



# WORLD CLIMATE RESEARCH PROGRAMME



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WCRP Secretariat

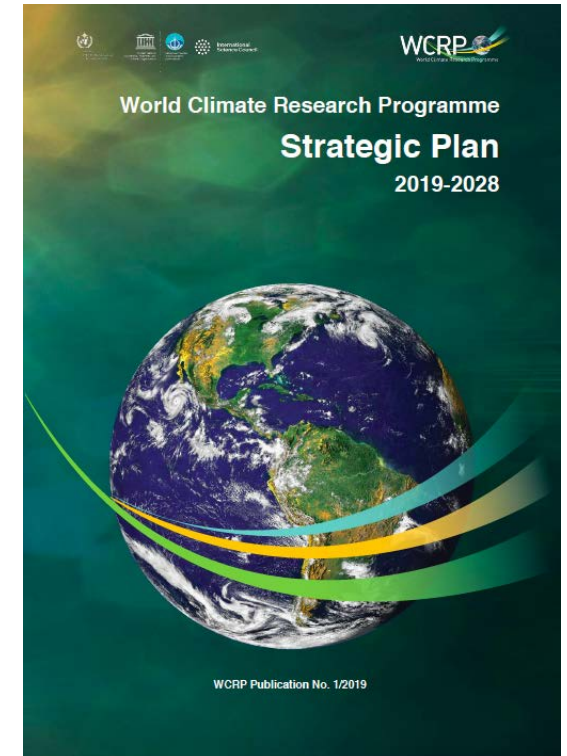
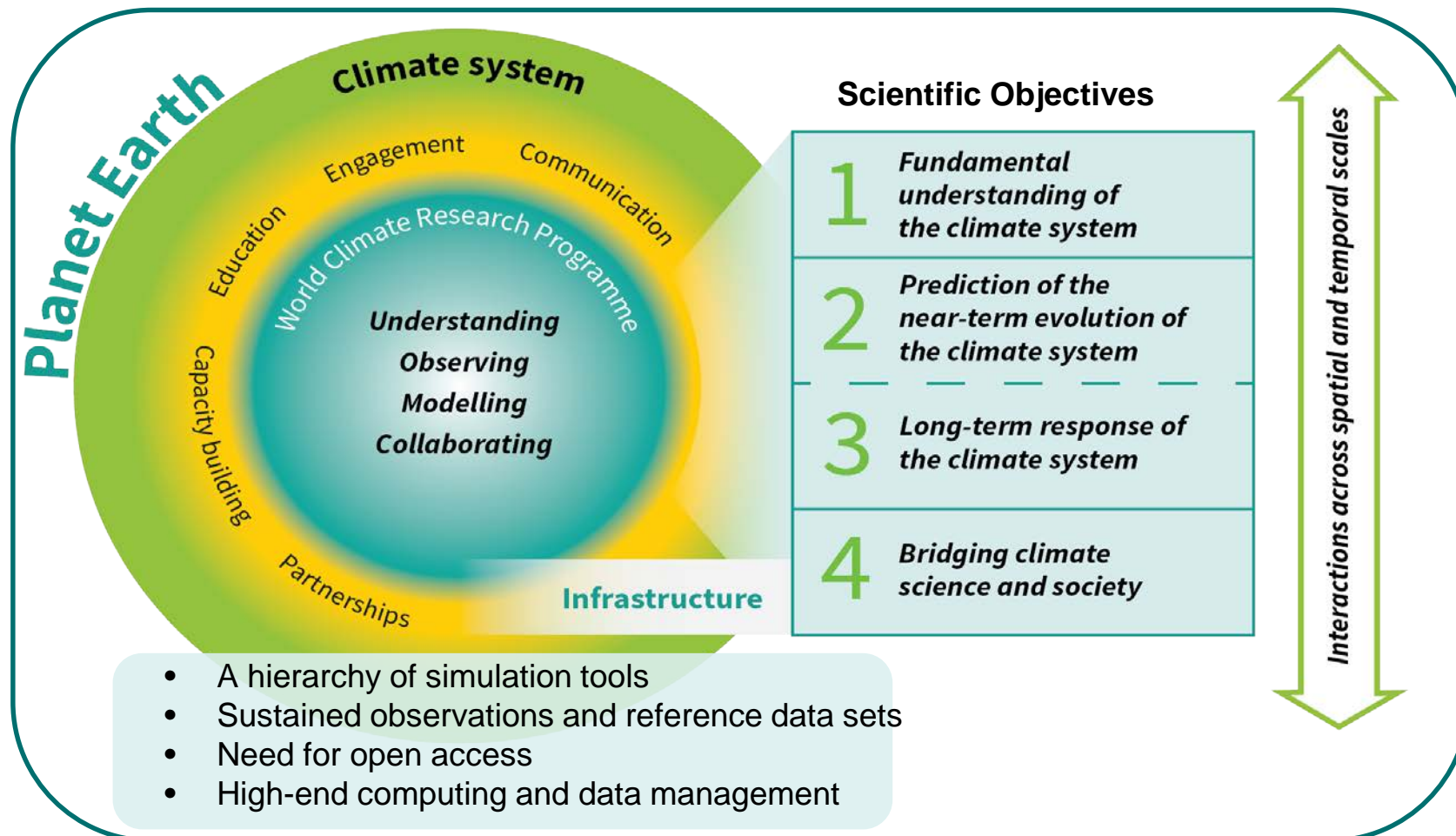


