World Meteorological Organization

Working together in weather, climate and water

WMO

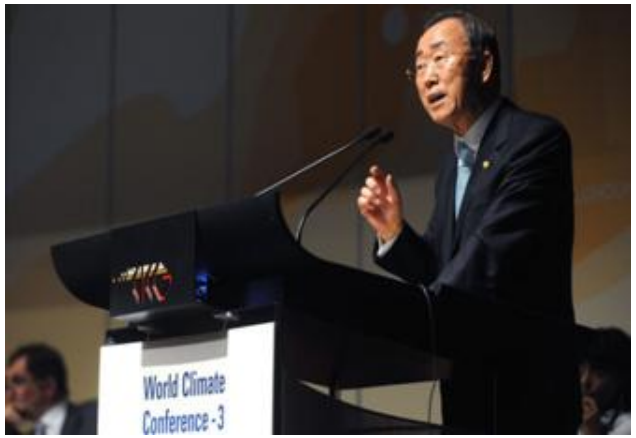
Global Framework for Climate Services (GFCS)

--Challenges and Opportunities to the CGMS Community

Wenjian ZHANG
Director, Observing and Information Systems Department, WMO
Director, WMO Space Programme

WMO Presentation @ 40th Session of CGMS, 5-9 Nov. 2012, Lugano, Switzerland

WCC · 3



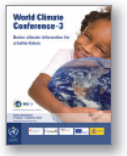
Australian Government
Canada
PEOPLE'S REPUBLIC OF CHINA
EUROPEAN COMMUNITY
MINISTRY FOR FOREIGN AFFAIRS OF FINLAND
Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
Die Bundesregierung
Japan
REPUBLIC OF KENYA
NORWEGIAN MINISTRY OF FOREIGN AFFAIRS
РОССИЙСКАЯ ФЕДЕРАЦИЯ
RUSSIAN FEDERATION
Saudi Arabia
GOBIERNO DE ESPAÑA
GOVERNMENT OF THE UNITED STATES OF AMERICA
Foreign & Commonwealth Office
Met Office
UN SYSTEM DELIVERING AS ONE ON CLIMATE KNOWLEDGE

A historic event (31 Aug – 4 Sept, 2009, Geneva)

WMO Cg-16 (2011) Decisions on Five Key Priorities for 2012-2015

- ✓ Global Framework for Climate Services (GFCS)
- ✓ WMO Integrated Global Observing System/ WMO Information System (WIGOS/WIS)
- ✓ Capacity building
- ✓ Disaster Risk Reduction
- ✓ Aeronautical meteorology

The Global Framework for Climate Services (GFCS)—A New Partnership Process



31 AUGUST–4 SEPTEMBER 2009
WORLD CLIMATE CONFERENCE-3

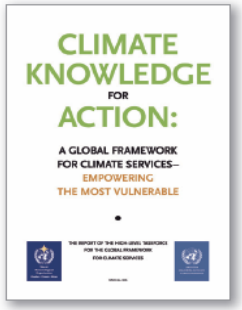
11–12 JANUARY 2010
INTERGOVERNMENTAL MEETING

16 MAY–3 JUNE 2011
SIXTEENTH WORLD METEOROLOGICAL CONGRESS

6–8 JUNE 2011
SIXTY-THIRD SESSION OF THE WMO EXECUTIVE COUNCIL

25 JUNE–3 JULY 2012
SIXTY-FOURTH SESSION OF THE WMO EXECUTIVE COUNCIL

2009 2010 2011 2012



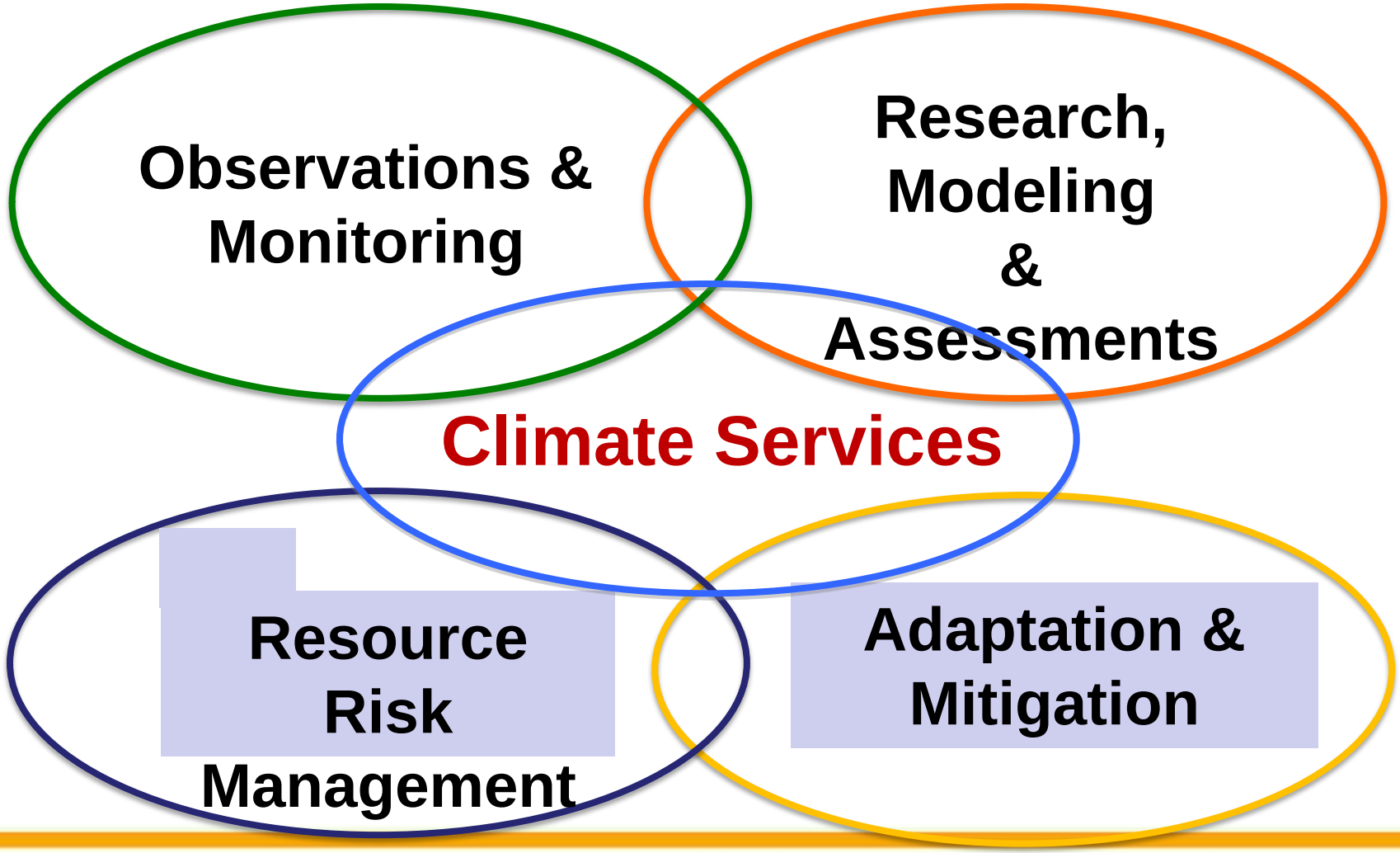
2010
HIGH-LEVEL TASKFORCE

FEBRUARY 2011
CLIMATE KNOWLEDGE FOR ACTION: A GLOBAL FRAMEWORK FOR CLIMATE SERVICES – EMPOWERING THE MOST VULNERABLE

JUNE 2011
ESTABLISHMENT OF THE GLOBAL FRAMEWORK FOR CLIMATE SERVICES OFFICE IN THE WMO SECRETARIAT

26–31 OCTOBER 2012
WMO GFCS USER CONFERENCE AND EXTRAORDINARY CONGRESS

Climate Services will Require an Unprecedented Level of Collaboration



Why should the health sector engage?

