

# The World Climate Research Programme (WCRP)

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# WCRP's Mission

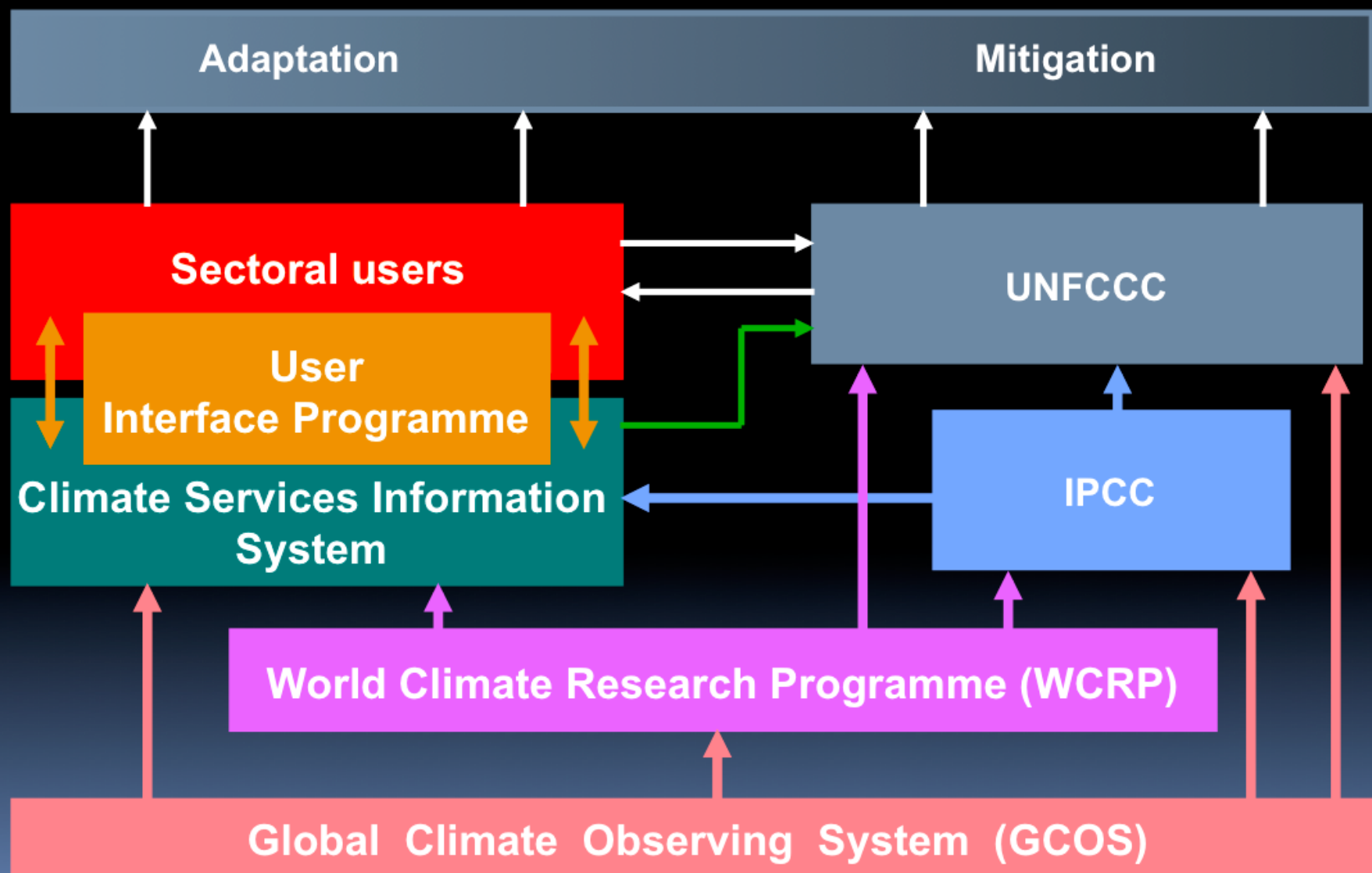
To facilitate **analysis** and **prediction** of **Earth system variability** and **change** for use in an increasing range of **practical applications** of direct **relevance**, benefit and value to **society**.



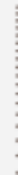
# 5 Foci of WCRP

1. **Observing changes** in the components of the Earth system (atmosphere, oceans, land and cryosphere) and in the interfaces among these components;
2. **Improving our knowledge** and understanding of global and regional climate variability and change, and of the mechanisms responsible for this change;
3. **Assessing and attributing significant trends** in global and regional climates;
4. **Developing and improving numerical models** that are capable of simulating and assessing the climate system for a wide range of space and time scales;
5. **Investigating the sensitivity of the climate system** to natural and human-induced forcing and estimating the changes resulting from specific disturbing influences.

