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18-22 May 2020, Online



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Action Items

1. Start regional and community consultations with the aim of including developing and other countries in the co-production of the new WCRP. Discussions should include members from regional WCRP communities and funding agencies (JSC and IPO contact points led by JSC Chair and Vice-Chair; Begin immediately with a view to holding first consultations by August 2020).
2. Create a Lighthouse Activity Task Team, to include representatives of the original authors as well as Core Project and Core Activity representatives. Ensure engagement of developing countries, early career researchers and partners as appropriate (JSC Chair and Vice-Chair, JSC Officers; Report back to WCRP Extraordinary Session, late 2020).
3. Core Projects to review and consolidate their structures to ensure efficiency and relevance to WCRP's new strategic directions and draft structure (Core Project Chairs; Report back to WCRP Extraordinary Session, late 2020).
4. Prepare an updated slide set for dissemination of the current thinking on WCRP structure and elements, as at the end of JSC-41 (clearly marked as under discussion) and circulate first to JSC members and then to the WCRP family (JSC Chair and Vice-Chair, WCRP Secretariat, 15 June 2020)
5. Report WCRP leadership election results and procedure to the WCRP Co-sponsors (Officer in Charge, WCRP Secretariat, 5 June 2020)
6. Issue an open call for two JSC members with links to social sciences for the term 1 January 2021 to 31 December 2024 (JSC, WCRP Secretariat, 30 June 2020)
7. Provide WCRP Budget for 2021 at Extraordinary JSC Session or before (Head WCRP Secretariat; Extraordinary JSC Session, late 2020)
8. Look at the Guidelines on Membership of WCRP Bodies to ascertain if they are fit for purpose (JSC; by Extraordinary JSC Session, late 2020) and then implement changes in a timely and respectful way (JSC Chair and Vice-Chair; by JSC-42).
9. Check rules for approving WGNE memberships before RB meeting planned in fall 2020 (JSC; Extraordinary JSC Session, late 2020)
10. Ensure that all groups have JSC liaisons to ensure diversity of membership and leadership (JSC Chair and Vice-Chair; June 30, 2020).
11. Advise all groups of the outcomes of JSC membership decisions (Officer in Charge WCRP Secretariat, 30 June 2020)
12. Work with the one group whose proposed membership was not diverse enough so that they can provide a new proposal to the JSC Extraordinary Session in late 2020 (JSC Chair, JSC Vice-Chair, with support from JSC Officers and Head of WCRP; by Extraordinary JSC Session, late 2020)
13. Send comments to all WCRP core activities on their JSC-41 reports and presentations (JSC Chair, JSC Vice-Chair, with support from WCRP Secretariat; by 15 July 2020).
14. Advertise call for CMIP Office (WCRP Secretariat, 1 July 2020).
15. Provide a letter of strong endorsement (in principle approval) and other support as needed to advance the proposal for a joint WCRP/WWRP Monsoons Office in Pune (JSC Chair and Vice-Chair, WCRP Secretariat; 30 June 2020).

16. Write a short statement of work for the Carbon Footprint Working Group, with the aim of soliciting community support and involvement (JSC Chair and Vice Chair, Pierre Friedlingstein, Pedro Monteiro, WCRP Secretariat; 30 June 2020)
17. Form the Carbon Footprint Working Group (Pierre Friedlingstein, Pedro Monteiro, WCRP Secretariat; 31 July 2020)
18. Put together information for the JSC to enable them to debate and agree on a target (and provide time on the agenda to discuss this) (Carbon Footprint Working Group; Extraordinary JSC Session, late 2020).
19. Form a WCRP Celebration and Achievements Symposium committee to determine how to take this forward and establish a plan to do so (JSC Chair and Vice-Chair, WCRP Secretariat, Grand Challenge leads; Extraordinary JSC Session, late 2020).
20. Agree on a date for Extraordinary JSC Session (late 2020) and JSC-42. The WCRP Secretariat will work with the JSC Chair and Vice-chair to isolate a set of dates and send a doodle to the JSC for each meeting (JSC Chair and Vice-Chair, WCRP Secretariat, JSC; 30 June 2020).
21. Outline a plan (guidelines, direction) for JSC work from May to December 2020 (JSC Chair and Vice-Chair, WCRP Secretariat; 30 June 2020)

Decisions

1. The proposed membership of all WCRP projects, councils and working groups (except one) were approved.
2. JSC approve in principle the creation of a joint WCRP/WWRP Monsoons Project Office.
3. The JSC decided that Ken Takahashi and Pedro Monteiro will be suggested as members of the SARS-COVID Working Group and that Pascale Braconnot and Susanna Corti will be suggested to represent WCRP in the Research Board Task Team on Exascale Computing, Data Handling and Artificial Intelligence.
4. The JSC decided to establish a WCRP Carbon Footprint Working Group.
5. The JSC decided to proceed with scoping a WCRP Celebration and Achievements Symposium (mid to late 2022).
6. The JSC decided to hold an online Extraordinary JSC Session in late 2020.

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1. Introduction and Session Opening

The WMO/IOC-UNESCO/ISC Joint Scientific Committee (JSC) of the World Climate Research Programme (WCRP) opened its 41st Session (JSC-41) at 13:00 Geneva/Paris time on 18 May 2020. Due to the Coronavirus Disease (COVID-19) situation, the decision was made to hold the core business of the meeting online, with additional focused follow-up meetings on, for example, engagement with partners to be held at a later date. All documents were made available in advance of the meeting on: <https://www.wcrp-climate.org/jsc41-documents>.

The session was opened by the JSC Chair, Detlef Stammer, and Vice-Chair, Helen Cleugh. They emphasized how important the issue of a changing climate was to society despite the understandable current focus on COVID-19. Detlef highlighted that the focus of this meeting was on implementation of the WCRP Strategy and on discussing what a fit-for-purpose structure for WCRP would look like. Despite the travel restrictions currently in place, Helen emphasized that significant progress had been made since the last JSC Session thanks to everyone's dedicated engagement and input.

The WCRP co-sponsors were invited to make short statements.

Heide Hackman, Executive Director of the International Science Council (ISC), discussed how the current COVID-19 crisis offers opportunities as well as challenges. For example, the UN Secretary General has said that now is a time for science and for solidarity. People are discussing how we should be recovering sustainably from this pandemic. There are new opportunities for accelerating science impact. The key message from ISC was a commitment to engaging more strategically with WCRP and others. ISC are planning to (a) convene the leadership of their science activities to define how we can act as a unit for global science and to (b) organize a gathering of global funders, with a focus on achieving the Sustainable Development Goals (SDGs).

Vladimir Ryabinin, Executive Secretary of the Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO), recognized that WCRP makes a huge contribution to ocean science and systems, for example with regards to providing advice to the ocean observing system in partnership with the Global Ocean Observing System (GOOS) and the Global Climate Observing System (GCOS), and in the development of ocean and polar modelling. He asked that WCRP continues to contribute to the [United Nations Decade of Ocean Science for Sustainable Development \(2021-2030\)](#). Vladimir reminded participants that in 2005 the JSC stated that “now is the time to invest in ocean reanalysis, fluxes and predictability of ocean from monthly to decadal timescales...”, which is as true as ever. Finally, he commented that IOC-UNESCO remains a committed sponsor of WCRP.

Elena Manaenkova, Deputy Secretary General of the World Meteorological Organization (WMO), highlighted how the WMO reform process places WCRP in a better position in terms of its ability to work across the full value chain, connecting research to observations and services. The structures of the new WMO commissions – which are much simpler than before – will soon be finalized. The WMO reform is very transformational, putting Earth system science and modelling at its core. Research is a key partner in a range of services, for example urban, health, and climate. Hydrology is now a topic WMO is integrating into its systems and practices. WMO is planning a number of activities relevant to the WCRP community, for example a large data conference and the next United in Science report, both of which will benefit from WCRP input. WMO has been producing a Global Climate Statement, which will now have a much bigger focus on regional climate. WMO continues to host the WCRP Secretariat, provide substantial resources and remains a committed co-sponsor of WCRP.

2. WCRP Strategy Implementation and Transition

A significant part of the JSC-41 session focused on taking forward the process of implementing the [WCRP Strategic Plan 2019-2028](#), building on a number of activities in 2019 and early 2020.

Helen opened the session by taking participants through the progress of the WCRP Strategy implementation and transition journey so far. Detlef highlighted that looking back at the [WCRP Review](#), there were a number of criticisms of WCRP, particularly around its current structure, which was not "fit for the future". The review was the motivation for the production of the WCRP Strategic Plan, which resulted in a new Vision, Mission, and Scientific Objectives.

Implementing the Strategic Plan began in May 2019 with an Implementation Workshop and the 40th Session of the JSC. This was followed by further consolidation and the formation of targeted task teams on modelling, data and regional activities. The process continued in December 2019 during the WCRP Climate Science Week, held in conjunction with the American Geophysical Union (AGU) Fall Meeting.

In early 2020, it was realized that two brainstorming workshops were needed to move implementation planning forward. The first workshop focused on key research questions and a second was planned to determine the structure and elements of the new WCRP. The WCRP High-level Science Questions and Flagship Workshop was held in Hamburg in February 2020. The onset of COVID-19 meant that the second workshop, which was to be held in Washington D.C., had to be cancelled.

Helen continued with an overview of the WCRP Conceptual Framework and science questions that were generated during the May 2019 workshop. She highlighted the essential need for partnerships, integration and enduring capabilities: the expertise of our people. Helen mentioned some of the outcomes from the task teams and the key messages from the WCRP Climate Science Week.

Detlef continued with the outcomes of the Hamburg Workshop and explained how the Lighthouse Activities (LAs) were developed, noting that the current titles are provisional (see Figure 1). Both Detlef and Helen provided brief overviews of each of the LAs, encouraging participants to read the full two-page outlines in the [Hamburg Workshop Report](#).

Proposed Lighthouse Activities

1. 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.

Detlef suggested this could culminate in an Earth Year. Although it is not yet spelled out clearly enough, observations are also critical to this LA. As with most of the LAs it can only be achieved through partnership.



Figure 1: Proposed Lighthouse Activities. For more details see the [Hamburg Workshop Report](#)

2. 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.

In its application it will become quite tailored. It is about developing a new way of synthesizing climate information that is consistent with best science practice and that is also useful. The current Grand Challenge on Weather and Climate Extremes could be part of this.

3. Safe Landing Climates

Objective: to explore the routes to climate safe landing 'spaces' for human and natural systems, connecting climate, Earth system and socio-economic development sciences.

This LA is intended to provide a way to achieve key SDGs (particularly SDG13). This will pick up on the positive impact that climate science can make.

4. Digital Earths

Objective: To develop a digital and dynamic representation of the Earth system founded on an optimal blend of models and observations. Digital Earths will enable exploration of past, present and possible futures of the Earth system by adding a new dimension to climate information.

This is essentially digital twins of the Earth. It will be something that WCRP will contribute to, in partnership with high-performance computing centers. Other LAs will draw on Digital Earths.

5. WCRP Academy

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

This is a work in progress (WCRP is currently establishing a team to take this forward). It is about ensuring that we build capability and it needs to link to other LAs.

Helen then discussed how after the Hamburg Workshop some time was spent thinking about how to connect the LAs to the Vision and Mission in the WCRP Strategic Plan. This led to the high-level Implementation Priorities, intended to guide WCRP's work over the next decade:

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
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

Helen explained that the first Implementation Priority reflects how WCRP stakeholders require information to help them quantify risk and identify opportunities. With regard to the second Implementation Priority, Helen clarified that the second point on mitigation strategies does not mean that WCRP will develop or implement mitigation policies. However, it is important that these policies are based on good climate science. For example, geoengineering/climate intervention is of concern to many researchers in the WCRP community. Helen showed that the Implementation Priorities, LAs and the Scientific Objectives of the Strategic Plan align and connect, explaining that we need the LAs alongside the core WCRP activities to achieve our Strategic Plan's Scientific Objectives.

Detlef then explained the progress made after the cancellation of the Washington D.C. workshop. In place of the workshop, the JSC leadership began a series of online consultations with the WCRP Core Projects and core activities. The major outcomes were:

- There is general support for the LAs, though more details are needed. They will not replace core WCRP activities
- We need depth of both science and infrastructure, along with cross boundary coordination and an integrated approach
- Designing an interface through partnerships and other mechanisms is a good way to provide linkages to diverse expertise, groups and geographies for the LAs and WCRP science goals
- Complexity is not necessarily the problem with our current structure. Rather it is a lack of clarity and transparency in our structure that needs to be addressed

- While WCRP is a global programme, that doesn't mean that we only focus on the global scale. Rather, we must traverse from global to regional to local scales

Taking these discussions into account, a picture began to emerge on how WCRP might be structured. The LAs would be an integrating element, but more details are needed to flesh out how they would work. It was also identified that there needs to be 'homes' for WCRP enduring capabilities. These homes would include the current Core Projects, optimized and modernized, plus potentially two new homes on (1) Earth System Modelling and Observational Capabilities and (2) Regional Climate Information for Societies. The homes would be based on science goals. The current Core Projects may need new names and it is recognized that each of the 'homes' would need supporting International Project Offices (IPOs) to provide administrative support and coordination (within and across WCRP).

