WORLD CLIMATE RESEARCH PROGRAMME

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25 September 2018

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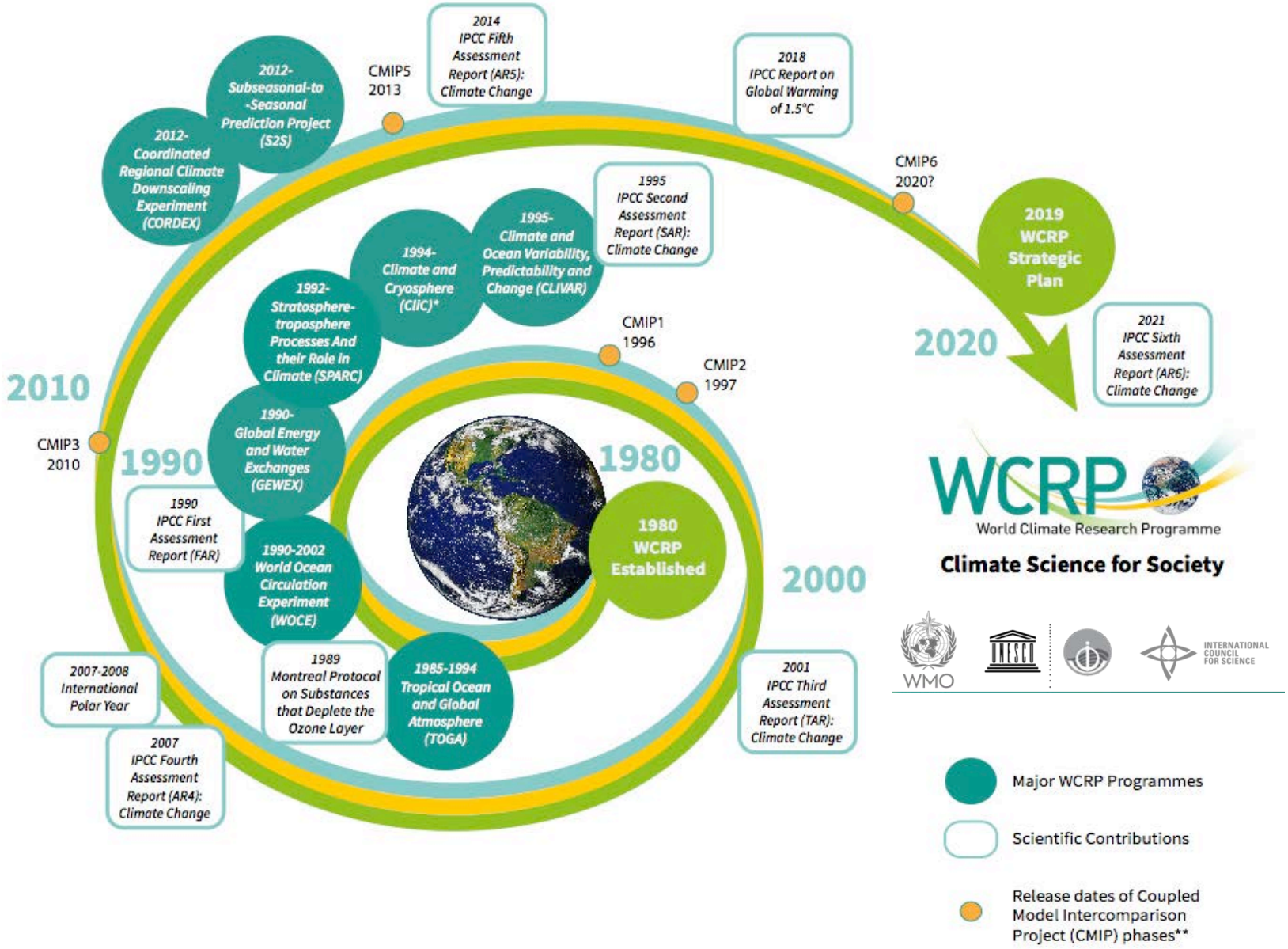
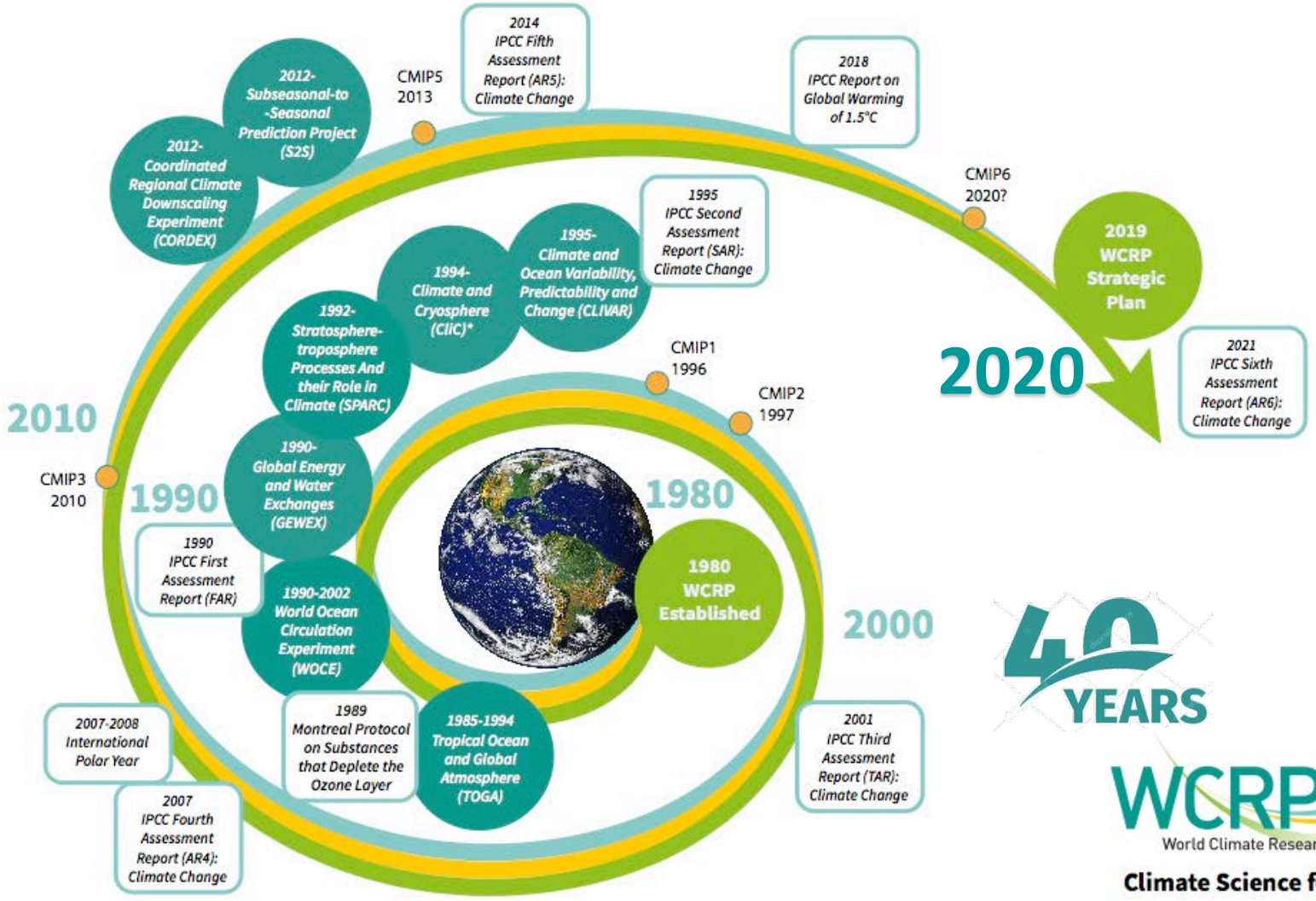
The World Climate Research Programme



The World Climate Research Programme



40 YEARS

WCRP
World Climate Research Programme

Climate Science for Society

The World Climate Research Programme

JOINT SCIENTIFIC COMMITTEE (JSC)

WCRP MODELLING ADVISORY COUNCIL (WMAC)

WCRP DATA ADVISORY COUNCIL (WDAC)

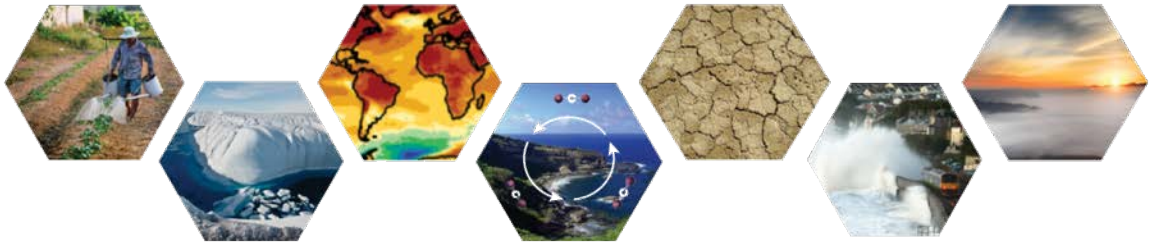
WORKING GROUPS ON:

SUBSEASONAL TO INTERDECADAL PREDICTION (WGSIP)
NUMERICAL EXPERIMENTATION (WGNE)
COUPLED MODELLING (WGCM)
REGIONAL CLIMATE (WGRC)

CliC	CLIVAR	GEWEX	SPARC	CORDEX
CRYOSPHERE-CLIMATE	OCEAN-ATMOSPHERE	LAND-ATMOSPHERE	TROPOSPHERE-STRATOSPHERE	REGIONAL CLIMATE DOWNSCALING

JOINT PLANNING STAFF (JPS)

GRAND CHALLENGES



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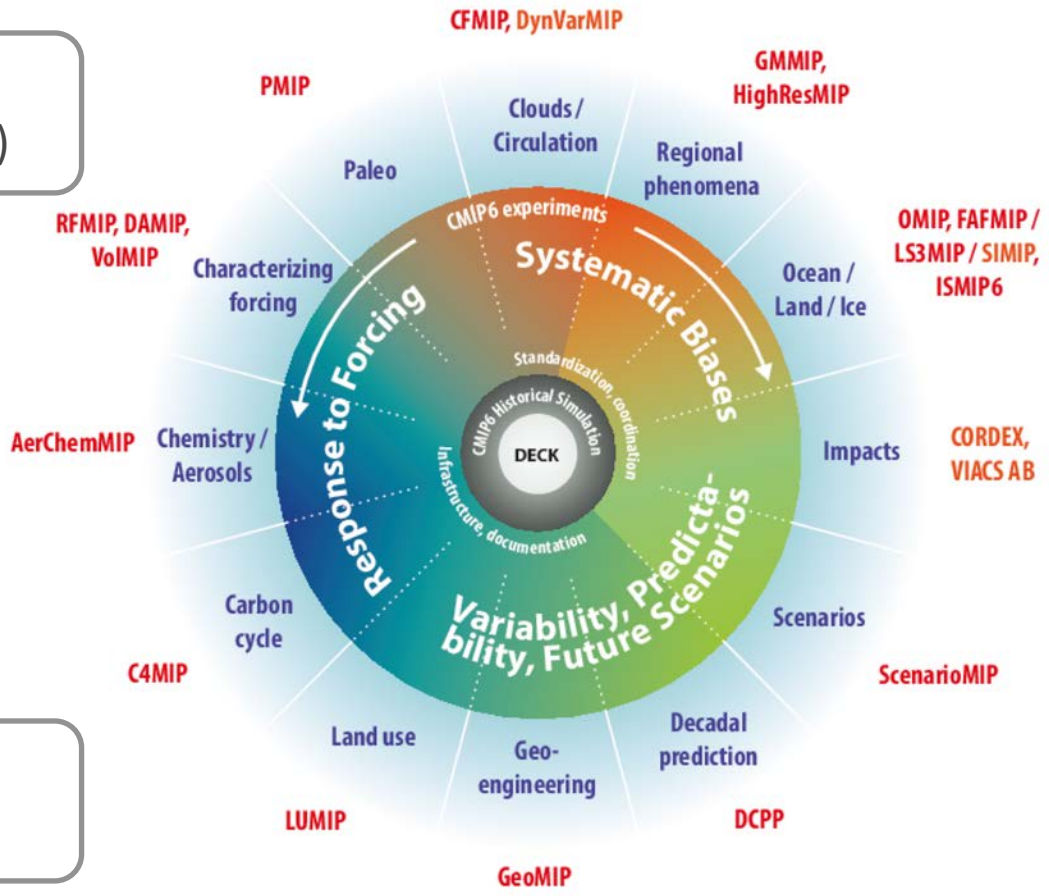
WCRP-leading climate science

CMIP
The World Climate Research Programme's Coupled Model Intercomparison Project

CMIP is a project of WCRP's Working Group on Coupled Modeling (WGCM)

CMIP has led to an improved understanding of past, present and future climate change and variability in a multi-model framework

CMIP defines common experiment protocols, forcings and output



21 CMIP6-Endorsed MIPs

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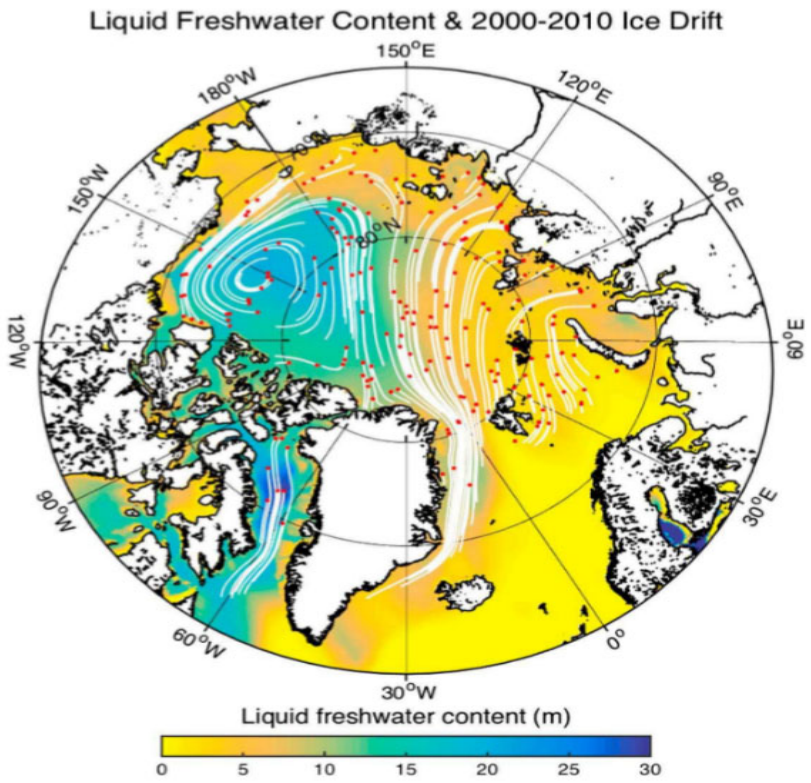
WCRP addresses key science questions…

Arctic freshwater is expanding and changing



- Arctic freshwater domain expanded, both for the oceans and land
- New freshwater regimes developed
- An un-quantified moisture flux detected, due to the loss of Arctic freshwater ice cover
- Increase of the benefits of freshwater-based resource activities

CliC Climate and Cryosphere

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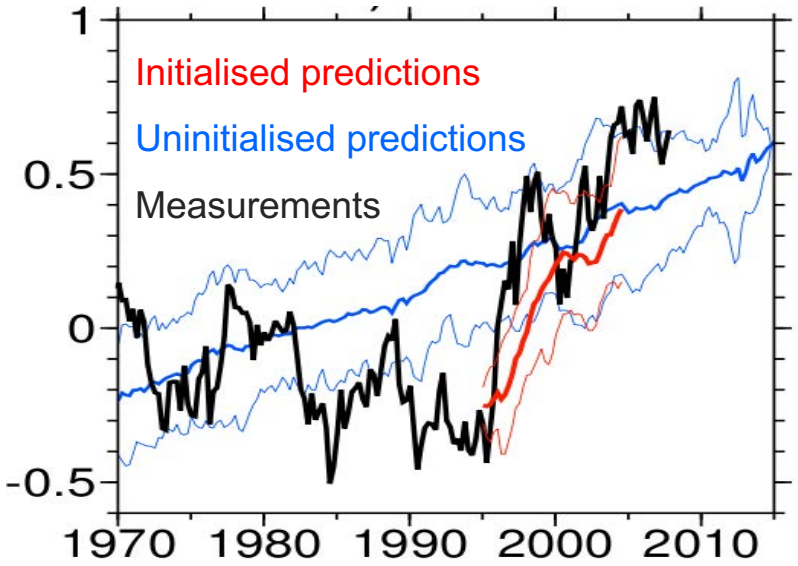
WCRP addresses key science questions…

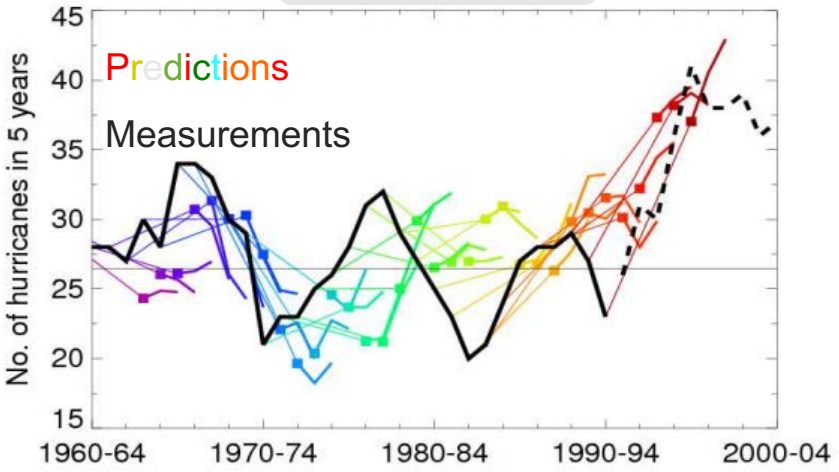
Change in Ocean Temperature in North Atlantic
Predicting the warming event in 1990s



