GCOS

GLOBAL CLIMATE OBSERVING SYSTEM

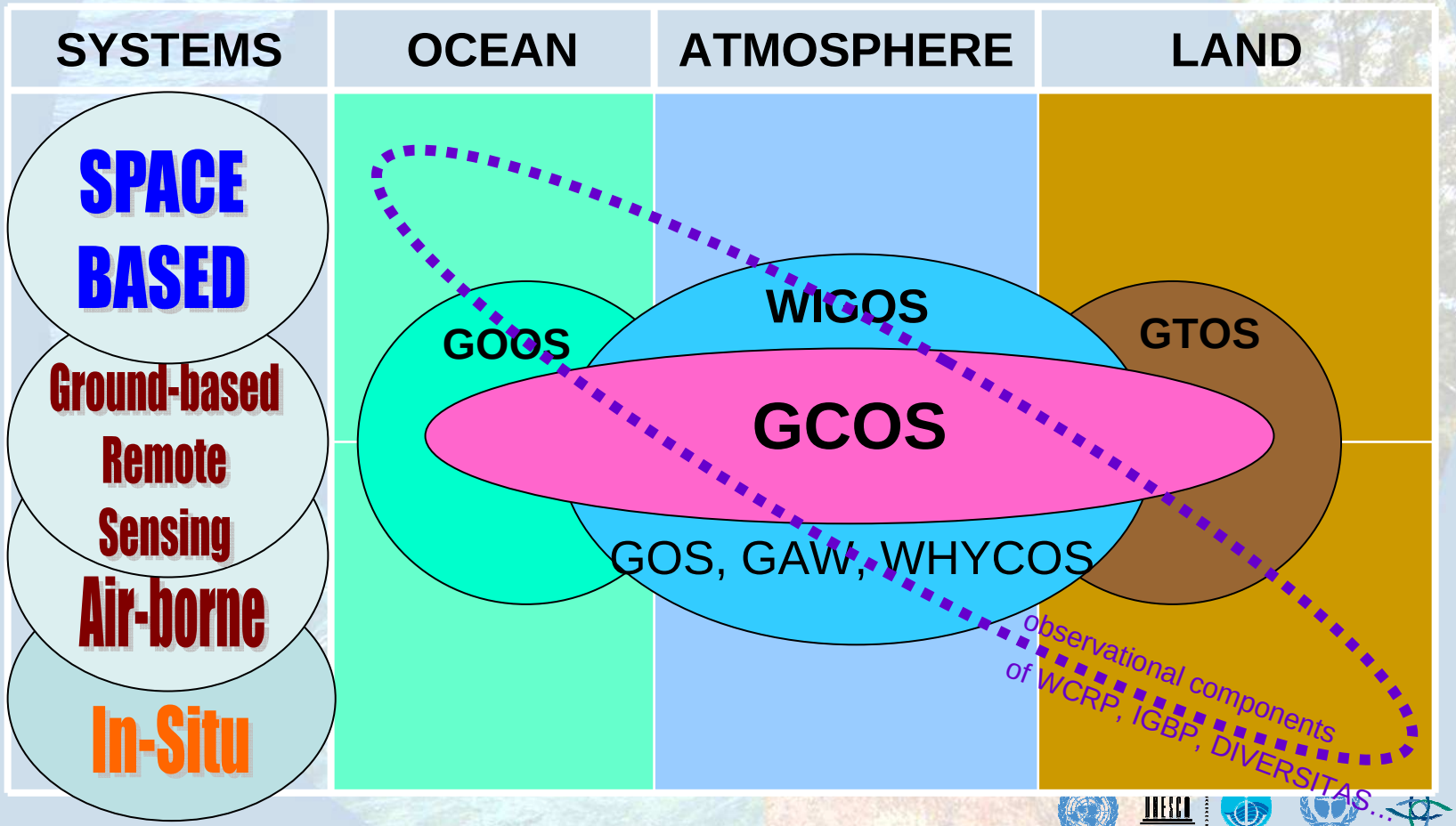
Role and Value of Systematic Observations in Adaptation

