WCRP’s mission....

... is to facilitate analysis and prediction of Earth system variability and change for use in an increasing range of practical applications of direct relevance, benefit and value to society.

*The two overarching objectives of WCRP are:*

- to determine the predictability of climate
- to determine the effect of human activities on climate
Role of WCRP

Week Season Decade Century

Atmosphere Land Ocean Ice

Heat Carbon Water

39 32
2050 2100

World Climate Research Programme
Role of WCRP

Observations

Models

CMIP

Multi-scale Prediction

Week Season Decade Century

Atmosphere Land Ocean Ice

Heat Carbon Water

World Climate Research Programme
COP-21: A major political achievement, based in large part on the knowledge provided by the scientific community.

For our scientific community:

After decades of active investigations (e.g., WCRP) and the efforts to communicate the findings (e.g., IPCC):

1. The science is now widely accepted:
   All key nations accept the concept of human-induced climate change, even if some large uncertainties remain.

2. The focus of the research must evolve from “making the case” for “greenhouse warming” to the development and dissemination of information for regions needed to minimize risks and to build resilience.
Three primary questions in defining key topics confronting the research community:

(WCRP “out of box” workshop, June 2016)

• Where will the carbon go?
• How will weather vary with climate?
• How will climate change impact the habitability of our planet and its regions?
WCRP Structure

Working Groups on: Numerical Experimentation (WGNE), Seasonal to Interannual Prediction (WGSIP), Coupled Modeling (WGCM), Regional Climate (WGRC)

Joint Scientific Committee
- CliC (Cryosphere)
- CLIVAR (Ocean-Atmosphere)
- GEWEX (Land-Atmosphere)
- SPARC (Troposphere - Stratosphere)

Joint Planning Staff
- Data Advisory Council
- Modeling Advisory Council
- CORDEX (Regional Climate Downscaling)
WCRP Grand Science Challenges

- Regional Sea Level & Coastal Impacts
- Water for Food Baskets
- Melting Ice & Global Consequences
- Near-Term Prediction
- Weather & Climate Extremes
- Clouds, Circulation & Climate Sensitivity
- Climate & Carbon

focused, measurable, innovative, collaborative
Coupled modeling

WGCM

CMIP

WGNE

Regional Climate
WGRC

Numerical Experimentation
Subseasonal to Interdecadal Prediction

WGSIP
Overarching research needs guiding CliC activities:

- Improved understanding and quantification of the role of the cryosphere in the global climate system, its variability and change

- Improved utilization of cryospheric observations as indicators of global and regional climate change

- Improved understanding of the physical, chemical and other processes that govern behavior of the cryosphere, and the representation of these processes in Earth System Models

- Improved ability to make quantitative predictions and projections of the cryosphere in a changing climate
Understanding the dynamics, the interaction and the predictability of the coupled ocean-atmosphere system

**Research Foci:**

- **Decadal variability and predictability** of ocean and climate variability
- Marine **biophysical interactions** and dynamics of upwelling systems
- **Regional sea level change** and coastal impacts
- Consistency between planetary energy balance and **ocean heat storage**
- **ENSO** in a changing climate
- Intraseasonal, seasonal and interannual variability and **predictability of monsoon systems**
**GEWEX science questions:**

- Observations and predictions of **precipitation**
- Global **water resources** systems (land use and hydrology)
- Changes in **extremes** (esp. droughts, flood, heat waves)
- **Water and energy** cycles and processes

**GEWEX Panels:** Global Land/Atmosphere System Study (GLASS), Global Atmospheric System Studies (GASS), Hydroclimatology Panel (GHP), GEWEX Data and Assessments Panel (GDAP)
Themes:

- **Atmospheric Dynamics and Predictability**
  - Climate variability, near-term climate predictions, stratosphere-troposphere interactions

- **Chemistry and Climate**
  - Coupling of climate-dynamical-radiative processes, gas emissions

- **Long-term records for Climate Understanding**
  - Construction, analysis, and interpretation of long-term climate records
CORDEX scientific challenges:

- **Added value** of downscaling, scales, bias and uncertainties, user-oriented metrics
- Understanding and simulating **human elements**, e.g. land use, urban development, climate and coastal cities
- Coordination of regional **coupled modeling**
- Precipitation, e.g. convective systems, monsoon
- Local wind systems
Capacity Development for future science leadership

• Continuing focus to support future science leadership
  – Results of Offenbach workshop (Oct’15): ECR position paper on future Earth System science published (http://journals.ametsoc.org/doi/abs/10.1175/BAMS-D-16-0025.1)
  – WCRP-WPP-GAW support for YESS: a coordination office being established (Argentine Met Service)
  – Extending and linking with ECR networks (NoN, etc.)

• Direct and substantial involvement of ECRs in WCRP activities
  – Actively recruiting and engaging ECRs in WCRP strategic discussions (regional scoping, trans-disciplinary discussions, etc.)
"Charting the course for climate and ocean research"

CLIVAR Open Science Conference on 16-23, September, 2016 in Qingdao, China

608 Participants
234 Poster presentations by early career scientists
108 Plenary and parallel session talks
50 Countries represented
42 Percent of early career scientists and students attending
21 Developing countries represented
20 Years since CLIVAR was established
11 Town halls
5 Days of meetings
3 Days for the Early Career Scientists Symposium
1 International CLIVAR

Open Science Conference plus Early Career Symposium as well as CLIVAR panel meetings

Special upcoming issue of CLIVAR Exchanges highlighting outcomes... www.clivar.org
Early Career Scientists Symposium at CLIVAR OSC
(18 and 24-25 September 2016, Qingdao)

• 135 early career scientists from 34 countries
• ECS perspective on future of ocean & climate science:
  • Improved understanding of 1) regional climate change and variability, 2) internal variability, 3) ocean carbon and heat uptakes, and 4) climate processes and feedbacks
  • Increased interdisciplinarity
  • Improving international collaboration, bridging gap between global North and South, equal & open access to data and journals, exchange of scientists (visa issues)
Capacity Development for regional climate research leadership
Thank You

http://wcrp-climate.org