

World Climate Research Programme

Climate Research in Service to Society

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Mission & Objectives

 **World Climate Research Programme** supports **climate-related decision making** and planning **adaptation to climate change** by coordinating research required to improve

- (1) climate predictions and
- (2) our understanding of human influence on climate

*“for use in an increasing range of practical applications of direct relevance, benefit and value to society”
(WCRP Strategic Framework 2005-2015).*

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World Climate Conference-3

Better Climate Information for a Better Future

A Global Framework for Climate Services



World
Meteorological
Organization
Weather • Climate • Water

Geneva, Switzerland

31 August–4 September 2009



UN SYSTEM
DELIVERING AS ONE ON
CLIMATE KNOWLEDGE



WCC-3 Outcomes

- **Relevant outcomes from the World Climate Conference-3**
 - **Decided to establish a Global Framework for Climate Services** to strengthen production, availability, delivery and application of science-based climate prediction and services
 - **Requested the Secretary-General of WMO to convene**, within four months of the adoption of the Conference Declaration, **an intergovernmental meeting** of Member States of the WMO to **approve the terms of reference** and to **endorse the composition of a task force** of high-level, independent advisors to be appointed by the Secretary-General of WMO with due consideration to expertise, geographical and gender balance.





WCC3 – Expert Segment



Called for major strengthening of the essential elements of a global framework for climate services:

- The **Global Climate Observing System** and all its components and associated activities; and provision of free and unrestricted exchange and access to climate data;
- The **World Climate Research Programme**, underpinned by adequate computing resources and increased interaction with other global climate relevant research initiatives.
- **Climate services information systems** taking advantage of enhanced existing national and international climate service arrangements in the delivery of products, including sector-oriented information to support adaptation activities;
- **Climate user interface** mechanisms focussed on building linkages and integrating information, at all levels, between the providers and users of climate services; and
- Efficient and enduring **capacity building** through education, training, and strengthened outreach and communication.