From end to end:
From climate observations to decisions

08 June 2011, Bonn, SBSTA34, Germany
Dr Carolin Richter, Director, Global Climate Observing System Secretariat

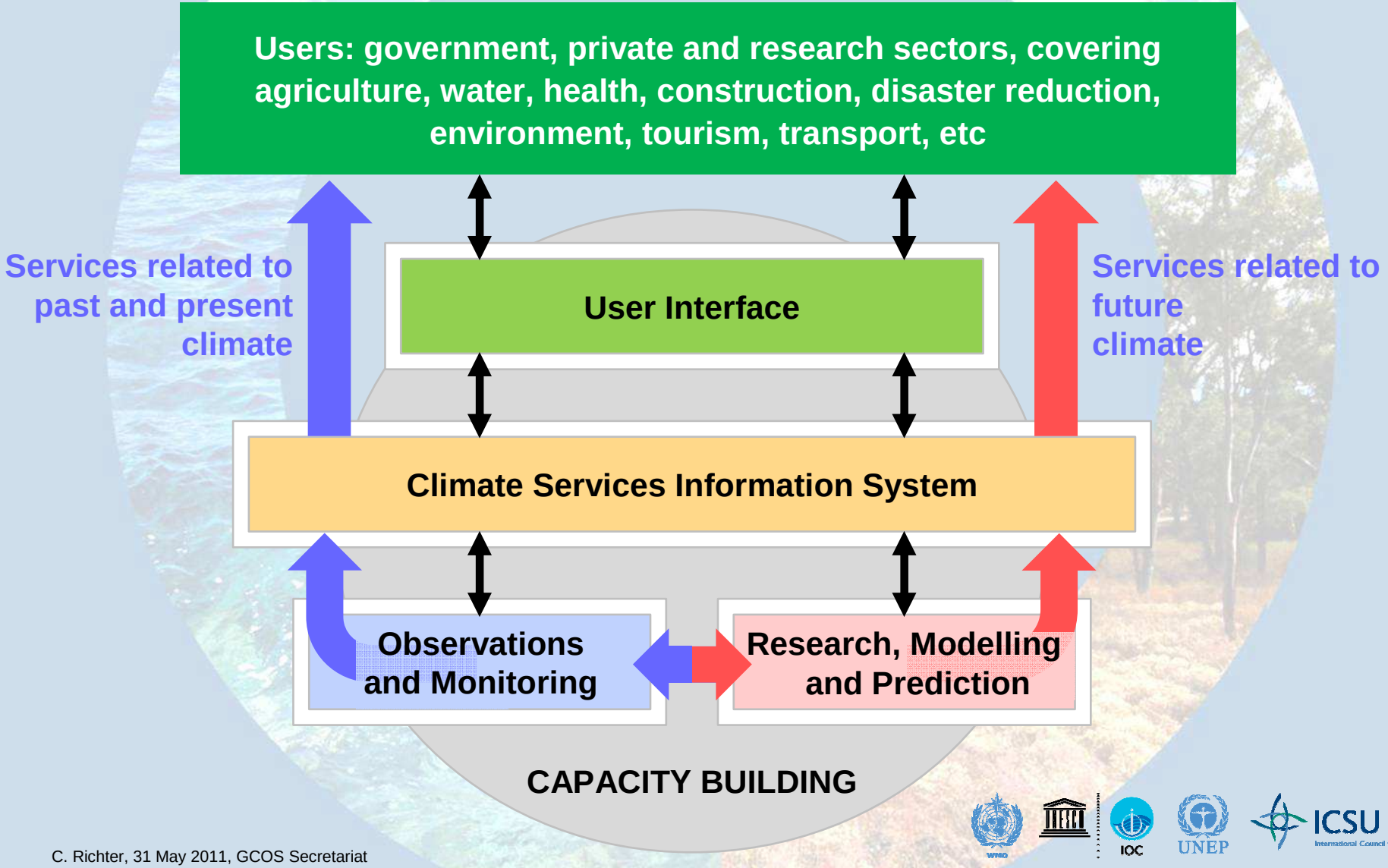
GCOS is a System of Systems

The Composition and Scope of the Main Global Observing Systems



GCOS as a Component of the Global Framework for Climate Services - GFCS

(Figure taken from Prof. A. Simmons, GFCS II side event, Cg-XVI, 19 May 2011)