# The Strategic Position of WCRP



# A Vision for WCRP



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# Support Frontier Research



- Our fundamental objective is to develop activities in support of the most **advanced fundamental research** dealing with the dynamics and physics of Earth's components and the interactions between these components. It is to assess how these fundamental processes affect the **dynamics of the Earth system** and how they are perturbed by human activities.

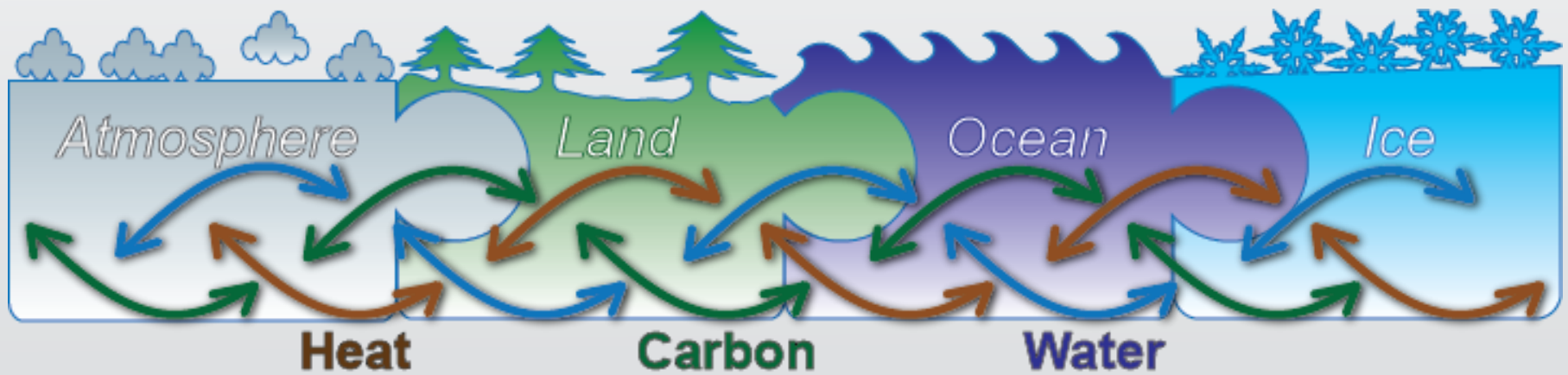


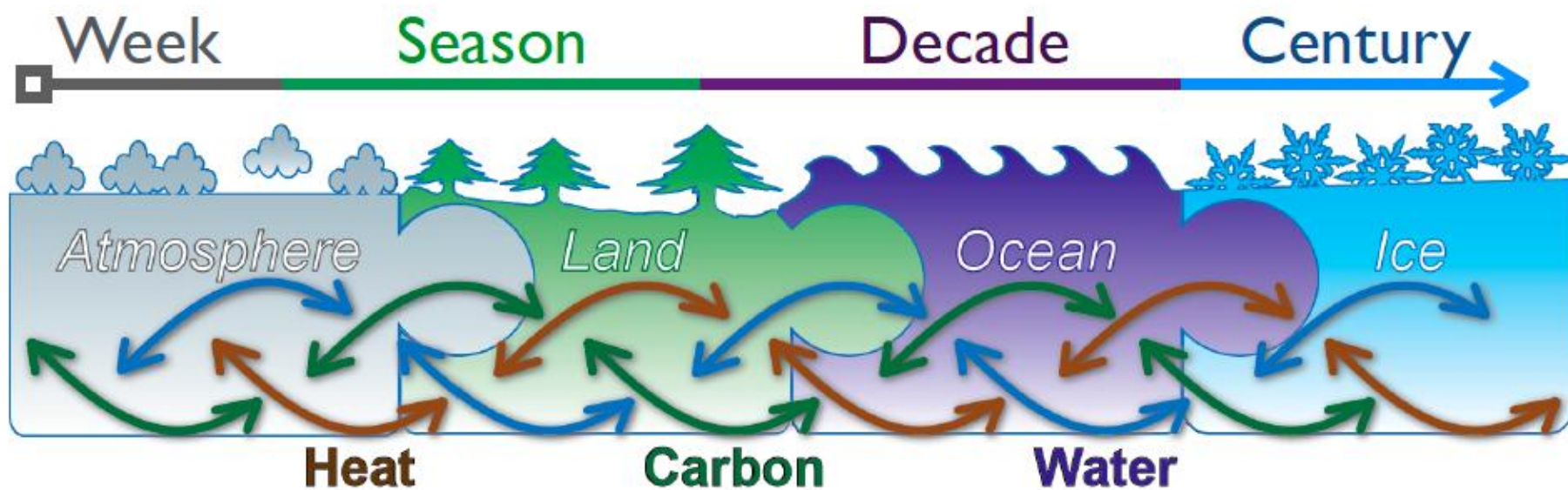
# Integrate the science from the 4 Core Projects