International  
Science Council



# WCRP's Strategic Plan for this decade

**WCRP's Mission** (*purpose*) is to coordinate and facilitate international climate research to develop, share and apply the climate knowledge that contributes to societal well-being



# WCRP Structure and Science

## WCRP Structure



Joint Scientific Committee (JSC)

WCRP Secretariat

Lighthouse Activities

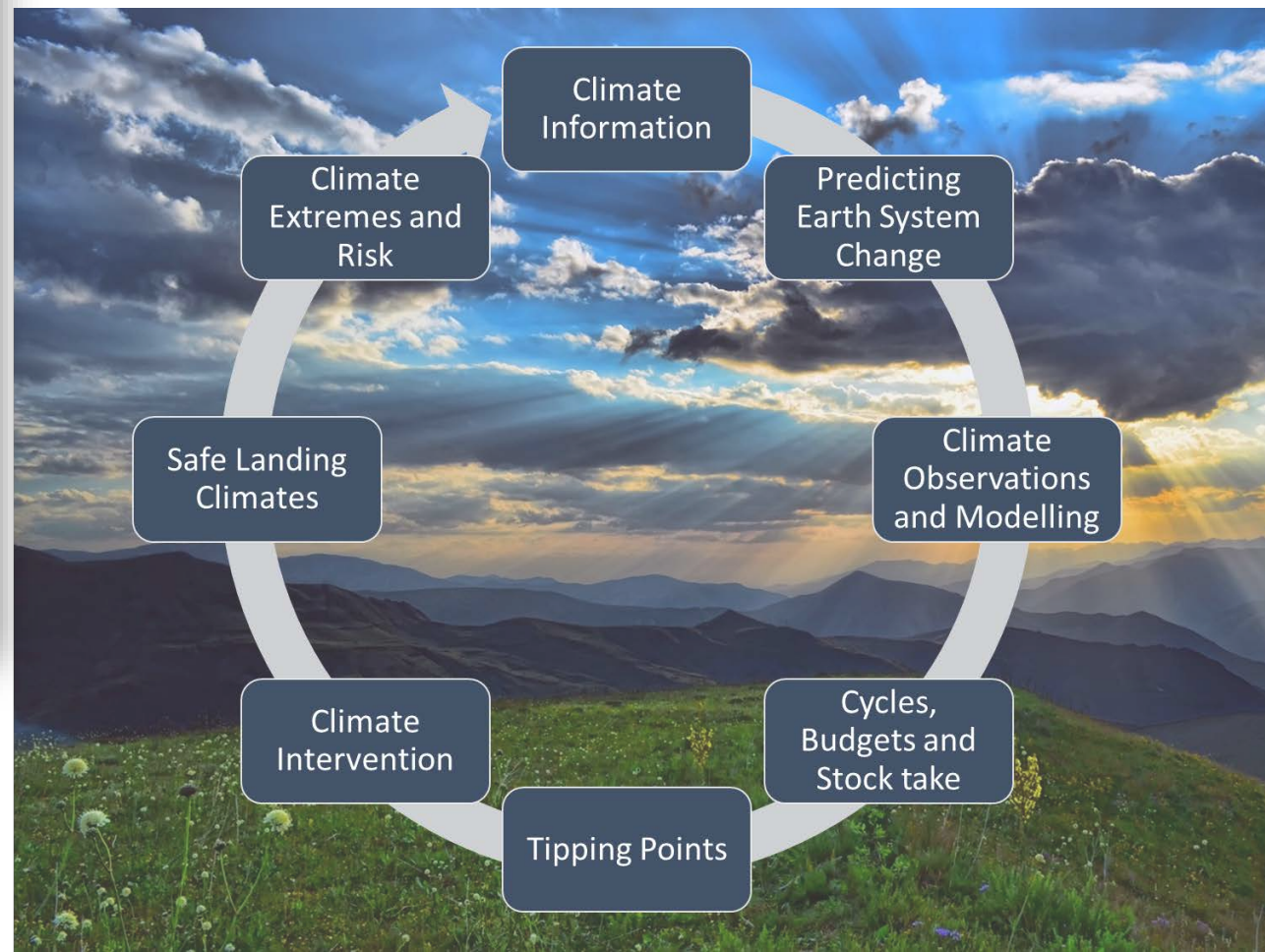
International Offices

### Core Projects and Research Communities

- Climate and Cryosphere (CLIC)
- Global Energy and Water Exchanges (GEWEX)
- Climate and Ocean Variability, Predictability and Change (CLIVAR)
- Stratosphere-troposphere Processes And their Role in Climate (STRAT)
- Earth System Modelling and Observations (ESMO)
- Regional Information for Society (RIFS)

### Ongoing Activities and Forums

- Fixed-term projects
- Conferences and workshops
- Reference datasets, evaluations and benchmarking
- Diversity and capacity building: ECRs, regions
- Rapid updates, syntheses, assessments, gap analysis
- Communications and outreach



# WCRP Lighthouse Activities

Major and new scientific approaches, technologies, and institutional frameworks required to meet society's need for robust and actionable climate information

My Climate Risk

Explaining and Predicting Earth System Change

Digital Earths

Safe Landing Climates

WCRP Academy



Design and deliver an integrated capability for observing, explaining and providing early warnings of Earth System Change - multi-annual to decadal timescales.

Digital, dynamic representation of the Earth system, blending models and observations to explore past present and future states.

