WCRP
World Climate Research Programme

WCRP introduction

M. Rixen, WCRP JPS

CORDEX South-Asia Training Workshop
Pune, 17-20 October 2012

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World Climate Research Programme

With special thanks to…

WCRP CORDEX

ICSU International Council for Science

START global change SysTem for Analysis, Research & Training

SMHI

Climate Systems Analysis Group

ICTP the abdus salam international centre for theoretical physics

INDIAN INSTITUTE OF TROPICAL METEOROLOGY PUNE

and

and his team!

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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).

- **The Interdisciplinary Nature of Climate Science**
  - Atmosphere, Oceans and Climate
  - Cryosphere and Climate
  - Atmospheric Chemistry and Dynamics
  - Water, Energy and Climate

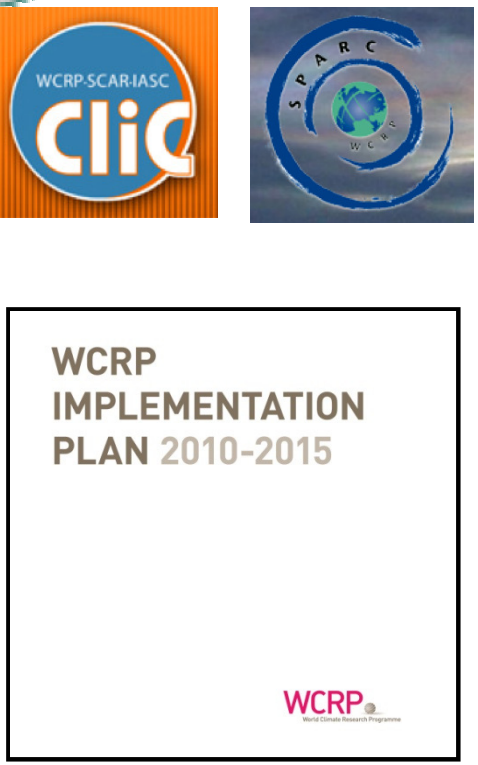
- **Meeting the Information Needs of Society**

vities in Support of Key Deliverables

  - Decadal Variability, Predictability and Prediction
  - Sea-Level Variability and Change
  - Climate Extremes
  - Atmospheric Chemistry and Dynamics
  - Centennial Climate Change Projections
  - Seasonal Climate Prediction
  - **Regional Climate**

vities in Support of WCRP Integrating Themes

  - Climate-Quality Data Sets and Analyses
  - A New Generation of Climate/Earth System Models
  - Next Generation of Climate Experts: Developing Capacity Regionally and Globally