The need to include developing countries in the co-production of the new WCRP was recognized. The first step in this will be a regional and community consultation — online meetings based on time zones aimed at bringing developing countries, along with the broader WCRP family and our allied communities, into the discussion. At the same time, task teams will need to be established to develop the details of the LAs, and the Core Projects and core activities of WCRP will need to look at their own structure and activities with the aim of creating a plan for the future.

Detlef made it clear that there is some urgency. WCRP cannot discuss implementation for two years without doing anything. He drew an analogy of moving into a building before it is finished and adding the final touches afterward to make it a home. He showed a slide on a possible new structure (Figure 2). The yellow pillars are the 'homes' for various WCRP communities and the green boxes, the Lighthouse Activities, are the hubs for major experiments (as described by the text boxes on the left-hand side of Figure 2). Other activities could be done jointly between or within homes, as shown in the blue arc on the side of the figure.

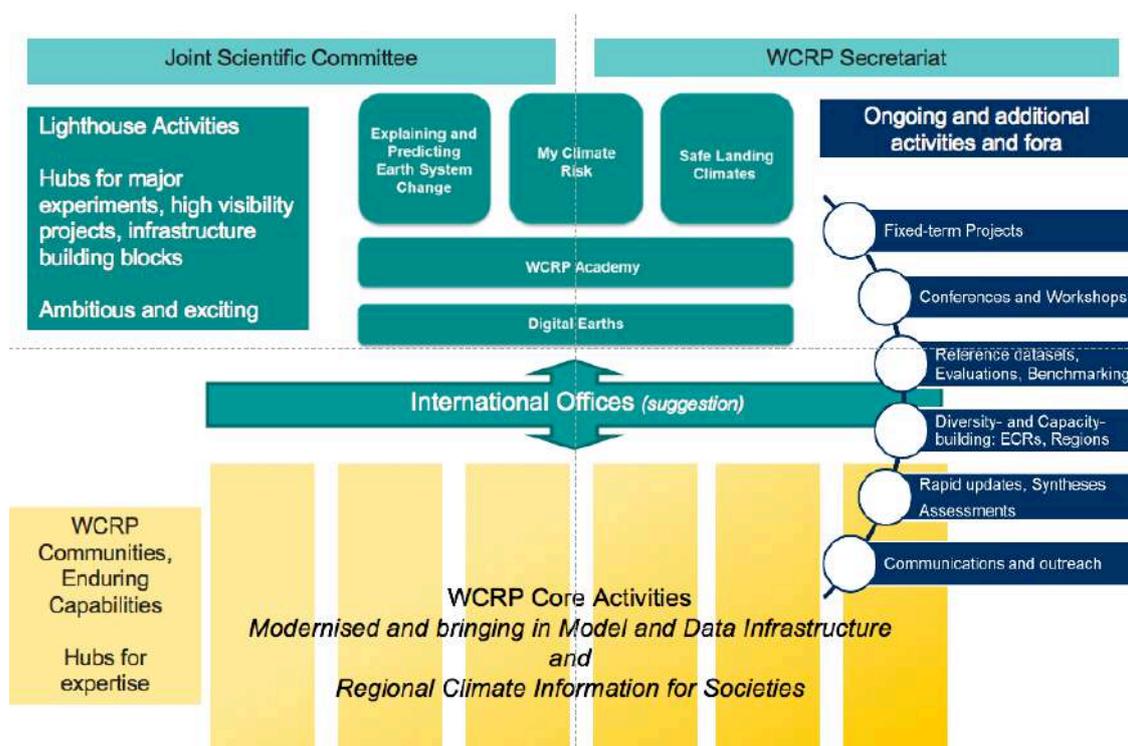


Figure 2: A DRAFT schematic for discussion on a possible new WCRP structure

Helen noted how this structure is agreement with the Conceptual Framework from May 2019 and that the journey so far has been guided by this and the roadmap first developed in May 2019 and updated over the intervening 12 months.

Actions:

- 1. Start regional and community consultations with the aim of including developing and other countries in the co-production of the new WCRP. Discussions should include members from regional WCRP communities and funding agencies (JSC and IPO contact points led by JSC Chair and Vice-Chair; Begin immediately with a view to holding first consultations by August 2020).**
- 2. Create a Lighthouse Activity Task Team, to include representatives of the original authors as well as Core Project and Core Activity representatives. Ensure engagement of developing countries, early career researchers and partners as appropriate (JSC Chair and Vice-Chair, JSC Officers; Report back to WCRP Extraordinary Session, late 2020).**
- 3. Core Projects to review and consolidate their structures to ensure efficiency and relevance to WCRP's new strategic directions and draft structure (Core Project Chairs; Report back to WCRP Extraordinary Session, late 2020).**

Helen then chaired a session where the community were able to discuss Detlef and Helen's presentation and comment on the plans presented.

Daya Reddy, President of ISC, made the point that the connection with social and economic sciences is very important. ISC spans the range of sciences and would be in the position to ensure that this interconnectedness is achieved. He also emphasized that it is important to remember that we have a responsibility to communicate science to the broader non-scientific public. With COVID-19 we are seeing how important that interface is, and how necessary that the public are well informed. WCRP can do this effectively with partnerships.

Wayne Higgins highlighted that the community needs to address large-scale systematic errors in global coupled models. In order to address these systematic errors, the community needs to align research activities to advance process level understanding (a WCRP objective) using a seamless approach from the near term (weather) to longer term (multi-annual to decadal climate and beyond). This should be taken into account in the proposed LA "Explaining and Predicting Earth System Change".

Marie-France and others highlighted the importance of WCRP's fruitful collaboration with Past Global Changes (PAGES), as we need to know about the past in many activities. The proposed LA "Safe Landing Lighthouse" would most likely also have a role for AIMES and PAGES. It was recognized that partnerships are critical and that there is a need to frame discussions in vocabularies that communities recognize.

Martin, Detlef and Helen commented that there needs to be a lot of work done on building communities in places where WCRP has not strongly engaged in the past, especially in developing countries. That will start with regional and community consultations and it may also be done through the proposed LA "WCRP Academy", through regional activities of the proposed LA "My Climate Risk," through Early Career Researcher (ECR) activities, and leveraging the networks of WCRP's Core Projects and activities. By way of example, there is a discussion with START aiming to establish activities in Africa. In the longer term, the leadership of WCRP activities needs to be much more inclusive.

Detlef clarified that the current WCRP Working Groups and CMIP could come under the new modelling and data 'pillar' or 'home', although the working groups and others would need to discuss the feasibility of such a structure.

Oksana Tarasova, Head of the Atmospheric Environment Research Division of WMO, highlighted that there is additional scope for WCRP to work more closely with WMO Regional Climate Centers. Francisco (Paco) Doblas-Reyes elaborated that the proposed LA “My Climate Risk” proposed to engage in regional climate science, detection and attribution, observational uncertainty, and to contribute a research component to some activities in these centers.

In response to a question from the AIMES representative, Viktor Brovkin, Detlef clarified that the proposed LA “Safe Landing Lighthouse” was developed independently of the [Planetary Boundaries](#) concept, though WCRP would be happy to collaborate with those involved in the latter endeavor.

Jürg Luterbacher, Director of the Science and Innovations Department of WMO, asked whether the proposed WCRP structure included a degree of flexibility. Detlef replied that this was the idea, for example, it would be easy for short-term projects to be established as needed, as this is captured in the elements identified (included in Figure 2). In addition, the Implementation Plan will not be set in stone, but will be a living document that could be reviewed every 5 years or so.

Vladimir suggested that WCRP move forward with a two-pronged approach: to think about new discoveries but also to think about delivering to society and to regions, quoting the example of the Decade of Ocean Science for Sustainable Development.

Detlef ended the day talking about the timeline for a soft transition to a new structure, including homework assignments for the activities, and an Extraordinary WCRP session in November/December 2020 to review suggestions and decide on what will be put in place and what will fade out. New activities would then begin to ramp up. By the 2021 JSC session, the WCRP community would start to “live in the new WCRP house.”

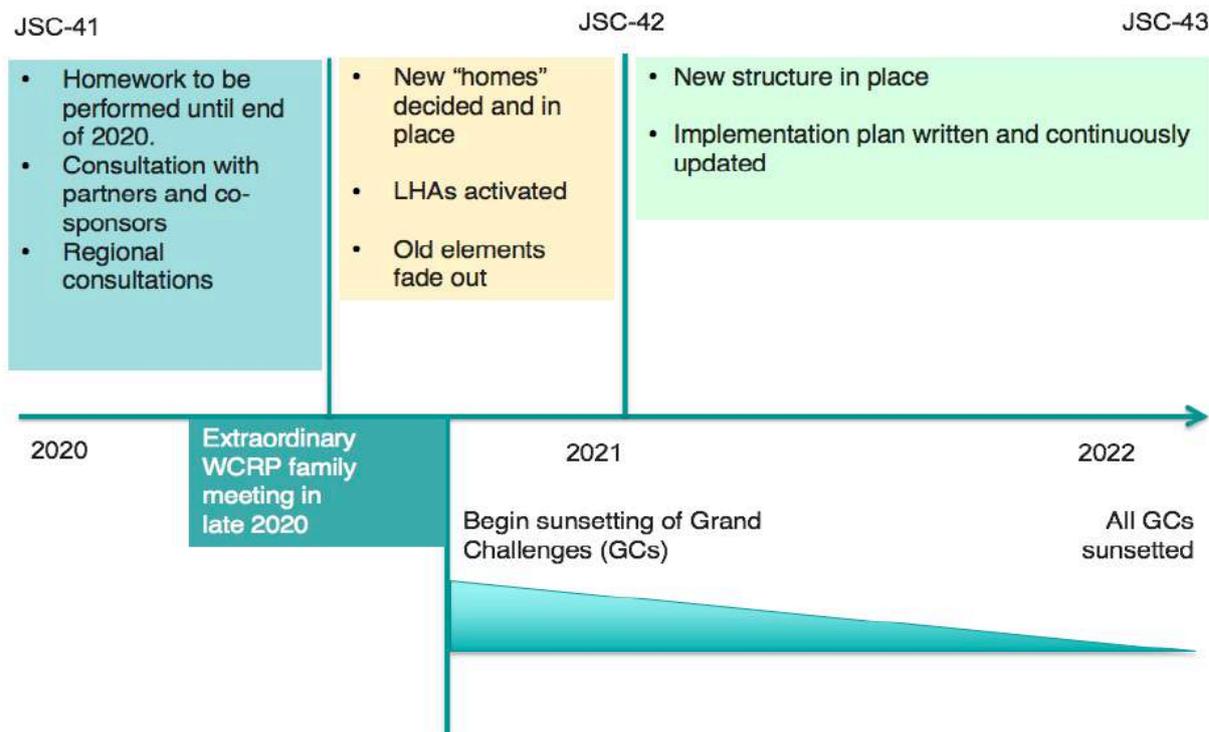


Figure 3: Draft timeline for a “soft transition” to a new WCRP structure

The second day of the meeting started with a short recap by Detlef and Helen of the previous day's discussion and continued with an outline of what would be covered in the next sessions. The first part focused on short summaries of the main recommendations from the Task Teams on (i) Modelling (ii) Data and (iii) Regional Information for Society:

- (i) Paco summarized the lessons learned and opportunities identified from the **Task Team on Modelling and Computing Infrastructure**. The final set of recommendations identified included:
- Put in place a mechanism (e.g., on-line map) to coordinate modelling activities across WCRP/WWRP/Global Atmosphere Watch (GAW)
 - Adequately source coordination of all modelling activities to leverage fundamental process understanding
 - Financially support WCRP modelling activities that are relied upon as service-oriented products (e.g., CMIP for IPCC), including support for data infrastructure
 - Better coordinate analysis tools¹ across WCRP/WWRP/GAW
 - Encourage and prioritize MIPs across timescales for understanding and process studies
 - Explore data science and machine learning (beyond Working Group on Numerical experimentation (WGNE) initial efforts)
 - Illustrate best practices and risks from exascale computing

Detlef commented that this is entirely consistent with the idea of a data and observations 'home' within a possible new WCRP structure.

- (ii) Susann Tegtmeier presented on behalf of the **Task Team on Seamless Data and Data Management**. She covered the present status, what needed to be strengthened or included and finally a set of recommendations:
- Better transfer of experiences in data management across WCRP entities
 - Close collaboration with modelling groups
 - Coordination of reanalyses, in particular around Earth system reanalysis
 - Include data assimilation (Observing System and Observing System Simulation Experiments (OSEs/OSSes) in coordination with WWRP/DAOS/PDEF and WGNE)
 - Include data science and data mining (connect with AI/IT communities more closely)
 - Interfacing/integrating (research) data infrastructure with their operational equivalent (WMO Information System, C3S/CDS)
 - Strong links to GCOS and space agency bodies to exchange on WCRP needs and space agency plans
 - Promote a broader Earth System approach to observations with GCOS

¹ Such as the [Program for Climate Model Diagnosis and Intercomparison \(PCMDI\) metrics package](#), the [Earth System Model Evaluation Tool \(ESMValTool\)](#), and the [Joint Working Group on Forecast Verification Research](#).

Detlef commented that this was also well thought through and highly relevant to the discussions on a data and observations 'home'.