New frameworks for assessing and explaining regional climate risk, so as to deliver climate information that is meaningful at local scales.

## Explaining and Predicting Earth System Change

**My Climate Risk**

**Digital Earths**

Routes to climate-safe landing 'spaces' for human and natural systems, multi-decadal to millennial timescales; connecting climate, Earth system, socio-economic sciences and pathways to SDGs.

**Safe Landing Climates**

**WCRP Academy**

Determine climate research education needs; build enabling mechanisms by working with WCRP core activities and education providers, incl. universities.

# New Topic: Climate Intervention

*Climate Intervention - the deliberate large-scale manipulation of the planetary environment to counteract anthropogenic climate change*

- CDR: Carbon Dioxide Removal: *The removal and long-term sequestration of CO<sub>2</sub> from the atmosphere in order to reduce global warming*
- SCI: Solar Climate Intervention: *Not a solution to anthropogenic climate change; but more research is needed to understand feasibility and especially impacts*

A WCRP **Task Team** is:

- **Assessing** current research in CDR and SCI – both internal and external to WCRP – where should WCRP to engage?
- Determining the **value** WCRP could add to existing research efforts, identifying research gaps that WCRP could help fill.
- Identifying **partners**, including other international research programs required for transdisciplinary research.

And will provide Recommendations to the JSC by late 2022



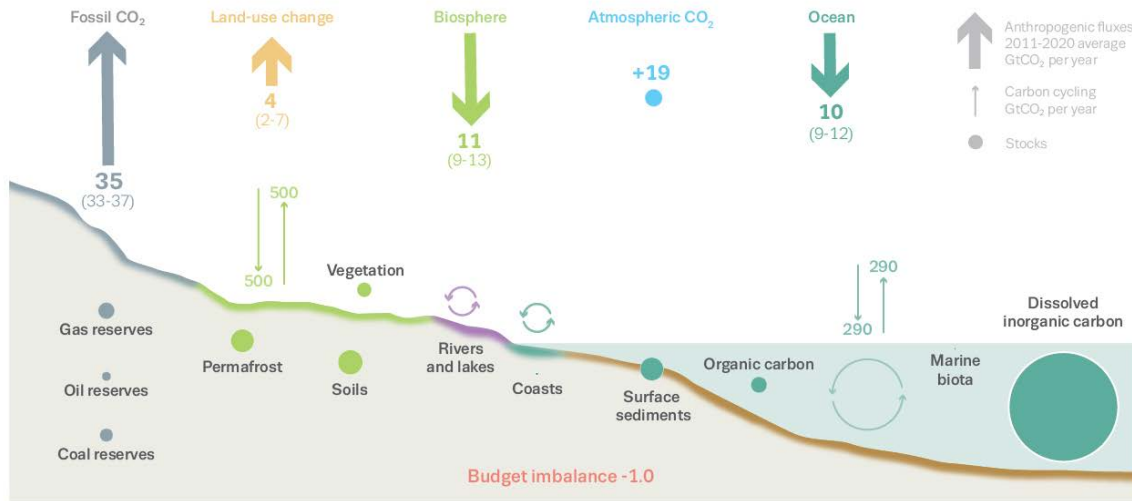
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# New Topic: Understanding Linked carbon, energy and water cycles