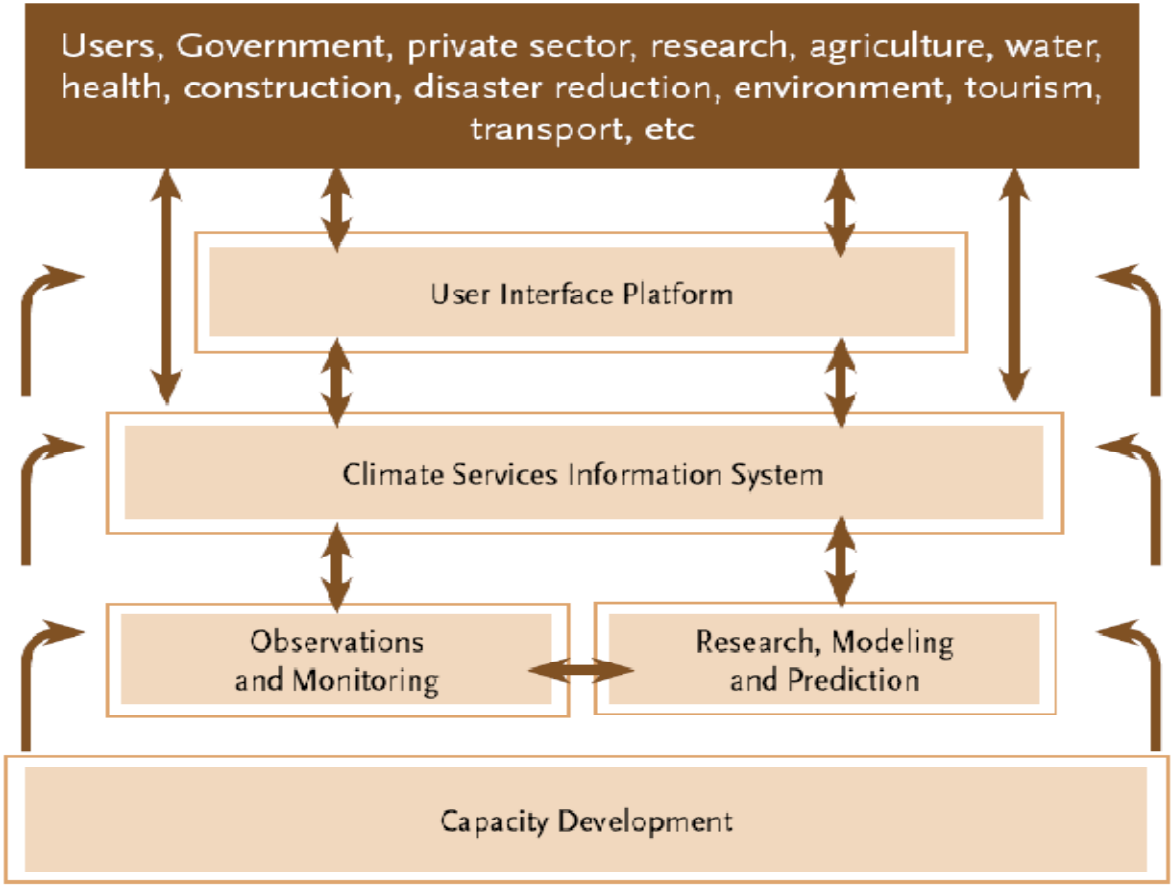


Future Directions: Actionable Science

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, Open Science Conference, acknowledging WCRP past contributions and identifying future challenges and opportunities
- Need for more flexibility/agility to respond to expandingusersneeds, thatincludes information:
  - At regionalscale
  - For keysectors of global economy
  - For adaptation, mitigation and risk management

Global Framework for Climate Services (GFCS)



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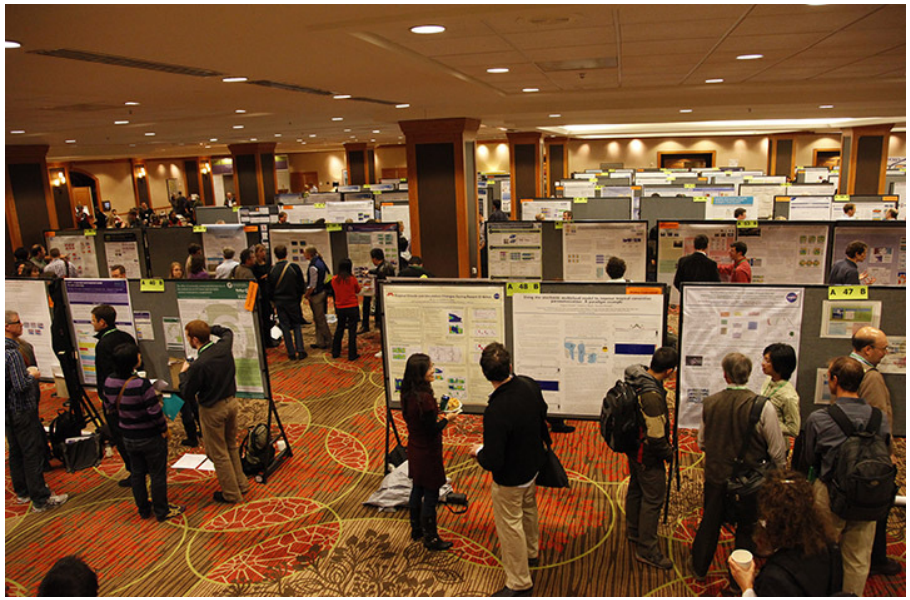
WCRP Open Science Conference:
Climate Research in Service to Society
24-28 October 2011, Denver USA



Registered Participants:

- 1907 from 86 countries
- 541 Early Career Scientists & Students
- 332 from Developing Countries

