



WORLD CLIMATE RESEARCH PROGRAMME

41st Session of the WCRP Joint Scientific Committee

Detlef Stammer and Helen Cleugh (WCRP JSC Chair and Vice Chair)



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Session 2: WCRP Strategy Implementation and Transition

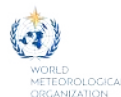
1. Report on Progress and Discussion on Way Forward
[60 mins]:
 - Update on Implementation Process (Detlef and Helen) including WCRP 40th Science Week, Hamburg High-level Science Questions and Flagship Workshop, and next steps/way forward
2. Discussions on WCRP structure and elements
[70 mins] (Detlef and Helen)

Duration: 2.5 hours with a break after the first hour

Chair: Helen

Rapporteur: Narelle

Chat Moderator: Mike



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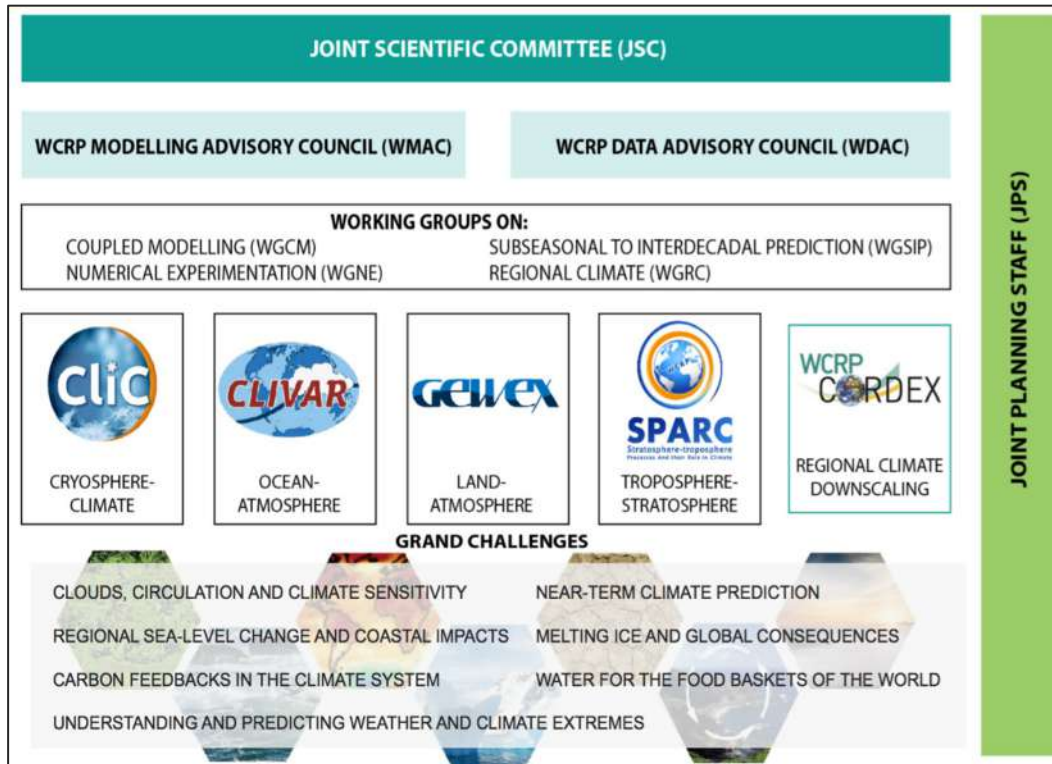


CURRENT WCRP STRUCTURE

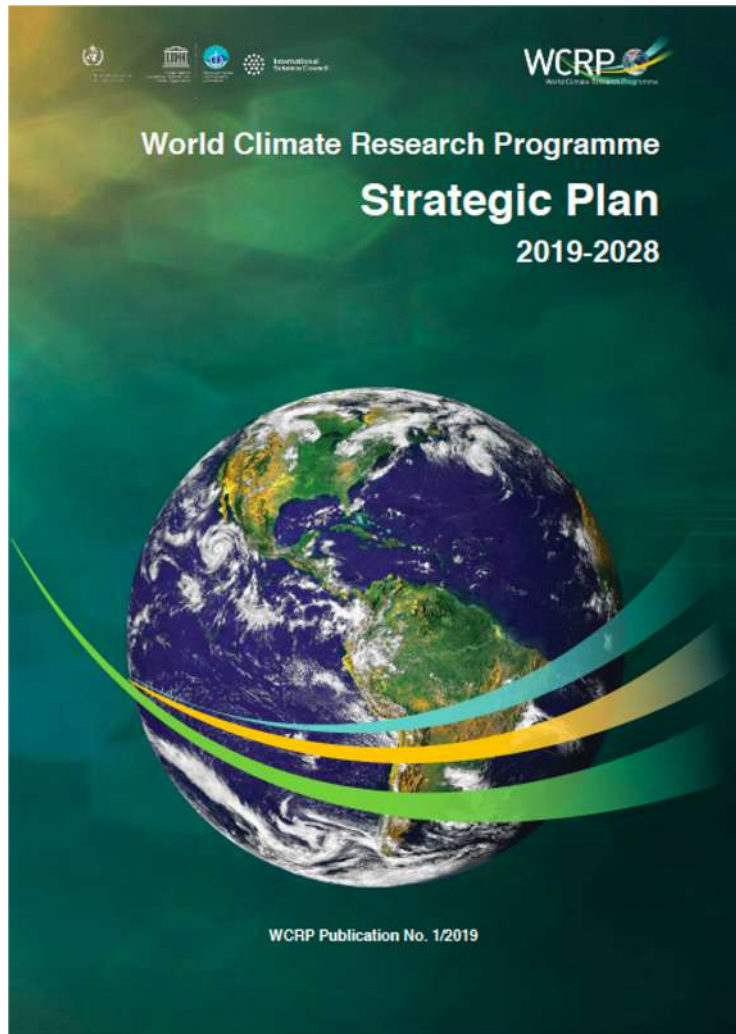
The WCRP Review:

- Unwieldy, complex and confusing.
- Core Projects stuck in the past?
- Where is whole system approach?
- Where is next generation model development?
- Where is the pathway to climate services?
- **Where is climate change?**

CURRENT STRUCTURE IS NOT THE STRUCTURE FOR THE FUTURE

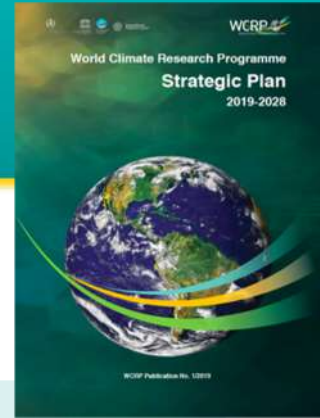


The future of WCRP



WCRP Strategic Plan 2019 - 2028

The new WCRP Strategy

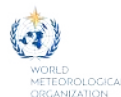


The Vision (*our aspiration*)

A world that uses sound, relevant, and timely climate science to ensure a more resilient present and sustainable future for humankind.