- (iii) Daniela Jacob presented the interim report from the **Task Team on Regional Information for Society** (originally called the Task Team on Regional Activities), noting that a full report (taking into account discussions held during the JSC) would be provided by the end of 2020. A set of preliminary recommendations included:
- To re-frame the “Recommendations on a Framework for WCRP Regional Activities” (JSC-38/Doc.11) in the context of the proposed WCRP pillars/homes
 - Proposal to replace the Working Group on Regional Climate (WGRC) with a Working Group on Information for Regions and Society (WGIRS)
 - To use Frontiers of Climate Information (FoCI) projects as a vehicle for co-design and co-production with stakeholders of climate information for regions. The Core Project Initiatives could serve as the basis of a proof of concept (see e.g. Section 3.1)
 - Identify organizations and communities WCRP should establish sustainable connections with, to bridge science with society, such as the Global Framework for Climate Services (GFCS), Future Earth, Climate Services, Social Science, Disaster Risk Reduction Communities, and others
 - To draw on the experience and expertise of the regional chapters of WGI IPCC AR6 report

Martin commented that both the modelling and data task teams reflected well from their own perspectives but if there was going to be a joint model-data 'home,' aspects such as reanalysis, initialization of forecasts, optimization of observing systems, and possibly benchmarking of models, could be fleshed out more by a 'joined up' team perspective. Jean-Noel agreed and also mentioned that it would be essential to draw upon expertise existing in WWRP and leverage on WGNE, the Subseasonal-to-Seasonal Prediction (S2S) Project, and others.

Kumar highlighted that for both data and regional information, it would be important to work with the WMO Technical Commissions, to complement and consolidate WCRP efforts.

3. WCRP Business Activity Reports

Core WCRP projects and activities presented brief activity reports, including an overview of how the activities will fit into the new WCRP strategy and proposed initiatives, such as the Lighthouse Activities (LAs). The order in which these are presented relate to the order in which they were presented on the Session agenda. Written reports and slide presentations are available online (See Section 1).

3.1. Climate and Cryosphere (CliC)

James Renwick began the presentation with a look at progress and achievements of CliC. In 2019 there were 16 funded workshops, 57 funded participants (from 24 countries, including 26 ECRs). CliC was a sponsor of, or gave input to, a number of conferences and schools and held over 60 online meetings. Highlights of CliC included a high-profile review paper on the mass balance of ice sheets and glaciers, a Polar CORDEX meeting, the GlacierMIP contribution to

the Intergovernmental Panel on Climate Change (IPCC) Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC) and ISMIP6 special issue in The Cryosphere.

CliC discussed its future plans. James noted that CliC and the Grand Challenge (GC) on Melting Ice and Global Consequences have very much become fused together and that a lot of CliC's modelling efforts and Model Intercomparison Projects (MIPs) fall under the remit of the GC but are supported by CliC. There has been a lot of success with the intercomparison projects, especially around ice sheet modelling and sea ice modelling. It is important to keep in mind the need for observational programs. The themes from the CliC Strategic Plan align very well with the proposed LAs: improved understanding and quantification of the cryosphere and its role in the climate system, increasing our ability to model the fully coupled system, better use of observations of the cryosphere for indicating global change, improved process understanding, and improved predictive ability.

Looking to the future there are strong links to the WCRP Strategic and Implementation Plans, under all four Scientific Objectives. Under longer-term prediction there are cryospheric climate tipping points, that fall under the "My Climate Risk" LA in the new proposed structure. Polar CORDEX has been successful in modelling of the Antarctic Peninsula and ice sheets and coupling that to atmosphere-ocean models. This would fit into the "Digital Earths" LA in particular, but also the "Explaining and Predicting the Climate System" LA. The "Safe Landing Climates" LA would also fit with CliC work in sea level rise and water availability. CliC has always had very strong support for ECRs and recognizes the importance of the "WCRP Academy" LA. Overall, CliC is well placed to move into the new structure.

At JSC-40 there was discussions about regional projects that would be collaborations between all of the Core Projects (Third Pole - carbon cycle, permafrost, glacier ice melt, water availability etc.). One way to approach this is to develop activities that have a regional focus and bring in all aspects of the climate system across the Core Projects.

James raised the ongoing issue of a new CliC International Project Office, which is still not resolved. Otherwise, there has been a lot of activity and things have expanded rapidly. Keeping on top of things and keeping people connected has been an issue over last few years. Stakeholder engagement could be broadened. Maintaining connections with other WCRP projects needs monitoring. Having joint projects, as proposed in the new structure, could help projects to work together better. The work of the GC will continue, whether it is called that or something else, as there is a lot of valuable model development going on.

David Behar, co-chair of the GC on Sea Level, asked about strengthening links to regional needs between the poles, specifically sharing and translating evolving ice sheet understanding with decision communities working on current adaptation planning. James replied that this was an important point. There are different needs at the different poles, and very different stakeholder communities, but adaptation implications are global.

Andrew Roberson, co-chair of S2S, reminded people that S2S has a real time pilot project on a Sea Ice Prediction Network led by University of Washington (Arctic sea ice prediction for shipping industry, resource management, marine mammals, etc.).

Martin asked if there is any discussion on 'new' satellite missions to better document cryospheric changes. Mike Sparrow, Officer in Charge of WCRP, replied that CliC has worked in the past with e.g. European Space Agency (ESA) and satellite requirements in the Southern Ocean and with the National Aeronautics and Space Administration (NASA) on a smaller scale, but agreed this should be explored further. James added that while there is no current initiative from CliC to develop new instruments or platforms, members of the CliC community are involved in things like the Global Cryosphere Watch and there are overlaps with WMO. There

are exciting recent developments with high resolution satellite imagery in the polar regions in relation to, for example, detecting sea ice thickness and snow on ice.

Ken Takahashi asked what would be the plans and limitations for strengthening research for high-mountain areas? James replied that CliC covers all the cryosphere, though its focus to-date has been more on the poles. The Andes would be a good target for joint activities, looking at glacier ice, permafrost, water and energy etc. Several attendees commented that this is what ANDEX is doing² and such linkages with CliC should be explored.

3.2. Grand Challenge (GC) on Melting Ice and Global Consequences

Tim Naish began his presentation by supporting the views presented by James previously. This GC has become aligned and is the engine room for a lot of the activities within CliC, particularly when it comes to the MIPs. The MIPs are well organized, with their own internal leadership structure, focused on key issues, and delivering to the IPCC reports. ISMIP6 is now starting to publish results ahead of the AR6. GlacierMIP is improving mass contribution to sea level rise from glaciers and ice caps. Many MIPs are gearing up for a new phase in the context of CMIP7. It is not clear what future of the GCs is, but there are opportunities for better integration, including with other Core Projects. In the context of the LAs, there is great potential. Perhaps we have not realized that as much as we could have in the past, with the possible exception of the regional sea level conference held by CLIVAR and the GC on Sea Level a couple of years ago in New York. That connection is not as clear on a day to day basis. The issue of land ice contribution to sea level rise is of broad interest to other partners and organizations, such as the Scientific Committee of Antarctic Research (SCAR) and the International Arctic Science Committee (IASC) and there are opportunities for future collaboration and integration.

Martin asked if there is a connection to PAGES and the 'Earth history' aspect of the cryosphere? Tim responds that a paleo-perspective on the cryosphere is important, especially in understanding thresholds, such as marine based ice sheet instabilities. There are connections with PAGES and CliC supports a paleo component going forward. Marie-France added that it would be interesting to connect this work with PAGES – data, modelling and the intercomparison. There are opportunities, such as reconstruction on past sea ice extent.

Detlef confirmed that the GCs will need to sunset. He noted that the discussion has shown that the sea level and melting ice GCs are very interlinked. The science will not go away, but we need to move this in the proper place in the future. It would not be called a GC anymore.

Sonya asked, with the GC sunsetting, whether there are any legacy products that will be produced? Tim responded that most of the MIPs will continue, but each one has individual products that they would like to see completion of. We are also asking whether the MIP approach is the right approach. As CMIP Phase 6 (CMIP6) outcomes come out it becomes evident that there is a very large spread, as the models are vastly different from one another. We have to ask if this is the right way to continue.

3.3. Stratosphere-troposphere Processes And their Role in Climate (SPARC)

Neil Harris started by outlining SPARC achievements over the last year. Neil highlighted that there have been two journal special issues on the role of the stratosphere in sub-seasonal to seasonal prediction, which came out of the SPARC Network on Assessment of Predictability

² See for example, ["Hydroclimate of the Andes Part I: Main Climatic Features."](#)

(SNAP) activity. This is a good example of how short-term process understanding is helping longer-term process understanding, particularly in models in this case. This is closely linked to a component of S2S. It shows the way it is possible to work with other activities in WCRP.

Neil outlined that SPARC has undertaken a lot of training schools and has focused on support to ECRs and to those who find it hard to obtain support (11 funded workshops and > 30 funded individuals from > 20 countries). SPARC has been carrying out work directly related to the Montreal Protocol, including a report on understanding uncertainties in long term ozone trends in the stratosphere. There has also been a lot of interest in the unexpected and unreported increase in CFC11 emissions, resulting in a Symposium and a contribution to new report by the UN Environment Programme for this year's Assembly.

Neil presented the future plans of SPARC, as developed at the last SSG meeting in December 2019. The CP is developing a new Strategy for the next five years, which is well timed to fit with the WCRP Implementation Plan. SPARC will contribute to three questions:

1. How will climate change on interannual to centennial timescales?
2. How can prediction of weather and climate-related extreme events on sub-seasonal to decadal (S2D) timescales be improved?
3. How/why is atmospheric composition changing over time and what are the impacts?

These will need to be folded into the new WCRP structure. There was a strong desire for the new structure to facilitate collaborative activities and strong support for a major WCRP interpretative initiative to make sure existing datasets are fully used. There was concern that a large model initiative on its own would not produce results in time and would drain resources, although SPARC is not against it in principle.

In terms of links to the WCRP Strategic and Implementation Plans, SPARC science is essential to meeting the new WCRP goals. SPARC naturally forms one of the yellow pillars/homes, but with a whole atmosphere approach. SPARC sees no reason to sunset but sees opportunities for more impact and for greater integration provided by the LAs and other activities in WCRP. Neil said that they are a bit frustrated that they have not been able to do more with the CLIVAR Dynamics Panel or on convection within WCRP. Neil noted that it would be really good if in the new structure that there was a way to do the collaboration that people want to do. SPARC also believe that capacity building and climate science and society could be done much better if it were a pan-WCRP plan. Neil agrees that to achieve this SPARC operations need to be reviewed. Immediate actions include communicating with the SPARC SSG and community, forming a representative group to explore where SPARC science contributes to the WCRP plan, and participation in WCRP implementation planning.

SPARC has recently moved to a three-co-chair system (based on longitudinal zones) and are looking for an SSG member from Africa. They are refreshing some of the leadership in SPARC activities and are looking at solutions to problems they have faced in provision of capability. SPARC are looking at ways to ensure success in capacity building and reducing their Carbon Footprint. They have issued a call for expressions of interest for the next SPARC General Assembly, encouraging the use of innovative meeting concepts to reduce the carbon footprint of the meeting and broaden inclusion, while meeting networking needs (looking closely at the GCOS plan).

Detlef commented that the provisional new structure does seem to resonate with SPARC. The blue arc on the side of the structure diagram (Figure 2) includes additional extra projects that can be undertaken between columns. Neil confirms that the SPARC community is behind the current plans. He says that he finds the ability to agilely respond as a critical thing to build into the new structure.

Martin asked whether SPARC has engaged more fully in tropospheric dynamics, as was asked of it in the last WCRP restructuring. Neil responded that they are trying in terms of dynamics and composition. In terms of dynamics, one is SNAP (S2S contribution). The other is less defined. Is a similar thing in the tropics on the Madden-Julian Oscillation. There are also gravity waves. In practical terms, people have thought of SPARC as stratosphere for so long there is longstanding inertia in the community. A whole atmosphere approach is essential.

3.4. Climate and Ocean Variability, Predictability and Change (CLIVAR)

Sonya Legg highlighted progress and achievements of CLIVAR, including ten white papers, several other reports and papers (e.g., the IndOOS-2 report), two summer schools, sessions and Town Halls at the Ocean Sciences Meeting (2020), and a number of workshops. There are increasing links between physical oceanography and biogeochemical processes. There are ongoing papers on a review of the Tropical Atlantic Observing System, current knowledge on EBUS, Arctic freshwater storage, North Pacific climate and ecosystem predictability on seasonal to decadal timescales and climate services for adaptation to sea-level rise.

Sonya outlined how CLIVAR has a new research focus on Tropical Basin Interaction, looking at how tropical basins influence each other through teleconnections. In 2019 there was a new agreement signed for the hosting of the International CLIVAR Project Office at the First Institute of Oceanography of the Ministry of Natural Resources, China (FIO, MNR). The agreement to host the International CLIVAR Monsoon Project Office (ICMPO) in Pune has been extended for one year (until February 2021) to enable consultations on future evolution of ICMPO. The Monsoon Panel is joint with GEWEX and there are discussions on whether this should be a pan-WCRP focus with WWRP as well, since monsoons cross the boundary between climate and weather. Other future plans include an AMOC Task Team starting in the Atlantic Regional Panel, an ENSO conceptual model working group starting in the Pacific Regional Panel, recommendation tracing by the IndOOS Task Team (Indian Ocean Regional Panel), coastal climate services and sea level rise, biophysical interactions focus by panels and contributions to the UN Ocean Decade implementation. Many of the events planned for 2020 have been postponed due to COVID-19.