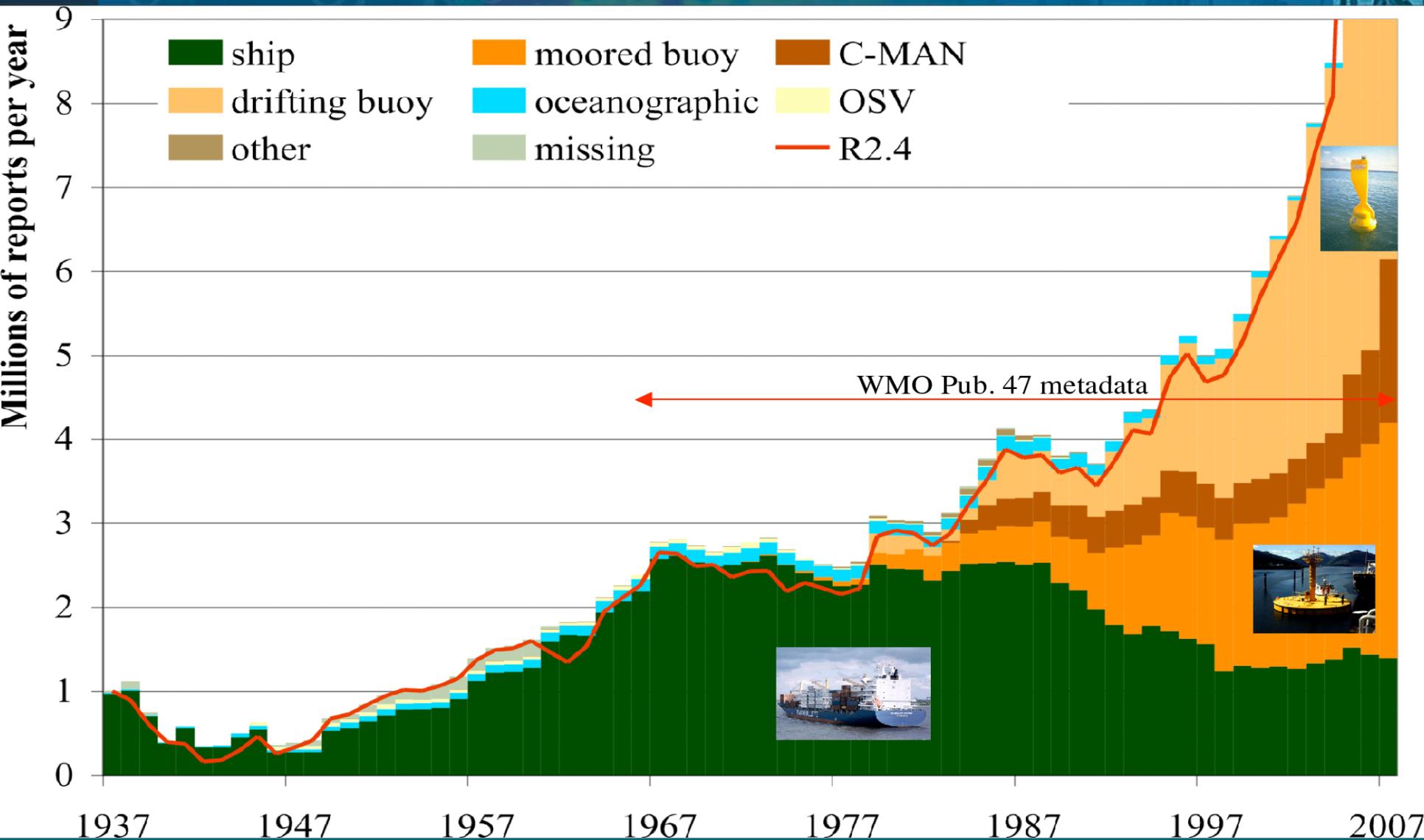
Conference Objective

“Ocean Information for society:

sustaining the benefits, realizing the potential”
Strengthen and enhance the international framework under GCOS, GOOS, WCRP, IGBP and supporting regional and national frameworks for sustained world ocean observing and information systems supporting the needs of society about ocean weather, climate, ecosystems, carbon and chemistry