The Mission (*what we do, our purpose*)

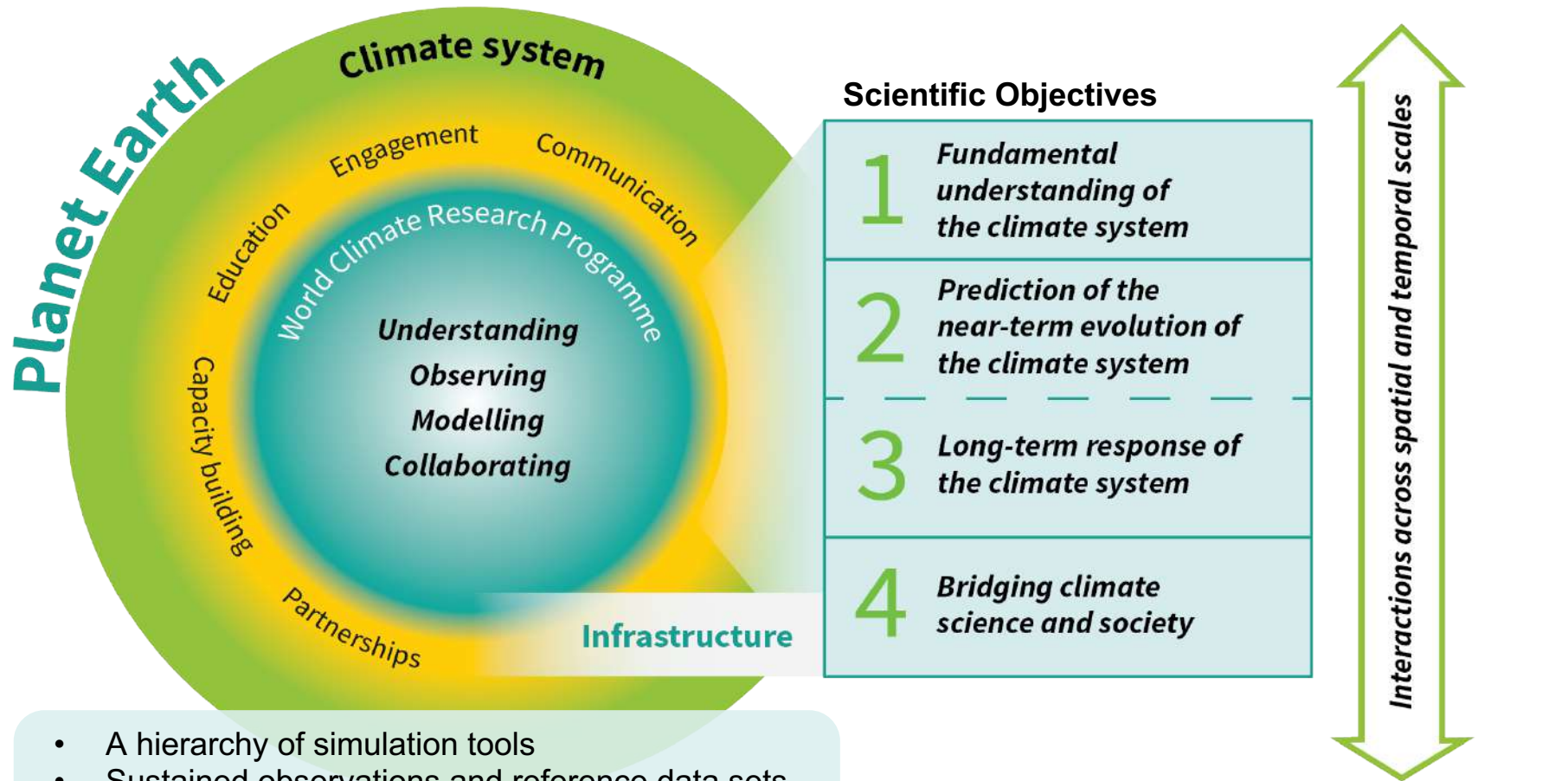
Coordinate and facilitate international climate research to develop, share, and apply the climate knowledge that contributes to societal well-being.



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WCRP Strategic Plan: Overview



- A hierarchy of simulation tools
- Sustained observations and reference data sets
- Need for open access
- High-end computing and data management

Implementation Plan: Roadmap

Initial planning and conceptualizing

Implementation and Transition Meeting and 40th Session of the Joint Scientific Committee (JSC-40)

May 2019

Consolidation:

- Questions and framework
- Partner & stakeholder consultation
- Funder and sponsor consolidation

Task Team Meetings

AGU: Community consultation of WCRP Framework
December 2019

Agreement on Implementation Plan Phase 1:

- Science questions and conceptual framework
 - Key elements for delivery and engagement
 - Science, funding and infrastructure needs.
- JSC-41

April 2020

"Elements" Workshop:

Finalize Phase 1
Brainstorming for Phase 2
March 2020

Science Questions Workshop:
February 2020

Consultation regarding new structure and governance

Decision on Phase 2 and beginning of transition (JSC-42)
April 2021

Synthesis of core activities

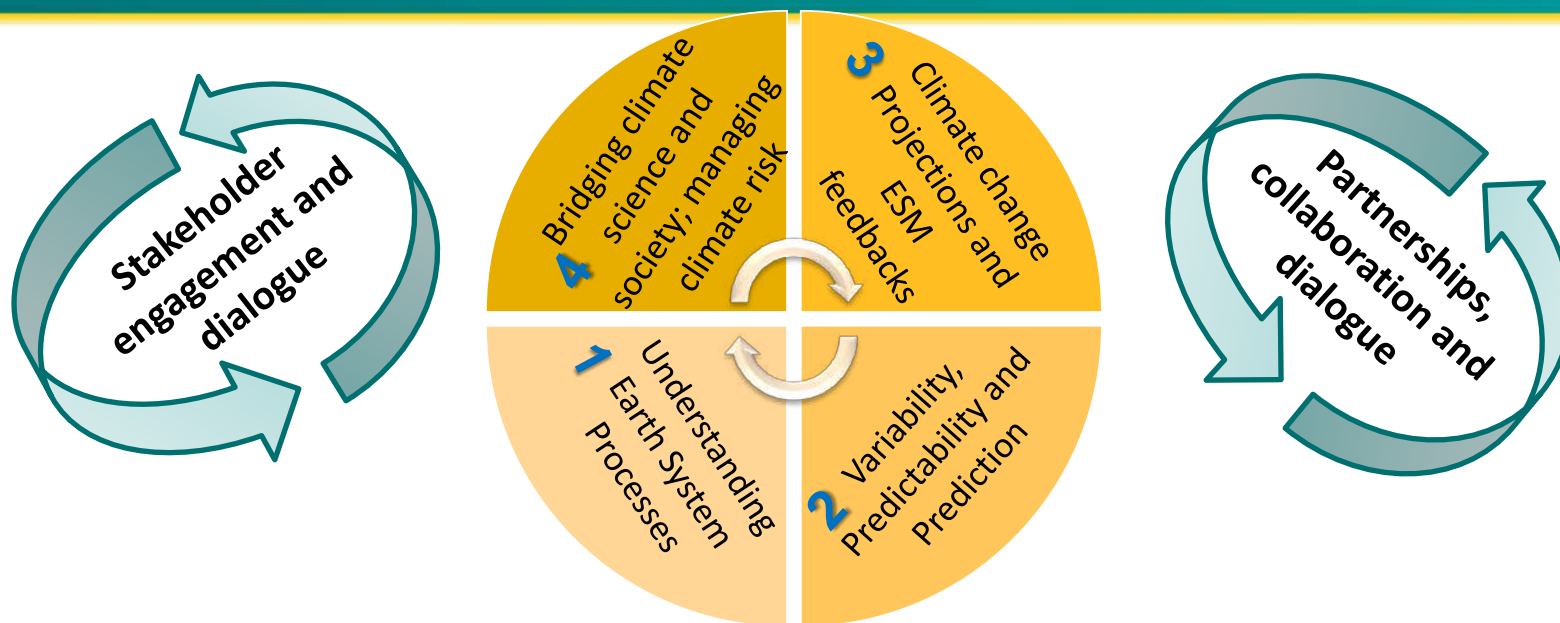
Transition

Agreement on Implementation Plan Phase 2 (JSC-43)

April 2022

WCRP Mission: to coordinate and facilitate international climate research to develop, share, and apply the climate knowledge that contributes to societal well-being

[Partnerships] Links to sustained observing systems (e.g. GCOS)



Science Questions: Relevance, Innovation, Discovery, Integration

Function: Integration across Earth System (Local to Regional to Global)

Earth System Model Development | Observing system innovation and evaluation | Model – Data fusion
Fora and services for Capacity development, Education, Community building

Function: Infrastructure

Simulation tools | Seamless data | Sustained obs. | High-end comp.; data storage & management |
Platforms for open access, data sharing, collaboration

**Climate
System
Elements**

Function: Enduring capability and Link to science communities

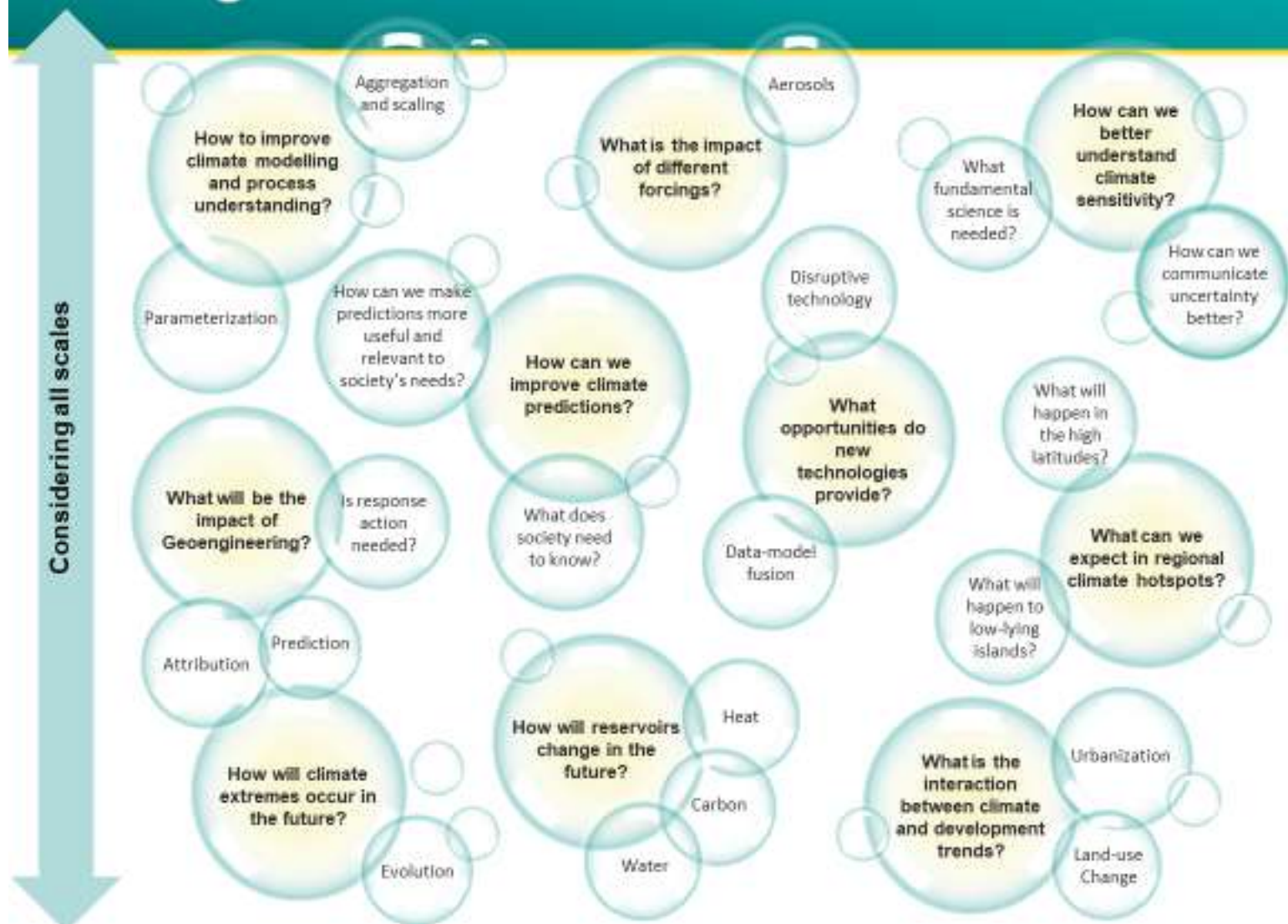
Water, Energy, Composition, Dynamics, (Biosphere)
Ocean, Atmosphere, Cryosphere, Land