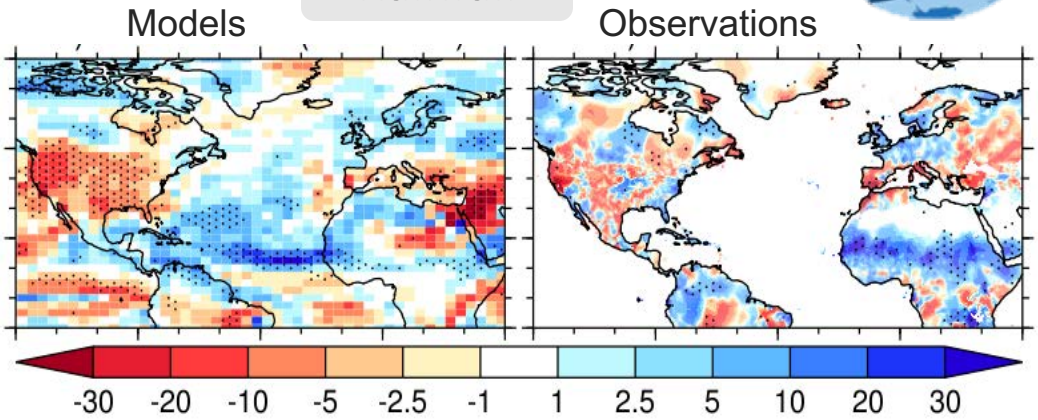
→ **Initialised decadal predictions for ocean warming show good skill**

→ **Higher predictiablilty for hurricanes than for rainfall**

Hurricanes



Rainfall



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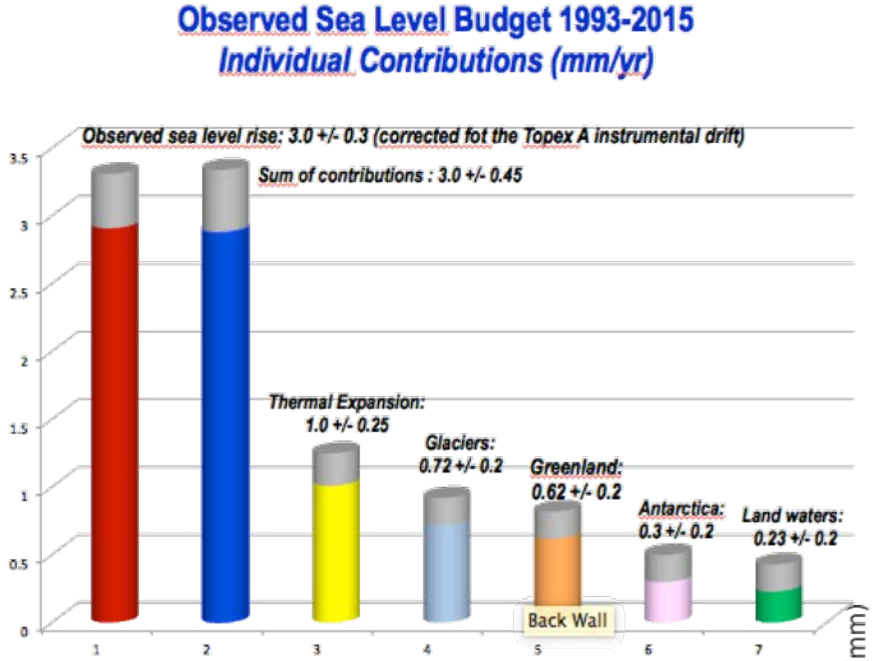
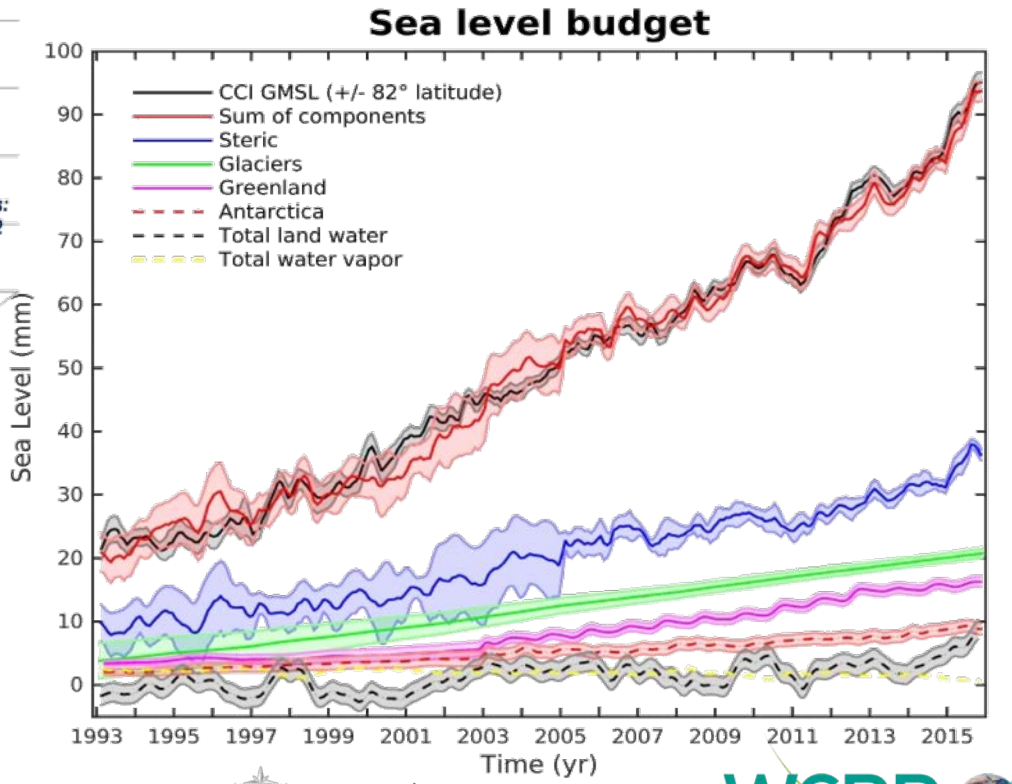
WCRP addresses key science questions…





Comparing the observed sea level to the sum of contributions: ocean thermal expansion, glacier and ice sheet mass balance, land water storage change

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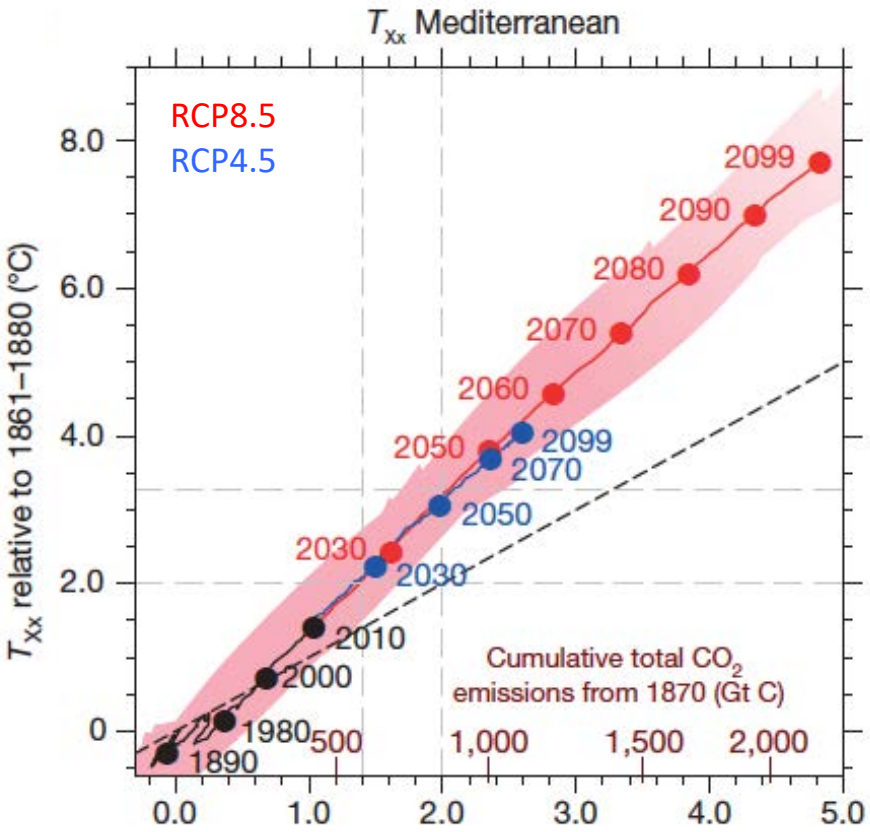
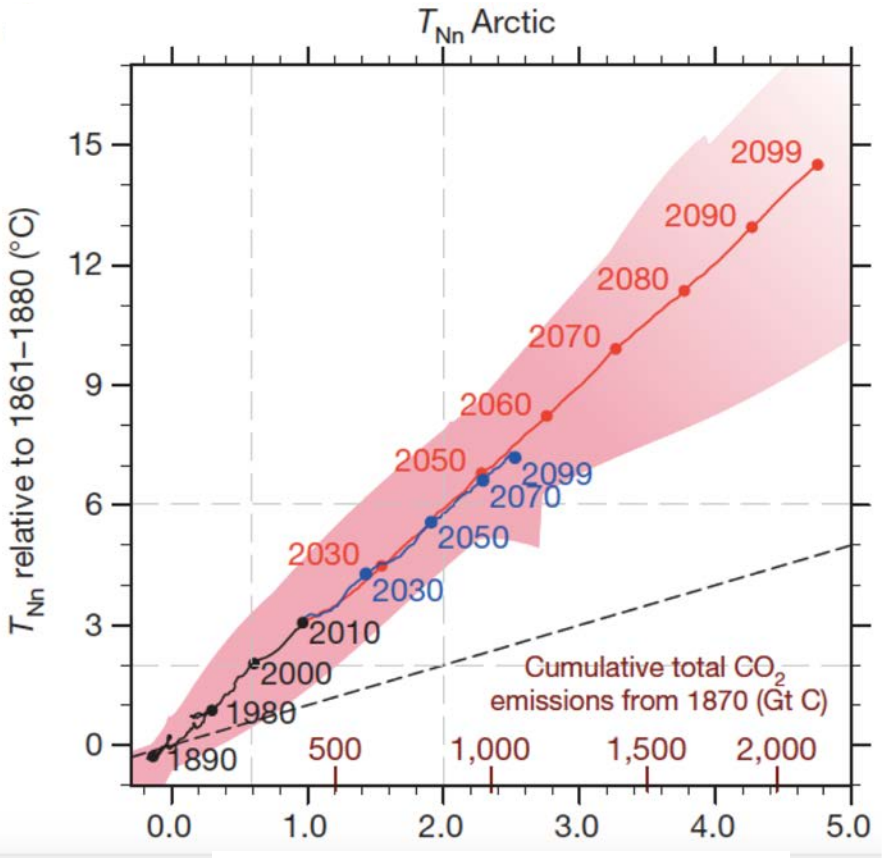
WCRP addresses key science questions…



