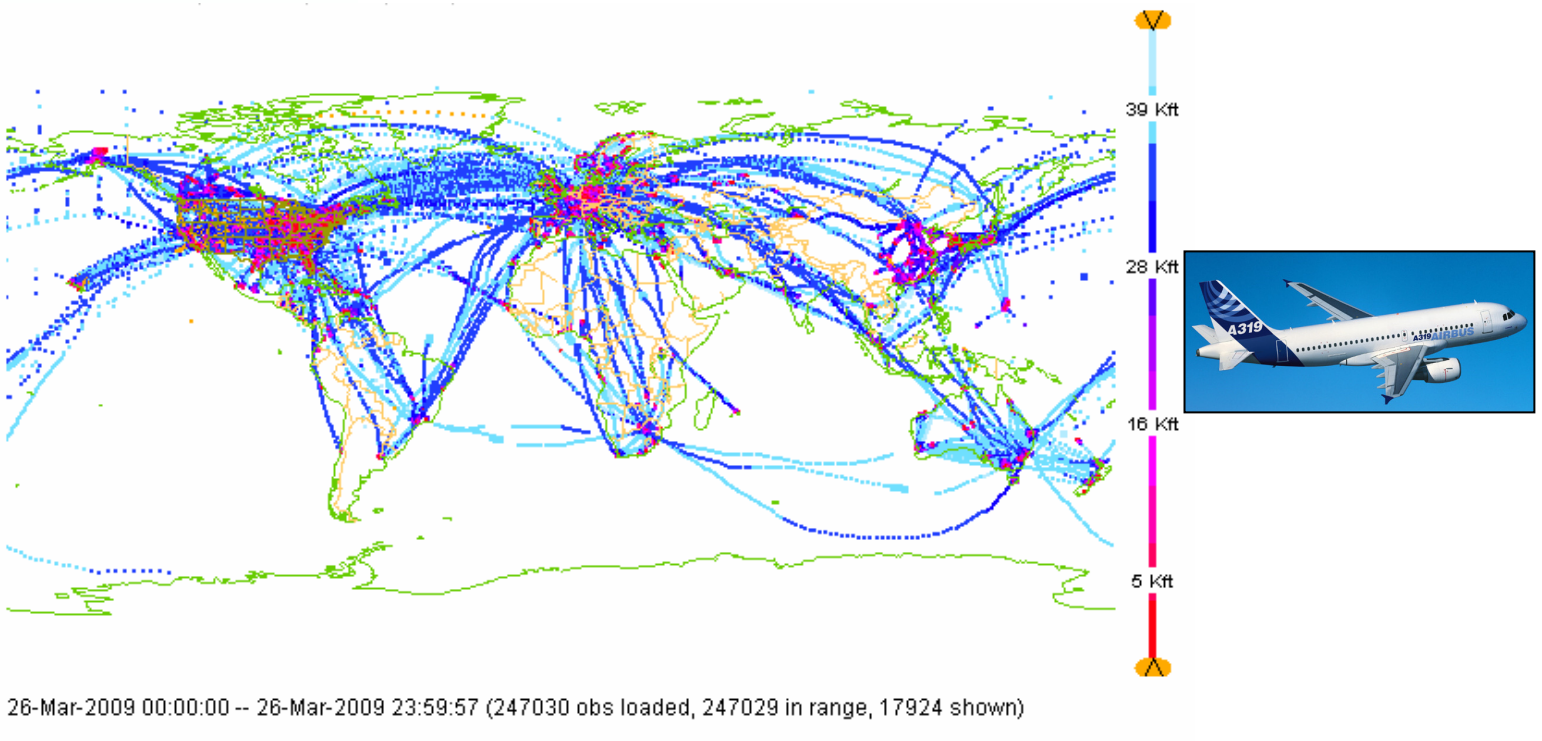
The Earth is a complex system of systems…

…understanding it requiring comprehensive observations

- The greater success of our further expanded business need first success on Observing and Information Systems
- Let's working together and SEE should play more important role in the region !

Organizational Structure of WMO (*189 Members*)

ATMOSPHERIC - AMDAR obs.



- About **250,000 AMDAR observations** per day disseminated on the GTS
- Over **3000 AMDAR reporting aircraft** apart of the Global AMDAR Progr.
- The availability of AMDAR **profiles in data sparse regions** of Southern Africa, Eastern Europe, parts of the Russian Federation, South and East Asia and South America **have significantly increased** over the past few years.

Organizational Structure of OBS Department