**Regional
and
Global**

[Partnerships] Coordinated Model Experiments and Assessments | Production | Evaluation

From JSC-40: Science Questions

High-level Science Questions are central



WCRP Task Teams Recommendations

Task Team on Seamless Data and Data Management

Task Team on Modelling and Computing Infrastructure

A few of the recommendations:

- Coordinate and support modelling, observations, reanalyses better across WCRP
- Develop a holistic approach for data management
- Define a clear path between research and operations to facilitate provision of climate change data and information
- Explore new technologies - machine learning, exascale computing, data mining

*Full discussion on recommendations:
Day 2 Session 3 of JSC-41
See also online Report*



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WCRP Task Teams Recommendations

Task Team on Regional Activities (Interim Report)

Interim recommendations:

- Establish a new WCRP coordinating element or structure on regional activities
- Implement Frontiers of Climate Information (FoCi) projects to support the generation and delivery of decision-relevant information and knowledge for regions.
- Draw on IPCC AR6 (regional chapters) to identify gaps and research questions critical to regions

*Full discussion on recommendations:
Day 2 Session 3 of JSC-41
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WCRP Climate Science Week

Selected messages:

- There is a need for coordination across WCRP communities (data, models, approaches)
- We are getting overwhelmed with data...machine learning (big data, artificial intelligence) can help
- We need to deal with model accuracy and systematic errors and find ways to contextualize and communicate these to the public and to stakeholders
- WCRP could make a difference by pulling the community together for large-scale field experiment to address a fundamental knowledge gap

See full report online



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WCRP Climate Science Week

Selected messages:

- There is room for closer cooperation between research and operations
- To co-design a climate service we need to involve the end-user at the very beginning of the process – and keep the user involved!
- Developing nations need to be at the table in initiating, maintaining and producing big science programs
- In order to guarantee long-term sustainability of climate knowledge, we need to educate the next generation

See full report online



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Implementing the WCRP Strategy

WCRP will prioritize its science and implement its Strategy by pursuing a series of Lighthouse Activities, along with other core research activities, to deliver and achieve critical Outcomes over the next decade



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Continuing the Path towards Implementation ...

First stop: Hamburg Workshop on high-level science questions:
*WCRP High-level Science Questions and Flagship Workshop,
Hamburg, 24-26 February 2020*

- **Specific Goal: Prioritize WCRP science** that will enable rapid progress towards providing societally-relevant climate information:
 - a. **“Lighthouse Activities¹”** that go beyond the capacity of an agency or nation and that will make critical near-term progress towards WCRP achieving its Vision, Mission and four Scientific Objectives
 - b. **“Implementation Priorities”** that will help the implementation of the WCRP Strategy by prioritizing the science needed for robust and actionable regional to local climate information, to support e.g. implementing SDGs; and informing climate adaptation and mitigation (incl. climate intervention)

1: Major experiments, high-visibility projects, or infrastructure building blocks

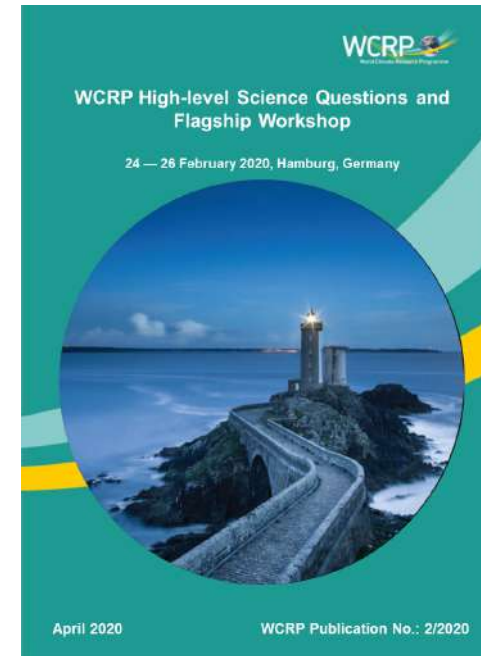


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Note of Caution

- **LHA titles** are draft “placeholders” for now.
- These titles did resonate with many; but this was not universal or unanimous.
- It will be part of our implementation process to review and revise these titles.
- For now we will continue to use them.



Proposed Lighthouse Activities

**Explaining and
Predicting Earth
System Change**

My Climate Risk

**Safe Landing
Climates**

WCRP Academy



Digital Earths

**These draw on WCRP's fundamental science, critical
infrastructure and strategic partnerships**

**Provisional
Names**

Explaining and Predicting Earth System Change

Objective: To design, and take major steps toward delivery of, an integrated capability for quantitative observation, explanation, early warning and prediction of Earth System Change on global and regional scales, with a focus on multi-annual to decadal timescales.

Core Activity: A research programme to:

1. Design, improve and evaluate individual components of the capability and the integrated capability itself.
2. Advance fundamental understanding of Earth System Change on global and regional scales.

Outcome: An integrated capability with significant input from WCRP with an Earth Year and Earth Observation decade as a focus.

- Advancement of methods (e.g. reanalysis).
- Improvement of predictions and confidence in these.
- Development of new capabilities for quantitative observation, explanation, early warning and prediction of Earth System Change.
- Improved capabilities for quantitative assessment of the global energy, water and carbon budgets to underpin climate mitigation policies.

My Climate Risk

Objective: To develop a new framework for assessing and explaining regional climate risk to deliver climate information that is meaningful at the local scale.

Core Activity: It will involve several case studies, in the form of labs; where labs are understood to be dynamic, exploratory, transdisciplinary environments, and not physical infrastructure, including providing a forum for bringing together relevant and interested stakeholders and partners. Examples include evaluation of different national or regional climate risk assessments and region-specific risk assessments.

Outcome: It will develop a new way of practice to synthesize climate information and will lead to production of consolidated regional climate information, global capacity exchange and guides on best practice.