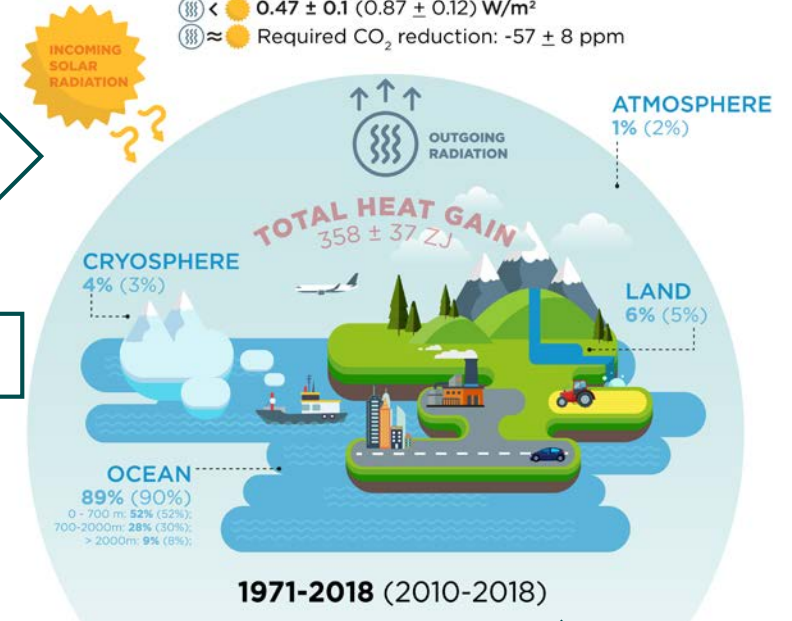
## Carbon Cycle



## Energy Cycle

### EARTH ENERGY IMBALANCE :

$\odot < \odot$   $0.47 \pm 0.1$  ( $0.87 \pm 0.12$ ) W/m<sup>2</sup>  
 $\odot \approx \odot$  Required CO<sub>2</sub> reduction:  $-57 \pm 8$  ppm