Sonya outlined how the structure of CLIVAR fits with the WCRP Strategic and Implementation Plans. In terms of the Strategic Plan, understanding ocean processes and ocean circulation, being able to observe the ocean and model and using this to develop prediction systems are all needed to achieve the first three Scientific Objectives. These also feed into the LAs "Explaining and Predicting Earth System Change" and "Digital Earths". Sonya gave the opinion that we need to focus more on integrating observations, models, and simulation and prediction systems together to achieve these goals. At present, CLIVAR has a regional panel structure, as well as panels on ocean modelling, climate dynamics and global synthesis. We need to think of ways of integrating observations and models, including assimilation and prediction systems to better serve the needs of the Strategic Plan and LAs.

With the Bridging Science and Society goal in the Strategic Plan and the "My Climate Risk" and "Safe Landing Climates" LAs, there is a greater need to focus on downscaling to local impacts, such as sea-level rise, marine heatwaves, and oxygen minimum zones. CLIVAR will need to think about how to do this. Sonya sees the "WCRP Academy" as an opportunity to help inform user communities – stakeholders who want to use climate information but who are not experts. This would improve the accessibility of climate-ocean information. CLIVAR will want to look inward at the structure and decide whether the current structure is the best way of organizing things to meet the needs of the new WCRP.

Sonya outlined that emerging issues in CLIVAR include the impacts of COVID-19, the ongoing question of how to place the ICMPO in the WCRP structure, and contributions to the UN Decade of the Ocean. There is an increasing emphasis on integrating modelling and observations, interdisciplinary research, and connecting understanding to improved predictions of impacts relevant to society. There are funding constraints, which leads to fewer in person meetings and workshops and reduced participation from developing countries. There are also funding constraints from government and intergovernmental agencies for science.

Detlef responded that the CLIVAR presentation indicated that what we have been talking about in terms of a new structure for WCRP does seem to resonate with CLIVAR's thinking. The Academy structure has not been worked out yet. Capacity building has been discussed as being part of this and now we need to establish a group to take this forward.

Martin noted that when it comes to the carbon-bioecology links we also need to work more closely with Future Earth (e.g. IMBER etc.). Sonya responded that it is always good to reach out to partners, but that it is sometimes hard to decide where our remit ends, and others start. Something that we can do is to make the right connections.

3.5. GC on Regional Sea-level Change and Coastal Impacts

Robert Nicholls started by noting that the GC on Sea Level has been going for six years. The GC has three "fundamental understanding of the climate system" (Strategic Plan, Scientific Objective 1) work packages: paleo time scales, the land ice contribution to sea level rise, and causes of sea level variability and change. There is also work on projections of regional sea level and work that looks at the sea level budget, which maps to Scientific Objectives 2 and 3. The GC also looks at sea level science for coastal zone management, which maps to Scientific Objective 4. This shows that the sea level GC is very relevant to all four scientific objectives of the Strategic Plan. It is very integrative – there are people in sea level science and also people dealing with sea level risk and adaptation – people are talking across boundaries.

In terms of the LAs, Robert showed how the activities of the GC also map to all five activities, particularly "My Climate Risk". The GC is now focusing on a second sea level conference in 2022 in Singapore. As with the New York conference in 2017, this will have a strong stakeholder engagement focus.

The GC has renewed its membership and leadership. To maintain diversity, there are now four co-chairs, with David Behar and Kathy McInnes joining Roderik van de Wal and Robert. The GC has annual meetings, which this year will be virtual. COVID-19 casts a shadow on the organization of the Singapore conference – flexibility in delivery has become important. The GC is increasing stakeholder engagement to better understand and design science questions and products for users (e.g. coastal climate services), including non-climate driven components related to relative sea level (such as human-induced subsidence), high-end terms of sea level rise, extremes and the Antarctic contribution to sea level change. The GC will also focus on enhanced cooperation, within and outside WCRP.

While the GC will end in 2022, the science will not. This important science should be taken forward.

3.6. Global Energy and Water Exchanges (GEWEX)

Graeme Stevens began by outlining recent progress and achievements of GEWEX. There are a number of new activities: International Satellite Cloud Climatology Project - Next Generation (ISCCP-NG); Earth's Energy Imbalance (EEI) assessment study (joint with CLIVAR); Impact of Initialized Land Temperature and Snowpack on Sub-seasonal to Seasonal Prediction (LS4P);

Soil and Water (SoilWat) initiative; Evapotranspiration crosscutting activity; ANDEX, AsiaPEX and TPE-Water Sustainability Regional Hydroclimate Projects; and new projects addressing recognized model biases/challenges. There are a number of model evaluation efforts and process studies underway. PROES is a project focused on data-model fusion focused on process understanding and process representation in models.

Graeme confirmed that the International GEWEX Project Office will be supported by NASA for the next five years. A new US GEWEX Office has been created under the auspices of U.S. Global Change Research Program (USGCRP). GEWEX Panels are currently restructuring and trying to align with WCRP restructuring. There is strong continued collaboration with operational and research space agencies. The EO4Water conference, planned for the end of 2020 with ESA, will have to be postponed.

Graeme highlighted GEWEX's future plans. There is a new collaboration with START and other partners to develop new activities in Africa and central Asia with the idea of addressing regional issues and capacity building in those regions. The GEWEX Global Land/Atmosphere System Study (GLASS) Panel are developing a strategy for a planetary boundary layer spaceborne observing system. In the near future there will be new climate data records, new process-orientated activities and assessments, and new modelling activities. The modelling activities fall into four broad efforts: model assessment; formulation; resolution and parameterization; and coordination.

These broad efforts can be then be mapped to look at how it aligns with WCRP goals. A GEWEX Science and Applications Traceability Matrix will be finalized at the next GEWEX SSG meeting. It will provide explicit traceability to WCRP strategic goals and LAs. It is already evident that all panels (GASS, GLASS, GDAP, GHP) contribute to process-level understanding and prediction of the climate and that these panels also engage with ECRs. The regional hydroclimate projects of the GEWEX Hydroclimatology Panel (GHP) are focused on regional understanding, impacts and prediction of the water cycle. These could contribute to "My Climate Risk" and "Safe Landing Climates" LAs. GHP, through its regional activities and GEWEX's collaboration with START and regional partners, contributes to capacity building. The Global Atmospheric System Studies (GASS) Panel and GLASS develop models and model modules which synthesize our process understanding. The GEWEX Data and Analysis Panel (GDAP) assesses the quality of global products used for assimilation and model validation and fosters development of new global products. These activities could contribute to the "Digital Earths" LA.

Lastly, Graeme examined emerging issues for GEWEX. In terms of sunseting GCs, these are big science problems that will not be solved in five years. The threads of the science will continue. The Water for Food Baskets GC could continue as a theme in GEWEX because it relates to capacity building, links to agriculture and will advance the Digital Earths capability. The work of the Extremes GC will continue across WCRP. Stewardship of the global climate data records that GEWEX maintains will be critical. Many elements of the Clouds GC, centered on process understanding and interaction, directly map into ongoing GEWEX activities (GASS, GDAP) and could move there. Graeme highlighted the need to balance top down and bottom up coordination. Clarity on a new structure is essential. Coordination with the Monsoons Panel is a question. Graeme thinks it might be a flagship effort that is coupled to WWRP and should be part of our regional dialogue. Graeme also thinks that the task now should be to define the sub-themes of the LAs, as this will need careful thought and will provide feedback on GEWEX strategies. If these LAs are properly defined they will be a real way that CPs could couple together more than in the past.

3.7. GC Water for the Food Baskets of the World

Jan Polcher highlighted that there has been a focus from the GC on convection modelling, addressing questions related to the snowpack and its contribution to water resources, the role of low topography in the lateral redistribution of water, and the impact of irrigation on atmospheric boundary layer and convection triggering. A field campaign (LIAISE - Northern Spain) was planned but has now been postponed to July 2021 due to COVID-19. Meanwhile, modelling activities continue.

The GC has been successful over the last few years in community building - bringing together communities around water management and irrigation. ESA is supporting two proposals on remote sensing of irrigation. Work on the AgMIP is ongoing. A new strategy is being developed on how to address irrigation and water management in ESMs. This will help with future partnerships.

Jan then outlined the links to the WCRP Strategy. The human dimension, especially water management is central to understanding the continental water cycle (GEWEX). Setting a sunset date for this GC is not a problem - the people will find a home in GEWEX. The GC is particularly relevant at the regional scale (CORDEX, WGRC, RHPs) and, as a trans-disciplinary activity, will allow a better understanding of the needs for Subseasonal-to-Seasonal (S2S) needs of water managers. Water for food-baskets is a topic in full interaction with social sciences as the system responds to our information. A challenge for the "Digital Earths" LA will be: do we do a digital Earth of a virtual world that does not exist or of the actual world?

Detlef commented that it is good to hear the work will continue. It is also related to the new regional 'home'. He mentioned that there is a new effort led by Roy Rasmussen concerned with developing a real Earth System Model with a 1 km resolution to simulated precipitation, regional water cycle along the Pacific coast of South America. How could this fit into WCRP? Jan responded that this emerged from an activity that the GC worked on with Roy. It is very relevant as the Andes provides water to a large population. WCRP can provide part of the answer. We then need to reach out to the science community that deals with other parts of the problem. It could fit in GEWEX regional activities or the "My Climate Risk" LA. Peter noted that GEWEX and CORDEX are already heavily involved in this effort.

3.8. GC Weather and Climate Extremes

Xuebin Zhang began by highlighting the WCRP Institute of Advanced Studies in Climate Extremes and Risk Management, held in Nanjing in 2019. This was a multidisciplinary school for which significant support was gained from outside of WCRP. The Grand Challenge has also contributed to the IPCC AR6, CMIP6 (multiple MIPs) and dataset developments (with GEWEX). Last year the GC proposed to develop a global extremes project. Unfortunately, there has not been much progress on scoping this. Partly there were time issues and partly it was because it was not clear what the new structure of WCRP would look like.

In terms of links to the WCRP Strategic and Implementation Plans, Xuebin explains that Extremes is aligned with both the Strategic Plan Scientific Objectives and Critical Infrastructure, and the Implementation Priorities outlined in the Hamburg Report. He outlined the case for how Extremes would fit into the new structure. A Global Extremes Project could provide a consensus about the importance of extremes, a place for partnerships with users and coordination of Extremes across the LAs. Initial activities could include global and regional monitoring and a global stocktake, annual updates on the status of extremes and attribution, cross-WCRP coordination and integration of extreme-related activities, and capacity building for proper applications and developing true partnerships with users. The place that we need

capacity is also where we need resources. We also need adequate incentives to attract leading lecturers.

Helen agreed that we need to have true partnerships between science and users. The "My Climate Risk" LA was thinking along those lines. As we flesh out the details, this should develop, but co-design was part of that LA.

3.9. GC on Clouds, Circulation and Climate Sensitivity

Sandrine Bony noted that the Grand Challenge on Cloud Circulation and Climate Sensitivity is now entering the end of its main phase and is beginning to think about how to bring this to a conclusion. Highlights for the period include two major assessments, on aerosol forcing (published) and climate sensitivity (revised version submitted) in Reviews of Geophysics and four workshop/conferences, including a week workshop/summer school on convective aggregation and climate sensitivity held at the International Centre for Theoretical Physics in Trieste. The European project EUREC4A has played an important role in the Grand Challenge. Endorsement by WCRP has strongly encouraged international participation, including in the Caribbean region. The suggestion was made to provide more visibility to these key science questions, to further promote the idea of assessments, and to offer more prominence to developing the next generation of climate models.

It was noted that activities associated with this Grand Challenge could sit in several places in the new structure, noting also that Lighthouses could be implemented as a series of grand challenge-like activities. The double ITCZ problem was noted in this context.

Neil and Tercio Ambrizzi agreed with the point raised by GC Clouds that WCRP has perhaps not been focused as much as it should be on the publication of scientific assessments. Jack Kaye commented that in the past SPARC did a really good job in doing assessments "out of phase" with IPCC that helped feed into them. Helen agreed also but also pointed out that we do also need to be cognizant that these can be demanding of resources in terms of people and time.

3.10. GC on Carbon Feedbacks in the Climate System

Tatiana Ilyina noted that the Grand Challenge on Carbon Feedbacks in the Climate System co-organized several important meetings. She highlighted the contribution to C4MIP, the Global Carbon Project, the support from the EU Project 4C coordinated by Pierre Friedlingstein and recent highly cited publications. Future plans include an assessment of the "Transient Climate Response to Cumulative Carbon Emissions", contributions to the Global Carbon Budget 2020 (with a focus of the impact of COVID-19), the development of a framework for decadal prediction of the global carbon cycle and further contributions to CMIP6 Earth system model analysis. It was recognized that this Grand Challenge links nicely to the science objectives and to the Lighthouse "Explaining and Prediction Earth System Changes" and "Safe Landing Climates".