Safe Landing Climates

Objective: To explore the routes to climate-safe landing 'spaces' for human and natural systems, on multi-decadal to centennial timescales, connecting climate, Earth system and socio-economic sciences. Explore present-to-future “pathways” for achievement of key SDGs.

Core Activity: A global research activity that will plan, encourage and coordinate relevant activity across the world; communicate and disseminate key findings; and facilitate user-oriented climate safe-landing tools.

Outcomes:

- a. New climate/Earth system models to investigate how risks of climate instabilities, extremes, and irreversible transitions might affect society/natural systems, including feedbacks, in the long term.
- b. Knowledge and tools to explore future scenarios and impact on climate and SDGs from global to regional scales.
- c. Information for global society on sustainable pathways, including “climate-proofing” these.

Digital Earths

Objective: To develop a digital and dynamic representation of the Earth system, optimally blending models and observations, to enable an exploration of past, present and possible futures of the Earth system.

Core Activity: A joint activity with existing/novel, technology driven national and international projects supported by new institutions. External institutions will provide the main digital infrastructure and WCRP will implement selected versions for topics where significant progress is required.

Outcome: Generic software-hardware solutions that allow simulation models and data assimilation to perform several orders of magnitude more efficiently. It will facilitate the extraction of Earth-system sector specific information from vast amounts of environmental data and allow exciting new ways of accessing and using climate data and information.

WCRP Academy

Under construction – we are currently forming a small team who will scope this lighthouse activity

Objective: To establish one or more targeted capacity exchange climate programmes, working with one or more of the other lighthouses and established climate education providers, including universities.

Core Activity: It could be online or face-to-face and it could be global or focussed on a particular region.

Outcome: Ultimately it will ensure that all regions of the world have the knowledge and information needed to address the challenges and take advantage of the opportunities of a changing climate.

Implementation Priorities

1. ***Foster and deliver the scientific advances and future technologies required to:***
 - *Advance understanding of the multi-scale dynamics of Earth's climate system*
 - *Quantify climate risks and opportunities*



Implementation Priorities

2. Develop new institutional and scientific approaches required to:

- *Co-produce cross-disciplinary regional to local climate information for decision support and adaptation*
- *Inform and evaluate mitigation strategies*



Alignment between Lighthouse Activities, Implementation Priorities and Scientific Objectives (DRAFT *still under construction*)

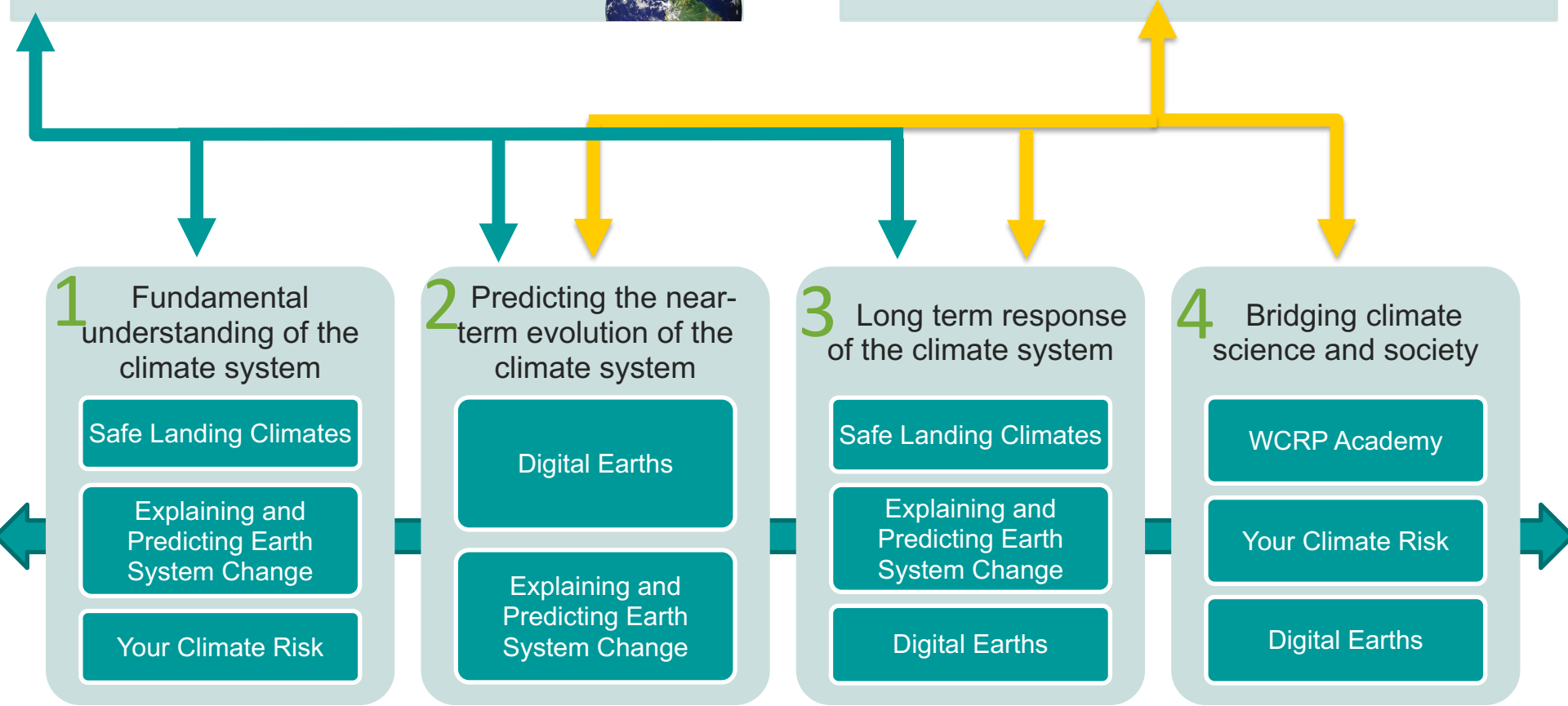
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Continuing the Path towards Implementation ...

- **Next stop: Workshop in Washington DC, end of March, 2020**
- **Goal: Identify structure and elements** that will facilitate and enable WCRP's delivery of these scientific advances
- **Plus community consultation and consolidation ...**



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Initial planning and conceptualizing

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JSC-41

April 2020

"Elements" Workshop:

Finalize Phase 1
Brainstorming for Phase 2

Coronavirus Disease (COVID-19)

February 2020

Consultation regarding new structure and governance

Decision on Phase 2 and beginning of transition (JSC-42)
April 2021

Synthesis of core activities

Transition

Agreement on Implementation Plan Phase 2 (JSC-43)

April 2022

Continuing the Path towards Implementation ...