Global mean temperature anomaly relative to 1861-1880 (deg)



Global mean temperature anomaly relative to 1861-1880 (deg)

(Seneviratne et al. 2016, Nature)

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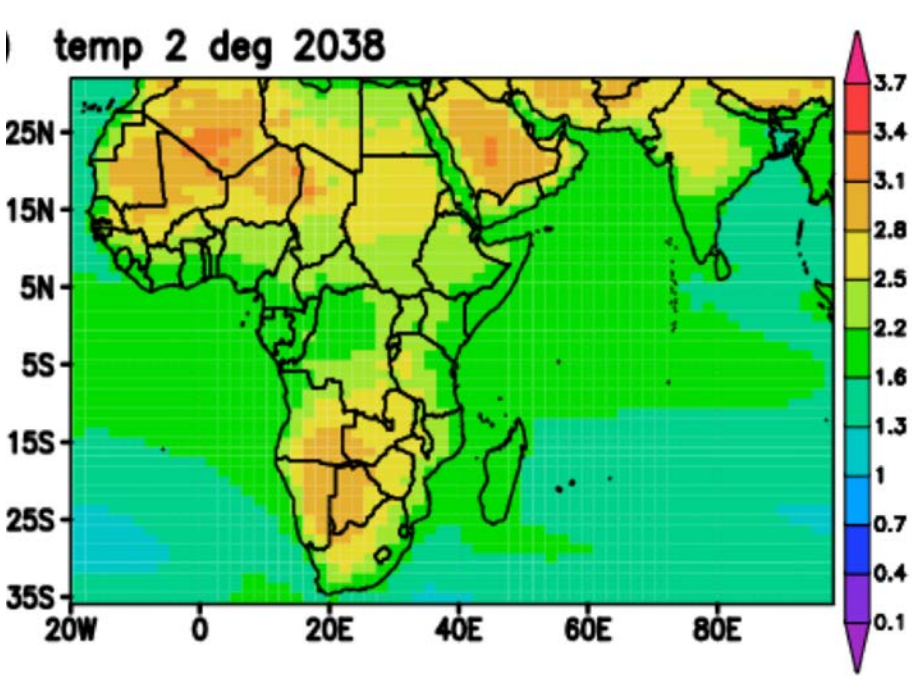
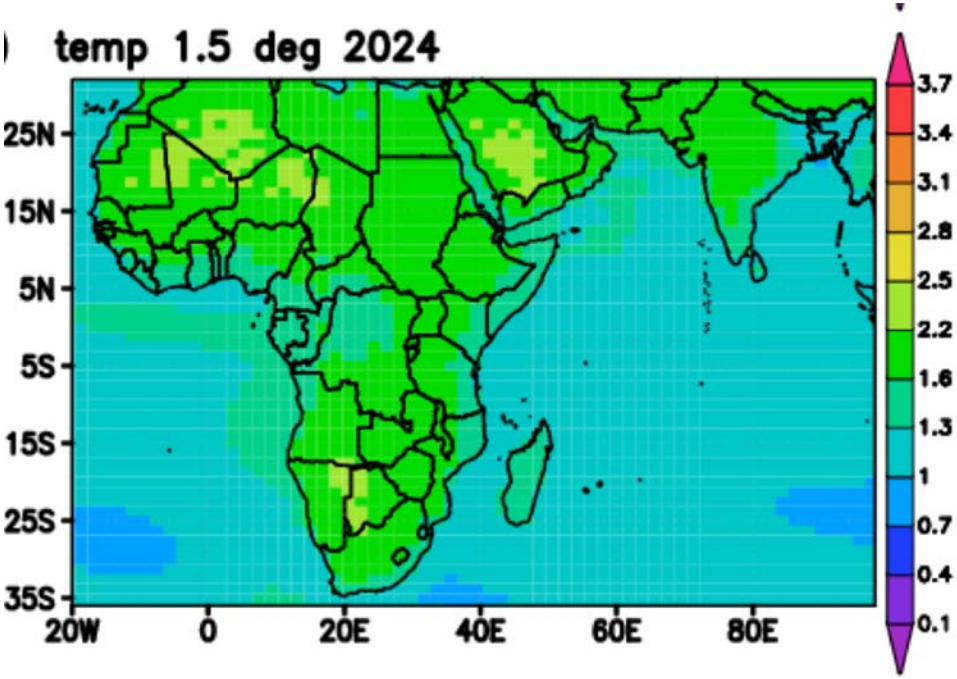
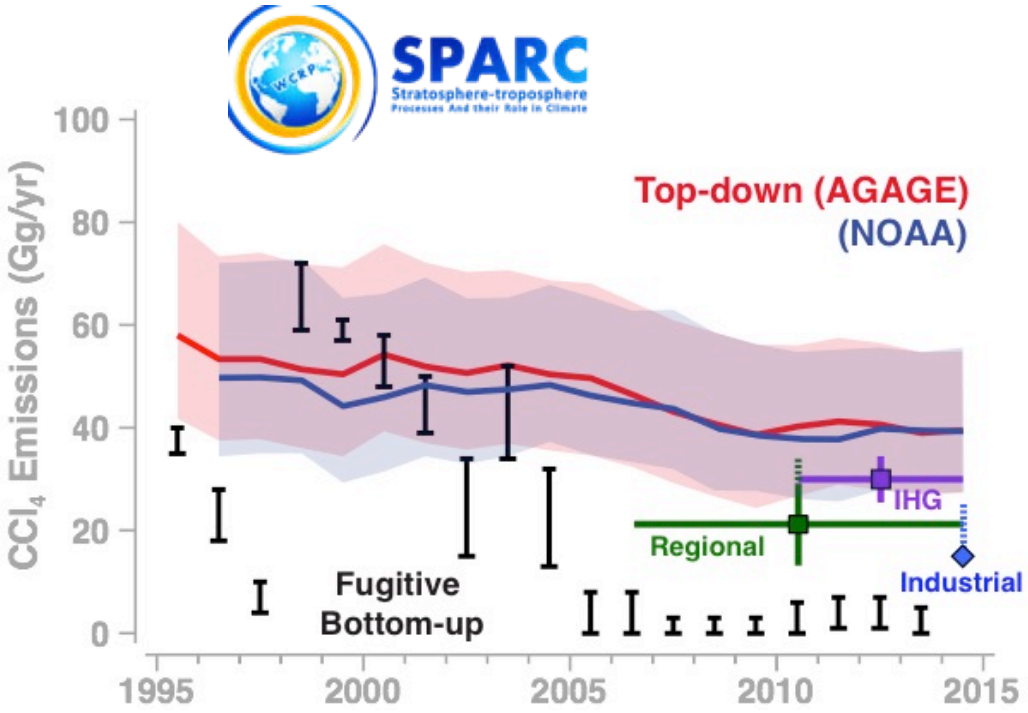




(Credit: Modathir Zaroug, Univ. Cape Town)