Pierre Friedlingstein commented that the current COVID-19 crisis highlighted the need to better monitor CO₂ emissions and their fate in the global carbon cycle. For example, can we detect (and attribute) a change in emissions in the atmospheric CO₂ record? Can we anticipate what will be the trajectory of atmospheric CO₂ in the near-term following implementation of low carbon policies, etc. At the moment our partial understanding of the natural variability limits our capacity to answer such questions. Helen agreed and added that the LA on "Explaining and Predicting Earth System Change" could address this. Oksana commented that GAW is looking into the Greenhouse Gas signal.

The relevance and potential of these activities to support the Global Stocktake also highlights the need to monitor emissions and understand natural variability, predictability and cycles, all being relevant topics to several Lighthouses.

3.11. Sub-seasonal to Seasonal (S2S) Prediction Project

Andrew Robertson emphasized that the WCRP/WWRP S2S Prediction Project is a data driven project, relevant to WCRP Scientific Objectives 1, 2 and 4 in particular and the overall mapping across the various LAs. S2S embodies the seamless paradigm across timescales and from science to users. He highlighted the strong collaborations across several WCRP entities, strong linkages to operational centers and the key focus towards applications in Phase II. Emerging opportunities and issues include low prediction skill over land, connections to regional dimension and CORDEX and further data infrastructure integration (e.g. ocean and sea-ice products, other related projects, big data access and AI). The potential offered by real-time availability and by regional statistical downscaling/calibration was noted.

Chris Davis, incoming Chair of WWRP, reminded attendees that as a joint activity between WWRP and WCRP working on the connections between the programmes is important for S2S.

Martin asked about the connection between S2S and climate services. Andy replied that the S2S real-time initiative consists of around 16 climate service demonstration projects.

Ken commented that real-time availability of S2S forecasts would provide a key contribution to the WCRP Science Objective 4 (bridge to society) and "My Climate Risk" LA. He asked whether free availability to all regional and national operational centers is envisioned for the future? Andy answered that there's a WMO task team to create a Lead Center for subseasonal forecasts that would make S2S forecast products available to National Meteorological and Hydrological Services as is currently done for seasonal forecasts. This is part of S2S R2O activities.

3.12. Working Group on Subseasonal to Interdecadal Prediction (WGSIP)

Bill Merryfield noted that the new cycle of WGSIP projects was formulated to address the objectives of the WCRP Strategic Plan and included research on monsoons, oceans, trends, extremes, and engagement with society. He highlighted the collaborations with corresponding entities within WCRP which are developing.

The near future is likely to bring increasing emphasis on developing and improving seamless climate information for regions, as well as broadened Earth system prediction capabilities requiring increased communication and coordination with the observational, data assimilation and reanalysis communities. Application of machine learning to postprocessing of climate forecasts is likely to be a further growth area. A central science issue is that models underestimate predictability and forced response of atmospheric circulation by up to an order of magnitude and will require coordinated efforts to understand and solve. Emerging issues and opportunities include renewed memberships, linkages to operations, the potential to leverage the CMIP protocol and Earth System Grid Federation access, and a joint approach to climate prediction science and operations with a target event around 2021-2022.

3.13. GC on Near-Team Climate Prediction

Adam Scaife started by noting that GC NTCP meetings have always been held on-line, so they are very used to this format. All the initial objectives of this GC have been met. Centers are

now sharing annual to decadal predictions in real time via a Lead Center hosted at the UK MetOffice and resulting in an Annual to Decadal Climate Update product. Science work has to continue, e.g. to address the Signal/Noise paradox. Focus is now shifting slightly to applications, with involvement e.g. of the United Nations Environment Programme Finance Initiative and the expansion of the WMO Lead Center into more data, contributions and associated verification. The need to seamlessly link seasonal predictions with near term decadal predictions and long-term projections was recognized.

Kumar asked if there were any initiatives to promote annual to decadal predictions on a regional scale. Adam answered that there was not really apart from our Global Annual to Decadal Climate Update. It would be good to enhance that aspect in the future.

Clare Goodess commented that during a recent Copernicus C3S symposium for the energy sector, strong interest was shown in the potential to bring in the near-term decadal prediction timescale (currently the focus is seasonal and long-term). Adam agreed there are good opportunities for energy sector related predictions on these timescales. This could be one of the sectors to benefit if we take the use of information forward to climate services. Insurance is another obvious area.

Huijun Wang highlighted that statistical approaches could be very useful in climate predictions from subseasonal to interdecadal scales, particularly when these approaches are combined with dynamical predictions. Adam agreed, adding that they often use large scale model predictions to infer regional climate effects rather than looking at the output directly. An example is the prediction of Atlantic hurricanes where decadal predictions of the large-scale flow and sea surface temperature are at least as good as storm counting. A second example is in the extra tropics where using North Atlantic Oscillation predictions gives better skill for temperature or rainfall for example than naively using the model output for those quantities.

3.14. WCRP Data Advisory Council (WDAC)

Susann Tegtmeier outlined the key pillars of WDAC activities and their alignment with the WCRP Strategic Plan: observations (for process understanding, sustained reference data sets), Earth system reanalyses and data assimilation, and data science, mining, infrastructure and management. In mapping those activities into a new structure, she noted the importance to keep strong interfaces with providers (e.g. CEOS/CGMS, GCOS), the need to reinforce the linkage between modeling and data with key communities (e.g. data assimilation in WWRP), and between research and operations. The "Digital Earths" LA is a unique opportunity in this context. She emphasized the need to keep those key pillars in the new structure.

Kumar asked if there had been attempts to align with the Climate Database Management System of the WMO Commission for Climatology. Susann said not as yet but it should be a topic for the next WDAC teleconference.

Attendees agreed on the "Digital Earths" LA being about both models and data. There is a need to look into gaps in the observing system and opportunities for new types of data, a work which should be conducted with GCOS, WG Climate etc. It was suggested that WDAC associated activities are relevant to the new 'model and data' pillar. A restructuring will have to retain those pillar activities and crucial connections which otherwise would create important gaps in the implementation of the Programme.

3.15. Working Group on Regional Climate (WGRG)

Clare Goodess noted that WGRG was very active between 2013 and 2016, and its contribution has embodied two main recommendations, on the Framework for Regional Activities and the

Implementation of Frontiers of Climate Information (FoCI). More recently, the group has contributed to the Task Team on Regional Activities.

FoCI projects align well with the ideal of regional labs in the Lighthouse My Climate Risk, to distill and reconcile decision and scale-relevant climate information from multi-model ensembles, between RCMs and GCMs, etc.

Kumar asked how the contribution of WGRC to the implementation of the Climate Services Information System regional layer, particularly the WMO Regional Climate Centres and Regional Climate Outlook Fora, over the entire spectrum of climate prediction/projection is envisioned? Clare responded that this will be discussed over the coming months.

Clare commented, and many agreed, that this activity would fit nicely into the new envisaged 'home' on regional activities which could serve as an interface with society. Ken made the point that we need to keep in mind that it would need to be interdisciplinary, incorporating expertise beyond the traditional WCRP community. This community should work as an interface with the social, health, economical, and other sciences. This was generally agreed.

3.16. Coordinated Regional Climate Downscaling Experiment (CORDEX)

Silvina highlighted CORDEX contributions and plans aligning with the WCRP science goals, in particular CORE (Coordinated Output for Regional Evaluations) underpinning fundamental science and long-term response, flagship pilot studies and convection permitting Earth system models. Connection with other WCRP Projects (e.g. GEWEX RHPs), CORA, GFCS and Future Earth also ensure a strong contribution to Science Objective 4. Two new Flagship Pilot Studies (FPSs) were endorsed at the ICRC-CORDEX 2019: 'Modelling the Southeast African regional Climate' and 'High resolution climate modeling with a focus on convection and associated precipitation over the Third Pole region' (the latter also proposed by Core Project Joint Initiative as a pilot FOCI project). Silvina highlighted that the CORDEX community is working with impact-, risk-, adaptation scientists as well as with decision makers and other users such as energy industry or agriculture, through projects, workshops, paper writing, etc. She noted the growing focus on regional climate science and need for products, requiring increased coordination and transparency and communication and the challenges to secure sustained resources to support CORDEX in this context.

3.17. WCRP Modelling Advisory Council (WMAC)

Paco noted that the Council has been active in providing recommendations on a number of key modeling issues, notably via the Task Team on 'Model Development and Computing Infrastructure', the Hamburg meeting, and WMO Research Board papers. He highlighted the importance of moving into seamlessness, ESMs and Research-Operations approaches. The Council recommends a stronger integration with the data activities as well as a broad coordination of modeling activities on top of the projected CMIP Office. He noted the stronger role of climate modelling expected in the WMO Research Board documents around e.g. synergies between weather and climate, exascale computing and standardization.

3.18. Working Group on Coupled Modelling (WGCM)

Including the Coupled Model Intercomparison Project (CMIP)

Cath Senior noted that WGCM is well situated within the WCRP structure, producing with CMIP some of the most visible and influential outcomes of WCRP and leveraging a huge investment

by many countries and institutions. Concerns include the continued visibility and effectiveness of CMIP in the new structure. She highlighted the call for the establishment of the CMIP Project Office and initial consultations towards CMIP7. New science priorities include climate sensitivity, reinforce activities around observations and verification (e.g. obs4MIPs, ESMValTool) and analysis and interpretation of CMIP6 multi-model ensembles.

The JSC took note of the WGCM concerns around the newly proposed pillar on 'model and data' in this context. The "Digital Earths" LA was mentioned as an important element to support this. The charge is on the community to propose a new organization.

3.19. Working Group on Numerical Experimentation (WGNE)

Keith noted the evolution of WGNE, formerly reporting both to JSC and the Commission for Atmospheric Sciences (WMO), and now reporting to the Research Board. This includes an expanded mission towards the development of ESMs for use in weather prediction and climate studies on all time scales, and diagnosing and resolving shortcomings, in particular around its core focus on systematic errors, working with other groups e.g. GASS, GLASS, to develop solutions. The recent emphasis includes a broader expertise requirement, exascale computing, AI/Machine Learning (e.g. emulating parameterization, speeding up code). The new ESM focus requires revisiting research priorities which will be conducted via another survey. WGNE would fit nicely within the 'model and data' pillar or home. He noted the opportunity offered by being part of the Research Board to work as closely as possible with WCRP, WWRP and GAW.

There was a good deal of discussion on the importance of maintaining a key activity on systematic errors. For those in the community, there is usually a good understanding and agreement between WGNE's (dynamical cores, parameterization) and WGCM's respective remits (e.g. forcings, interactive ice-sheets, model tuning, climate sensitivity, long-term feedbacks, human dimension). WGNE would not replace but rather call and build upon the disciplinary expertise in the various groups (e.g. CLIVAR Ocean Model Development Panel for ocean model development). It was also noted that data assimilation falls naturally outside WGNE. The new pillar/home on 'model and data' would need to look into ways to best organize all those aspects.

4. Other Business

4.1. WCRP and the Decade of Ocean Science for Sustainable Development

Given the importance of WCRP engagement with the UN Decade of Ocean Science for Sustainable Development, a special session after the ocean-related activity presentations was included in the JSC-41 agenda. Detlef mentioned that a draft Implementation Plan was recently circulated for comment. CLIVAR and WCRP provided comments, but there could be more room for WCRP to provide contributions to the aspects concerned with climate. We need to establish to what extent and how the other parts of WCRP, beyond CLIVAR, can contribute.

Vladimir stated that it is very important that WCRP is part of the Ocean Decade. He emphasized that it is not an IOC decade, although IOC is responsible for preparing the implementation plan. Ocean science has been built out of curiosity. It has now reached a level of maturity sufficient to sound the alarm on issues such as sea level rise. Moving towards solutions is difficult in matters of managing ocean health, managing ocean ecosystems, ensuring clean oceans, etc. We need to develop a system which deals with the complexity of ocean issues.

Vladimir outlined that there were more than 230 comments on the zero-order draft of the Ocean Decade Implementation Plan. It now needs rewriting. One key decision is that there will be Grand Challenges – the climate-ocean nexus will be one of them. The Ocean Decade will be the largest campaign in the history of ocean science, with the aim of moving ocean science to a position where it has real decision-making power. The aim is to move away from an ocean suffering from multiple stresses - humankind is running out of time to start managing the ocean sustainably ([World Ocean Assessment, 2016](#)). It is important to start managing the ocean based on science. This includes restoration of data, reanalysis, prediction, management of ecosystems, marine planning, marine special areas etc. Climate science is a key contributor to the future success of that endeavor. There will be 10 Grand Challenges and a lot of activities. There will soon be a call to action.

Martin commented that some LAs that are being discussed, especially "Safe Landing Climates," have a direct connection to sustainable development. That provides a great opportunity. The LA "Digital Earths" also resonates, as there is some discussion in Ocean Decade community of something similar (transparent ocean). There is enormous interest in building capacity and sharing knowledge: The LA "WCRP Academy" has some elements of that. There are parallels in our thinking as we restructure WCRP and the thinking in relation to the Ocean Decade. One of the areas is the connection between ocean and climate. In practical terms, in the next six months there will be a lot of discussion on how we will roll out the Ocean Decade. Groups like CLIVAR together with the WCRP family should engage in this discussion to see how we can bring climate and ocean knowledge forward to support decision making in sustainable development.