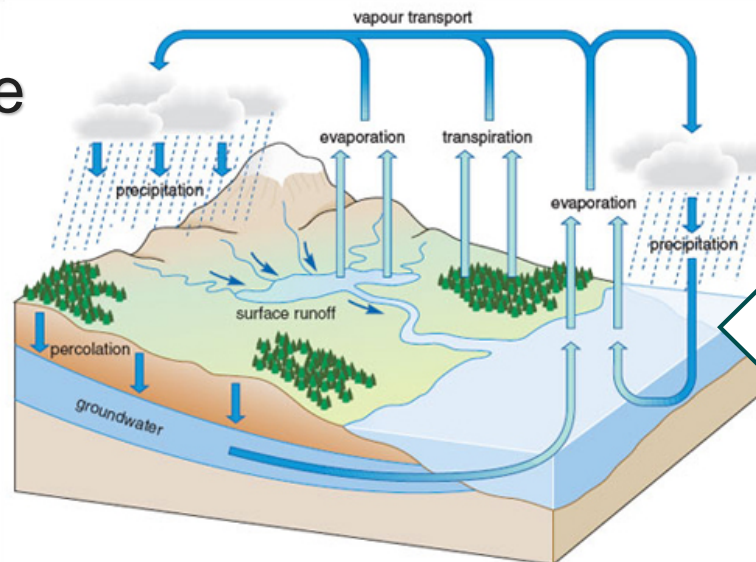


Radiative Forcing

Oceanic Circulation

## Water Cycle

Photosynthesis/respiration  
Plant transpiration



Evaporation  
Condensation

# New Topic: WCRP GPEX

- *Tiger Team* prepared a white paper for a *Global Precipitation Experiment (GPEX) Implementation Plan*
- Led by Xubin Zeng (GEWEX co-chair); includes representation from USGCRP.
- White paper proposes how GPEX will best fit within the WCRP structure and how it will be supported, as well as the need for a Scientific Steering Group
- Should support establishment of global and regional precipitation databases, multi-model databases, national and/or regional activities (e.g., Andex, AsiaPEX, African Precipitation initiative with START...), capacity development etc.
- Proposed International Year of Precipitation and Decade of Water to be launched in Kigali.
- Will require many partnerships e.g., the World Weather Research Programme, START, satellite agencies ...



# Other Strategic Activities

- Workshop on future of climate modeling: May 2022  
Report and recommendations/publication in preparation.
- Workshop with GCOS on budget and cycles: spring 2023  
Understanding involved processes and identify needed obs.
- Workshop with IPCC WG 1, 2, 3 on gaps in climate knowledge TBC
- New Science and Implementation Plan will be out for partner comments towards the end of the year...

# WCRP Open Science Conference 2023



**WORLD CLIMATE  
RESEARCH PROGRAMME**  
**OPEN SCIENCE  
CONFERENCE**  
**23 - 27 OCT 2023 | RWANDA**

## Advancing climate science for a sustainable future

An opportunity to celebrate achievements, work with partners, and launch new initiatives

**Theme 1: Ac**  
Showcasing pr  
system, and ac

**Theme 2: H**  
Analyzing key  
identifying risks

**Theme 3: Co**  
Connecting sci

Meet with us in remarkable Rwanda in 2023.  
We look forward to welcoming you, virtually or in-person, at  
the Kigali Convention Centre.



<https://wcrp-osc2023.org/>

Additional slides (if needed)

# WCRP's Four Ongoing Core Projects

## ***CLIVAR - Climate and Ocean Variability, Predictability and Change***

Describe, understand and model the dynamics of the coupled climate system, emphasizing **ocean-atmosphere interactions** and **identify processes** affecting climate variability, change and predictability across all time scales.

[www.wcrp-climate.org/clivar](http://www.wcrp-climate.org/clivar)



## ***GEWEX - Global Energy and Water Exchanges***

Understanding the Earth's **water cycle and energy fluxes** at and below the surface and in the atmosphere, through observations, process studies and modelling.

[www.wcrp-climate.org/gewex](http://www.wcrp-climate.org/gewex)



## ***CliC - Climate and Cryosphere***

The **cryosphere and its interactions with the global climate system** - encouraging collaboration, highlighting emerging issues, recommending research directions.

[www.wcrp-climate.org/clic](http://www.wcrp-climate.org/clic)



## ***SPARC - Stratosphere-troposphere Processes and their Role in Climate***

Using knowledge of **the atmosphere** to understand how **atmospheric chemical and physical processes** interact with Earth's climate system.

[www.wcrp-climate.org/sparc](http://www.wcrp-climate.org/sparc)



# Two New Core Projects

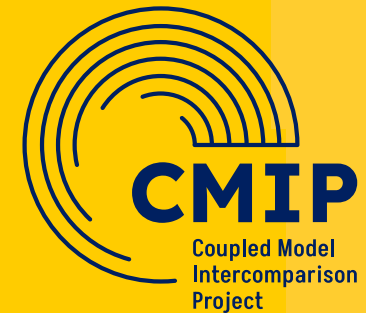
## ***ESMO - Earth System Modelling and Observations***

→ Science and technologies for modelling, observations and model – data integration

→ Unite and strengthen the Working Groups on:

- Coupled Modelling (WGCM) incl. CMIP (CMIP & Infrastructure Panels)
- Numerical Experimentation (WGNE)
- Sub-seasonal to Interdecadal Prediction (WGSIP)

[www.wcrp-climate.org/esmo-overview](http://www.wcrp-climate.org/esmo-overview)



## ***Rifs - Regional Information for Society***

→ Includes CORDEX (science and applications of regional climate downscaling)

→ Coordinating and advancing WCRP's Climate Extremes research

→ Science and capability needed to provide societally-relevant climate information for regions.

[www.wcrp-climate.org/rifs-overview](http://www.wcrp-climate.org/rifs-overview)



# Thank You