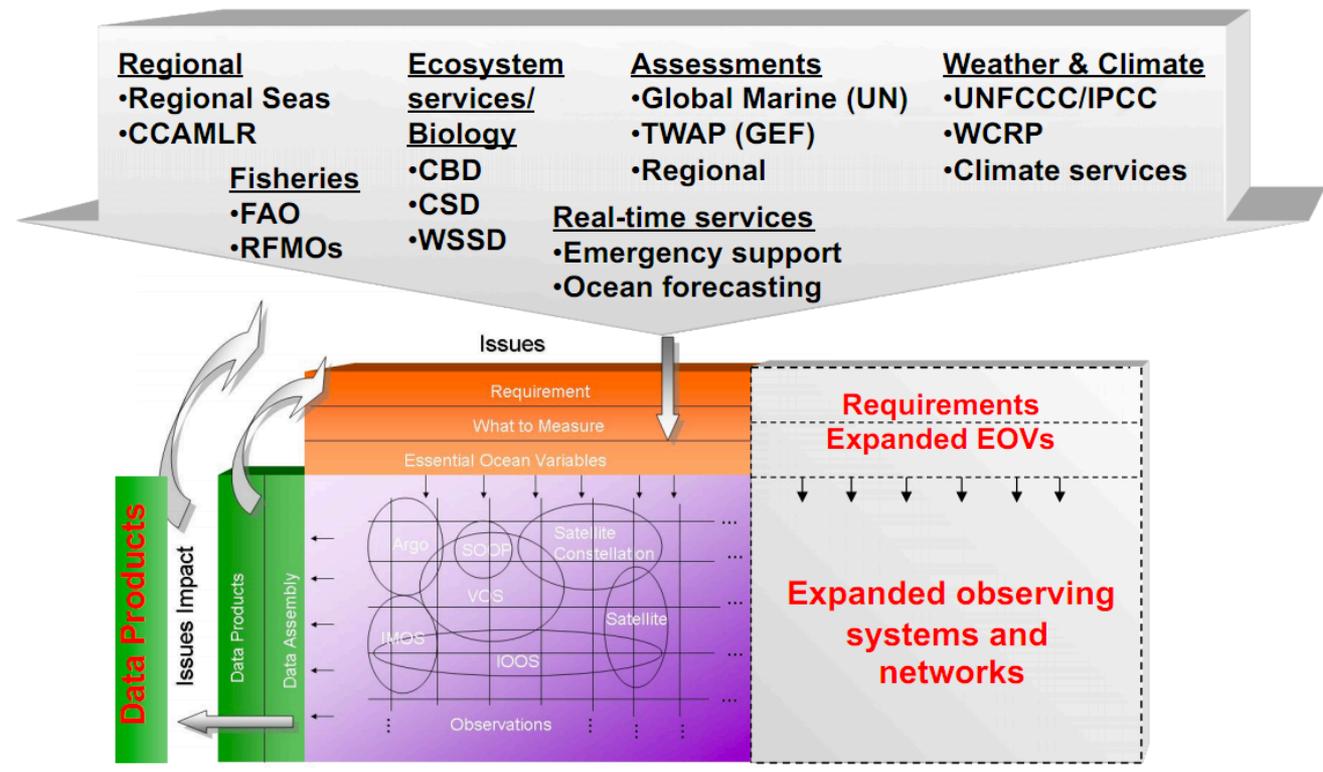
OceanObs'09

Ocean information for society: *sustaining the benefits, realizing the potential*