4.2. WCRP Carbon Footprint

Pierre started the presentation by explaining the background behind the Carbon Footprint initiative. It began during the planning of JSC-41, which was to be held in Sydney before COVID-19 travel restrictions moved it to an online format. There was some concern regarding the Carbon Footprint that would result from all of the WCRP leadership travelling to the session. As a result, a study on the impact of having the JSC in several different locations and to look at what other recommendations could be made was undertaken. This study started with the premise that WCRP should be consistent with the IPCC Special Report on Global Warming of 1.5°C. This report outlines that to limit warming to 1.5°C, global net anthropogenic CO₂ emissions must decline by about 45% from 2010 levels by 2030, reaching net zero around 2050. Therefore, Pierre explained that WCRP should set clear and measurable objectives in terms of an emissions reduction over a given time period. The proposal made is to reduce WCRP CO₂ emissions by 75% by 2030 (relative to current). This should apply to all WCRP activities, such as travel, building heating, electricity, and procurements.

As a starting point, Pierre compared the travel emissions for JSC members, IPO Staff and WCRP Secretariat staff were they to attend a meeting in Geneva, Washington D.C., Sydney, Cape Town, or Lima. Currently, 55% of this group are from Europe. As a result, meeting in Geneva emits 40% less CO₂ than a meeting in Washington D.C., 55% less than in Cape Town or Lima, and 65% less than in Sydney (Figure 4). Most of the difference comes from the travel of European participants. The non-European contribution is essentially the same regardless of the meeting location. To put these numbers into context, averaged per participant, a meeting in Geneva uses more than the annual (per capita) CO₂ emissions of a person living in Brazil, Peru, or India and a meeting in Sydney uses more than the annual (per capita) CO₂ emissions of China, EU, and Brazil, for only one return trip (Figure 5). Each person who travels in this way emits much, much, more CO₂ per year than an average citizen of the world.

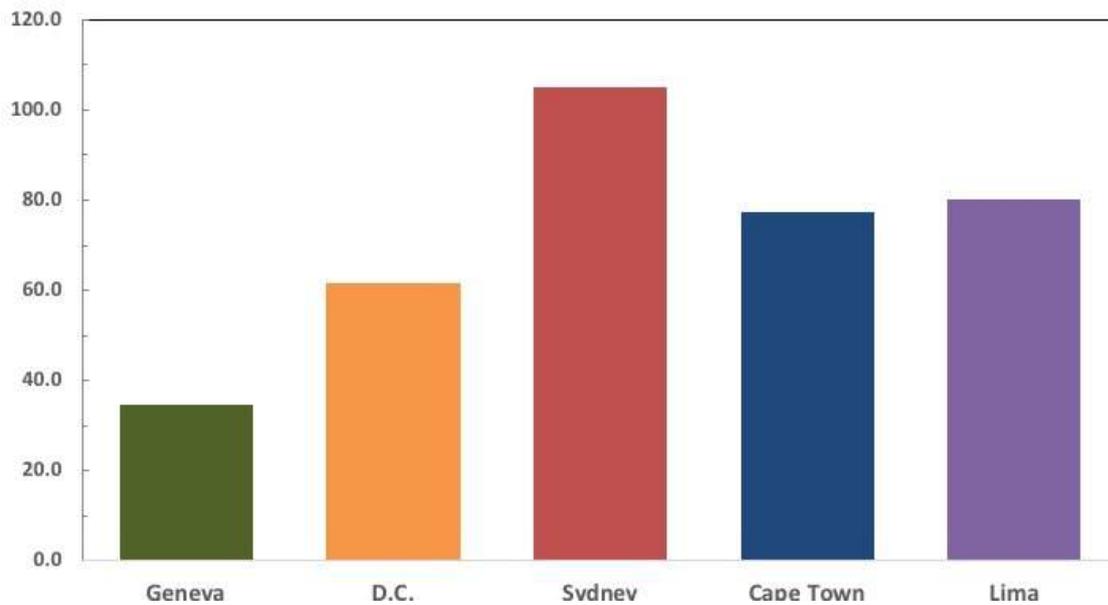


Figure 4: Emissions (tonnes of CO₂ equivalent) for different JSC Session locations

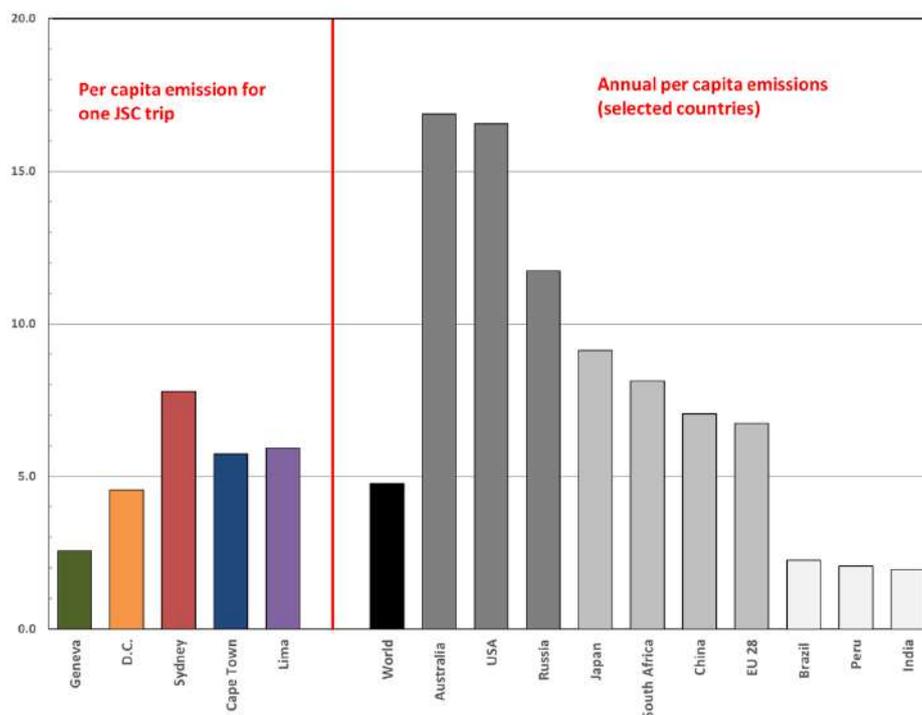


Figure 5: Per capita emissions for a round trip to one JSC Session location, compared to country annual per capita fossil fuel emissions.

Pierre explained that it is necessary to assess the carbon footprint associated with travel for all Core Projects and core activities. Ideally, we would produce a first estimate of the WCRP carbon footprint from travel for 2019/2020. Then we would develop a fair strategy for reducing this carbon footprint by 75% over the coming years. To achieve this, he made a number of recommendations (see [Carbon Footprint Report](#)).

The discussion that followed raised the following points:

- Each of the international WCRP offices has a host organization. These are typically donated to us and may or may not have their own carbon policies. This needs to be considered.
- The boundary of what we do and do not include in any carbon assessment needs to be clearly defined. Do we include the full carbon emissions of our science activities (e.g. emissions from computing facilities or research vessels undertaking WCRP-endorsed research) or do we limit the assessment to activities that we can control (e.g. travel, meeting organization)?
- The first phase of developing a carbon strategy should be discovery and learning. We should identify a framework to explore what emissions are occurring and then think about what strategy is needed. However, we should also not wait too long to act.
- It is clear that online meetings help to reduce carbon emissions, but there are times when face-to-face meetings are needed, especially when people do not know each other or to engage the next generation or the developing world. A combination of meeting nodes and holding meetings back to back were part of the suggestions made in this context. The top priority is to get the best science, but that does not always need to involve travel.

4.3. Partner Comments

Sarah Jones (WWRP, Chair WMO Research Board)

Sarah started by explaining that the WMO Research Board (RB) translates decisions of WMO members into research priorities and works with the research programmes toward any needed advances. It is important that the programmes themselves are part of this translation process. This is a joint process and Detlef is very strongly engaged. Sarah stated that the reports that she has been hearing from this session in the last few days really underline the importance of WCRP, with respect to advancing the fundamental understanding of the climate system and translating the science into societal benefit. Sarah hopes that WCRP takes the opportunity presented by the RB to shape how it works. It is also an opportunity for ISC and IOC to influence the research agenda of WMO. In terms of the WCRP implementation process, one important factor is that the RB has decided to establish a Task Team on Exascale Computing, Data Handling and Artificial Intelligence. This should provide leadership for WMO and it should provide a mechanism to coordinate data handling in GAW. It may also be relevant to the "Digital Earths" LA (and in WWRP there is an action area on this subject) and the WMO Technical Commissions of Infrastructure and Services (a coordination mechanism). Sarah hopes that by the RB meeting in the Northern Hemisphere autumn there should be news on the advancement of the WCRP Implementation Plan. The RB will be looking for contributions to member priorities.

It is essential to coordinate modelling and data activities across WMO. Using the analogy of building a house, some of the rooms in the house will need to be shared rooms. Some will have one wall to connect to outside architecture. It is important that we engage soon about what the definition of some of these activities are so we can make sensible structures before the WCRP house has been poured into concrete. Regarding WGNE, as far as GAW and WWRP are concerned the coordination will take place in the RB.

Chris Davis (WWRP)

Chris picked up on some of the issues of proposed implementation. At present, the complexity makes it a bit challenging for partners to see how and where they intersect with the emerging WCRP structure. We want to pay attention to this issue as we move forward. It will require coordination from the RB and us really talking and addressing some of these cross-cutting themes, projects and activities together.

Looking at the diagram with the partners on the wings, we see some areas where the partners, and WWRP in particular, are directly intersecting e.g. S2S, ESM development, exascale, data handling and processes. In these areas Chris saw synergies and potentially strong benefits in WCRP and WWRP working together.

Chris saw S2S as a really good, jointly managed, activity. WWRP has a very active group in social economic impacts which supports all WWRP Projects, including S2S, the Polar Prediction Project and the High-Impact Weather Project. A lot of the work done on early warning systems and stakeholder engagement could be beneficial to WCRP.

Detlef emphasizes that WCRP has launched a very intensive interaction with WWRP and GAW. This will continue and the further development of WCRP is moving and there needs to be continuous coordination, collaboration and discussion. He notes that WCRP has three co-sponsors, including strong links to ISC delivering social science aspects. Maybe WWRP can also benefit from these activities.

Marie-France (PAGES)

Marie-France explained that there is a long history of partnership between PAGES and WCRP. There is a long tradition of cooperating with CLIVAR, that maybe needs reviving a bit. There is also cooperation on data assimilation techniques in the short term and then there is CMIP where the connection with PAGES is extremely strong.

Marie-France asked how, as a partner, can PAGES contribute to the design of the WCRP Implementation Plan? How can PAGES find a room for partners? What is the future of partnerships? Is WCRP looking for the status quo or do we want to do something better in another way?

Detlef responded that we want to continue, but also to improve the activities. The vision is that all these LAs will be codesigned. We need to see which partners belong in which LAs, but the science plan has to be developed together. It is a joint journey forward. The MoU with PAGES will continue and we have to bring partners into the design now.

Helen supported this. She said that she hears that WCRP needs to be clear on how we can engage with partners so that we can do this in a codesigned manner.

Lisa Miller (SOLAS)

Lisa began by saying that she was very happy to hear the enthusiasm and commitment to maintaining and building links with partners like SOLAS. SOLAS has activities that touch on almost all the WCRP Science Objectives and LAs. a few that are particularly relevant are climate intervention, a global network of air-sea observatories (this would feed into the "Explaining and Predicting Earth System Change" LA and could make contributions to the "WCRP Academy"), and ship plumes (that could feed into the "My Climate Risk" LA and related to the bridging climate science Scientific Objective). Lisa also stated that the Task Team on Surface Fluxes has been important to SOLAS and she hopes that it can continue in some way

in the new structure.

Detlef stated that he is looking forward to the outcomes of further discussions. WCRP would like to have MoUs with SOLAS and IMBER.

Viktor Brovkin (AIMES)

Viktor opened by saying that he feels like he is visiting a construction site. Partners need some help from WCRP to navigate where things are and where they will move to. For example, where is long term dynamics in new structure? This is relevant to AIMES and PAGES. Is it only in "Safe Landing Climates" LA? AIMES is also currently restructuring. They just established a new working group on modelling of system and human interactions. As a part of that, they want to facilitate new methods and scenarios for modelling, and it is unclear to Viktor who to talk to about this. More help and clarification are needed.

Detlef replied that a lot of things have to evolve and there needs to be discussion within WCRP and we need to work on the science plans together. Some of the information might already be in the Hamburg Report. Long term dynamics is not just in the "Safe Landing Climates" LA but across most of WCRP.

4.4. WCRP Budget Briefing

Detlef invited Mike Sparrow, as Officer in Charge of the WCRP Secretariat, to talk about the current financial situation. Mike started by explaining that the general principle is for WCRP to both increase its income and to focus expenditure on science activities. In terms of income, we get national contributions from countries and national support for our project offices which is absolutely critical to WCRP's success.