Meteorological conditions affect some of the largest disease burdens:

- Undernutrition kills 3.5 million/yr
- Diarrhoea kills 2.2 million/yr
- Malaria kills 900,000/yr

-Hydrometeorological extremes kill 10s of thousands, and cause multiple other health effects

Exemplary Grand Challenges: Droughts

Satellite monitoring of soil moisture can support agriculture/food security, DRR, Water and health

WCRP Workshop on Drought Predictability and Prediction in a Changing Climate Barcelona, March 2011

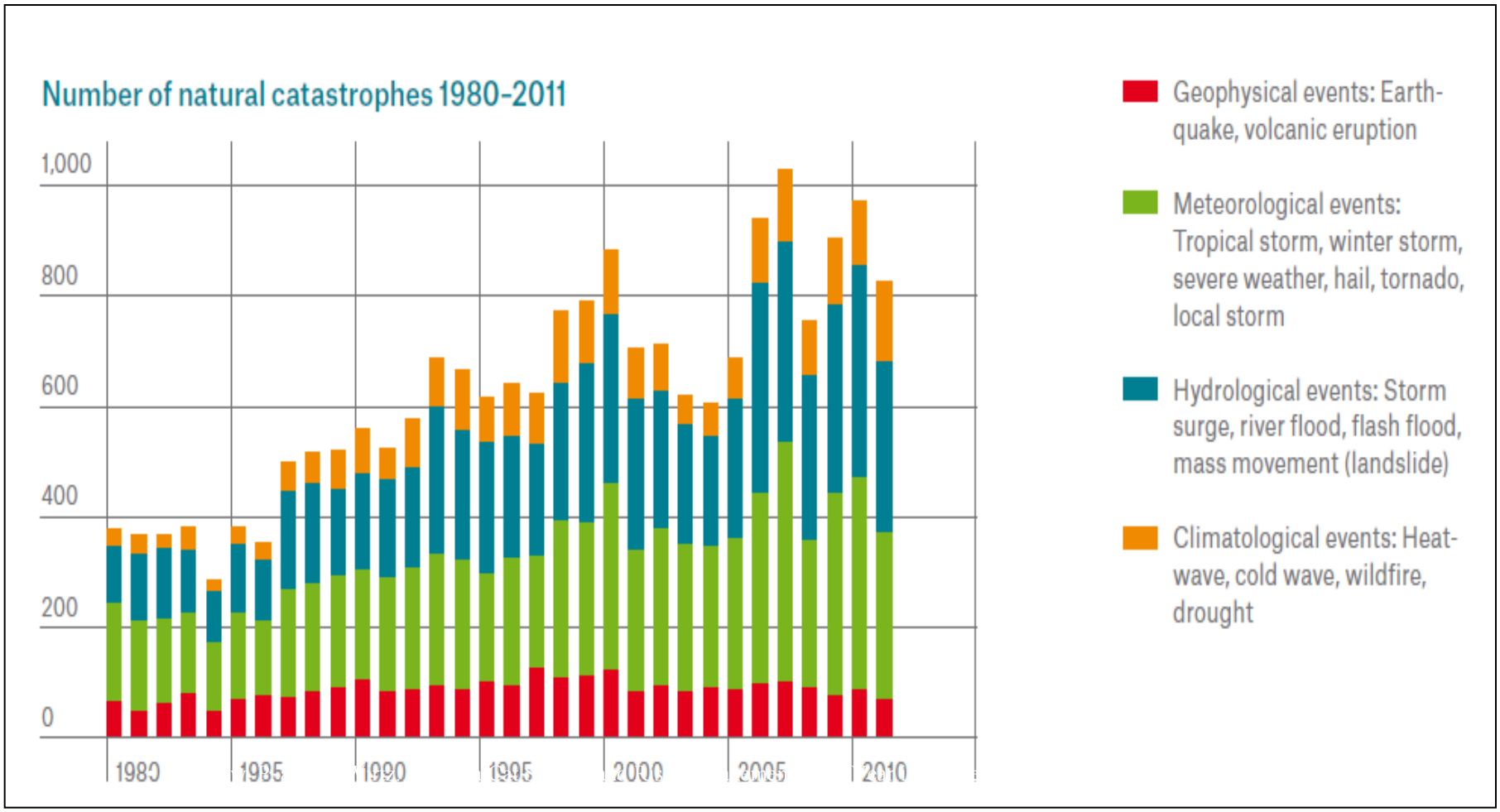
Three Major Recommendations:

1. Drought Catalogue
Summarizing key drivers of global drought events.

2. Case Studies
Focusing on large-scale and regional issues in areas where drought is a key issue.

3. Develop Drought Early Warning System

Natural disasters 1980-2011



The following key challenges have been identified through widespread consultations with experts of key communities (challenges similarly identified in GCOS)

- ***Accessibility:*** *many countries do not have climate services at all, and all* countries have scope to improve access to such services.
- ***Capacity:*** *many countries lack the capacity to anticipate and manage climate* related risks and opportunities.
- ***Data:*** *the current availability and quality of climate observations and impacts* data are inadequate for large parts of the globe.
- ***Partnership:*** *interactions between climate service users and providers are not* always well developed, and user requirements are not always adequately understood and addressed.
- ***Quality:*** *operational climate services are lagging advances in climate and* applications sciences, and the spatial and temporal resolution of information is often insufficient to match user requirements.