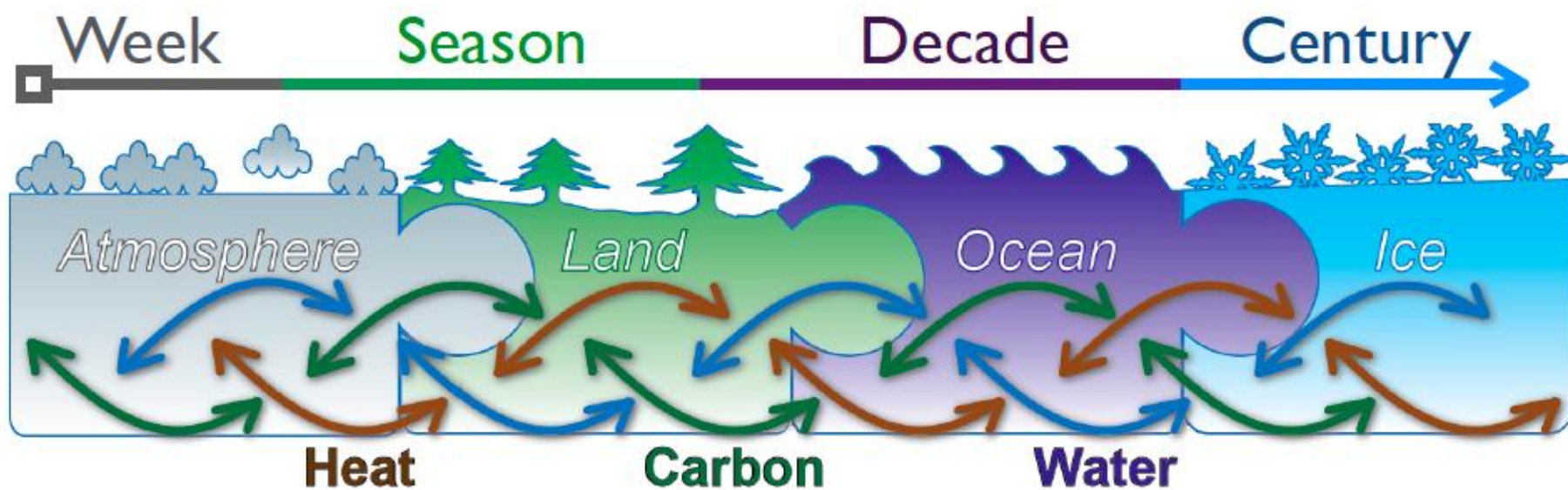
- **CLIC** (Climate and Cryosphere)
- **CLIVAR** (Climate and Ocean: variability, Predictability and Change)
- **GEWEX** (Global Energy and water Exchanges)
- **SPARC** (Stratosphere-troposphere Processes and their Role in Climate)
- **Integration** of the science conducted by the core projects will support the overall mission of WCRP