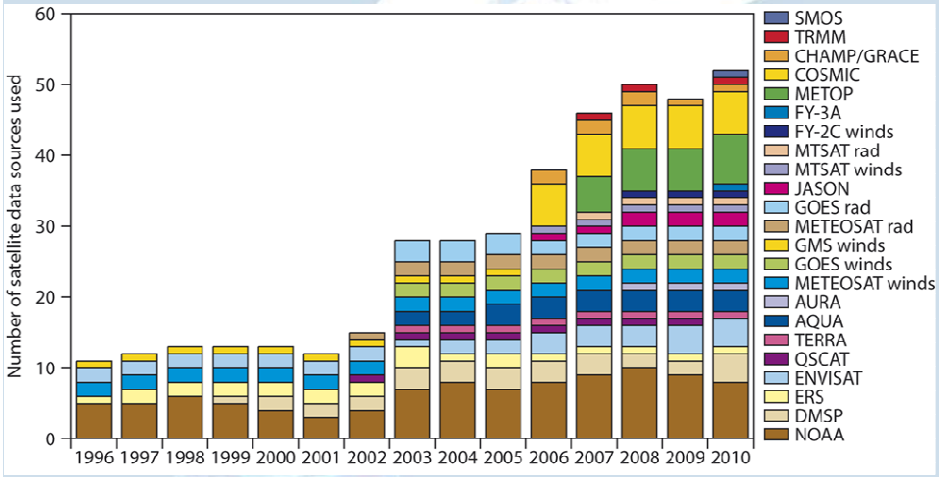


GCOS Essential Climate Variables (ECVs)

- **Atmospheric**
  - **Surface –** Air temperature, **Precipitation**, Pressure, Surface radiation budget, **Wind speed and direction**, Water vapour
  - **Upper Air – Earth radiation budget (including solar irradiance), Temperature, Wind speed and direction, Water vapour, Cloud properties**
  - **Composition – Carbon dioxide, Methane and other long-lived greenhouse gases (N2O, CFCs, HCFCs, HFCs, SF6 and PFCs), Ozone and Aerosol, supported by their precursors (NO2, SO2, HCHO and CO)**.
- **Oceanic**
  - **Surface – Sea-surface temperature, Sea-surface salinity, Sea level, Sea state, Sea ice, Surface Current, Ocean colour**, Carbon dioxide partial pressure, Ocean acidity, Phytoplankton.
  - **Sub-surface:**Temperature, Salinity, Current, Nutrients, Carbon dioxide partial pressure, Ocean acidity, Oxygen, Tracers.
- **Terrestrial**
  - River discharge, Water use, Ground water, **Lakes, Snow cover, Glaciers and ice caps**, **Ice sheets**, Permafrost and seasonally-frozen ground, **Albedo, Land cover (including vegetation type), Fraction of absorbed photosynthetically active radiation (FAPAR), Leaf area index (LAI), Above ground biomass, Soil carbon, Fire disturbance, Soil moisture.**