WCRP has been working closely with its co-sponsors. Annual solicitation letters for national contributions are now sent jointly from the WCRP co-sponsors as well as from the JSC Chair. In addition, there is a significant funding proposal to USGCRP nearly finalized, and WCRP is working with the Belmont Forum and funding agencies directly. Mike presented a summary of the 2020 budget. WMO is the largest single contributor, of both science activities and the Secretariat staff. IOC provides a smaller contribution and national (voluntary) contributions is about equal to that of WMO. In 2020 WCRP did use some of its reserve, but expenses for 2020 are expected to be lower due to the COVID-19 situation. WCRP activities are able to carry forward unspent funds from 2020 to 2021. For 2021 and 2022 there are uncertainties in our income. While some new sources are being targeted, both the co-sponsors and national contributions are uncertain. Some countries may not be in a position to contribute due to COVID-19. In addition, future budgets will need to take into account JSC decisions on transitioning to a new WCRP structure.

Detlef noted that a lot of WCRP's budget goes to travel. More virtual meetings will impact what we can do elsewhere with the money. It will be interesting to play this through, also in terms of the budget.

Peter van Oevelen noted that there is a strong dependency on US contributions to the WCRP budget. Are there ideas or alternatives to go beyond this?

Detlef explained that currently WCRP is trying to make better use of IOC and ISC channels to target new country contributions. Once WCRP has its new Implementation Plan there will be moves to explain the relevance of what WCRP does to additional countries. There is also the connection to USGCRP for enhancing funding. This is proceeding on various fronts. The aim is to bring back interest in WCRP and the outcomes of WCRP research.

Jerry noted that a few years ago there was a big 50% cut in the budget and the feeling was that WCRP would have to be scaled back. Looking at this budget, it seems like we can cover current activities adequately?

Mike confirmed that we can cover activities. However, it is important to note that funds to activities have been cut significantly. We are eating into our reserve. The situation is not as drastic as it was a few years ago, but we still need to increase our income.

Jerry asked whether this is being considered in the new structure? Should the scale of the activities be related to the budget?

Detlef noted that this is always being considered. We need to be able to afford what we wish to do. A lot of the funds go into travel and conferences. We can't design a new WCRP in a vacuum. We need to consider the budget. So, for now, it is a moving target.

5. Wrap-up and Close of the JSC-41 Open Session

Detlef ended the meeting by discussing a number of emerging issues that he and Helen have identified throughout the meeting:

- There is a need for WCRP to periodically undertake scientific assessments when and as needed (an example was provided by the GC Clouds) noting that these are included in the required elements under the draft structure.
- Appropriate visibility for success stories is important.
- Adoption of best practices from GCs should be part of the WCRP implementation.
- A WCRP Celebration and Achievements Symposium, to take place at the end of 2022, would be a joint closing celebration for all GCs as well as an opportunity to showcase success stories (like climate prediction).
- The effects of COVID-19 on the carbon budget and maybe on climate is to be considered (e.g. can we learn anything from reduced emissions?).
- There is a need for closer integration / fusion of models and data.
- The proposed new structure resonates with the WGs and CPs, but the details need fleshing out.
- There is a growing importance of regional information and also carbon-climate (i.e. not just physics) information.
- There is an urgent need to scope out the WCRP Academy (we need volunteers).

In the context of the WCRP Academy, Andrew Robertson noted that IRI has a [prototype initiative](#) on developing these.

Helen thanked everyone for the engagement and lively discussion in the chat box. This three-day session with over 90 participants has gone much better than she had expected, and it was a really good learning experience. She thanked all the speakers and partners. Helen was heartened to see that there is a lot of enthusiasm for the house that WCRP is building and notes that we have made quite significant progress since AGU in December 2019 by using virtual meetings.

Detlef looked back to the significant progress made in the last year, since the last JSC in Geneva. We have a first drawing of the house and now it is up to us to do some homework and come back at the end of this year to review the homework and make our decisions. Detlef

thanks everyone very much and closes the Open Session.

6. WCRP Closed Session

This section lists the main decisions and outcomes from the JSC Closed Session.

6.1. JSC-41 Outcomes

The JSC discussed how to publicize the outcomes of JSC-41 in a clear and transparent way. It was agreed that a presentation would be shared that represents the outcomes of JSC-41. These slides could be used by community leaders to communicate WCRP implementation plans widely. It would be made clear on the slides that the structure and elements proposed are still under discussion.

ACTION:

- 4. Prepare an updated slide set for dissemination of the current thinking on WCRP structure and elements, as at the end of JSC-41 (clearly marked as under discussion) and circulate first to JSC members and then to the WCRP family (JSC Chair and Vice-Chair, WCRP Secretariat, 15 June 2020)**

6.2. JSC Membership and Leadership Elections

Elections of both the Chair and Vice-Chair of the JSC were conducted for terms from 1 January 2021 to 31 December 2022. Nominations were accepted until 19 May 2020, with only one candidate nominated for each role. Members of the JSC voted electronically to support or reject (or abstain) the candidate for each position. Mike Sparrow announced on 22 May 2020 that Detlef Stammer and Helen Cleugh will continue as Chair and Vice-Chair of the JSC, respectively. Martin Visbeck, as election scrutineer, reported the election was perfectly executed. A report on the election will be sent to WCRP co-sponsors. It is envisioned that JSC Officers will be elected for the 1 January 2021 to 31 December 2022 term at the planned WCRP Extraordinary Session at the end of 2020.

Of the five JSC members whose terms will end at the end of 2020, four will be automatically extended for a further two years (in agreement with the WCRP co-sponsors) to facilitate the transition to a new WCRP structure. At his own request, Masahide Kimoto will rotate off at the end of 2020, which means that two JSC membership seats will be open from 1 January 2021 (one seat was also vacated in 2019). The JSC agreed to issue an open call to fill these two JSC membership seats. Detlef, on behalf of himself and the JSC, also thanked Masa for his contributions to the JSC.

ACTIONS:

- 5. Report WCRP leadership election results and procedure to the WCRP Co-sponsors (Officer in Charge, WCRP Secretariat, 5 June 2020)**
- 6. Issue an open call for two JSC members with links to social sciences for the term 1 January 2021 to 31 December 2024 (JSC, WCRP Secretariat, 30 June 2020)**

6.3. WCRP Secretariat Report

Mike began by presenting an overview of the role of the WCRP Secretariat and staff changes that have taken place over the last year and that are planned for later this year. In particular, there will be a new Head of the World Climate Research Division (of WMO), under which there will be three professional staff members. Catherine Michaut (Institut Pierre Simon Laplace,

IPSL) will also continue to support WCRP conference activities, for which WCRP is very grateful. Jürg Luterbacher will continue overseeing WCRP, WWRP and GAW as Director of Science and Innovation at WMO. Under the WMO Reform there will be more sharing of human resources across WMO and with the Science and Innovation Department.

Mike then looked at WCRP resources and finances. He listed the current international project and support offices (SPARC, CLIVAR, GEWEX, CORDEX, S2S, CORA), representing a current annual contribution of over US\$ 3 million in national support, which is crucial for WCRP work and most gratefully acknowledged. He also noted the planned (CliC, CMIP) WCRP project and support offices.

In terms of the WCRP budget, Mike noted that the aim is to increase income to WCRP and to focus expenditure on science activities. In terms of bringing in additional funding, Detlef, Helen and Mike have been working closely with the WCRP co-sponsors. This year, national solicitation letters were sent jointly from the JSC Chair and WCRP Co-sponsors to both countries that normally provide funds and to those who have provided funds in the past but no longer do. In addition, discussions are underway on approaching new countries for funding contributions. In addition to national contributions, there is also a significant funding proposal to USGCRP nearly finalized and there are ongoing discussions with funding agencies and the Belmont Forum.

Mike presented the WCRP budget for 2020 (Table 1). He noted that a budget for 2021 could not yet be finalized due to significant uncertainties in income (also due to COVID-19), both from WCRP co-sponsors and national contributions. In addition, JSC decisions on the transition to a new structure and the timeframe involved will also need to be taken into account. The JSC asked that a draft WCRP budget for 2021 be available at the extraordinary Session of the JSC planned for late 2020.

It was noted by Masahide Kimoto that some countries provide national contributions to WMO and that this is seen as a contribution also to WCRP. It was agreed that this needs to be clearer and that money that countries provide for WCRP activities should reach the Programme. It may also be that countries provide funds to ISC and IOC with WCRP in mind, but this is not transparent. It was further noted, especially by Pascale and Pierre, that now is a very good time to renew conversations with a number of countries that may have an interest in supporting the proposed Lighthouse Activities.

ACTION:

- 7. Provide WCRP Budget for 2021 at Extraordinary JSC Session or before (Head WCRP Secretariat; Extraordinary JSC Session, late 2020)**

WCRP Budget 2020		
<i>Proposed Expenditure</i>		
	2019	2020
	budget (CHF)	budget (CHF)
Geneva Staff Operation		
Temporary staffing	200	70
Geneva Staff Operation	200	65
JSC Steering Meeting and JSC travel	60	20
CLIVAR	60	80
CLIC	60	70
GEWEX	60	70
SPARC	60	90
CORDEX	60	60
Modelling (CMIP, WGCM etc.)	60	60
Data/Obs/Analysis	30	30
Grand Science Challenges	70	70
Education and Capacity Dev.	10	10
Regional Activities	20	10
AGU Climate Science Week	80	0
Transition and Implementation	0	60
TOTAL EXPENDITURE	1030	765
<i>Income</i>		
WMO Contribution to JCRF 2020		307.5
IOC Contribution to JCRF 2020		24.5
Voluntary - country - contributions in 2020		306
(Subtotal)		638
C/F from 2019		559
TOTAL ESTIMATED AVAILABLE JCRF FUNDS		1197
(Predicted C/F to 2021)		432
NOTES		
<i>All funds in Swiss Francs (CHF). As of 8/5 1 CHF = 1.03 USD</i>		

6.4. WCRP Membership Process

The JSC and WCRP Secretariat discussed the process of establishing membership of the WCRP Core Projects SSGs, Working Groups and other committees. While the [Guidelines on Membership of WCRP Bodies](#) are useful, there have been several issues raised by the community. The first is that undertaking annual calls is a burden on the community, especially since there are many calls that are not synchronized across all groups. It was also noted that although each committee is supposed to have a JSC liaison with whom they discuss proposed membership changes before submitting them to the JSC for approval, in practice many groups are without liaisons. Lastly, it was noted that transparency on how decisions on membership were made is lacking and feedback was not provided uniformly to nominees.

Martin Visbeck noted that the Guidelines did not specify that calls must be made annually, but what is important is that a robust and transparent process is followed (a letter could be provided stating that no membership changes would be made in a given year). It was decided that JSC liaisons will be assigned to all WCRP high-level committees and that the guidelines for membership of WCRP bodies will be reviewed with the idea of resetting the clock and having a clearer and more centralized call as part of the new WCRP. The cases of WGNE, S2S and the joint GCOS AOPC, TOPC and OOPC panels, where there is co-sponsorship, will need to be considered separately but will also require clear rules.

ACTIONS:

8. **Look at the Guidelines on Membership of WCRP Bodies to ascertain if they are fit for purpose (JSC; by Extraordinary JSC Session, late 2020) and then implement changes in a timely and respectful way (JSC Chair and Vice-Chair; by JSC-42).**
9. **Check rules for approving WGNE memberships before RB meeting planned in fall 2020 (JSC; Extraordinary JSC Session, late 2020)**
10. **Ensure that all groups have JSC liaisons to ensure diversity of membership and leadership (JSC Chair and Vice-Chair; June 30, 2020).**

6.5. Core-activity Memberships

The JSC reviewed the proposed Core-activity memberships changes that will begin on 1 January 2021. The geographical and gender diversity of each committee was reviewed. As part of the discussion it was decided that Ex Officio members of a committee would not be included in determining if diversity of the group was sufficient. All group memberships except one were approved, although it was noted that gender and geographical diversity could be improved in most cases. In the future the JSC will be paying even greater attention to diversity as we transition to a new WCRP structure and all activities are encouraged to actively seek members who will ensure that both the WCRP membership and leadership is representative of gender and of a majority of the regions of the world.

DECISION:

1. **The proposed membership of all WCRP projects, councils and working groups (except one) were approved.**

ACTIONS:

11. **Advise all groups of the outcomes of JSC membership decisions (Officer in Charge WCRP Secretariat, 30 June 2020)**

12. **Work with the one group whose proposed membership was not diverse enough so that they can provide a new proposal to the JSC Extraordinary Session in late 2020 (JSC Chair, JSC Vice-Chair, with support from JSC Officers and Head of WCRP; by Extraordinary JSC Session, late 2020)**
13. **Send comments to all WCRP core activities on their JSC-41 reports and presentations (JSC Chair, JSC Vice-Chair, with support from WCRP Secretariat; by 15 July 2020)**

6.6. CMIP Office, Monsoons Project Office, and the CliC IPO

The JSC were updated on the progress of the CMIP Project Office call. This is underway and the call has a deadline of 31 August 2020. Michel Rixen invited JSC members to also help publicizing the call in their home countries. So far there are two expressions of interest.