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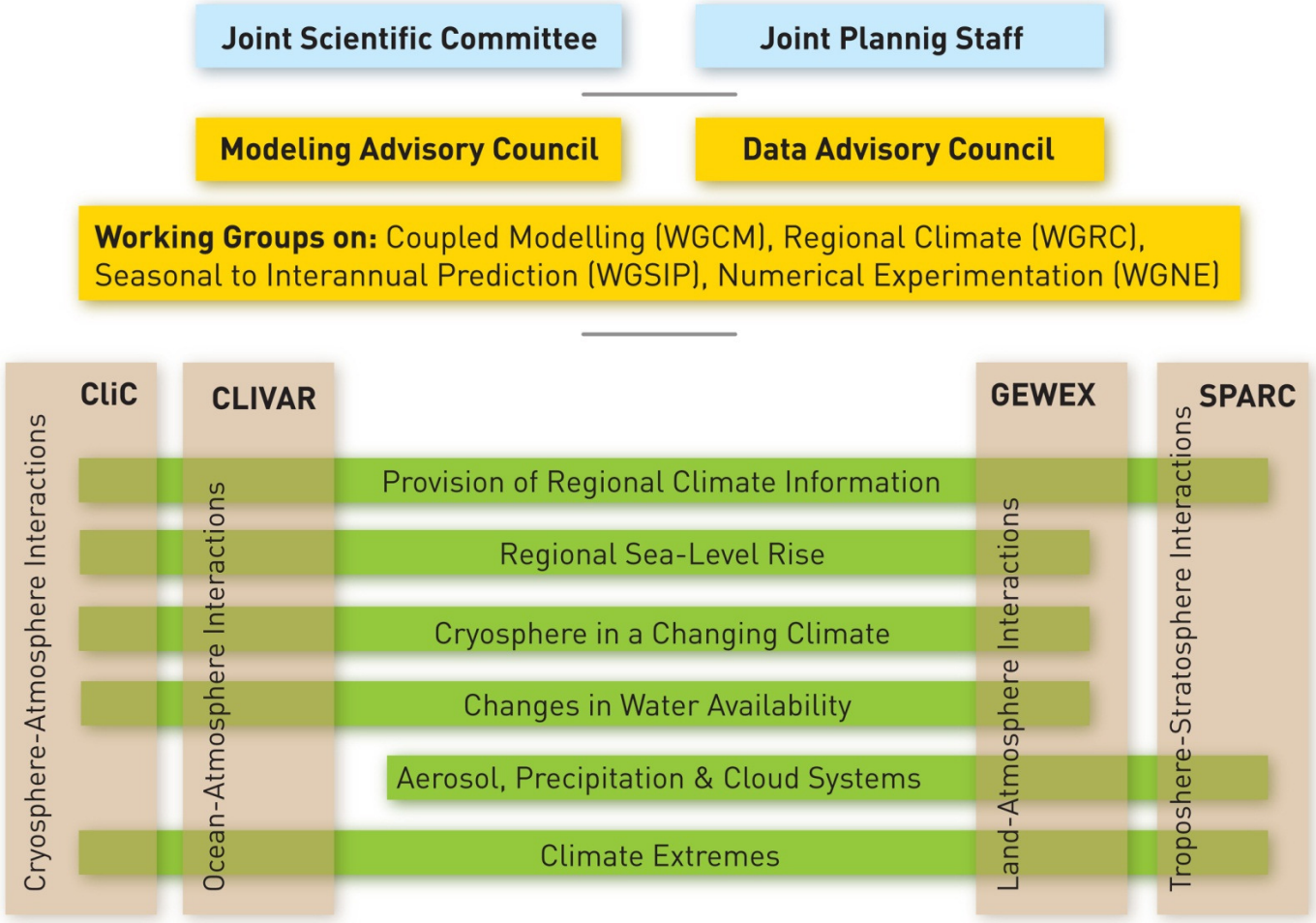
WCRP Organization



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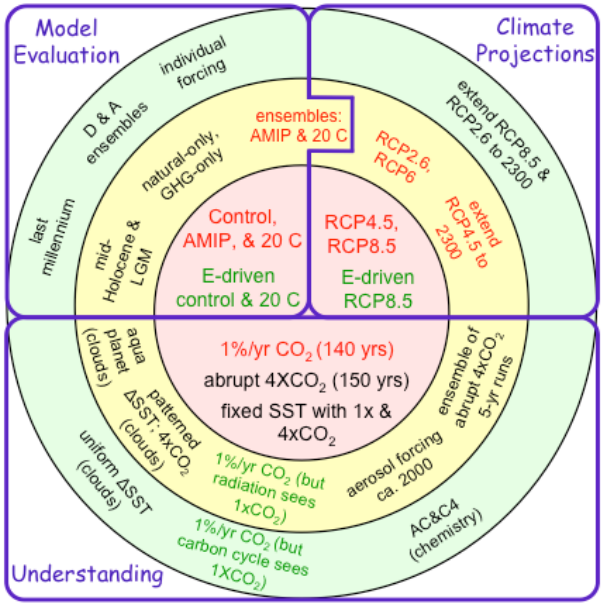
A rich set of modeling experiments, drawn from several predecessor MIPs, focuses on model evaluation, projections, and understanding