Blue/bold = largely space-based **red** = new in 2010 plan

Observations improve Quality of Forecasts



Increased number of satellite data

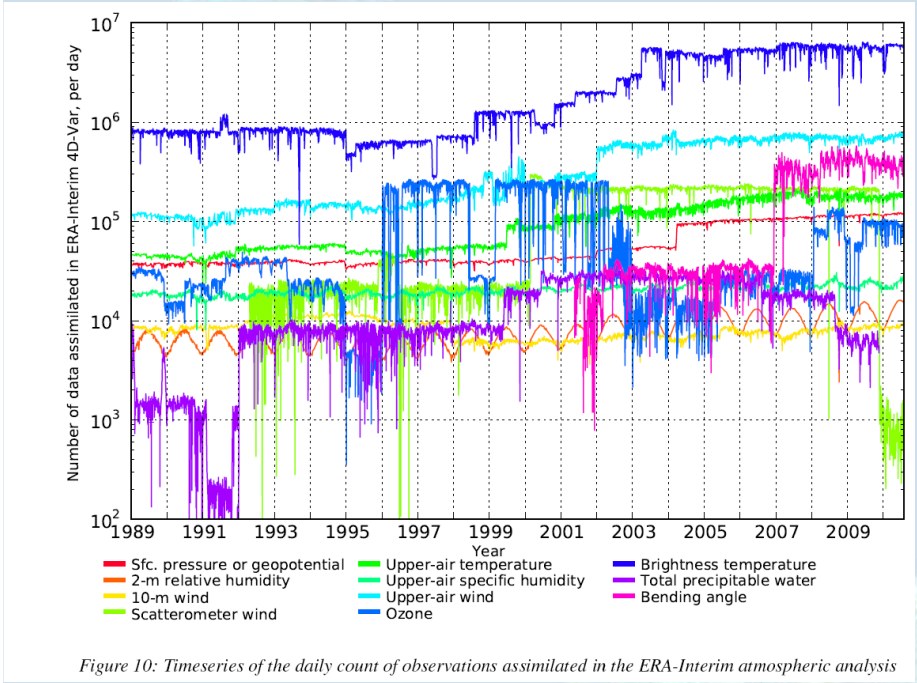
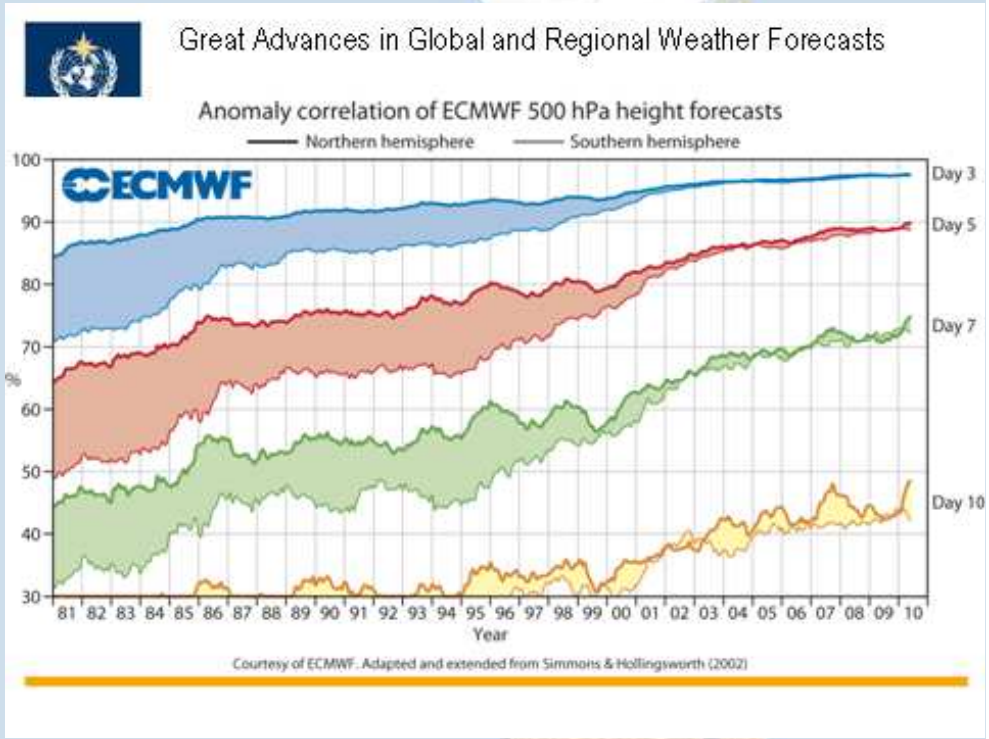
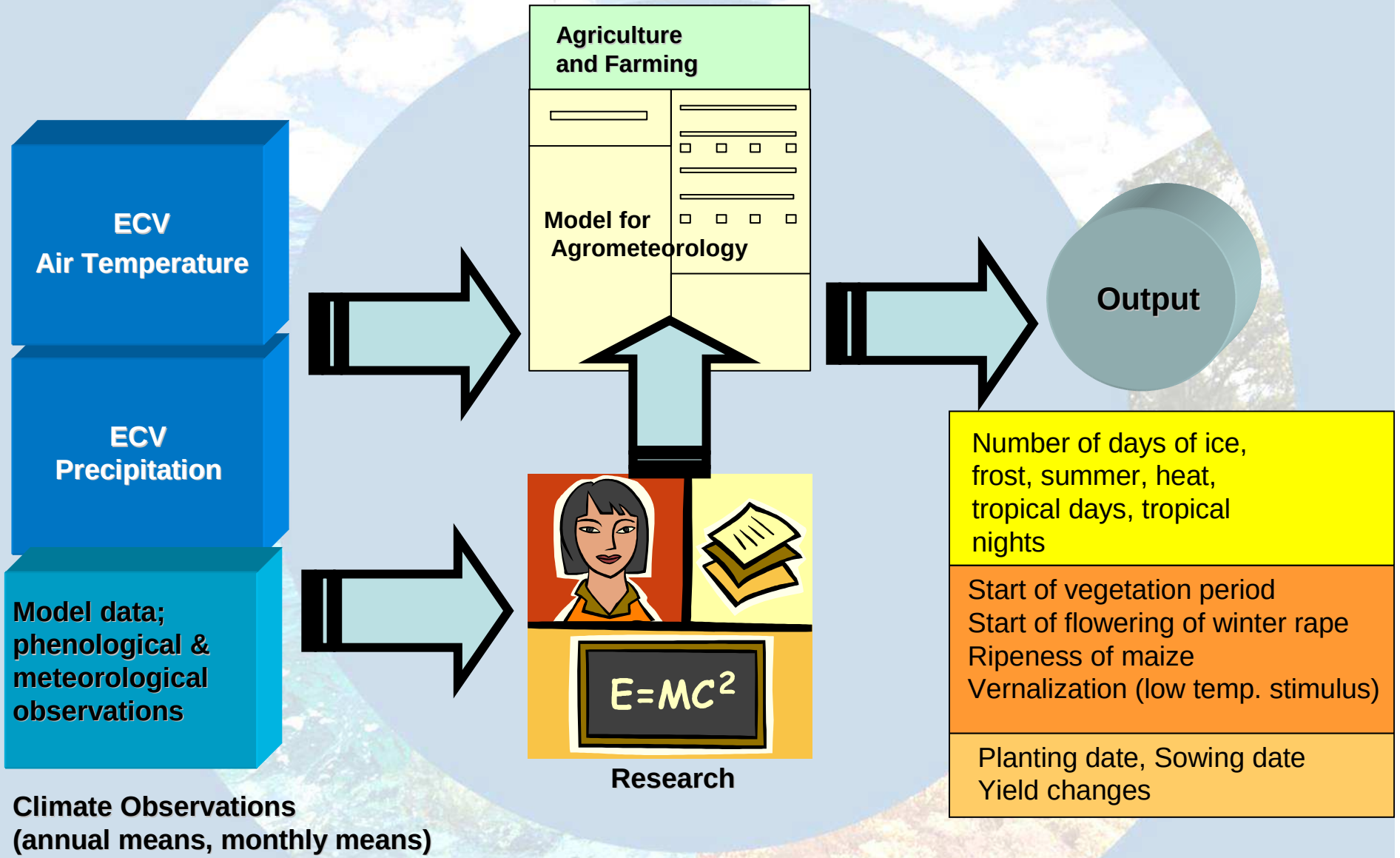