Initial GFCS priority areas

Provide opportunities for new partnership to address new observational requirements through user communities

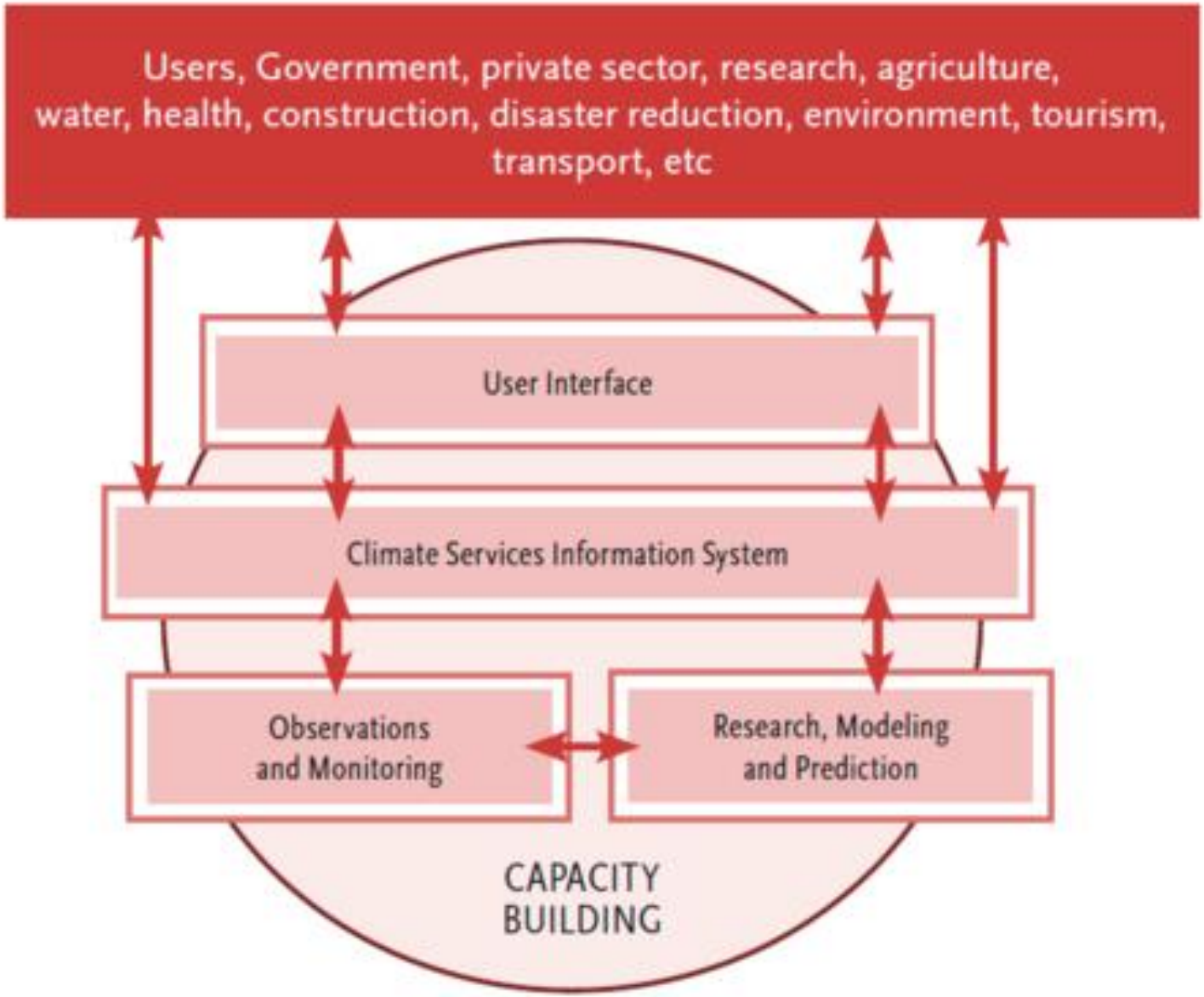
Agriculture

Water

Health

Disaster Risk Reduction

GFCS components



GFCS Implementation Plan

Chapter 1: Introduction
Chapter 2: Benefits from GFCS
Chapter 3: Issues to be addressed in implementation
Chapter 4: Implementation priorities
Chapter 5: Enabling mechanism
Chapter 6: Resources mobilization
Chapter 7: Conclusions and recommendations

Annex 1: UIP
Annex 2: CSIS
Annex 3: Obs & Mon
Annex 4: Res & Mod
Annex 5: Cap Dev

Exempl.: Water
Exempl.: Dis.Risk Red.
Exempl.: Health
Exempl.: Agric./Food Security