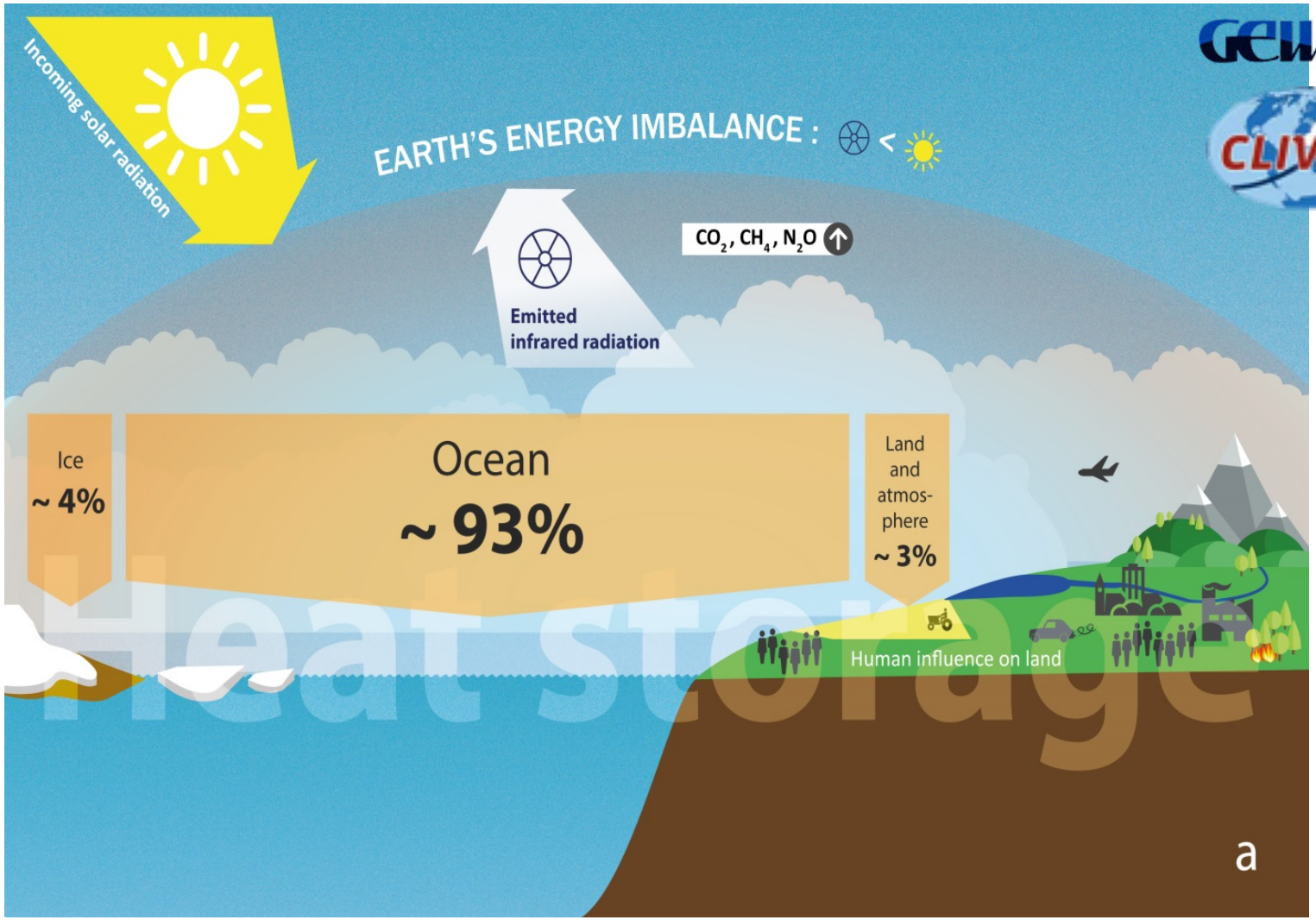
WCRP addresses key science questions…



- Disagreement between reported (bottom-up) and calculated (top-down) CCl_4 emissions since 1999
- Multi-disciplinary activity using innovative analysis techniques and new observations
- Total lifetime of CCl_4 updated
- New emissions estimates (reported + unreported inadvertent industrial emissions) agree within the uncertainty range

Policy Relevant: Direct response to stakeholder needs (Parties to the Montreal Protocol)

WCRP addresses key science questions…



von Schuckmann et. al, 2016a: Nature Climate Change 6, 138–144, doi:10.1038/nclimate2876

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Evolving Context and Challenges

Research is pulled into a new and broader

“operational/service/policy” landscape

- IPCC Assessment Reports
- UNFCCC Paris Agreement and Global Stocktake
- Global Framework for Climate Services
- Sendai Framework for Disaster Risk Reduction

Evolving Context and Challenges

Research is pulled into a new and broader

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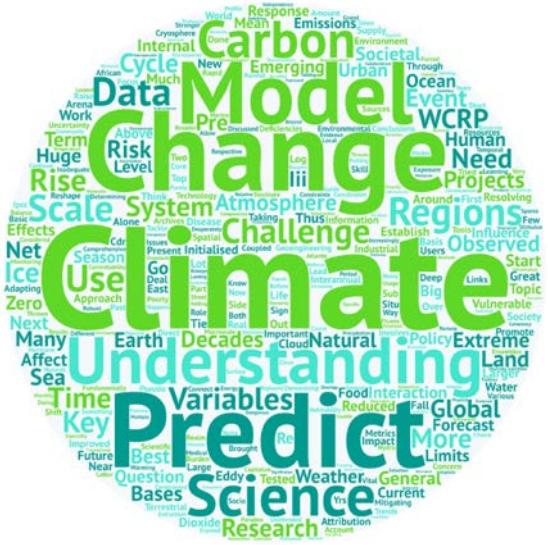
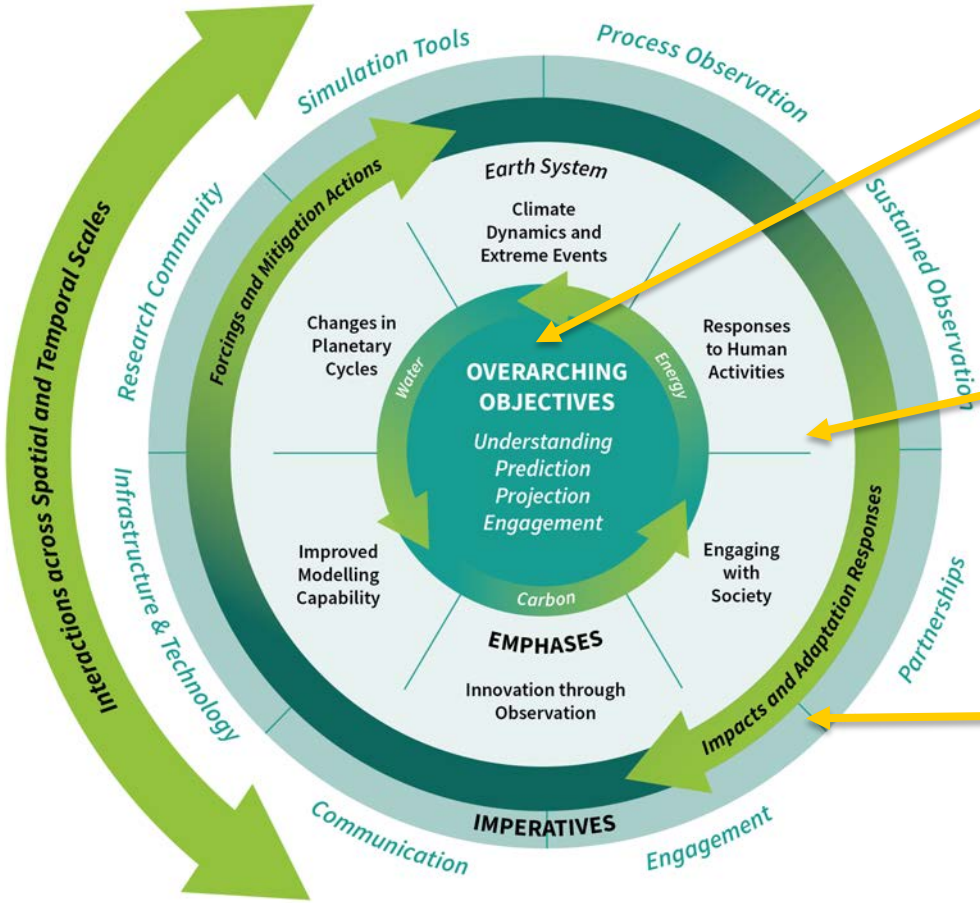
- A new Strategic Plan, under development for a 10-year time horizon (2019-2029)
- 10-year accompanying Implementation Plan (2019-2029)



WCRP Scientific Strategy 2019-2029



Overarching Objectives

Focuses on the far horizon - the scientific research required to address current and future challenges and take advantage of opportunities

Emphases

Highlights the bedrock science that must be supported and nurtured as communities form and re-form around evolving scientific foci in support of the Objectives

Imperatives

WCRP tools and capabilities, including those focused on technical capacity and those relating to human capacity driven activities