- ~~Next stop: Workshop in Washington DC, end of March, 2020~~
- ~~Goal: Identify structure and elements that will facilitate and enable WCRP's delivery of these scientific advances~~
- ~~Plus community consultation and consolidation ...~~
- Proposed workshop scheduled to take place in Washington, DC, end of March 2020 had to be canceled.
- **Instead: Several video conferences with CPs and core activity representatives during last weeks.**
- The next slides summarize the “journey so far” post-Hamburg.

Consultation outcomes (1)

- General support for the Lighthouse Activities (LHAs) – **more details are needed**. They will not replace core WCRP activities
- **We need depth of both science and infrastructure – cross boundary coordination and an integrated approach**
- Designing an interface through partnerships and other mechanisms is a good way to provide linkages to diversity in expertise and geography for the LHAs and WCRP science goals
- **Complexity is not necessarily the problem** with our current structure; rather a **lack of clarity and transparency** in our structure that needs to be addressed
- While **WCRP is a global programme**, that doesn't mean we only focus on the global scale. Rather, we must **traverse from global to regional to local scales**

Consultation outcomes (2)

- **A new WCRP structure needs to serve the broader climate science community.** This requires good communication, an integrated view; and will need to be attractive to ECS and funders.
- There may be a role for **regions as the location of "campaigns" to understand regional risk.**
- Why did the Grand Challenges not achieve wide integration across the Programme? Is it a question of scale or communication?
- **Core Project is not the best title**, but GEWEX, SPARC, CliC and CLIVAR do have long-standing brand recognition and buy-in.
- **What do we need to coordinate to add value? No need to coordinate everything, but to make the right connections at the right time**

Possible next steps

1. Thoughts on a new structure
2. Launch of a soft implementation
3. Regional Consultation
4. Creation of a Lighthouse Activity Task Team
 - Task Team description
5. Soft implementation and transition to a new WCRP

Implementation Plan - Elements

Implementation Plan Elements

Research Projects

- Lifecycle (start and end) with a clear timeline and deliverables
- Joint and co-designed with Partners outside WCRP
- Deliver to Strategic Plan Objectives
- WCRP attributes: Integration; Scale; Relevance; Climate Change; Discovery and Innovation

Jointly through
dialogue and
co-design

Conferences, Workshops, WCRP Forum

Enduring capability - people:
Climate System Elements
Infrastructure and Integration

Projects and fora to engage and empower ECRs; and regional partners: part of the WCRP family

Regular Syntheses, Assessments, Gap Analyses Rapid Assessments and Reports

Reference data sets (observed, modelled)

Evaluations, Inter-comparisons, Benchmarking, Standards

Coordination

Educational services and activities

Stakeholder engagement and outreach

Capacity building and communication

Thoughts on a new structure (1)

- It is important to create a “home” for the **enduring capabilities**.
 - This function is currently served by the **Core Projects**
 - **Regional information and infrastructure** (models, observations, data, model – data fusion) also need a home.
- This should proceed in parallel with the task of **agreeing on the Lighthouse Activities**, and developing and **implementing their science plans** as well as introducing other project-type activities
- One option could be the following “homes”:
 - Current Core Projects
 - Plus two new homes: *Regional Climate Information for Societies* and *Earth System Modelling and Observational Capabilities*.
- There needs to be a **science and/or technical driver** that focuses and guides the modelling and observational efforts and gives clear purpose and goals. CMIP is a good example of this.

Thoughts on a new structure (2)

- It is possible that some of the Core Projects could/should merge to assure better coverage of topics/expertise and less duplication.
 - In any case: **Core Projects are keen to review their current structure and scope and reflect on what changes might be needed so that they continue to be optimal**
- We need to find a different name to “Core Projects” for these “homes”.
- Each “home” needs an IPO (international project office) to manage the workflow, and provide administrative support and coordination, within the “home” and across WCRP.
- We also must think about how the work in the LHAs will be organized; potentially the IPOs of the “homes” could play a key role in providing support for this.

Regional Consultation

ACTION: Put the necessary steps in place to “roll out” the regional consultations on WCRP evolution.

- There needs to be an identified regional “lead” to make it happen; i.e. establish the process, establish a team from across the JSC/WCRP family to be the local leads, etc.
 - It is intended to draw upon the networks of JSC members, current WCRP Core Projects and core activities, and also YESS
- Chair and Vice Chair to attend these regional consultations to provide a consistent message
 - A package of materials will be developed to support these consultations
- Outcome: consultation outcomes will refine the Lighthouse Activities, their research program as well as the thinking process about WCRPs future structure.

Lighthouse Activity Development Task Team

ACTION: Create a Task Team (TT) with a mandate to put the “flesh” on the Lighthouse Activity (LHA) “bones”, including consideration of: What do we need, what is missing?

- **Membership:** WCRP core activities to propose names from their membership to join this, along with those who originally wrote the LHA proposal text.
- **Key Steps (see also next slide):**
 - The TT will develop a potential plan and then report back to the core activity leads and JSC.
 - The LHAs then will evolve in an iterative way, with the JSC and core activity leads taking on the responsibility of carrying the process forward to next levels.
 - Importantly this will include brainstorming about external engagement and exploring partnerships.

Lighthouse Science Plans

ACTION: Groups identified by the TT for each LHA are charged with the task of co-designing and co-developing Lighthouse science plans. These Groups are called LHA Science Teams

- **Membership:** Representatives from the LHS core team, plus those identified by the TT and appointed by the JSC. This should include members from across WCRP and representatives from relevant external partners.
- **Key Steps:** Starting with the original proposals, and drawing on further input and guidance from the LHA TT, these LHA Science Teams will co-develop and co-design full science and work plans across the WCRP and with key partners and stakeholders.

Tasks of the Lighthouse Activity Science Teams

For each LHA, Science Teams will provide a detailed plan that includes:

1. The LHA Objective
2. Scope of the activity
3. Scientific research to be undertaken
4. Science knowledge and/or technical gaps or constraints that need to be resolved
5. Partnerships needed
6. Management, communication and outreach plans
7. Timeline
8. Science and infrastructure contributions from activities within and outside the WCRP
9. Performance indicators
10. Main outputs

NB: Guidance will be provided for this plan; including key headings, a draft template, and a timeline for the development of the Science Plan.