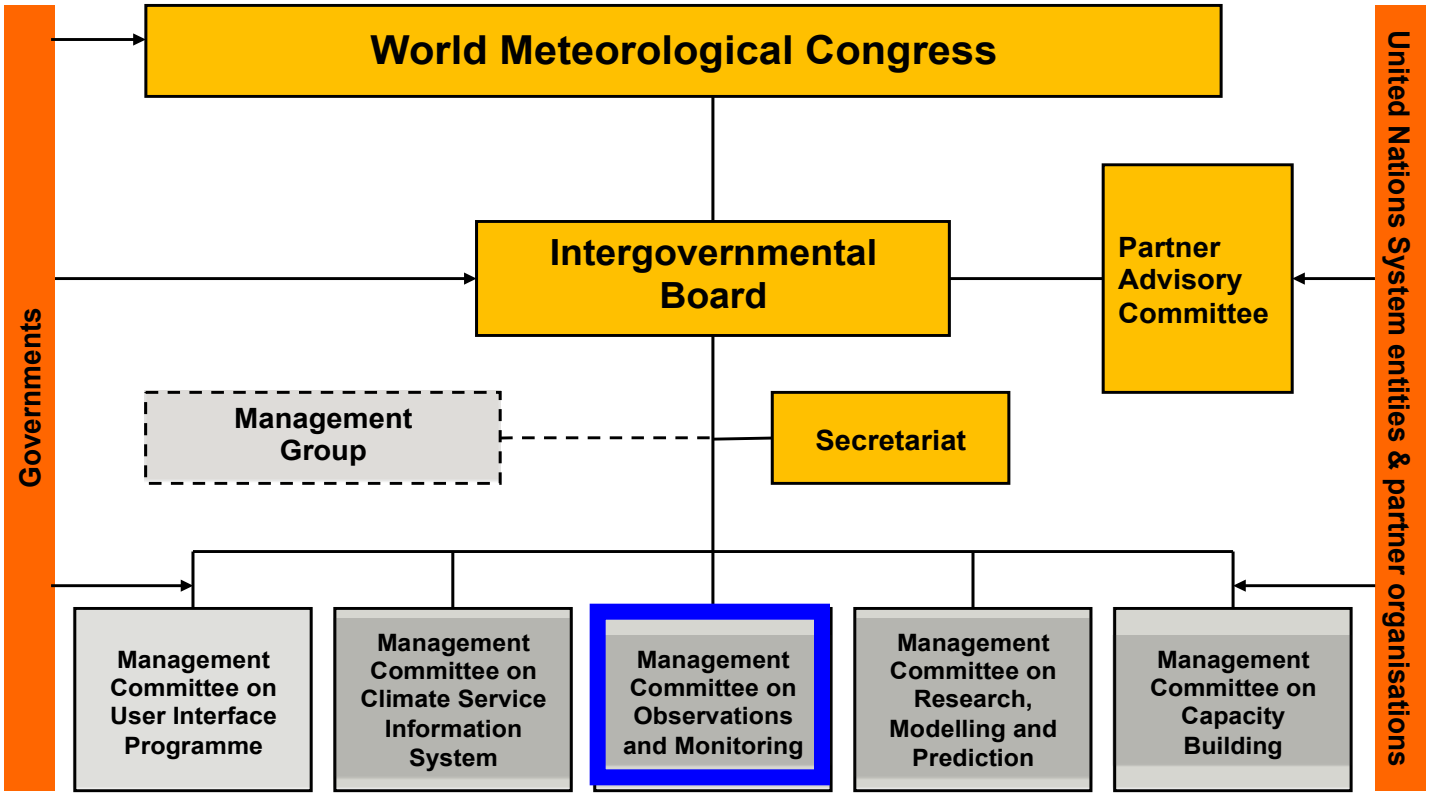
Observations & Monitoring Pillar

- Existing capabilities for climate observation and data exchange provide a strong basis for improving climate services globally.
- In this respect, the Framework will benefit from **existing surface-based and satellite-based observing systems that already provide a wealth of data**
- In recent decades, satellite data have contributed very significantly to climate datasets and are the only way to provide global coverage of some parameters
- **The Architecture for Climate Monitoring from Space is a key component of GFCS**

Observations & Monitoring Pillar

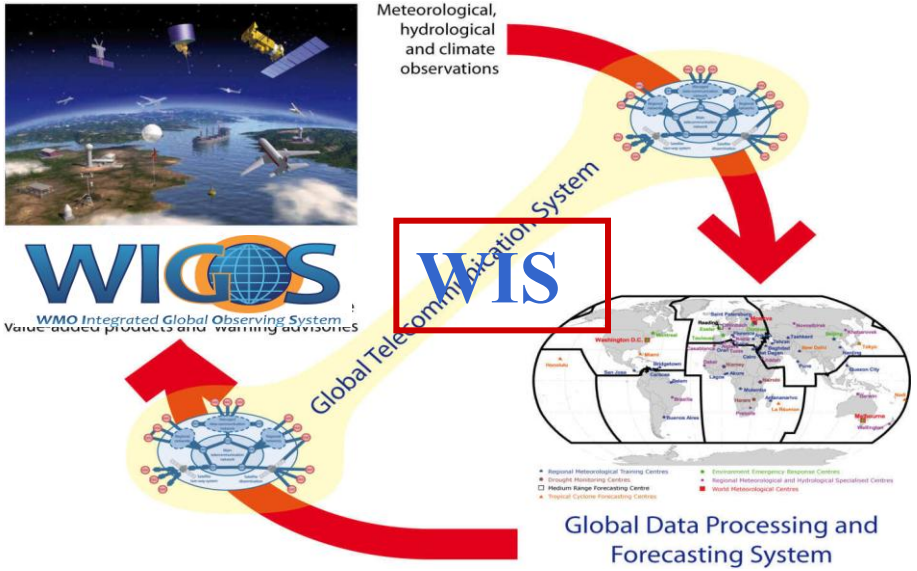
- The specific role of the pillar is to re-focus and strengthen such systems to support climate services:
  - Address **important gaps in climate observations**, including the weaknesses of the observation networks in the most vulnerable, risk-prone and remote areas of LDC & developing countries
  - Address **transforming research-based observations into operations, promotes the integration of remotely-sensed and *in situ* observations**
  - Promote **free and open exchange of climate-relevant observational data** while respecting property rights and national and international policies.

Governance Structure



The contribution of WMO to the Development of GFCS

- WMO with its Members, bodies and co-sponsored programmes will provide only a component needed to build the framework
- GFCS is a global collective effort being built in collaboration with UN family, partners and stakeholders **(CGMS, CEOS & GEO)**



GCOS
GLOBAL CLIMATE OBSERVING SYSTEM

WCRP
World Climate Research Programme

The Space Architecture is a key component of GFCS.

Thank you

Global Framework for Climate Services (GFCS) Office

For more information on GFCS, kindly contact:
Global Framework for Climate Services (GFCS) Office
World Meteorological Organization
Tel: 41.22.730.8579
Fax: 41.22.730.8037
Email: gfcs@wmo.int
http://www.wmo.int/gfcs

Global Framework for Climate Services

World Meteorological Organization

Working together in weather, climate and water

WMO Integrated Global Observing System (WIGOS)

Key Tasks to the Space Component

CGMS 40, Lugano, Switzerland

5 – 9 Nov. 2012

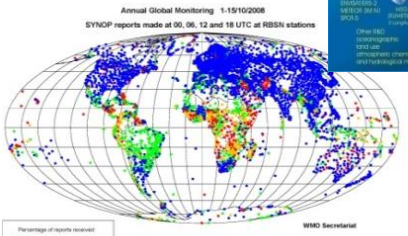
Wenjian Zhang

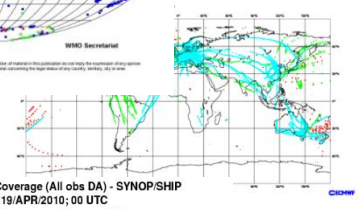
Director, Observing and Information Systems Department

World Meteorological Organization

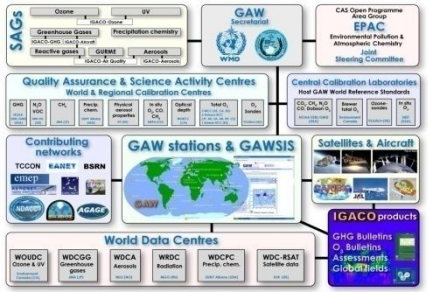
WMO Integrated Global Observing System (WIGOS)---Background

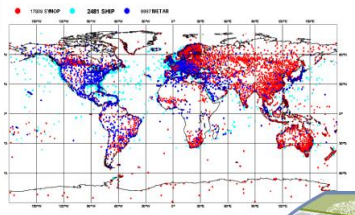
WMO Global Observing Systems



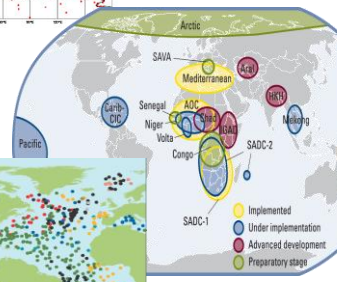


- **Global Observing Systems** (WWW/GOS)
  - Space-based observing system (Serving all WM
  - RBSN, RBCN (>10,000 stations,1,000 upper-air)
  - AMDAR (39754/day)
  - Ship & Marine obs (30417/day)
  - Surface-based remote sensing
  - Meso-scale networks

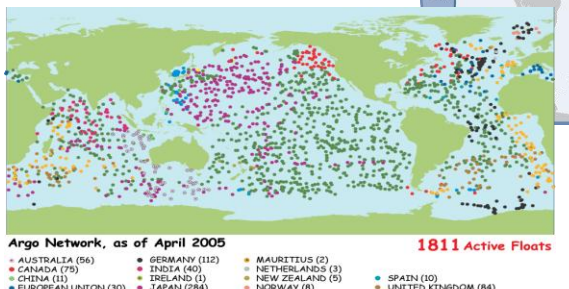




- **Global Atmosphere Watch (GAW)**
- **World Hydrological Cycle Observing System (WHYCOS)**