Red matches CMIP3 experimental suite

Green coupled carbon-cycle climate models

- 1+ Petabyte on ESG
- Between 15 and 22 AOGCMs, 4 to 8 decadal prediction simulation sets, about 6 high-top models, and 3 to 8 ESMs
- Considerable interest and excitement in analyzing model data to learn new things about the climate system
- Spread of projections in CMIP5 AOGCMs comparable to CMIP3, most first generation ESMs are well-behaved and produce comparable first order results to AOGCMs, but with all their additional capabilities
- Many studies contributing to the IPCC AR5 report
- Several papers in Nature and Nature Climate Change

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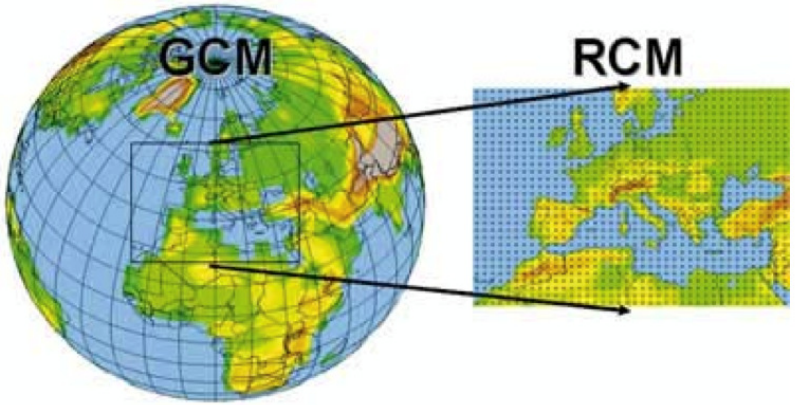
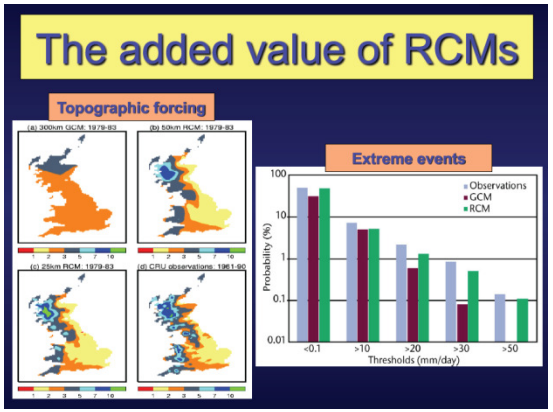
From Global to Regional Scale





Why do we need Regional Climate Downscaling Global Climate Models (GCM) can provide us with predictions and projections of how the climate of the earth will change in the future. These results are vital to inciting the international community to take decisions to help limit climate change. However, the **impacts of a changing climate, and the adaptation strategies to deal with them, need to be addressed at a finer, regional scale**. This is where Regional Climate Downscaling (RCD) has an important role to play by providing predictions and projections with much greater detail.

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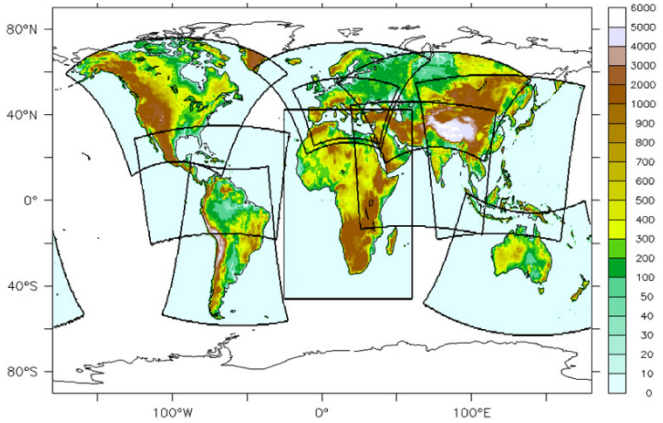
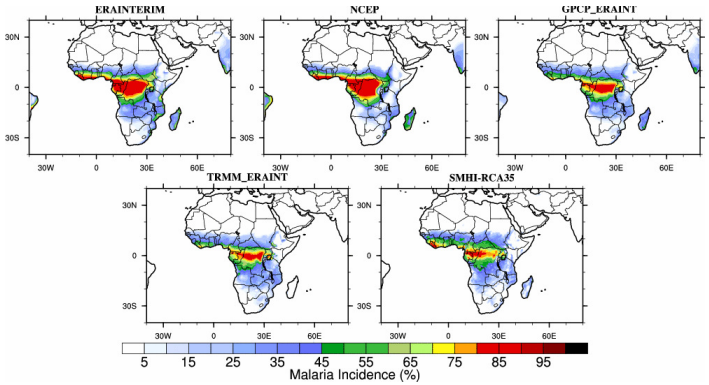
Coordinated Regional Climate Downscaling (CORDEX)