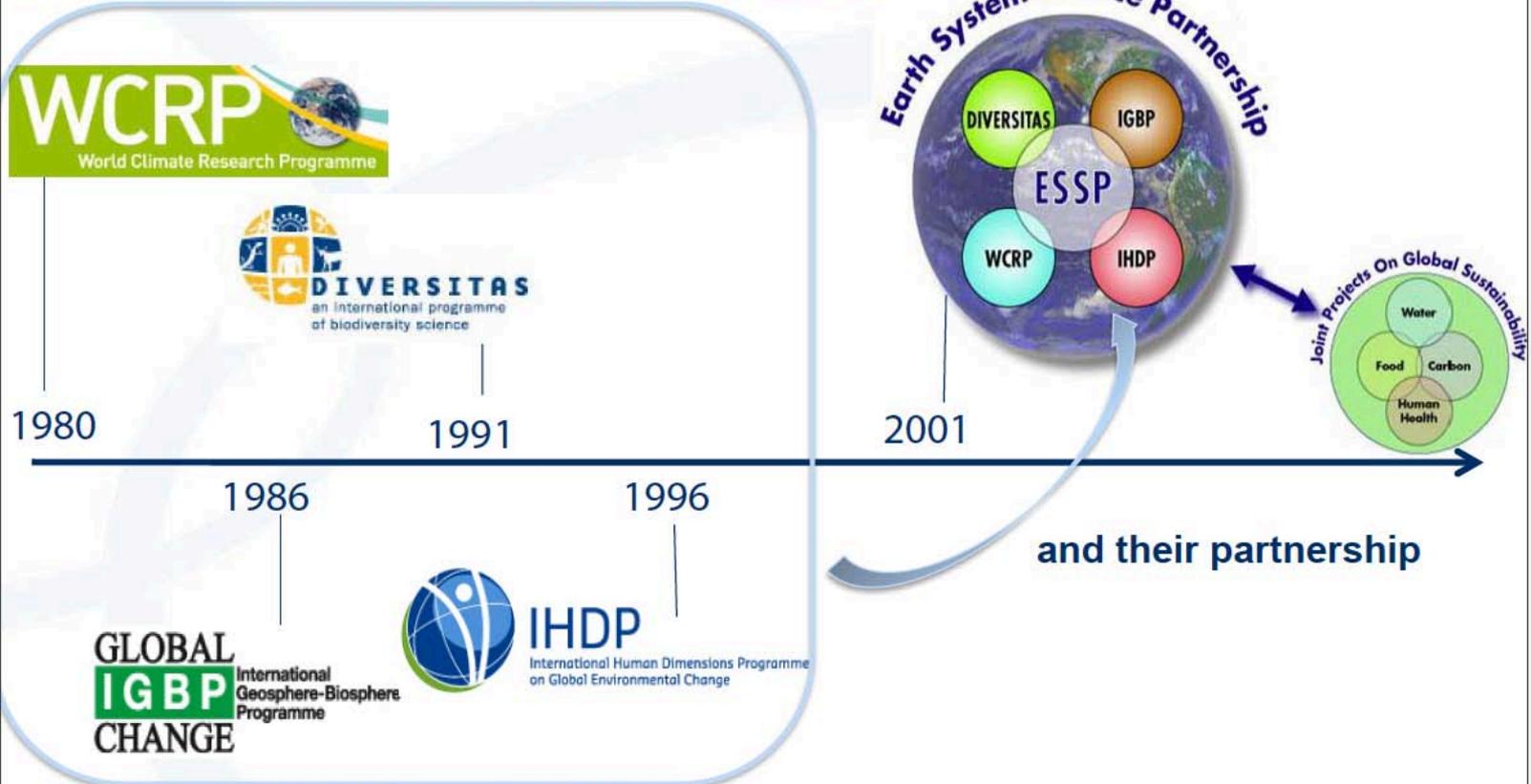
00'09: Framework for Ocean Observing

Framework: Societal Drivers Next Decade



Global environmental change research: a long, successful history

four Global Environmental Change Programmes

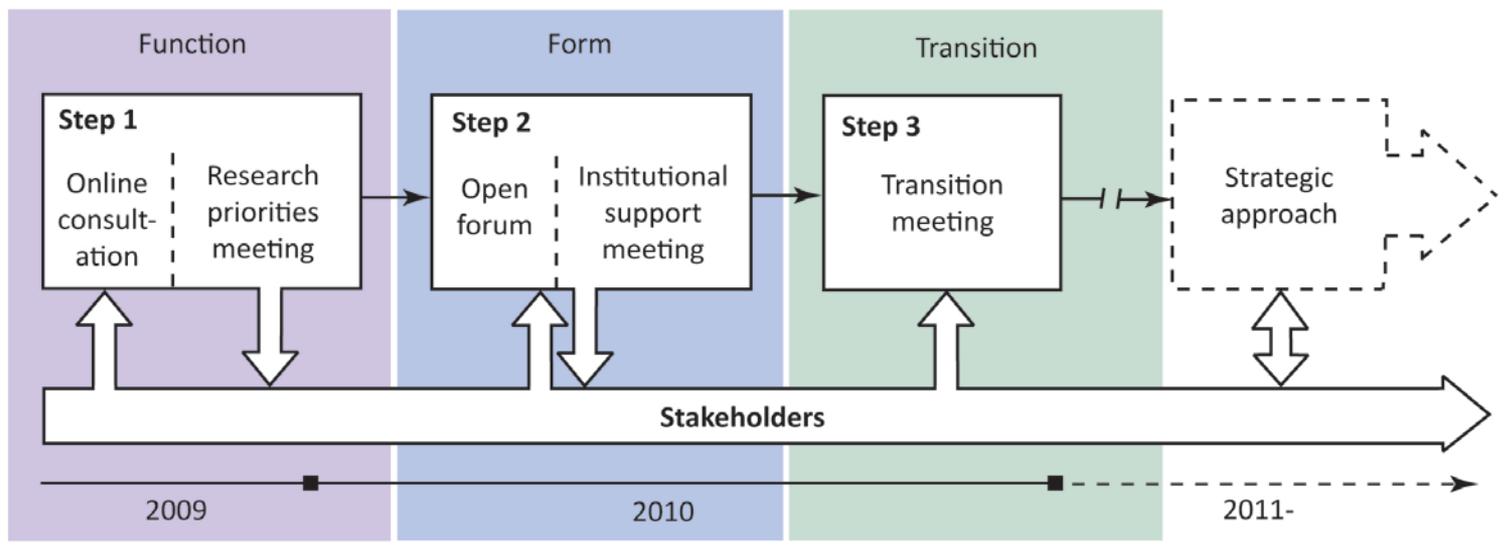


and their partnership

all co-sponsored by ICSU

Three Step Process for an Alliance

The Earth system visioning process



For more information on the process see <http://visioning.icsu.org>



Goal: to engage the scientific community to explore options and to propose implementation steps for a holistic strategy on the Earth system research. This strategy will both encourage scientific innovation and address policy needs.

The Belmont Challenge

To deliver knowledge needed for action to mitigate and adapt to detrimental environmental change and extreme hazardous events.

This requires:

- Information on the state of the environment, through advanced observing systems;
- Assessments of risks, impacts and vulnerabilities, through regional and decadal analysis and prediction;
- Enhanced environmental information service providers to users;
- Inter-and transdisciplinary research which takes account of coupled natural, social and economic systems;
- Effective integration and coordination mechanisms, to address interdependencies and marshal the necessary resources.



BELMONT
FORUM

Future Directions: Actionable Science

Defined as: data, analysis, and forecasts that are sufficiently predictive, accepted and understandable to support decision-making, including capital investment decision-making.



World Climate Conference-3, OceanObs '09, ICSU Review and Visioning, acknowledge WCRP past contributions and identify future challenges and opportunities.



Need for more flexibility/agility to respond to expanding users needs, that includes information:

- At regional scale
- For key sectors of global economy
- For adaptation, mitigation and risk management

WCRP OPEN SCIENCE CONFERENCE