- **WMO Co-sponsored Observing Systems**
  - GCOS, GOOS, GTOS

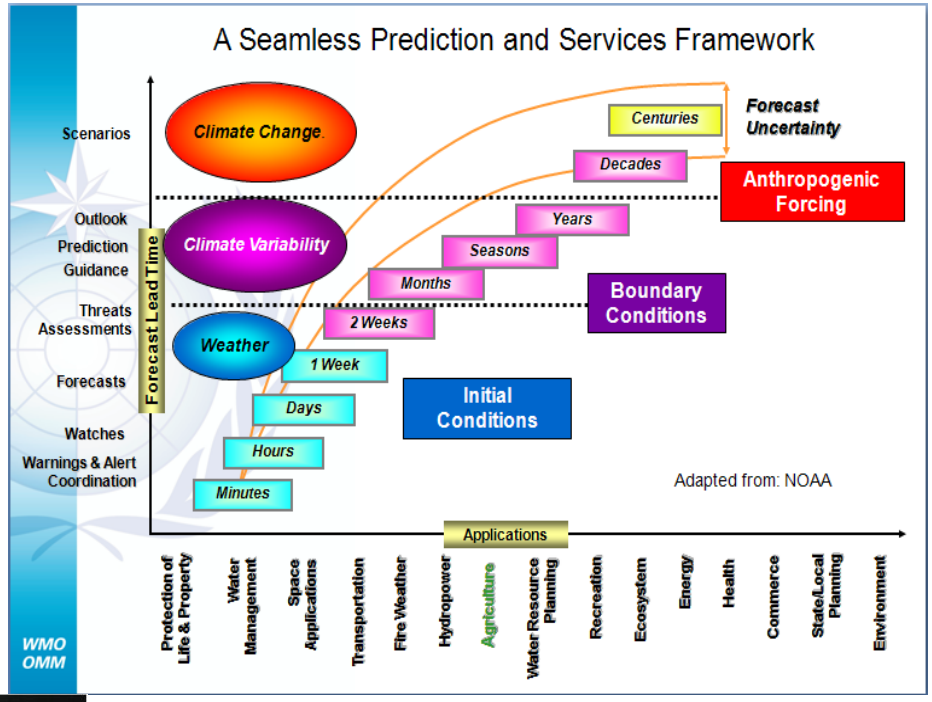


- WMO Cg-16 (2011) decisions to Implement

WMO INTEGRATED GLOBAL OBSERVING SYSTEM (WIGOS)

The key word is Integration: promote synergy among systems

The whole is more than the sum of the parts--Aristotle



Need an Integrated Global Observing System to meet all requirements in a cost – effective manner

KEY ACTIVITY AREAS FOR WIGOS IMPLEMENTATION

1. **Management of WIGOS implementation** (EC, RAs, TCs, ICG)
2. **Collaboration with WMO and co-sponsored observing systems (including Space agencies & satellite operators)**
3. **Design, planning and optimized evolution**
4. **Integrated Observing System operation and maintenance**
5. **Integrated Quality Management**
6. **Standardization, system interoperability and data compatibility**
7. **The WIGOS Operational Information Resource**
8. **Data and metadata management,** delivery and archival
9. **Capacity development**
10. **Communication and outreach**

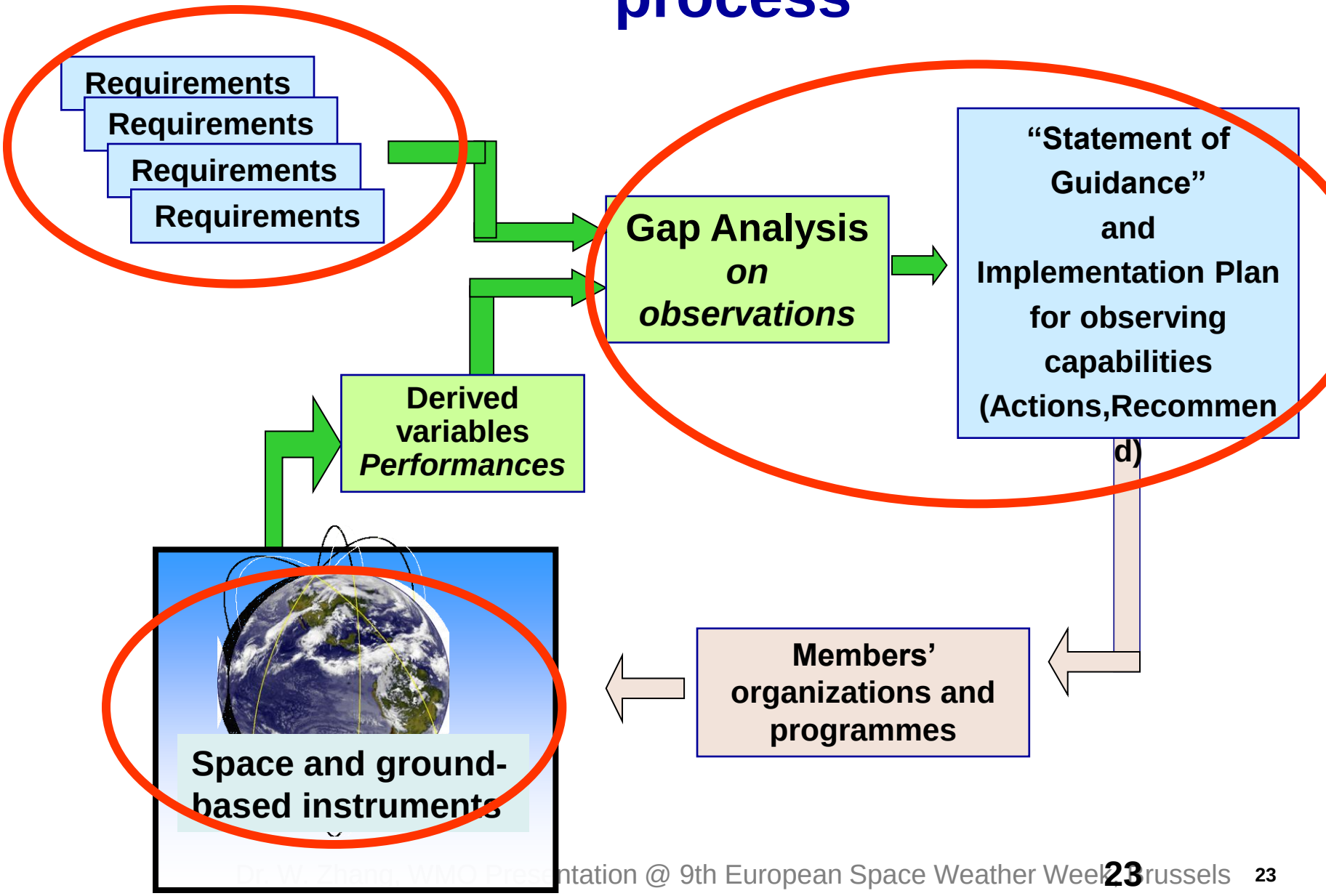
WIGOS Framework Implementation Plan

Key Activity Areas for WIGOS Implementation

2. Collaboration with WMO and co-sponsored OSs

Develop guidance, mechanisms and procedures for engagement coordination and collaboration with partner organizations	2014	ICG-WIGOS Partners
Develop the Architecture for Climate Monitoring from Space (ACMS) focusing on GFCS four priorities	2013-2015	**CGMS** **CEOS** **CBS, WMOSP**
Examine and recommend areas where closer regional cooperation and coordination would be beneficial	2012-2015	**Satellite user conferences** **•EUMESAT** **•Asia/oceania,** **•NOAA**
Establish closer collaboration at the national level, within NMHS, with other government agencies, and with potential external data providers	2012-2014	Members RAs