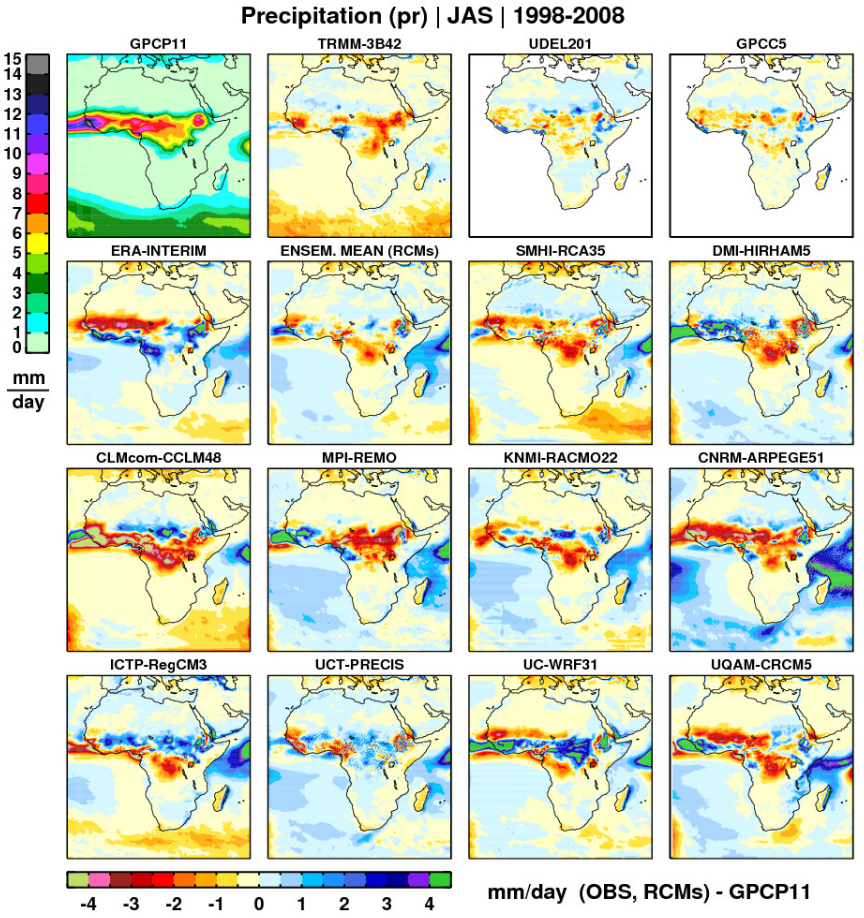


- 12 domains with a resolution of 0.44° (approx. 50x50km²), focus on Africa
- High res ~0.11° x0.11° for Europe (by some institutions)

Dynamic Malaria Model driven by climate observations & CORDEX simulations (mean annual prevalence (%)



SMHI (50km²) reproduces well the mean annual malaria incidence pattern with respect to TRMM-ERAINT & GPCP-ERAINT control experiment



Example of CORDEX multi-model data available for Africa. From Top to bottom and left to right: GPCP mean July-August-September precipitation for 1998-2008 and differences compared to GPCP in the other gridded observations, and the individual RCMs with their ensemble average.