CLIMATE RESEARCH IN SERVICE TO SOCIETY

- Monday:** The Climate System Components and their Interactions
- Tuesday:** Observation and Analysis of the Climate System
- Wednesday:** Assessing and Improving Model and Predictive Capabilities
- Thursday:** Climate Synthesis and Assessments
- Friday:** Translating Scientific Understanding into Climate Information for Decision Makers

24–28 October 2011, Denver, Colorado, USA

conference2011.wcrp-climate.org



WCRP Open Science Conference

- Assembly of WCRP affiliated researchers and partners (~1900 participants)
- Exclusive opportunity for exchange and collaboration across diverse research communities (e.g., WCRP, WWRP, IGBP, IHDP, ...) working to advance understanding and prediction of climate variability and change across scales

The Conference will:

- Appraise the current state of climate science (→ IPCC AR5)
- Identify the most urgent scientific issues and research challenges
- Ascertain how the WCRP can best facilitate research and develop partnerships critical for progress
- Facilitate the growth of the future, diverse workforce

<http://conference2011.wcrp-climate.org>

- The goals of the OSC include:
 - Building interdisciplinary collaborations within the WCRP community, across the core projects
 - Encouraging more of an “end-to-end”, user-needs-driven approach to climate research
 - Demonstrating the continued (in fact growing) importance of fundamental research for meeting user needs
 - Facilitating meaningful collaborations with partners
 - Growing the scientific community
- *All WCRP core projects and working groups will be looking to the OSC for new ideas on opportunities and research needs, **and new and diverse talent to entrain***

Emerging structure Post-2013

- The WCRP will be based on four fundamental *interactions* of the Earth/climate system:
 - Ocean-atmosphere
 - Land-atmosphere
 - Stratosphere-troposphere
 - Cryosphere

WCRP Overarching/Unifying themes:

Observation and Analysis

Process understanding

Modeling development, projections and prediction

Climate Information and Application

WCRP Grand Challenges

- A Grand Challenge is both **highly specific and highly focused** identifying a specific barrier preventing progress in a critical area of climate science.
- This focus enables the development of **targeted research efforts** with the likelihood of significant progress over 5-10 years, even if its ultimate success is uncertain.
- It should thus enable the implementation of effective and **measurable performance metrics**.
- By being transformative, a Grand Challenge should bring the **best minds** to the table (voluntarily), **building and strengthening communities of innovators that are collaborative**, perhaps also extending beyond “in-house expertise”.
- It can **capture the public’s imagination**: teams of world-leading scientists working to solve pressing challenges can offer compelling storylines to capture the interest of media and the public.

WCRP Grand Challenges

- **Provision of skillful future climate information on regional scales (includes decadal and polar predictability)** Filippo Giorgi, Carolina Vera, Fred Semazzi, CLIVAR, SPARC, WMAC
- **Regional Sea-Level Rise** Konrad Steffen, WCRP/IOC Task Force on Sea Level Variability and Change, CLIVAR, CliC
- **Cryosphere response to climate change (including ice sheets, water resources, permafrost and carbon)** Vladimir Kattsov, CliC, GEWEX, Greg Flato, Sarah Gille, WGCM, WGOMD
- **Improved understanding of the interactions of clouds, aerosols, precipitation, and radiation and their contributions to climate sensitivity** Terry Nakajima, Hong Liao, Graciela Binimelis de Raga, GEWEX, SPARC, WGCM, WGNE
- **Past and future changes in water availability (with connections to water security and hydrological cycle)** Kevin Trenberth, Pius Yanda, Hervé le Treut, GEWEX, CLIVAR, WGCM
- **Science underpinning the prediction and attribution of extreme events** David Karoly, CLIVAR, GEWEX, Modeling Council, ETCCDI, Fred Semazzi

WCRP Modelling Advisory Council (WMAC)

Terms of Reference:

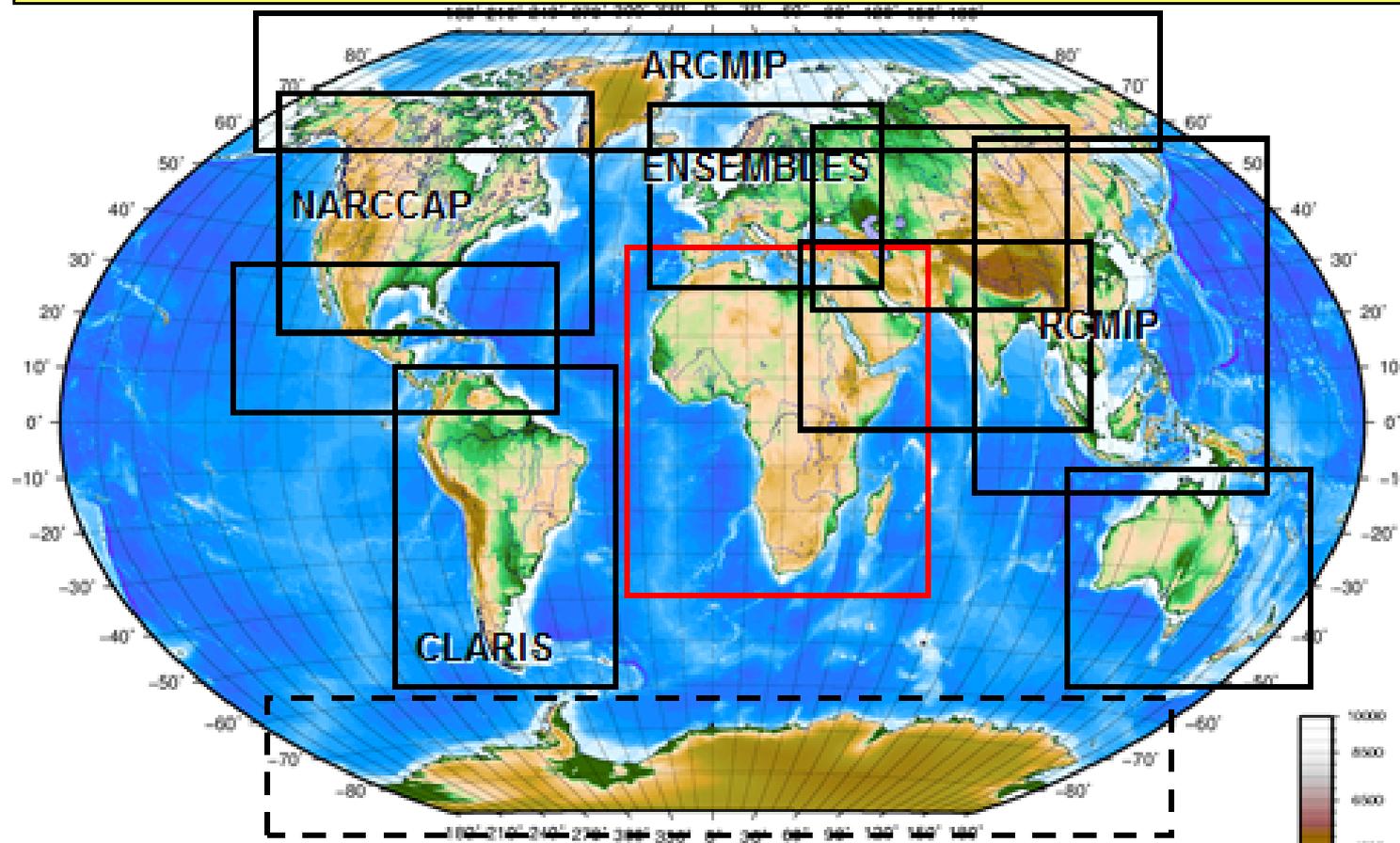
- To act as a focal point for climate modelling in WCRP
- To advise JSC and WCRP Projects on issues pertaining to modelling.
- To help identify modelling aspects of the Grand Challenges and advance them.
- To help coordinate modelling activities by identifying gaps and reducing unnecessary duplication.
- To assess strategic priority aims for modelling across WCRP and to assess current capabilities for WCRP, in collaboration with other partners, to meet these aims.
- To advise and recommend to JSC and WCRP Projects the activities to be carried out across WCRP projects and programs and collaborations to be developed between WCRP and other partners (including the weather community and IGBP) to meet the priority aims.
- To facilitate and enhance the communication and the coordination across the various WCRP modeling groups.
- To act as a clearing house for exchange of information between modelling groups and the JSC.
- To facilitate the WCRP modelling community speak from a common voice to external bodies such as IPCC, climate services or funding agencies.
- To convey modelling needs to Earth observing communities.
- To assist the modelling community deal with supercomputing challenges and advise new supercomputing centers about climate modelling needs.
- To promote scientific development of modelling aspects of data assimilation, including coupled data assimilation; coordinated development of modelling aspects of global and regional reanalyses; and paleoclimatic research.
- Promote seamless prediction system, model evaluation and metrics and use of ensembles

WCRP Data Advisory Council (WDAC)

Terms of Reference:

- To serve as a focal point for observations and data in WCRP
- To advise JSC and WCRP Projects on issues pertaining to observations and climate data.
- To promote research using sustained observations and data from process studies across the WCRP.
- To promote assessment of the adequacy of sustained observations and derived products to support climate research.
- To promote assessment of gaps in the global observing system in cooperation with observation programmes.
- To promote coordinated assessment and comparison of climate-data products, including those from reanalyses.
- To promote research for continuing improvement in the processing and reprocessing of fundamental climate data records
- To promote development of mechanisms for archival of, access to and analysis of data, and associated meta data, across the research community.
- To promote standards for product generation, including global and regional reanalyses.
- To promote scientific development of coupled data assimilation and a coordinated approach to reanalysis across all domains.
- To liaise with GCOS, CEOS and GEOSS, as required.