Figure 10: Timeseries of the daily count of observations assimilated in the ERA-Interim atmospheric analysis

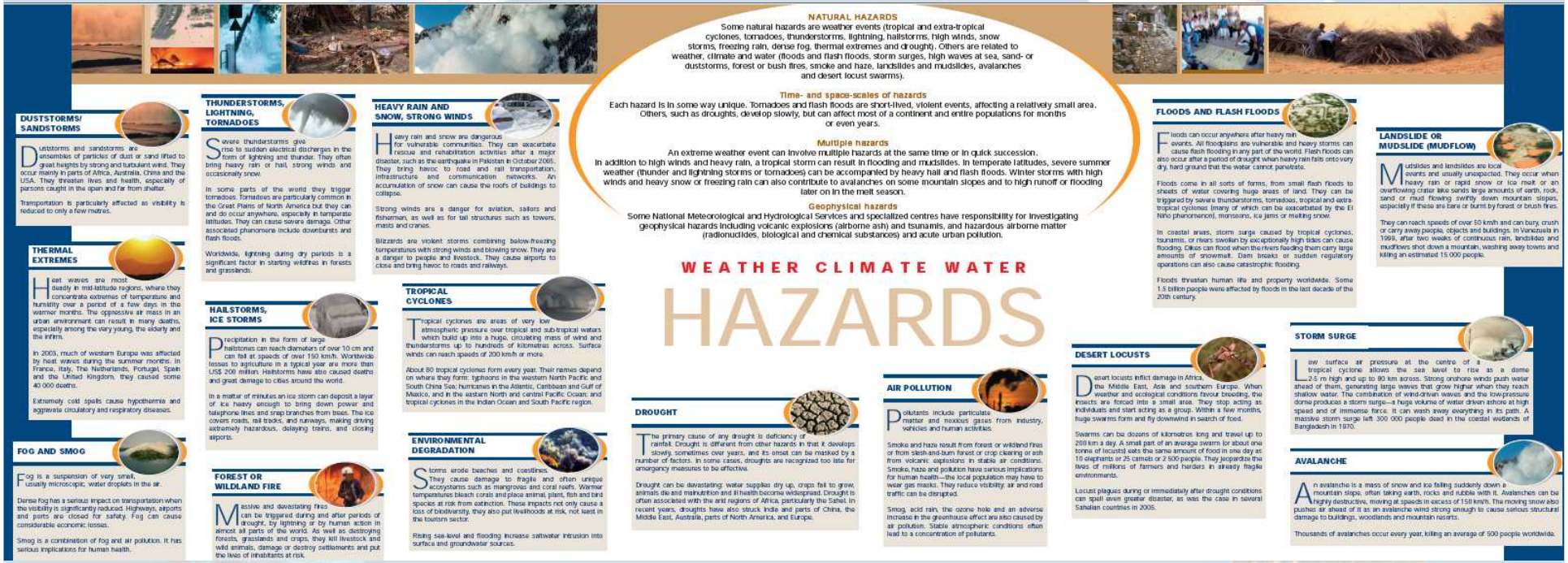


Increase of overall number of data assimilated in ERA-interim by a factor of 10 between 1989 and 2010

From Observations to Information to Services



Risk Management – Early Warning Systems



Elements of Risk Management:
historical climate record, EWS, Insurance tools

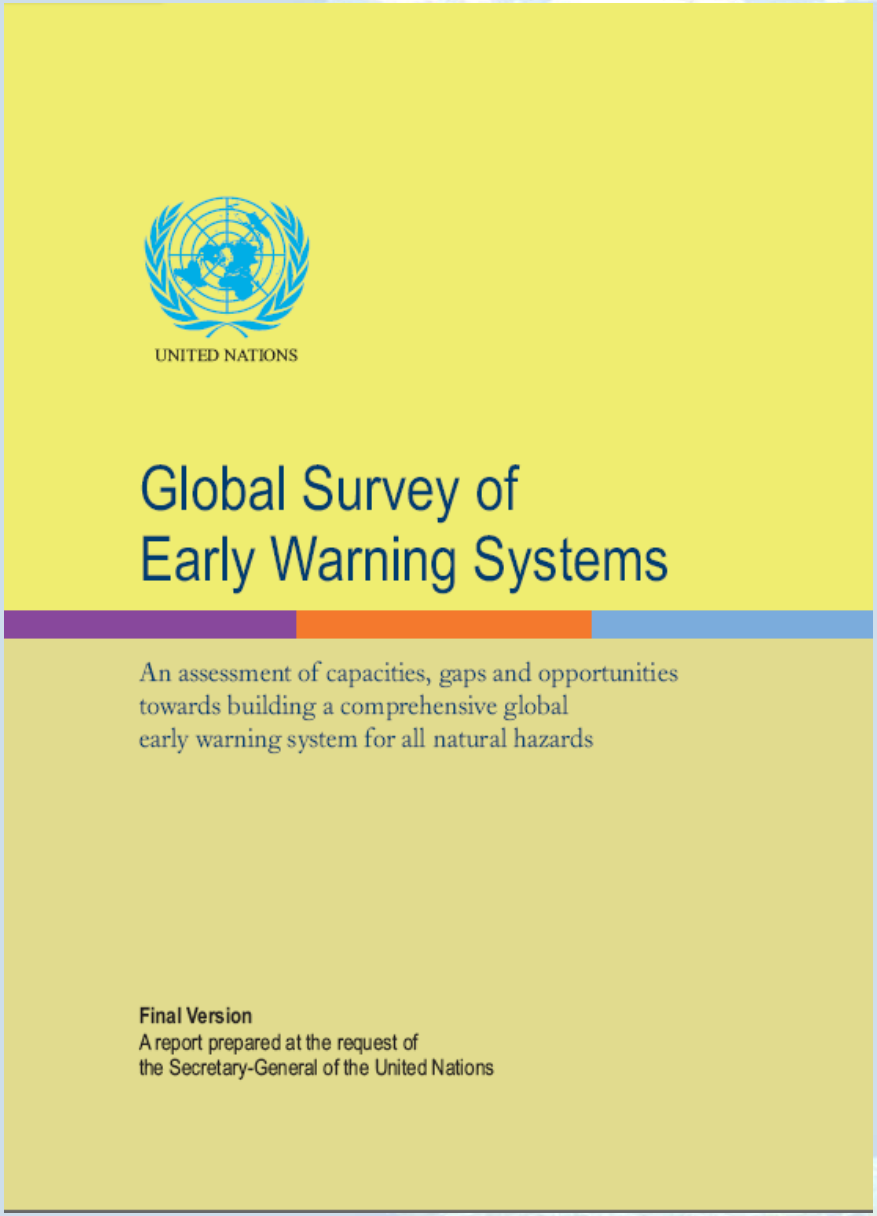
<u>"Early warning systems help in foreseeing and responding to future weather and climate variations and their warnings and predictions can be directly integrated into decision making processes."</u> (Source: HLT on GFCS Report "Climate Knowledge for Action, p. 28")

What kind of decisions need to be made in particular sectors if they are based on specific forecast / prediction models (time scales)?