WMO Rolling Requirements Review process



Review of a capability: IR sounding from LEO

Instrument	Rating	Satellite	Orbit	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
TANSO-FTS	1	GOSAT	13:00 asc	X	X	X	X	X																
CrIS	1	Suomi-NPP	13:25 asc		X	X	X	X	X	X														
AIRS	1	EOS-Aqua	13:30 asc	X	X	X																		
CrIS	1	JPSS-1	13:30 asc							X	X	X	X	X	X	X	X							
CrIS	1	JPSS-2	13:30 asc												X	X	X	X	X	X	X	X		
HIRS/4	3	NOAA-19	13:34 asc	X	X	X	X	X																
IRAS	3	FY-3B	13:40 asc	X	X	X	X																	
HIRAS	1	FY-3D	14:00 asc						X	X	X	X												
HIRAS	1	FY-3F	14:00 asc										X	X	X	X								
HIRS/4	3	NOAA-18	14:58 asc	X	X	X																		
IKFS	1	Meteor-M N2-1	15:30 asc					X	X	X	X	X	X											
IKFS-2	1	Meteor-MP N1	15:30 asc								X	X	X	X	X	X								
HIRS/3	3	NOAA-15	04:44 desc	X	X	X																		
HIRS/3	3	NOAA-17	07:50 desc	X	X	X																		
HIRS/3	3	NOAA-16	08:37 desc	X	X	X																		
IASI	1	MetOp-A	09:30 desc	X	X	X																		
IASI	1	MetOp-B	09:30 desc			X	X	X	X	X	X													
IASI	1	MetOp-C	09:30 desc							X	X	X	X	X	X									
IKFS	1	Meteor-M N2	09:30 desc			X	X	X	X	X	X													
IKFS	1	Meteor-M N2-2	09:30 desc						X	X	X	X	X	X										
IASI-NG	1	MetOp-SG-A1	09:30 desc											X	X	X	X	X	X	X	X	X		
IASI-NG	1	MetOp-SG-A2	09:30 desc																		X	X		
IKFS-2	1	Meteor-MP N2	09:30 desc									X	X	X	X	X	X							
HIRS/4	3	MetOp-A	09:30 desc	X	X	X																		
HIRS/4	3	MetOp-B	09:30 desc			X	X	X	X	X	X													
HIRAS	1	FY-3E	10:00 desc								X	X	X	X										
HIRAS	1	FY-3G	10:00 desc												X	X	X	X						
IRAS	3	FY-3C	10:00 desc				X	X	X	X														
IRAS	3	FY-3A	10:15 desc	X	X	X																		

PM

AM

Gap in early morning

Ensure that the quality of the observations from space meets users requirements

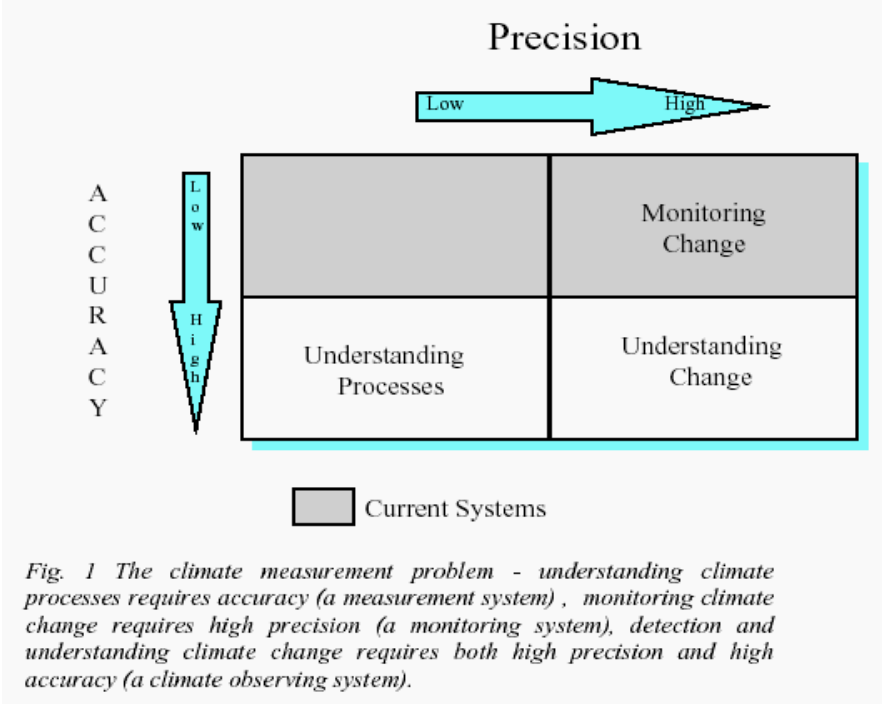
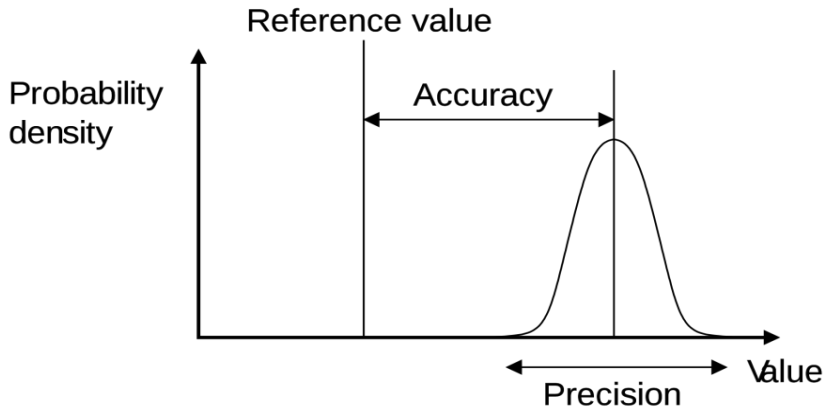
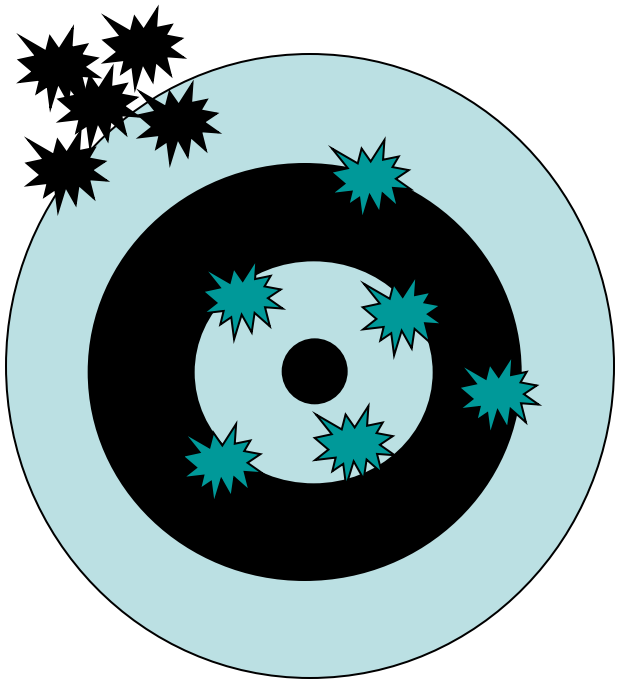