CORDEX domains



Working Group on Regional Climate (WGRC)

- Detailed regional climate information (both historical and future) is required to develop policies, to assess impacts and risks, and to plan adaptation measures (e.g. changes to building codes or infrastructure planning).
- Recent progress in climate prediction, on time scales from months to years, offers the possibility to implement better near-term decision making in climate-sensitive areas such as agriculture, transportation, tourism, energy production and water resource management.
- Coordinated regional modeling and observational studies can lead to an increased understanding of, and ability to simulate, processes that are important in determining regional climate variability and change, and in realizing the potential for improved regional-scale climate predictions.
- Within the context of the GFCS, the WCRP is taking steps to ensure that its research is informed by and responsive to the needs of climate service providers and the users they serve.
- Following from these deliberations, it was agreed that the WCRP should institute a working group dedicated to this topic.
- This would serve to prioritize and coordinate regional climate research within the WCRP and serve as the conduit for two-way information exchange between the WCRP, the rest of the GFCS, and the various institutions and coordinating bodies that provide climate services in various regions.

Working Group on Regional Climate (WGRC)

Terms of Reference

- 1) To facilitate coordination of WCRP research activities relevant to the provision of regional climate information and related climate services.
- 2) To foster communication between the WCRP and the GFCS and ESSI, and to serve as the point of contact to regional climate information/service entities. Ensure that the research needs of end users are understood and that new developments in climate science are communicated to users. This is fundamentally a two-way communication and development activity.
- 3) To provide advice to the WCRP regarding prioritization of research activities directed at supporting and improving regional climate science and prediction, To provide advice regarding the provision of information for impact assessment, decision making and climate services, particularly as related to water, health, food and disaster risk reduction.
- 4) To oversee specific WCRP regional climate research initiatives such as the Coordinated Regional Downscaling Experiment (CORDEX), and other activities as may be established in the future, either independently or in collaboration among the WCRP Projects or with other sister research programmes (e.g. IGBP, IHDP, WWRP, etc.).
- 5) To ensure that regional climate science is a visible activity within the WCRP and that research results are communicated effectively to climate service institutions. This may involve preparation of web-based information, publication of reports, organization of targeted workshops, etc.
- 6) To liaise as appropriate with other relevant weather, oceanographic, climate and global change research programmes sponsored by the WMO, IOC, and ICSU, and communicate science priorities to funding agencies, NGOs and development agencies

Regional activities of WCRP Projects including research on monsoons

- VAMOS in South America is active, involves GEWEX, helps with capacity development, and makes progress in the research on monsoons.
- VAMOS funding under CLIVAR is available with the support of the InterAmerican Institute.
- GEWEX continues guiding the relatively well-supported La Plata Basin (LPB) initiative.
- The JSC initial guidance on regional activities was that management of pan-WCRP initiatives is to be provided by the Projects in coordination and partnership mode, including appropriate coordination with other related efforts, and with one Project taking the lead on each specific activity.
- For example, JSC envisions great opportunities for cooperation and partnership between CLIVAR and GEWEX for both the VACS and VAMOS, or any subsequent activity they may transition to in the future.
- In addition, there will be a need to coordinate with the other WCRP activities, e.g. CORDEX
- JSC agreed to request CLIVAR and GEWEX communities associated with VACS and VAMOS panels to work with their constituencies (researchers, institutions, funding agencies and other stakeholders), to develop a list of research priorities and activities for their respective regions for the post 2013 timeframe.
- JSC would like to encourage a fresh look, independent of prior panel names or structure, starting with anticipated stakeholder needs and developing a research agenda that addresses those needs within the region, the grand challenges and imperatives of CLIVAR and GEWEX, and the overall WCRP future plan and priorities.