	Agriculture	Water	Energy
2050 and beyond = Climate Change (Emission Scenarios)	**Strategic Thinking on how to adapt the relevant policies** Land use Reproductivity capacity of stocks	Water reserves Coastal lines, Shipping ways, Planning policies	Purchasing&stock policies
Decadal 10 yrs Inter-Decadal (10-20 yrs) Mulit-Decadal (> 20 yrs) (PDO,AMO,MOC)	**Long-term Planning** Crop industry, Breeding, Plan to restock, Protection of infrastructure, Sustain Quality	Drinking water quality, protection of coastal lines&waterways	Crisis precautions; Renewable energy; Alternative energy sources
Seasonal, Inter-annual (ENSO, TBO, Monsoon) 6 months – 5 yrs	**Management** Crop type&sequence Stocking rates, Herd management Change area & method, Reduce deseases, Initiate legislation	Drinking&cooling water; Possibility of shipping	Generation of energy; New/modify regulations
Sub-seasonal Intra-Seasonal MJO (30-90 days) up to 6 months	**Logistics: scheduling of activties** Planting/Harvesting Use of Pesticides/Fertiliser Choose a method, an area Prevention of Drought, Pest outbreaks	Prevention on floods, droughts, storm surges	Lead of adequate energy supply
synoptic			

C. Richter, 31 May 2011, GCOS Secretariat

Evaluation of Observing Systems



Section on 2.1.2 Major Gaps in Risk Knowledge

Data gaps

"….

Although significant progress has been made in some countries and **long historical records do exist in many cases, particularly for hazards, in others data is scarce and there are significant variations in data quality**. **Inconsistencies in the historical records across national boundaries and over time are common. In many cases data is accessible in nondigital paper form only.**

At the national level, the main challenges include:

- **Establishing and maintaining observing systems** and data management systems;
- **Maintaining archives, including quality control and digitisation of historical data**;
- Obtaining systematic social and environmental data for vulnerability analysis;
- Securing institutional mandates for collection and analysis of vulnerability data.

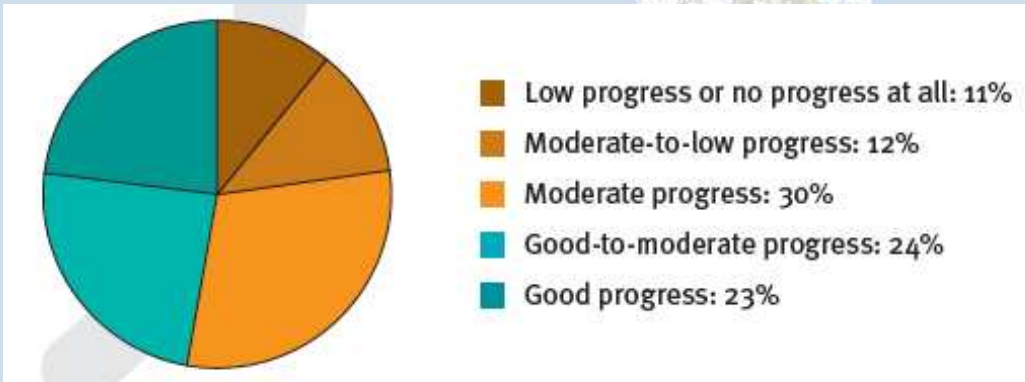
….."