Fig. 1 The climate measurement problem - understanding climate processes requires accuracy (a measurement system) , monitoring climate change requires high precision (a monitoring system), detection and understanding climate change requires both high precision and high accuracy (a climate observing system).



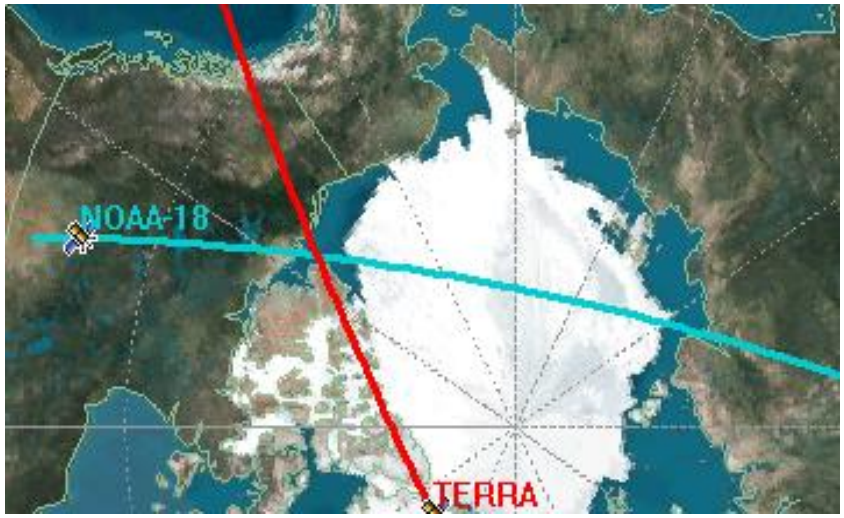
Accuracy, Precision
Representativeness
Measurement traceability
Long-time series stability
Reducing uncertainty
……



Global Space-based Inter-calibration System (GSICS)

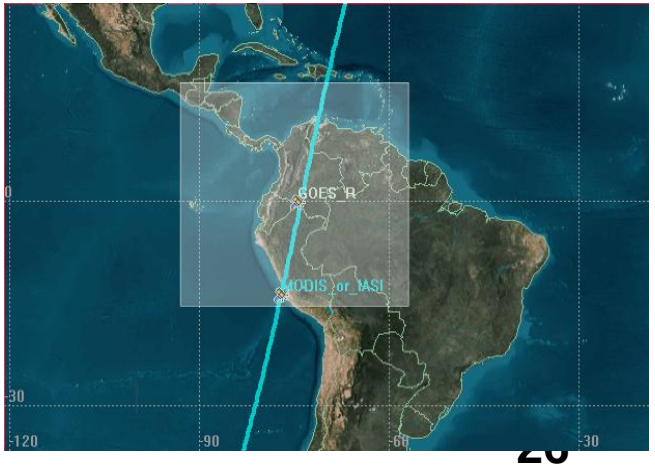
CMA-CNES-EUMETSAT-IMD-ISRO-JAXA-JMA-KMA-
-NOAA-NASA-NIST-Roshydromet-USGS-WMO