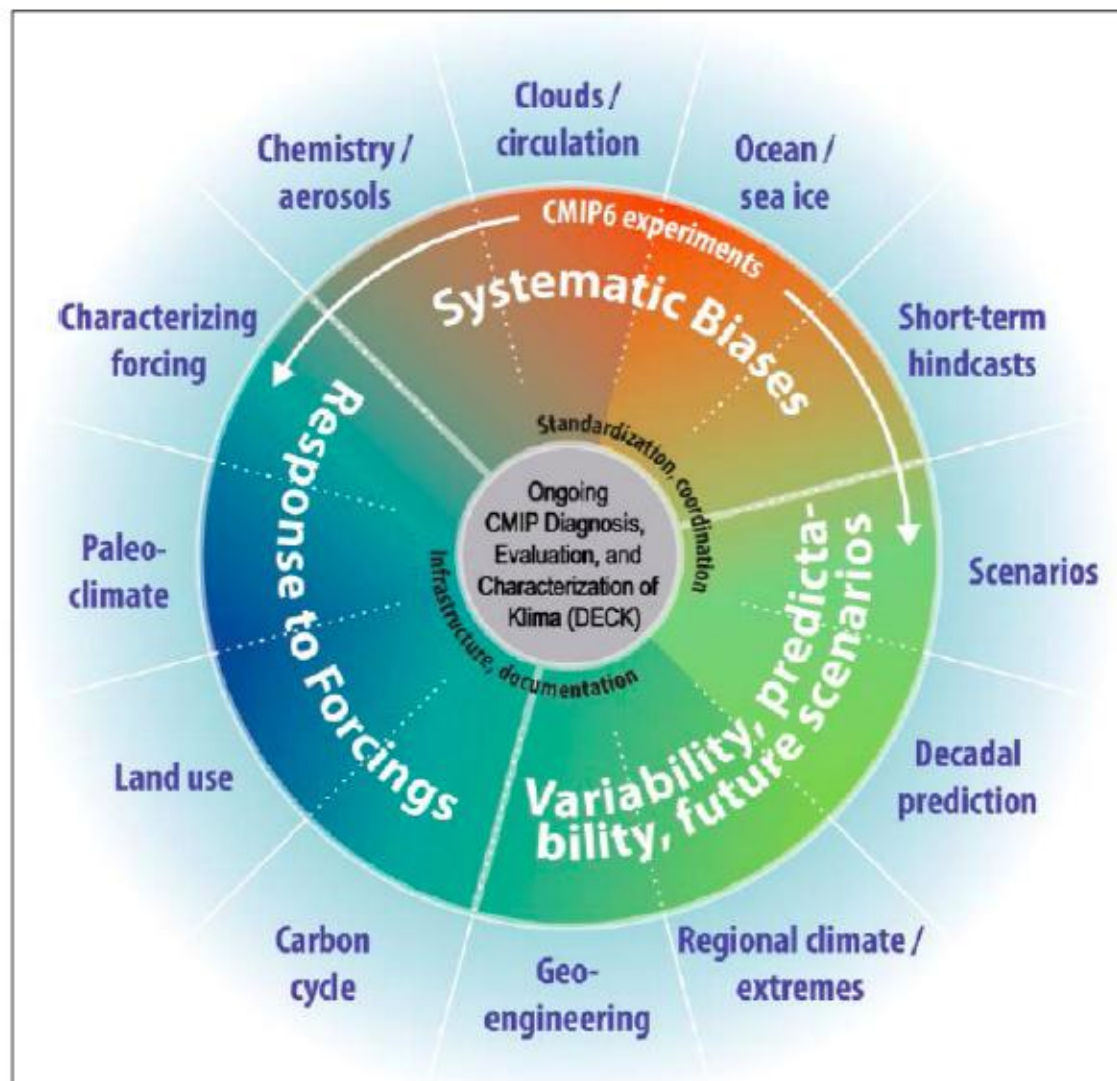


# CMIP and CORDEX in support of IPCC





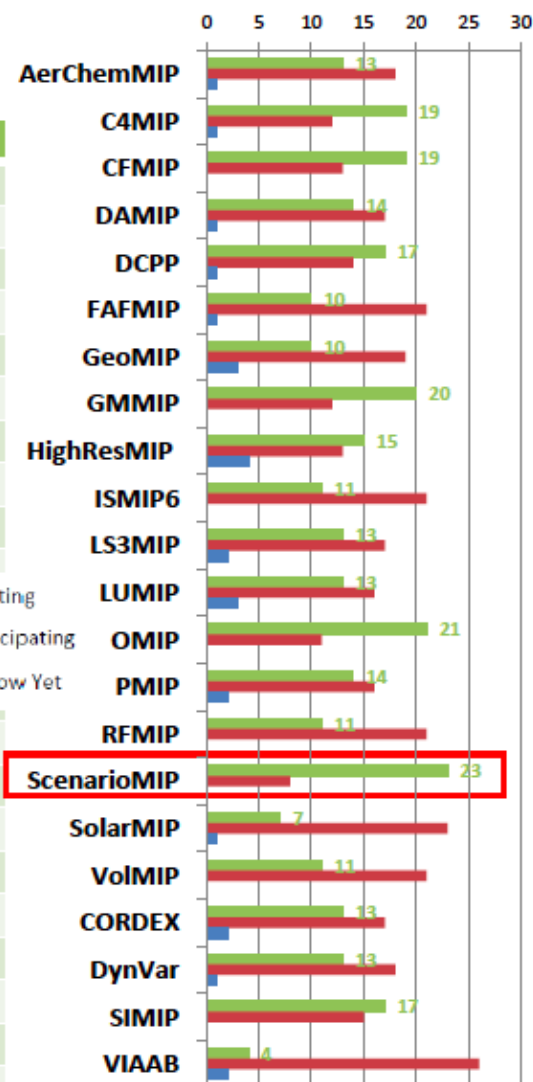
# Coupled Model Intercomparison Project (CMIP6)