(Global Survey of Early Warning Systems, p.9)

Evaluation of Observing Systems

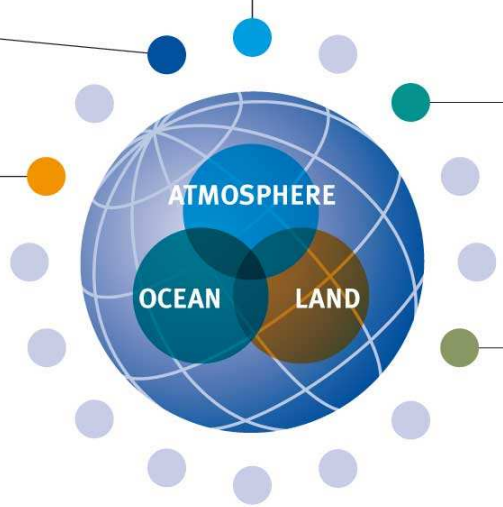
GCOS Progress Report 2004-2008 – Summary

- Developed Countries:
  - improved climate observation capabilities,
  - limited progress in resolving financial issues related to long-term continuity
- Developing Countries:
  - limited (in-situ) progress, with decline in some regions,
  - capacity building support remains small in relation to needs
- Satellite agencies:
  - improved mission continuity and capability
  - increasingly meeting climate needs
- Progress made, but:
  - Many gaps persist,
  - Continued engagement needed for coordinated implementation and long-term continuity



Summary of progress on all 131 Actions in 2004 GCOS IP

Continuous Improvement and Assessment Cycle
GCOS – an all domain system



What needs to be measured?

Essential Climate Monitoring Variables (ECVs)
Implementation Plan

Where are we now?

Progress Report

How to do it?

Climate Monitoring Principles
Guidelines for Datasets and Products
Regional Action Plans

How to improve the system?

New Networks
Research
WCRP, IGBP
National Coordination
GCOS Cooperation Mechanism
Contributing Systems
Global Terrestrial Observing System,
Global Ocean Observing System,
WMO Integrated Global Observing System,
and others

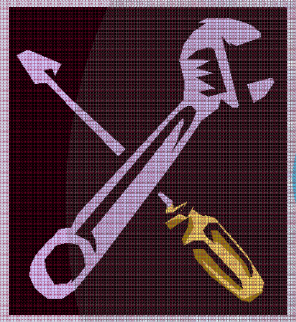
By whom/by which means?

Space Agencies
Network Owners
Meteorological Service, Hydrological Service,
Research Organizations, and other institutions
Data and Analysis Centres

End-to-End

Supporting activities:
Maintain Infrastructure
Build on Capacities
Improve Training &Education
Mobilize Resources

Objective:
To make information available

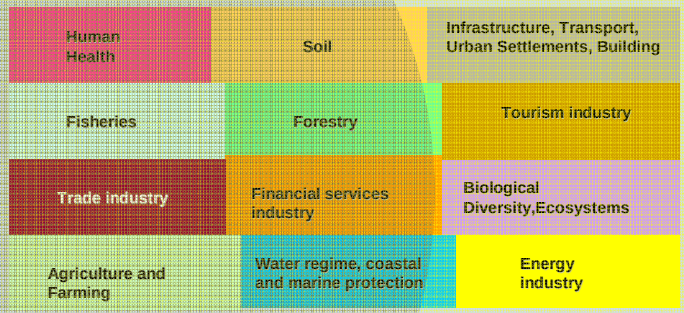


Projects
Initiatives
Programmes

Supporting activities:

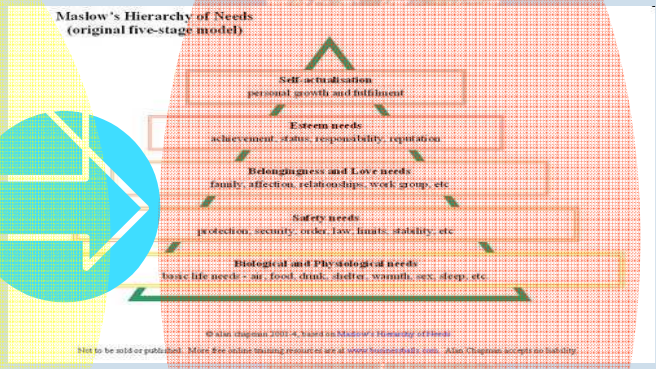
Risk Management

Assess Vulnerability & Impact
Give knowledge support to policy makers
Strengthen Communication & Outreach
Raise Awareness



Socio-economic Benefit Areas

Objective:
To offer advocacy to make informed decision-making possible



Responsibilities

GCOS operating area

WMO/UNEP/ UNESCO/FAO/WHO… operating area

UN/Ministerial level operating area

Top-Government operating area

Key Questions

- What kind of decisions need to be made in particular sectors if they are based on specific time scales?
- What kind of actions are required if you are looking at particular time scales?
- Which kind of data are needed to make (climate) infomation available and to support the decision-making process for sectors important to maintan the basic life needs, safety and psychological needs ?