LEO-LEO intercalibration

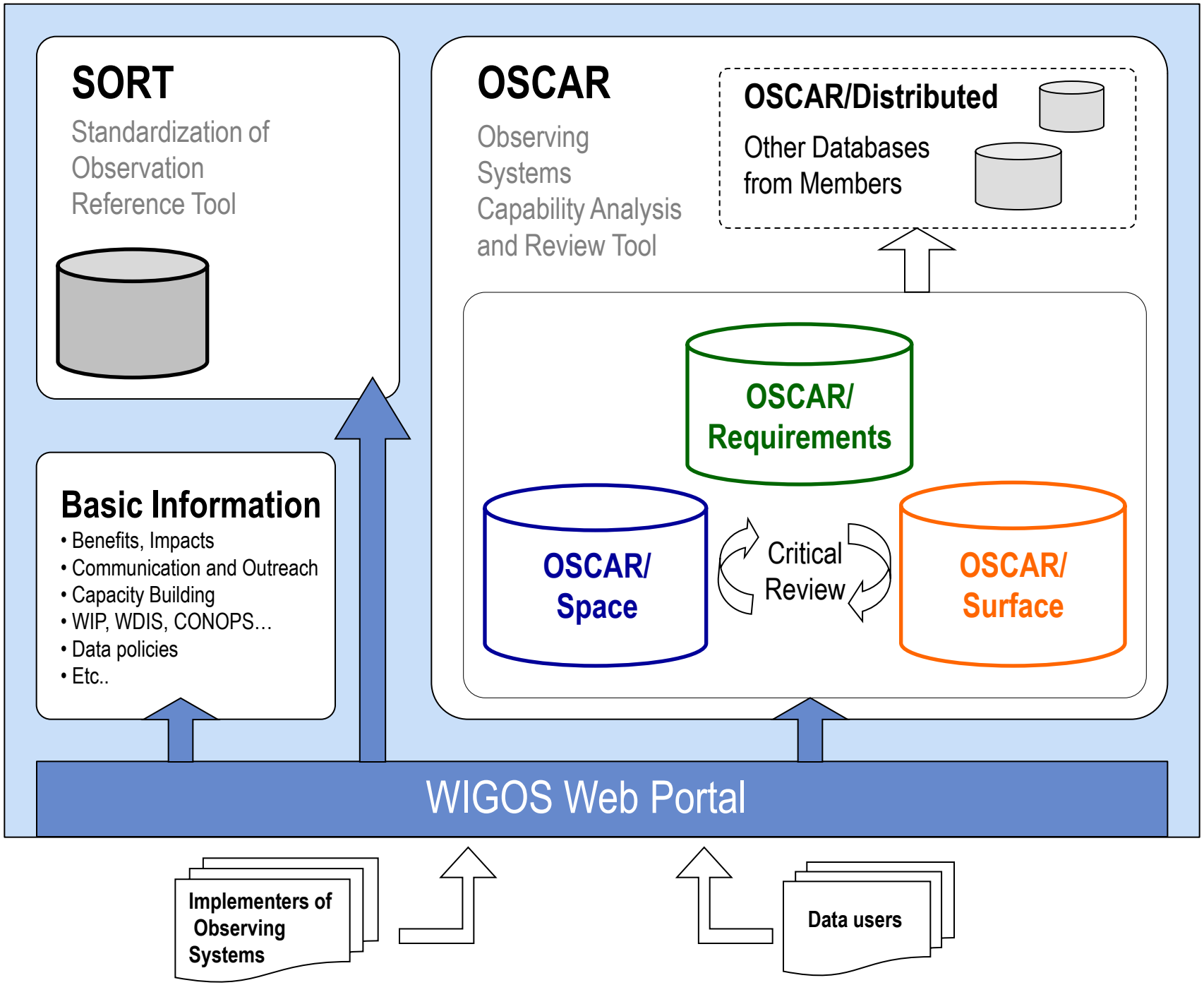


- Routine IR inter-calibration against IASI and AIRS on simultaneous overpass
- VIS and MW calibration under development

GEO versus LEO



More on:
http://gsics.wmo.int


SORT
Standardization of Observation Reference Tool
OSCAR
Observing Systems Capability Analysis and Review Tool
OSCAR/Distributed
Other Databases from Members
OSCAR/ Requirements
OSCAR/ Space
Critical Review
OSCAR/ Surface
Basic Information
• Benefits, Impacts
• Communication and Outreach
• Capacity Building
• WIP, WDIS, CONOPS…
• Data policies
• Etc..
WIGOS Web Portal
Implementers of Observing Systems
Data users

Three Legal Governance Pillars of WMO

Since 1951, WMO Cg-I

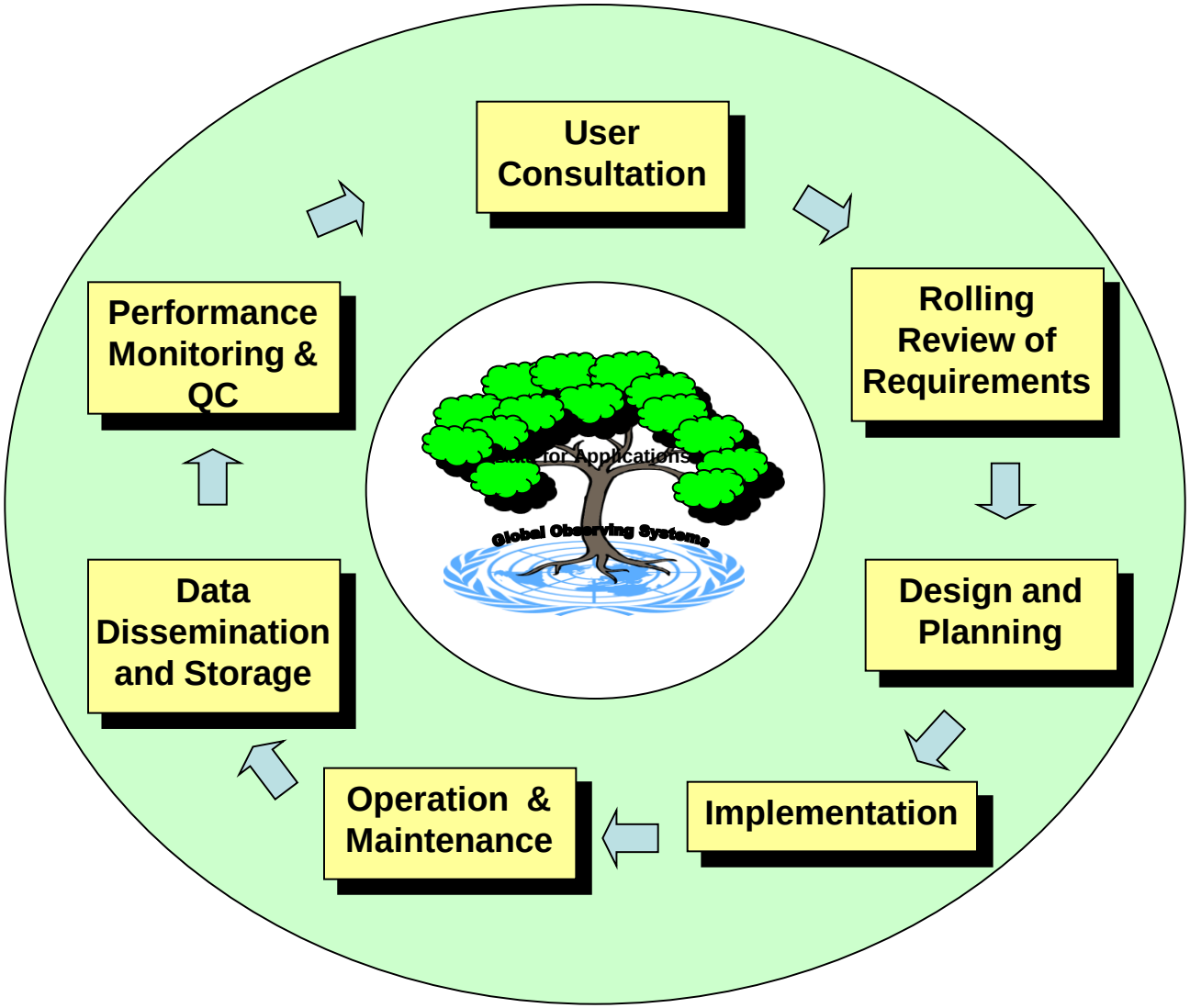
Manage WIGOS Implementation through Integrated Technical Regulations

---Promote recommended to standard practices and procedures

Update WMO Technical Regulations: engage all observing systems

Standard practices and procedures	***Recommended*** practices and procedures
necessary for Members to follow or implement	***desirable*** for Members to follow or implement
distinguished by the use of the term ***shall***	distinguished by the use of the term ***should***
status of ***requirements***	status of ***recommendations***
defined in a technical resolution	
Members shall ***do their utmost to implement***	Members ***urged to comply*** with
Article 9(b) of the Convention ***is applicable***	Article 9(b) of the Convention ***is not applicable***
Members ***shall inform*** SG of inability or impracticability of implementation	No requirement
GR 128 is applicable	GR 128 is not applicable

WIGOS: OPERATIONAL CYCLE



Conclusion remark

- **Benefits of WIGOS**
  - ***Enhanced Members' ability*** to meet expanding national mandates and achieve higher ***national and international visibility*** –including space agencies;
  - WIGOS provides a framework for ***improved collaboration and coordination*** within and beyond WMO;
  - Enhanced observing capabilities from space, including **space architecture for climate monitoring** will be vital for success of WIGOS

Thanks for your attention !!