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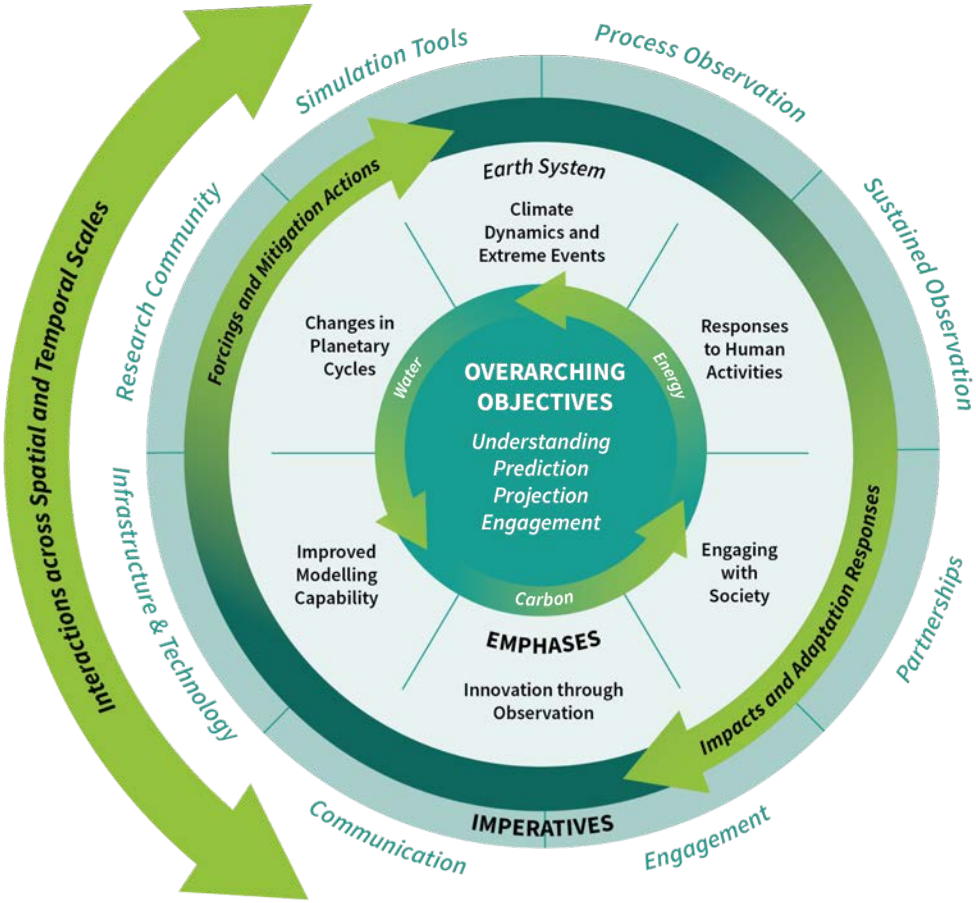
The World Climate Research Programme

The Next Decade

WCRP Coordinates international climate research to develop, share and apply the climate knowledge that contributes to societal well-being.



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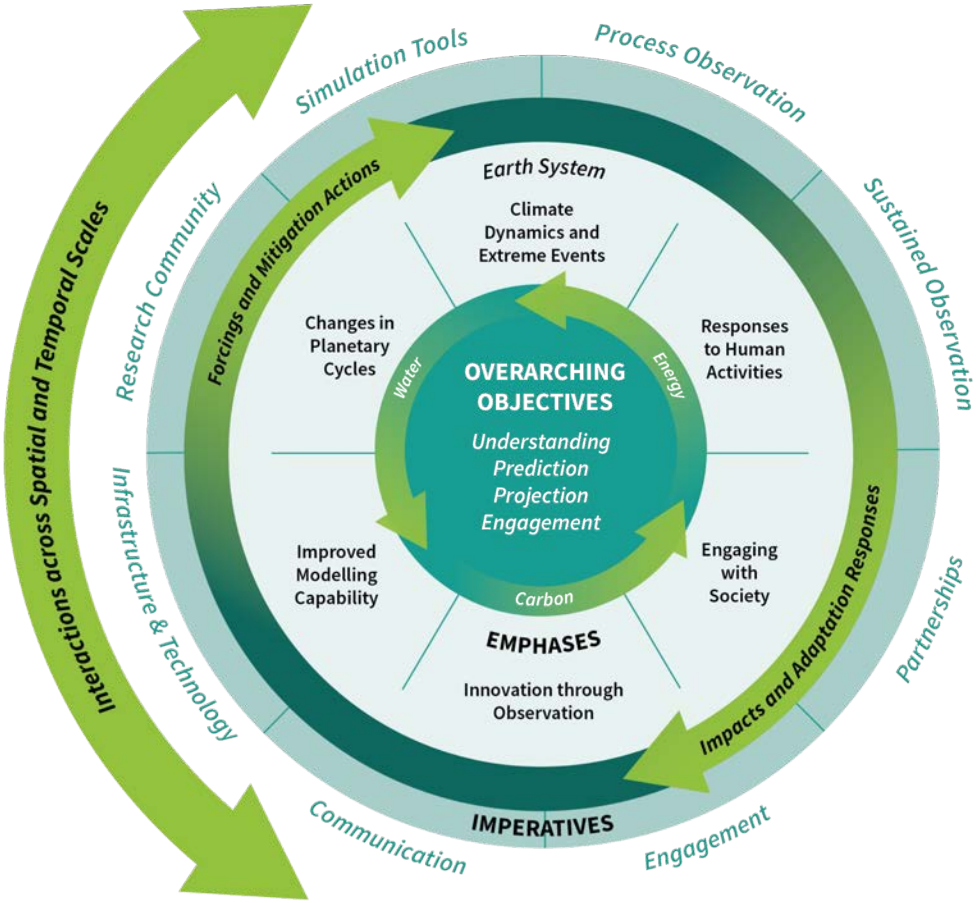

Science for Understanding

Science for Impact

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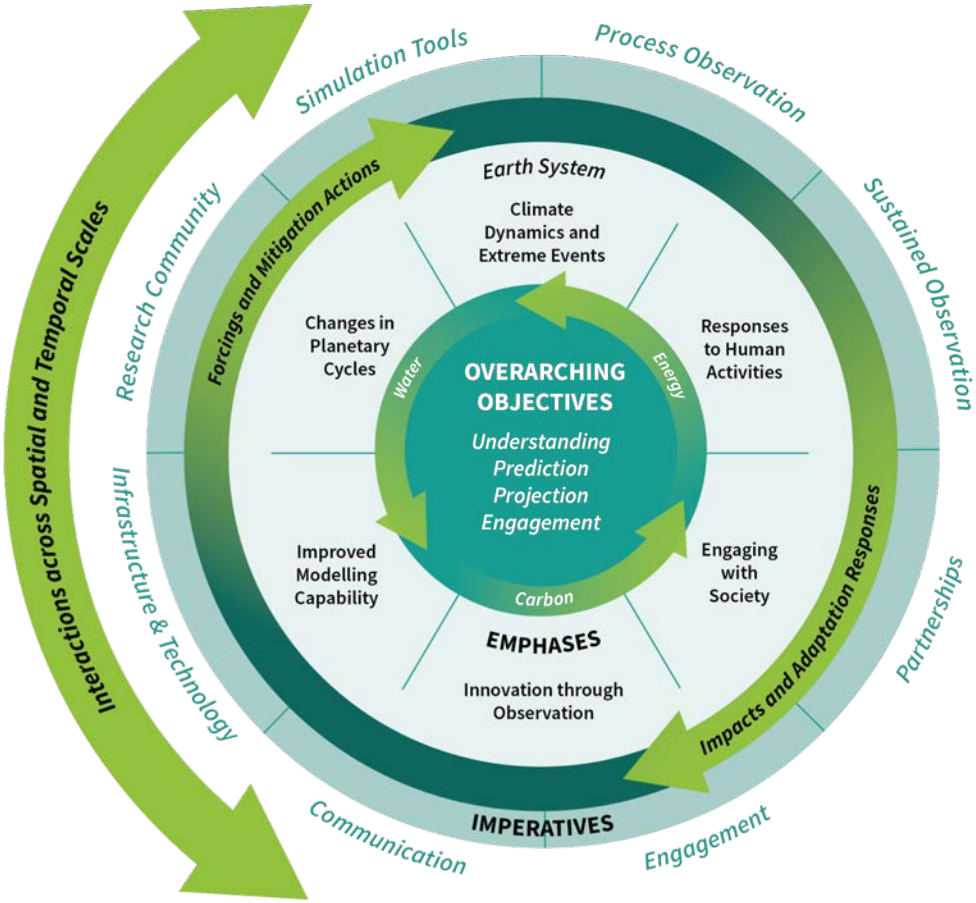
The World Climate Research Programme

The Next Decade

- Imbalances in the fluxes of energy, water, carbon and other climate-relevant compounds
- Understanding and pushing limits to predictability of the climate system
- Understanding and predicting sensitivities of climate stresses
- …