## Proposals from CMIP6-Endorsed MIPs & Model Groups' Commitments to Participate in each MIP

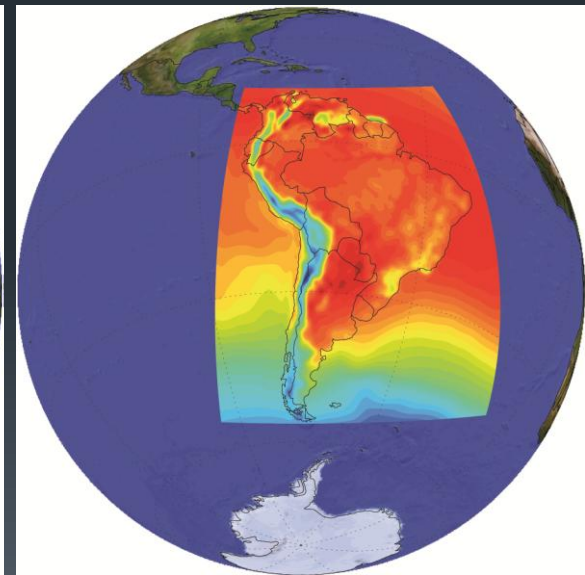
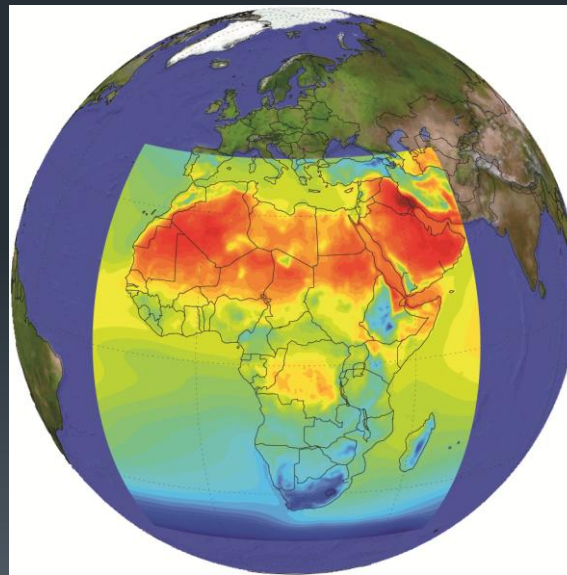
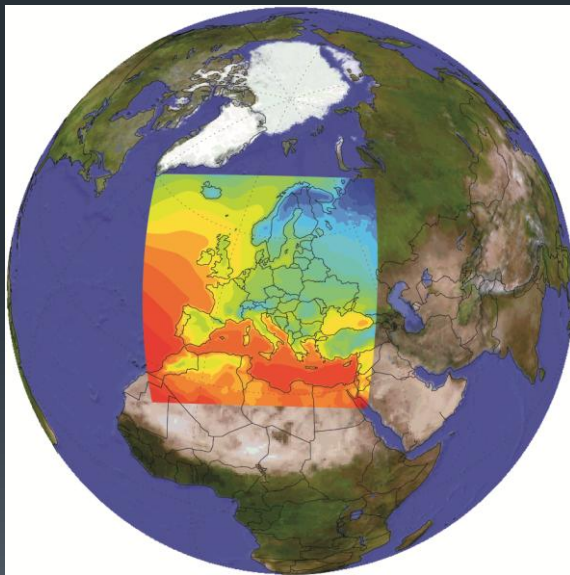
	Long Name of MIP (Short Name of MIP)
1	<b>Aerosols and Chemistry Model Intercomparison Project (AerChemMIP)</b>
2	<b>Coupled Climate Carbon Cycle Model Intercomparison Project (C4MIP)</b>
3	Cloud Feedback Model Intercomparison Project (CFMIP)
4	<b>Detection and Attribution Model Intercomparison Project (DAMIP)</b>
5	<b>Decadal Climate Prediction Project (DCPP)</b>
6	Flux-Anomaly-Forced Model Intercomparison Project (FAFMIP)
7	<b>Geoengineering Model Intercomparison Project (GeoMIP)</b>
8	Global Monsoons Model Intercomparison Project (GMMIP)
9	<b>High Resolution Model Intercomparison Project (HighResMIP)</b>
10	<b>Ice Sheet Model Intercomparison Project for CMIP6 (ISMIP6)</b>
11	<b>Land Surface, Snow and Soil Moisture MIP (LS3MIP)</b>
12	<b>Land-Use Model Intercomparison Project (LUMIP)</b>
13	Ocean Model Intercomparison Project (OMIP)
14	Palaeoclimate Modelling Intercomparison Project (PMIP)
15	<b>Radiative Forcing Model Intercomparison Project (RFMIP)</b>
16	<b>Scenario Model Intercomparison Project (ScenarioMIP)</b>
17	Solar Model Intercomparison Project (SolarMIP)
18	<b>Volcanic Forcings Model Intercomparison Project (VolMIP)</b>
19	<i>Coordinated Regional Climate Downscaling Experiment (CORDEX)</i>
20	<i>Dynamics and Variability of the Stratosphere-Troposphere System (DynVar)</i>
21	<i>Sea-Ice Model Intercomparison Project (SIMIP)</i>
22	<i>Vulnerability, Impacts, and Adaptation Advisory Board for CMIP6 (VIA AB)</i>