Launch of soft implementation (1)

- **Core Projects** to undertake a review of all current **Core Projects**, individually and across all, in terms of optimal “fit-for-purpose” structure and role for the future WCRP.
- Undertake a **brainstorming session with the WGs and Panels** to discuss what future vision they would craft if the WCRP created two new “homes” for: i) *Regional Climate Information for Societies* and ii) *Earth System Modelling and Observational Capabilities*.
- **Agree and decide** on the new “homes” and arrange IPOs for each [taking into account geography, budget, expertise, funding partners]
- **Agree on the LHAs and flesh out their science activities** (as explained on previous slides) taking account of outcomes from the Regional Consultations.
 - The TT will report back to CPs and the JSC.
- Once that step is completed the **WCRP family will decide whether to officially launch each of the LHAs**.

Launch of soft implementation (2)

1. Start the **transition by the end of 2020**; after an extraordinary JSC meeting late in November that will be attended by WCRP family:
 - a. *Before the meeting*: undertake and complete the required homework
 - b. *At the meeting*: agreeing on:
 - target elements: “homes”, LHAs, short-term research projects, etc ...
 - a plan for moving and transitioning older structures and groups (e.g. where will they move to, what are some key considerations for the transition etc.)
 - c. *After the meeting*: start “sun-setting” older elements, such as the GCs
 - d. *Ongoing*: continue developing details and continuously implement them
 - e. *Ongoing*: continuously develop an Implementation Plan as a living document
2. **Late in 2022: High-level WCRP event celebrating the success of GCs and announcing the new WCRP.**

All guided by the general principle for WCRP’s future structures and activities:

We should put coordination where it is needed to make progress achieve our goals; and not just to do it for the purpose of coordination.

Homework Assignments

- Roll out of the Regional Consultation task
- Create LHA Development Task Team and Science Teams
- Co-design and co-develop full LHA science plans
- Partner and sponsor consultation
- Internal and cross-Core Project consolidation
- Extend the remit of the existing Regional Task Team to further consider, develop and design a *Regional Climate Information for Society* “home”
- After JSC-41 meet with Modeling and Data groups and discuss opportunities for forming an *Earth System Modelling and Data Capabilities* “home”
- Develop PowerPoint slide pack and associated communications materials to support consultation.

Implementation: soft transition from ...

JOINT SCIENTIFIC COMMITTEE (JSC)

WCRP MODELLING ADVISORY COUNCIL (WMAC)

WCRP DATA ADVISORY COUNCIL (WDAC)

WORKING GROUPS ON:

COUPLED MODELLING (WGCM)
NUMERICAL EXPERIMENTATION (WGNE)

SUBSEASONAL TO INTERDECADAL PREDICTION (WGSIP)
REGIONAL CLIMATE (WGRC)



CRYOSPHERE-
CLIMATE



OCEAN-
ATMOSPHERE

GEWEX

LAND-
ATMOSPHERE



STRATOSPHERE-TROPOSPHERE
Processes And Their Role In Climate

WCRP
CORDEX

REGIONAL CLIMATE
DOWNSCALING

GRAND CHALLENGES

CLOUDS, CIRCULATION AND CLIMATE SENSITIVITY

REGIONAL SEA-LEVEL CHANGE AND COASTAL IMPACTS

CARBON FEEDBACKS IN THE CLIMATE SYSTEM

UNDERSTANDING AND PREDICTING WEATHER AND CLIMATE EXTREMES

NEAR-TERM CLIMATE PREDICTION

MELTING ICE AND GLOBAL CONSEQUENCES

WATER FOR THE FOOD BASKETS OF THE WORLD

JOINT PLANNING STAFF (JPS)

to this ...

Joint Scientific Committee

WCRP Secretariat

Lighthouse Activities

Hubs for major experiments, high visibility projects, infrastructure building blocks