Importance of bedrock science



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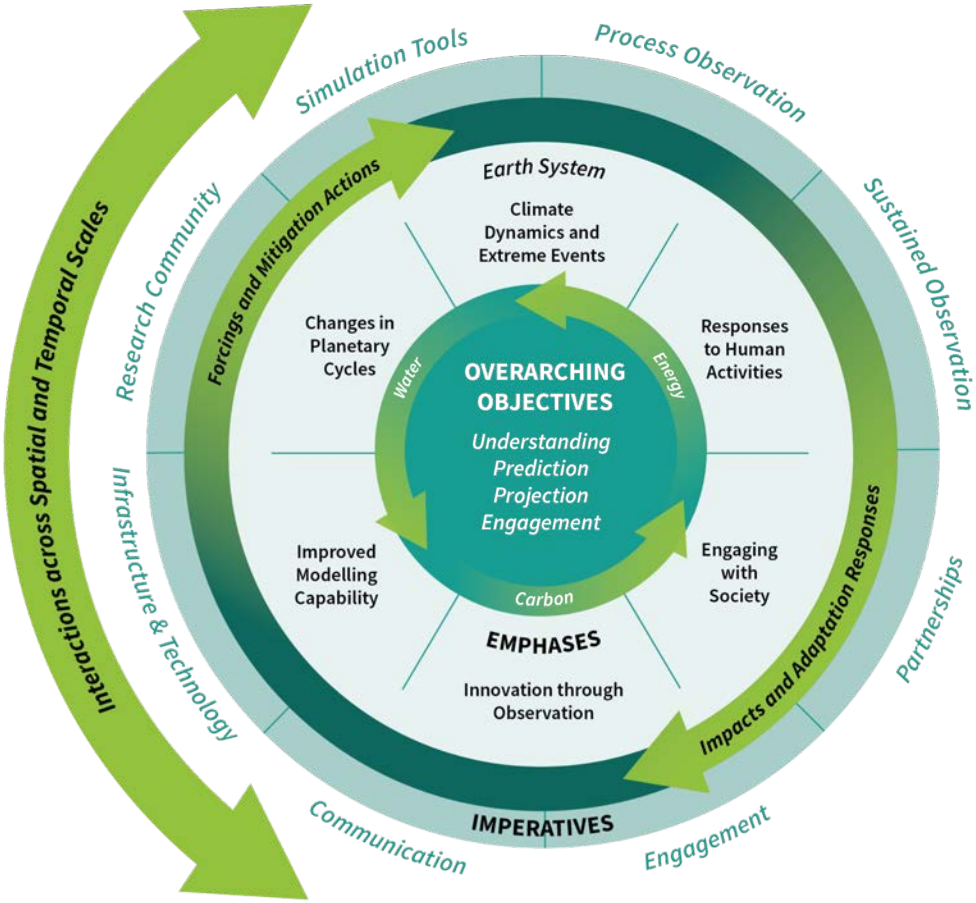
The World Climate Research Programme

The Next Decade

- seamless approach in time & space
- “Earth System” modelling
- Research-to-operations
- …

Deliver actionable, accessible, inclusive and authoritative scientific information on the Earth system



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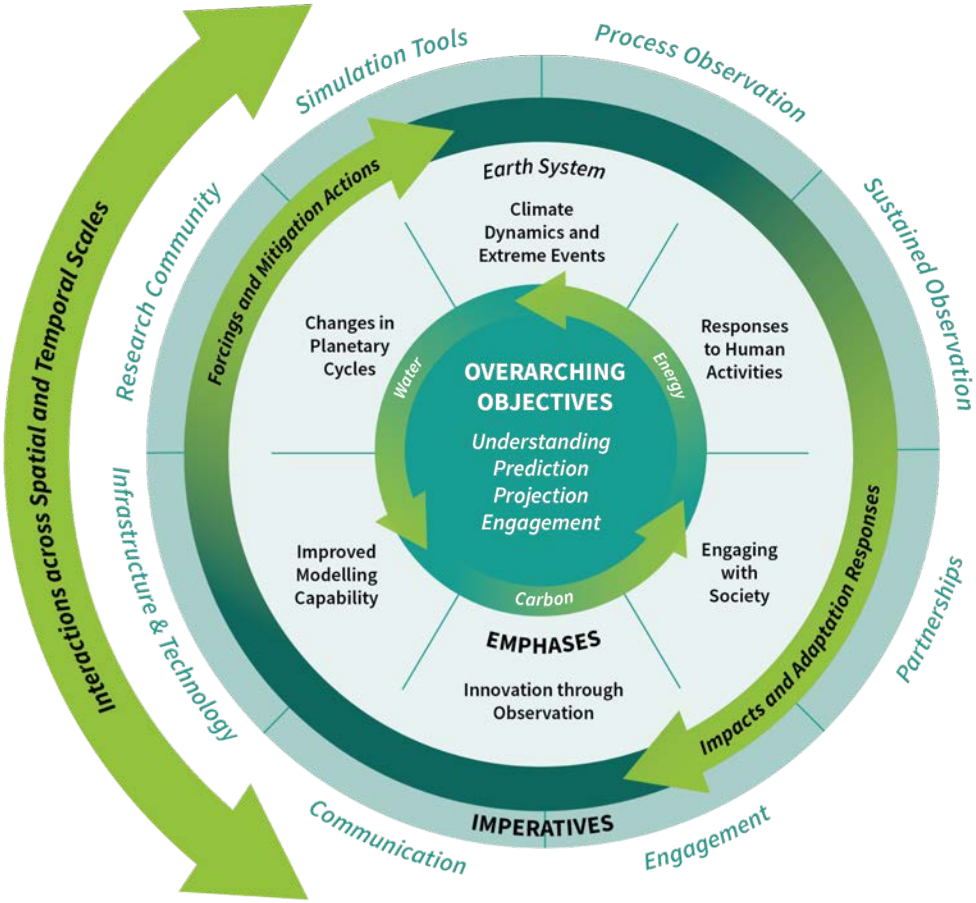
The New World Climate Research Programme

Scientific partnerships across science communities are critical:

- Capacity and infrastructure development
- Consistent support for critical work e.g. CMIP

Wider partnerships – social sciences, governments, industry, civil society – are critical for climate science to service society.

- Co-production of knowledge, co-design of solutions
- Connecting global to local scales for adaptation



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WCRP Scientific Strategy 2019-2029

Overarching Objectives

Fundamental understanding of the climate system

Advance predictive skill on timescales up to a decade

Constraining projections on decadal to centennial timescales

Connecting climate science with policy and services

Understand Earth's Climate

Determine Future Climate

Connect with Policy & Services

Bedrock Science (Emphases)

Tools and Capabilities (Imperatives)

Partnerships

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Emerging issue:

Public-Private Partnership Global Weather Enterprise

(supported by WMO, WB GFDRR, HMEI, IAMAS…)

WMO OMM

Drivers

Agenda 2030 for Sustainable Development

Paris Agreement

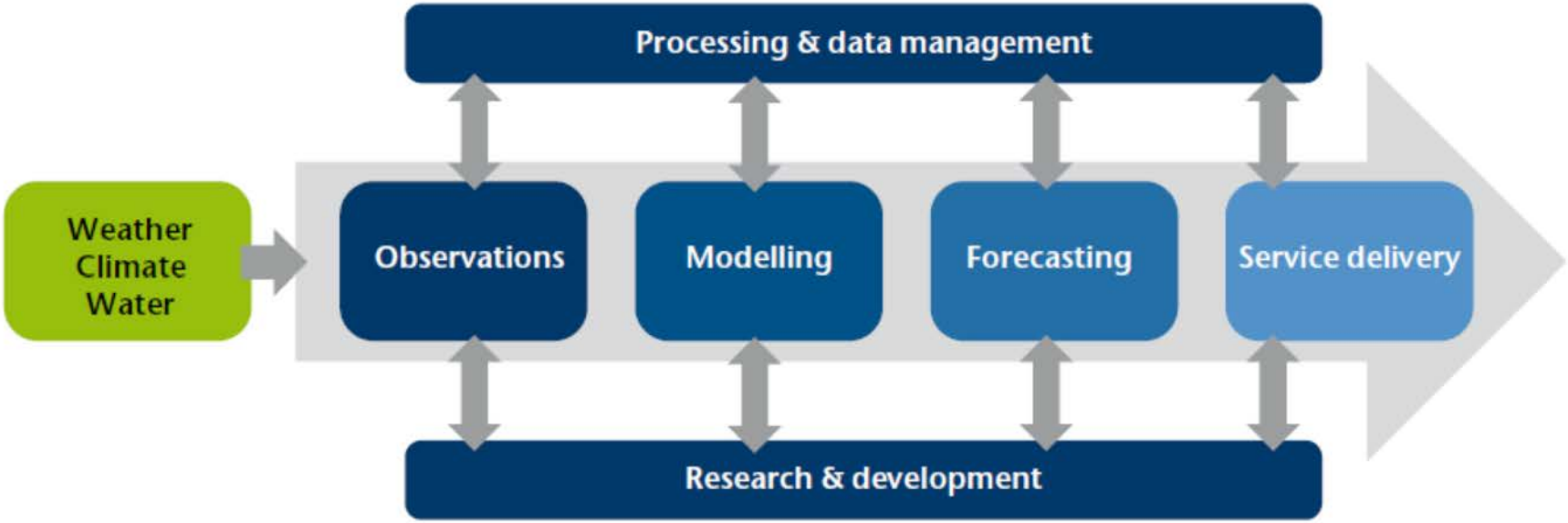
Sendai Framework for Disaster Risk Reduction

Engagement of non-state actors

*There is a need for the **public and private sectors and civil society organizations, as well as academia and scientific and research institutions**, to work more closely together and to create opportunities for collaboration …"*