■ Participating  
■ Not Participating  
■ Don't Know Yet

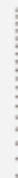


# Regional climate downscaling - CORDEX

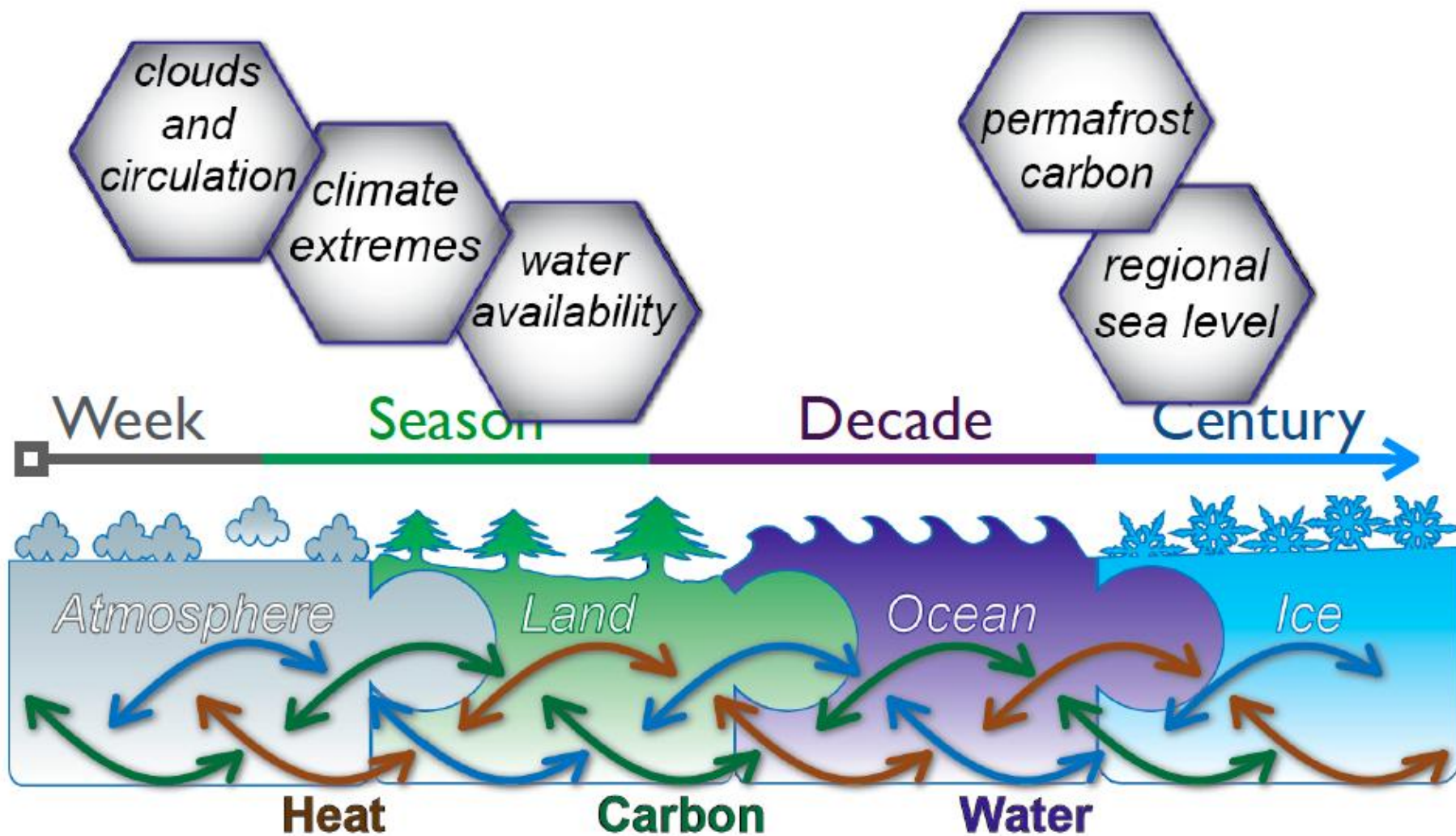
- Coordination of regional climate modelling
- Evaluate & improve downscaling techniques
- Support vulnerability, impact, adaptation
- Direct engagement with stakeholders