Ambitious and exciting

Explaining and Predicting Earth System Change

My Climate Risk

Safe Landing Climates

WCRP Academy

Digital Earths

Ongoing and additional activities and fora

Fixed-term Projects

Conferences and Workshops

Reference datasets, Evaluations, Benchmarking

Diversity- and Capacity-building: ECRs, Regions

Rapid updates, Syntheses Assessments

Communications and outreach

International Offices *(suggestion)*

WCRP Communities, Enduring Capabilities

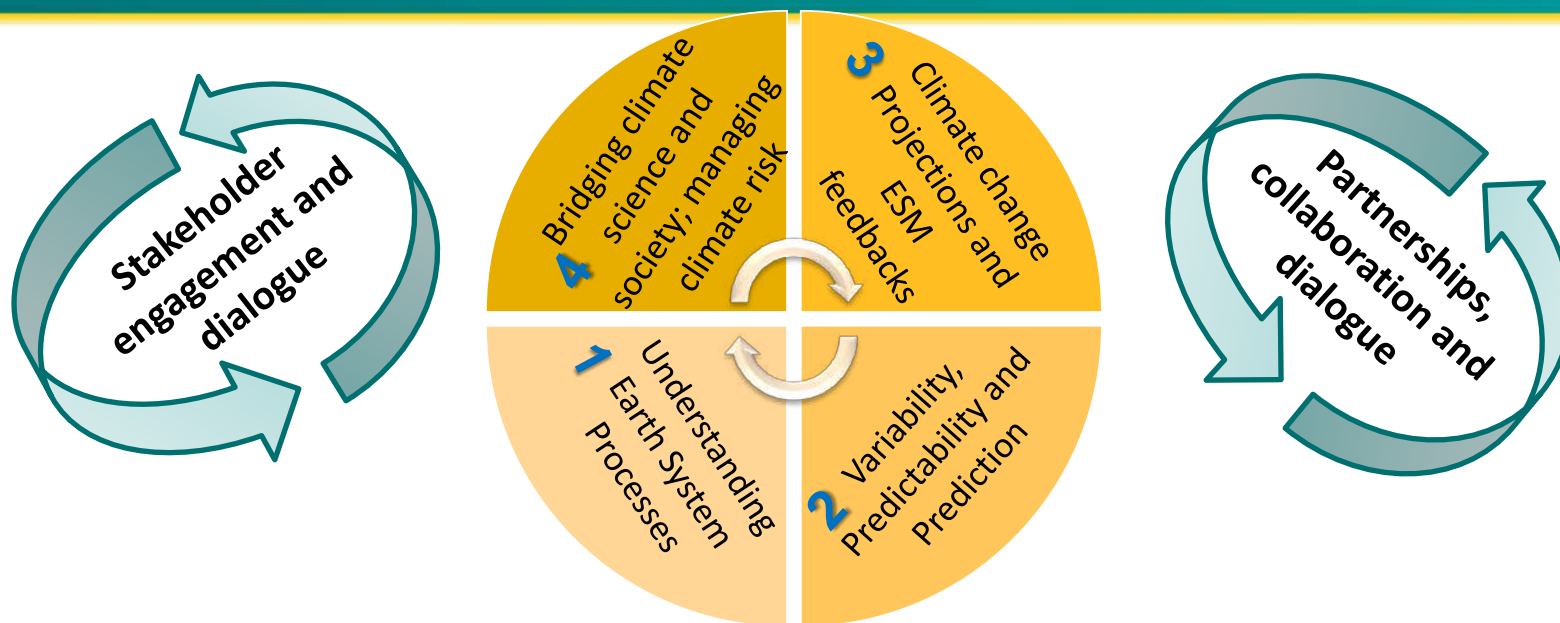
Hubs for expertise

WCRP Core Activities

Modernised and bringing in Model and Data Infrastructure and Regional Climate Information for Societies

WCRP Mission: to coordinate and facilitate international climate research to develop, share, and apply the climate knowledge that contributes to societal well-being

[Partnerships] Links to sustained observing systems (e.g. GCOS)



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**Climate
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Function: Enduring capability and Link to science communities

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Ocean, Atmosphere, Cryosphere, Land

**Regional
and
Global**

[Partnerships] Coordinated Model Experiments and Assessments | Production | Evaluation

High-level Science Questions – from JSC 40

Considering all
scales

How to improve
climate modelling
and process
understanding?

Aggregation
and scaling

What is the impact
of different
forcings?

Aerosols

How can we
better
understand
climate
sensitivity?

What
fundamental
science is
needed?

How can we
communicate
uncertainty
better?

Parameterization

How can we make
predictions more
useful and
relevant to
society's needs?

How can we
improve climate
predictions?

Disruptive
technology

What
opportunities do
new
technologies
provide?

What will
happen in
the high
latitudes?

What will be the
impact of
Geoengineering?

Is response
action
needed?

What does
society need
to know?

Data-model
fusion

What can we
expect in regional
climate hotspots?

Attribution

Prediction

What will
happen to
low-lying
islands?

How will climate
extremes occur in
the future?

Evolution

How will reservoirs
change in the
future?

Heat

Carbon

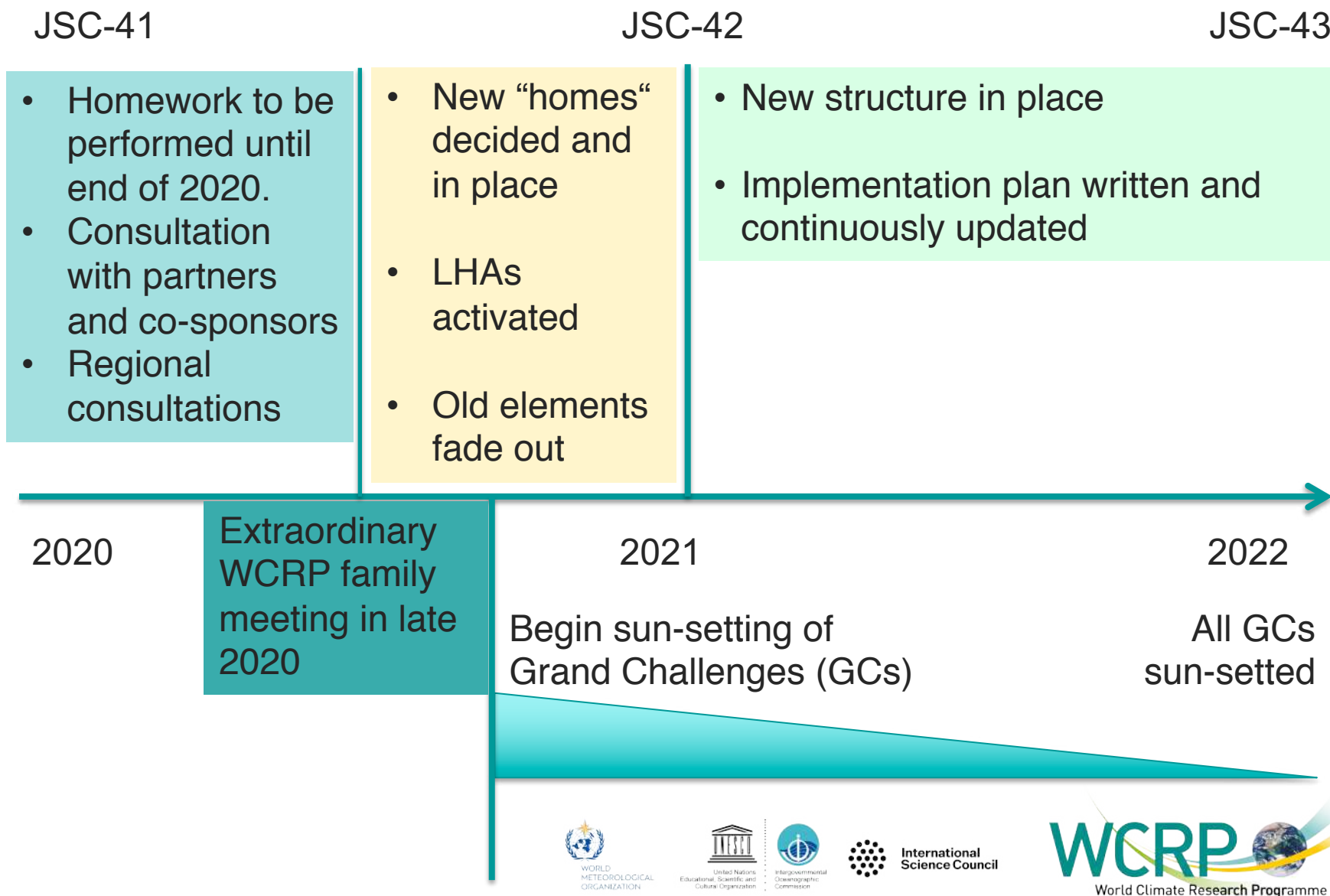
Water

What is the
interaction
between climate
and development
trends?

Urbanization

Land-use
Change

Soft Transition



Session 2: WCRP Strategy Implementation and Transition

End of Session 2



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