WMO OMM

- … encompasses all business areas of WMO, including weather, climate and water.
- … a description of the multitude of systems and entities participating in the production and provision of meteorological, climatological, hydrological, marine and related environmental information and services.
  - Public-sector entities (NMHSs, governmental agencies)
  - Private-sector entities (such as equipment manufacturers, data and service-provider companies, private media companies, etc.)
  - Academia
  - Civil society (community-based entities, NGOs, NMSs, etc.)
  - Users



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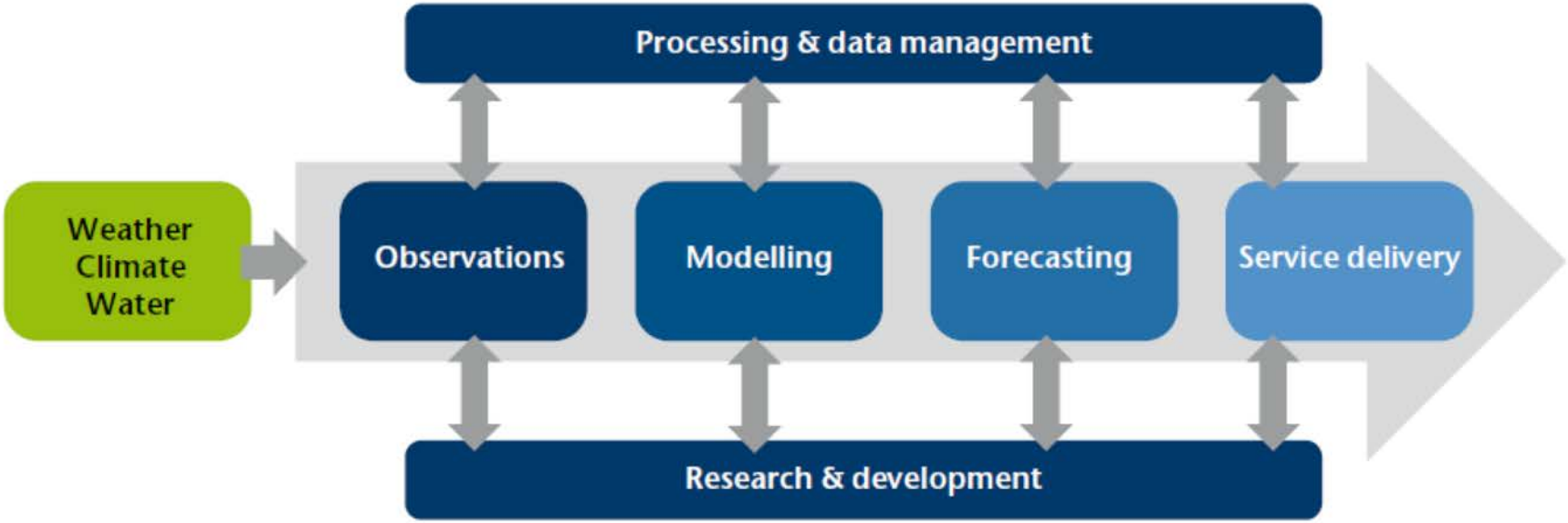
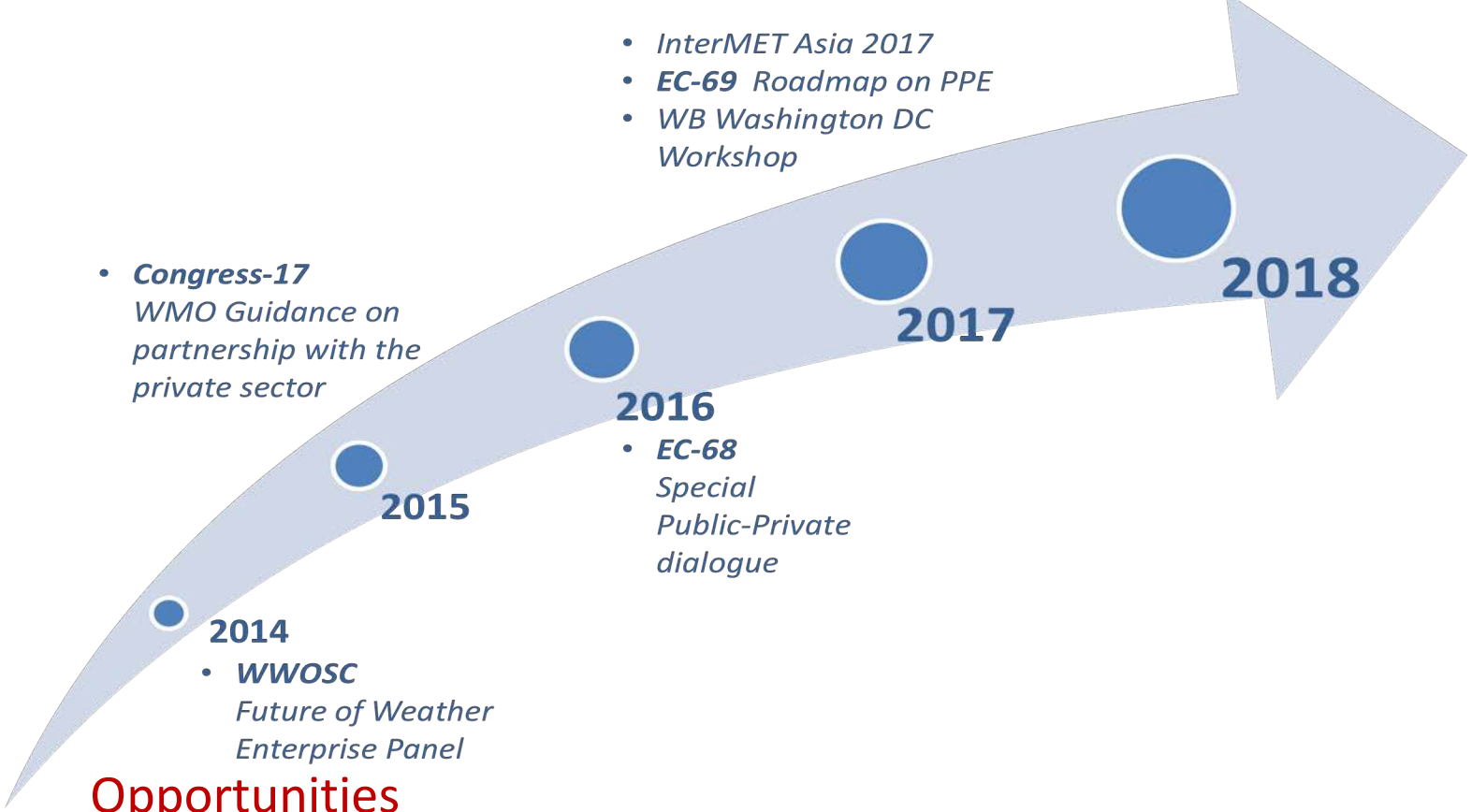


Challenges

- Multiple sources for information and services (competition, markets) - How to know which source is credible
- How to demonstrate the quality of information
- National legal frameworks – large variety from country to country



Opportunities

- Building trust
- Business models, Smart investment
- Making more data, metadata available
- Technology impact (big data, IoT, AI, etc.)
- Education and training


Thank You
WCRP
World Climate Research Programme
WMO
IOC
ICSU
International Council for Science
www.wcrp-climate.org
You Tube

WCRP SWOT Summary

STRENGTHS
- Active global science community collaborating toward common goals
- Excellent reputation and legitimacy (long history of global leadership) and strong co-sponsor backing
- Global research products
- Participation of leading scientists – strong scientific expertise

WEAKNESSES
- Overly complex structure
- Lack of clarity of focus/vision and boundaries
- Insufficient funding – complex and competitive
- Ineffective communication, successes not well showcased
- Not well connected to National Research Programmes, funding agencies, services etc. – requires global travel
- Reliance on voluntary efforts

OPPORTUNITIES
- Climate important to societal questions, particularly climate change
- Benefits (funding, in kind) associated with closer collaboration with operational agencies, international programs, etc. (stakeholders)
- Leadership needed to capitalize on new technologies
- Many emerging areas of research

THREATS
- Budget cuts and inefficient funding - leading to demotivation of volunteers/community
- Organizations with overlapping or perceived as overlapping mandates
- Fast-changing and reactive political landscape
- Perception that fundamental climate science is 'done' - reduction in support for fundamental science - perceived as irrelevant

26 September to 12 November 2017, 49 responses

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Vision and Mission

- **Vision**

A world that uses relevant and authoritative climate science to ensure a resilient present and sustainable future for humankind.

- **Mission**

The World Climate Research Programme (WCRP) coordinates and guides international climate research to develop, share and apply the climate knowledge that contributes to societal well-being.

WCRP addresses aspects of climate science that are too large and too complex to be tackled by a single nation, agency or scientific discipline. Through international science coordination and successful partnerships, WCRP leads the way in understanding the fundamentals of the climate system and in determining its interactions with human activities. WCRP research provides the climate science that underpins the United Nations Framework Convention on Climate Change and contributes to the 2030 Agenda for Sustainable Development and the Sendai Framework for Disaster Risk Reduction.