Nikulin, G., et al, J. Clim, 2012

WCRP 4th International Reanalysis Conference

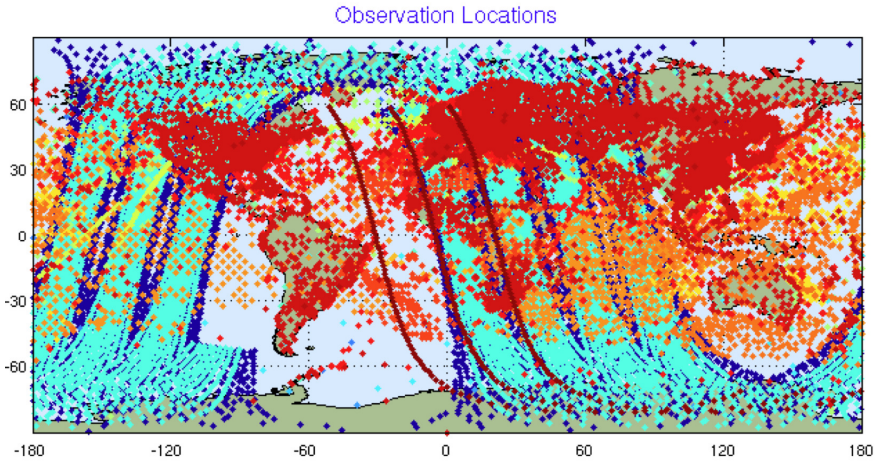
7-11 May 2012

Silver Spring, Maryland USA

270+ participants

42 countries

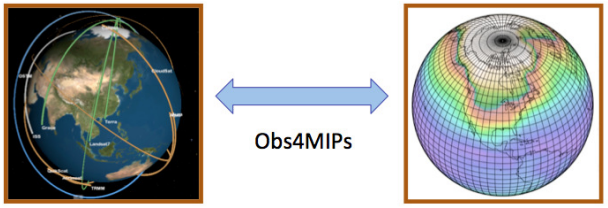
Agency Priorities: An Open Panel Discussion with Conference Participants



- *Quantitative Uncertainty Estimation: families of reanalyses*
- *Qualitative Uncertainty Estimation*: *reanalysis.org, climatedataguide.ucar.edu*
- *Earth System Coupling: interdisciplinarity, synergies between communities*
- *Reanalyses, Observations and Stewardship*: seamlessness of data discovery and access, ESG

Tools and Requirements

- Models and observations: Earth System Grid, http://www.earthsystemgrid.org/



Regional Climate Model Evaluation System

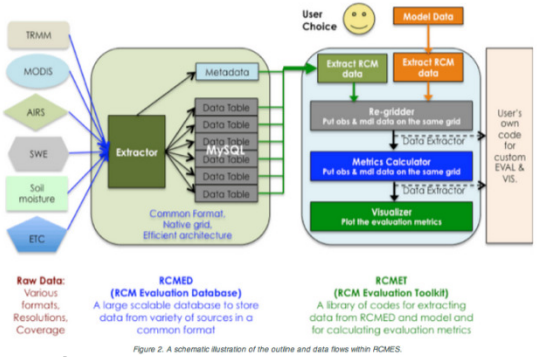


Figure 2. A schematic illustration of the outline and data flows within RCMES.

- Community of stakeholders and end-users: communication and outreach

http://wcrp.ipsl.jussieu.fr/cordex

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Why is Monsoon Asia high on WCRP's regional agenda?

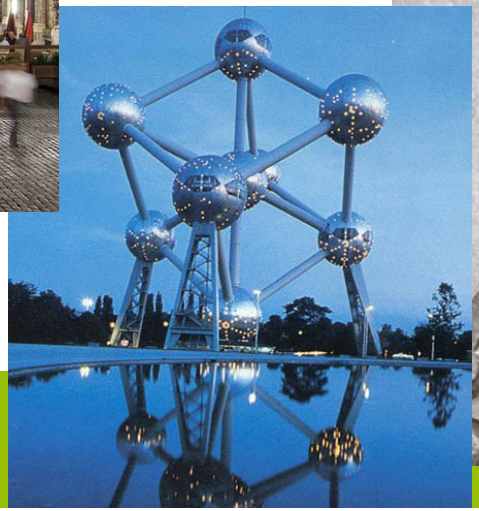
- World's highest mountains
- Heat source of Tibetan Plateau
- Seasonal monsoon impacts water and food
- Range of natural hazards (tropical cyclones, floods)
- 3.6 billion people
- Rapid urbanization
- Anthropogenic aerosols
- Vulnerable coastal development
- IPCC ARs regional needs
- GFCS

Vision for CORDEX

- Actionable regional information: models and data
- Consistency of CORDEX experiments and protocols
- Past, present, future (predictions and projections)
- Importance of assessments and validations
- Transfer of uncertainties from observations and models to VIA applications
- Benefits of a multi-model approach to capture uncertainties

International Conference on Regional Climate CORDEX 2013

- 4-7 November 2013, Brussels, Belgium
- Partnership between WCRP, IPCC and EC
- Timed between IPCC WGI and WGII releases
- 1st day: High Level Session, Stakeholder dialogue
- 2-4th days: Scientific Conference



- Thank you very much for your attention!