# WCRP Grand Challenges



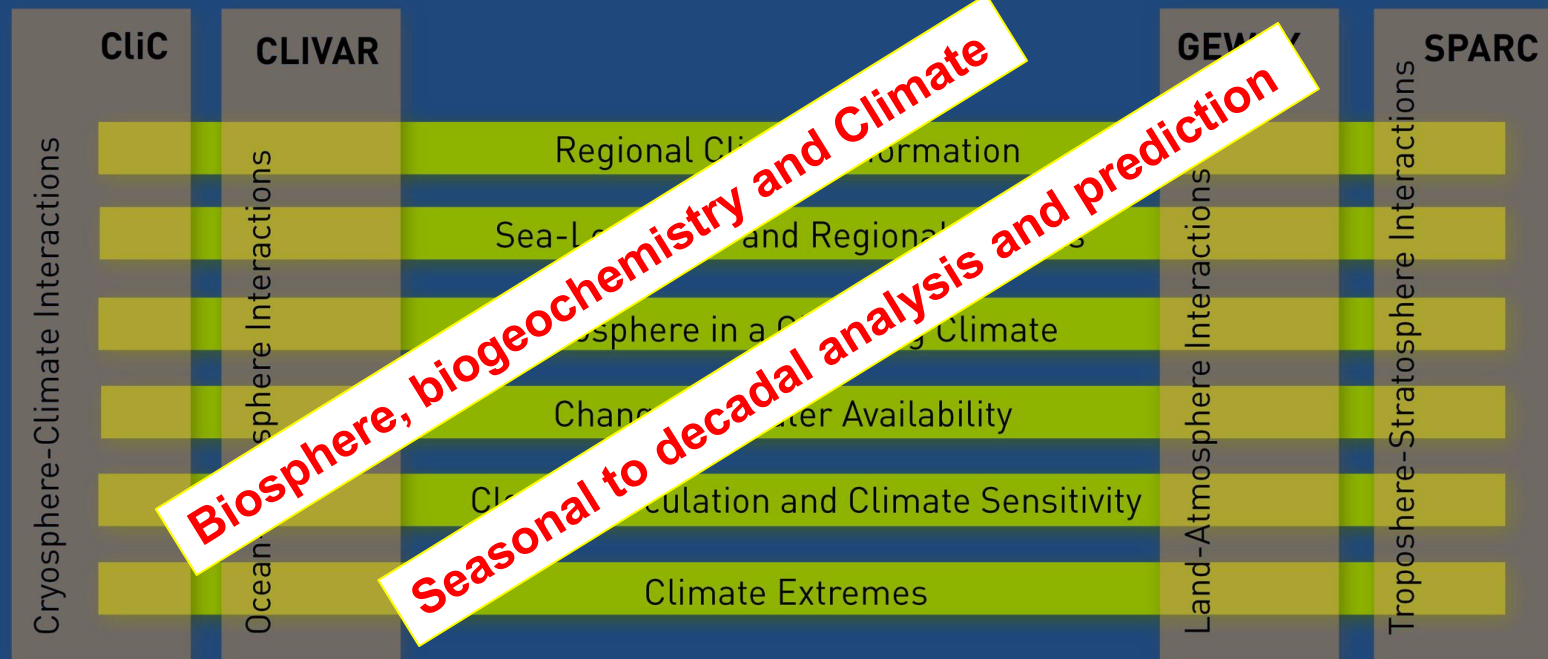




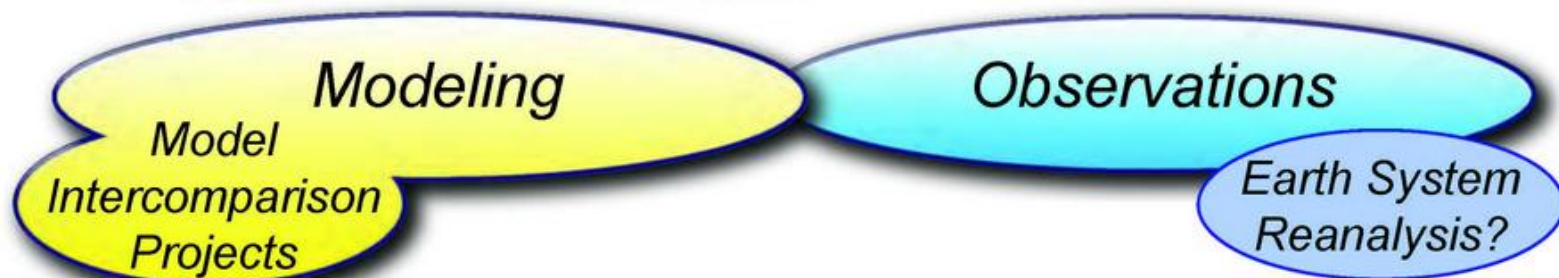
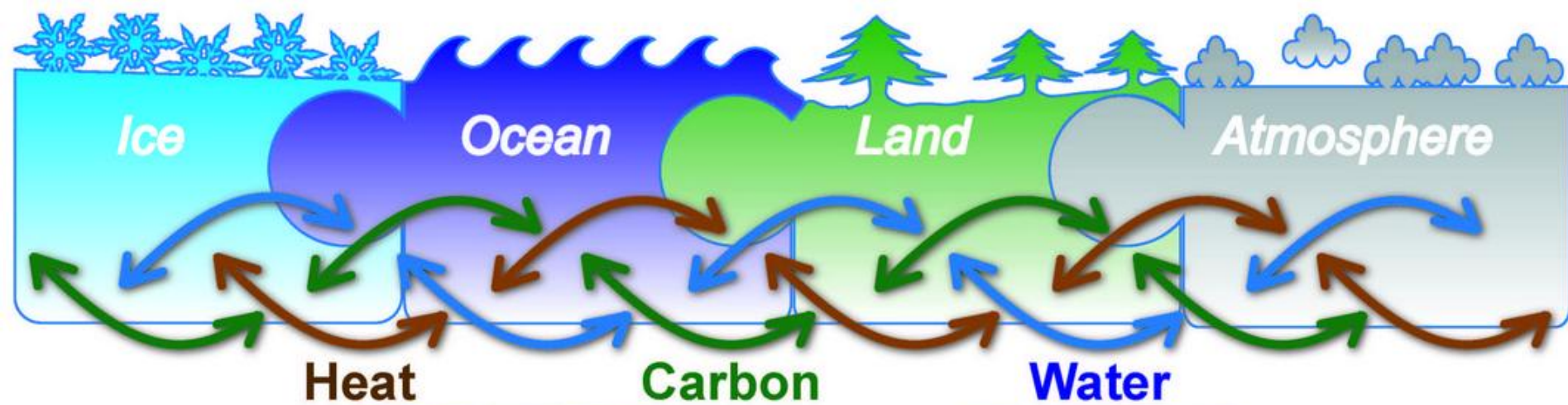
# WCRP Organization

Grand Challenges are designed to be cross-cutting and involve external groups and projects

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







# Developing a demand-oriented portfolio



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# Develop a “demand-oriented” interdisciplinary research portfolio

- Scientific questions posed by society require **fundamental scientific research** as well as elaborate scientific approaches using the traditional scientific method: complex Earth system models, space observations, reanalyses, hypothesis testing, etc..
- A two-way **dialogue** is important and will be realized through the development of **climate services** and **interfaces** with other downstream organizations (IPCC, others).
- WCRP is not a climate service, but provides knowledge to these interface organizations

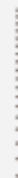
## Example: Develop a Predictive Understanding of Seasonal-to-decadal Variations: A Necessity to Respond to Society's Concerns

- WCRP addresses important questions posed by **stakeholders** in different economic sectors (e.g., water management, agriculture, tourism, disaster reduction, etc.)
- It will increasingly focus on shorter-term questions including the **prediction of extreme events** (droughts, flooding, hurricane frequency, etc.)
- Issues around natural **climate variability**, climate modes, exchange of energy, water and carbon between the **atmosphere and the ocean, etc. must be addressed to be able to perform** seasonal-to-decadal climate predictions.

# Introduce New Research Themes

- The WCRP-IPCC meeting in Bern has highlighted several new themes:
  - Climate modes of variability, climate cycles, seasonal-to-decadal predictions
  - The dynamics, physics and biogeochemistry of the ocean
  - The biogeochemical cycle of carbon and other elements
  - Aerosols, clouds, atmospheric chemistry
  - Urbanization and climate change

# Working together with Future Earth





# WCRP-EF Interactions



- Reciprocal participation in management meetings
- Joint participation in major scientific and political events
- Periodic strategic discussions
- Memorandum of understanding between different projects to facilitate interactions
- New common initiatives

# Conclusions



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# Integrating innovative “top-down” research with advanced societally relevant “bottom-up” science

- Major scientific progress in the last decades has been the result of fundamental discoveries (“supply-oriented” science).
- There is, however, an increasing emphasis on societally relevant “demand-oriented” science (contract between science and society).
- WCRP will combine the two approaches to address scientific challenging questions to respond to relevant societal questions.