Detlef then brought up a proposal from the CLIVAR Monsoons Project Office (ICMPO) on becoming a shared activity between WCRP and WWRP. Krishnan Raghavan noted that there is currently a draft proposal, put together by ICMPO Executive Director, Kumar Kolli, for the Office to coordinate the monsoon activities of both WCRP (including CLIVAR and GEWEX activities) and WWRP. The Ministry of Earth Sciences (India) is very interested in supporting this effort. A full proposal will need to be drafted giving the details of the proposed Office (terms, conditions, responsibilities, resources, budget, etc.). The ICMPO has renewed its hosting agreement for one year (until February 2021), while this possibility is explored. The JSC were then asked if they approve this proposal. The JSC unanimously supported this proposal and a letter of strong endorsement will be provided to the ICMPO.

Mike gave a brief update on the CliC IPO. There is a proposal with the National Science Foundation and NASA to support the CliC Office at the University of Massachusetts (USA), including support for 2.5 people. A review to the proposal was received late last year and it was revised and resubmitted. There has been no further news to date. There is a second proposal for Norway to host the Office (or part of the Office) and that is support for 0.5 people. Both potential hosts are talking together and there may be a possibility to work together.

As a last note, Helen explained that as WCRP moves into a soft launch of the new structure, we need to keep in mind how we support it with the project offices.

DECISION:

2. **JSC approve in principle the creation of a joint WCRP/WWRP Monsoons Project Office.**

ACTION:

14. **Advertise call for CMIP Office (WCRP Secretariat, 1 July 2020)**
15. **Provide a letter of strong endorsement (in principle approval) and other support as needed to advance the proposal for a joint WCRP/WWRP Monsoons Office in Pune (JSC Chair and Vice-Chair, WCRP Secretariat; 30 June 2020)**

6.7. WMO Research Board Input

SARS-COVID WG and Task Team on Exascale Computing

Detlef explained that a SARS-COVID Working Group has been set up by the WMO Research Board to look at the connections between COVID-19 and climate. The terms of reference are currently being written. The JSC decided that Ken Takahashi and Pedro Monteiro will be

suggested as members on behalf of WCRP. Ken and Pedro are already involved with the formation of the Working Group.

Detlef then outlined that the WMO Research Board is also setting up a Task Team on Exascale Computing, Data Handling and Artificial Intelligence. The terms of reference are being circulated now. This is extremely relevant to the proposed LA on "Digital Earths". The JSC decided that Pascale Braconnot and Susanna Corti will be suggested as members on behalf of WCRP.

DECISION:

- 3. The JSC decided that Ken Takahashi and Pedro Monteiro will be suggested as members of the SARS-COVID Working Group and that Pascale Braconnot and Susanna Corti will be suggested to represent WCRP in the Research Board Task Team on Exascale Computing, Data Handling and Artificial Intelligence.**

6.8. Carbon Footprint Working Group

Pierre asks the JSC to approve the creation of a Working Group to monitor the CO₂ emissions from WCRP travel and activities and to set a target for emission reduction by a future date (e.g. 75% reduction in emissions by 2030 was proposed).

There was universal agreement on the creation of the working group. It was suggested to put together a one-page statement of work to solicit community support and involvement. Membership could be solicited from across the WCRP family and should include YESS (and ECRs in general). There was a discussion on what should be included in an assessment and whether scenarios could be presented to discuss trade-offs.

Deciding on a target was problematic, given that current emissions are unknown. Detlef suggested that a recommendation could be made by the Carbon Footprint Working Group. Pierre explained that it was important not to wait too long, as it is usual to set a target and then determine how to meet it. It was agreed that the target would be debated and agreed on at the Extraordinary JSC Session in late 2020.

DECISION:

- 4. The JSC decided to establish a WCRP Carbon Footprint Working Group.**

ACTIONS:

- 16. Write a short statement of work for the Carbon Footprint Working Group, with the aim of soliciting community support and involvement (JSC Chair and Vice Chair, Pierre Friedlingstein, Pedro Monteiro, WCRP Secretariat; 30 June 2020)**
- 17. Form the Carbon Footprint Working Group (Pierre Friedlingstein, Pedro Monteiro, WCRP Secretariat; 31 July 2020)**
- 18. Put together information for the JSC to enable them to debate and agree on a target (and provide time on the agenda to discuss this) (Carbon Footprint Working Group; Extraordinary JSC Session, late 2020)**

6.9. WCRP Celebration and Achievements Symposium

Detlef asked whether the JSC would support a WCRP celebration to mark the end of the WCRP Grand Challenges and to mark the beginning of a new WCRP. It would take place at the end of 2022 or the beginning of 2023 (noting also that some current JSC members will rotate off at the end of 2022). It was agreed that it is important to showcase what has been

achieved, but we need to consider that if we include all the Grand Challenges it will be very large. The last WCRP Open Science Conference was in 2011 and was a great success. This is an opportunity for the community to meet and to launch the new WCRP.

Mike pointed out that some Grand Challenges, such as the one on Sea Level and Coastal Impacts, are planning their own end of Grand Challenge Symposium in July 2022 and WMO is also talking about an Open Science Conference in 2022. It will be important to coordinate and may also be possible to combine meetings.

There was general support for the concept. Pascale liked the idea in principle as it is important to showcase what has been done but noted that it could be a large event and would need to be well targeted. Jim very much supported the idea. He noted the success of the 2011 WCRP Open Science Conference. It would be exciting to do something grand like this again, celebrate activities that are sunsetting, and launch the new WCRP moving forward.

Helen suggested that it could be an opportunity to do this with some of our partners and to do something innovative with a virtual meeting in addition to a face-to-face one. We could aspire to do something beyond the traditional meeting. It was noted that this type of meeting would be a substantial amount of work and that planning time is already short.

DECISION:

- 5. The JSC decided to proceed with scoping a WCRP Celebration and Achievements Symposium (mid to late 2022).**

ACTION:

- 19. Form a WCRP Celebration and Achievements Symposium committee to determine how to take this forward and establish a plan to do so (JSC Chair and Vice-Chair, WCRP Secretariat, Grand Challenge leads; Extraordinary JSC Session, late 2020)**

6.10. 42nd Session of the JSC and Extraordinary JSC Session

The JSC agreed that due to the uncertainty of travel, the decision on where to hold JSC-42 would be deferred. It was decided to determine the dates first and look at location when things are more certain. Pierre noted that the default should be a virtual meeting.

DECISION:

- 6. The JSC decided to hold an online Extraordinary JSC Session in late 2020.**

ACTION:

- 20. Agree on a date for Extraordinary JSC Session (late 2020) and JSC-42. The WCRP Secretariat will work with the JSC Chair and Vice-chair to isolate a set of dates and send a doodle to the JSC for each meeting (JSC Chair and Vice-Chair, WCRP Secretariat, JSC; 30 June 2020).**

6.11. Closing

It was agreed that a plan outlining the various aspects of work that needs to be undertaken by the JSC between this Session and the Extraordinary JSC Session at the end of the year will be compiled and circulated. Detlef and Helen thanked everyone for the progress made this week and for the great discussions, and also thanked the Secretariat for the great support.

ACTION:

- 21. Outline a plan (guidelines, direction) for JSC work from May to December 2020 (JSC Chair and Vice-Chair, WCRP Secretariat; 30 June 2020)**

Annex 1 – JSC-41 Participants

41st Session of the Joint Scientific Committee

18-22 May 2020

No.	First Name	Last Name	Position
WCRP Joint Scientific Committee			
1	Detlef	Stammer	JSC Chair
2	Helen	Cleugh	JSC Vice-chair
3	Lisa	Alexander	JSC Member
4	Tercio	Ambrizzi	JSC Member
5	Pascale	Braconnot	JSC Member
6	Jens Hesselbjerg	Christensen	JSC Member
7	Susanna	Corti	JSC Member
8	Pierre	Friedlingstein	JSC Member
9	James	Hurrell	JSC Member
10	Masahide	Kimoto	JSC Member
11	Thomas	Peter	JSC Member
12	Krishnan	Raghavan	JSC Member
13	Pedro	Scheel Monteiro	JSC Member
14	Igor	Shkolnik	JSC Member
15	Ken	Takahashi	JSC Member
16	Martin	Visbeck	JSC Member
17	Hui-Jun	Wang	JSC Member
WCRP Activities			
18	Sandrine	Bony	GC Clouds
19	Wenju	Cai	CLIVAR Co-chair
20	Francisco	Doblas-Reyes	WMAC Co-chair
21	Clare	Goodess	WGRC Co-chair
22	Neil	Harris	SPARC Co-chair
23	Gabriele C.	Hegerl	GC Extremes
24	Tatiana	Ilyina	GC Carbon
25	Daniela	Jacob	CORDEX Co-chair
26	Yochanan	Kushnir	GC NTCP
27	Sonya	Legg	CLIVAR Co-chair
28	Gerald	Meehl	WMAC Co-chair
29	William	Merryfield	WGSIP Co-chair
30	Timothy	Naish	GC Melting Ice

No.	First Name	Last Name	Position
31	Robert	Nicholls	GC Sea Level
32	Jan	Polcher	GEWEX Co-chair, GC Water
33	James	Renwick	CliC Co-chair
34	Andy	Robertson	S2S Co-chair
35	Adam	Scaife	GC NTCP
36	Cath	Senior	WGCM Co-chair
37	Silvina	Solman	CORDEX Co-chair
38	Seok-Woo	Son	SPARC Co-chair
39	Graeme	Stephens	GEWEX Co-chair
40	Susann	Tegtmeier	WDAC Co-chair
41	Jean-Noel	Thépaut	WDAC Co-chair
42	Keith	Williams	WGNE Co-chair
43	Xuebin	Zhang	GC Extremes
Sponsors			
44	Heide	Hackmann	CEO, ISC
45	Daya	Reddy	President, ISC
46	Vladimir	Ryabinin	Executive Secretary, IOC-UNESCO
47	Elena	Manaenkova	Deputy Secretary-General, WMO
Additional Invited Attendees			
48	Susanne	Mecklenburg	ESA
49	Sarah	Jones	Chair, WWRP
50	Chris	Davis	Incoming Chair WWRP (as of 1 July)
51	Viktor	Brovkin	AIMES
52	Gregory	Carmichael	Chair, GAW
53	Blaize	Denfeld	USGCRP
54	Jessica	Gier	Executive Director, SOLAS
55	Lisa	Miller	SOLAS
56	Anna	Rutgersson	SOLAS
57	Wayne	Higgins	NOAA
58	Jack	Kaye	NASA
59	Erika	Key	Executive Director, Belmont Forum
60	Marie-France	Loutre	Executive Director, PAGES
61	Valentina	Rabanal	YESS
62	Gaby	Langendijk	YESS
63	Yuhan	Rao	YESS
64	Maria	Uhle	Belmont Forum/NSF

No.	First Name	Last Name	Position
65	Florin	Vladu	UNFCCC
66	David	Behar	SFPUC
67	Salvatore	Arico	IOC-UNESCO
68	Michael	Morgan	UW-AOS
69	Kathleen	McInnes	CSIRO
WCRP International Project Office Hosts and Staff			
70	Beatriz	Balino	CORA/BCCR
71	Tore	Furevik	CORA/BCCR
72	Paul	Bowyer	CORA/GERICS
73	Anke	Schluensen-Rico	CORA/GERICS
74	Gwenaelle	Hamon	CliC IPO and WCRP Secretariat
75	Irene	Lake	Director, CORDEX IPO
76	Lindha	Nilsson	CORDEX IPO
77	Jose Luis	Santos Davila	Director, International CLIVAR Project Office
78	Liping	Yin	International CLIVAR Project Office
79	Jing	Li	International CLIVAR Project Office
80	Peter	van Oevelen	Director, International GEWEX Project Office
81	Hans	Volkert	Director, SPARC IPO
82	Mareike	Heckl	SPARC IPO
83	Rupa	Kumar Kolli	Executive Director, International CLIVAR Monsoon Project Office
WMO Secretariat			
84	Jürg	Luterbacher	Director, WMO Science and Innovation Department
85	Oksana	Tarasova	Head, Global Atmosphere Watch, WMO
86	Paolo	Ruti	Head, World Weather Research Programme, WMO
87	Wenchao	Cao	Junior Professional Officer, WMO
WCRP Secretariat Staff			
88	Michael	Sparrow	Officer in Charge, WCRP Secretariat
89	Michel	Rixen	Senior Scientific Officer, WCRP Secretariat
90	Josefa (Pepi)	Potter	Administration Assistant, WCRP Secretariat
91	Narelle	Van der Wel	Consultant, WCRP Secretariat

Annex 2 – Agenda

41st Session of the WCRP Joint Scientific Committee (JSC-41) Online Outline Agenda

DRAFT: 18th May 2020

Videoconference 18-20 (all) and 22 (JSC/WCRP Secretariat only) May 2020



Notes

- The initial face-to-face JSC-41 was changed into a condensed and on-line meeting. To make this practical, the meeting has to focus on the JSC's core business.
- Attendance of the JSC-41 videoconference is by invitation only. Should you wish to attend please contact mssparrow@wmo.int in the first instance.
- A GoToMeeting link for the whole meeting will be provided by the WCRP Secretariat. Should you experience problems please email Gwen (gghamon@wmo.int).
- Questions can be submitted via the Chat Box in GoToMeeting (either type your question or write “!” if you wish to speak). A member of the WCRP Secretariat will moderate the chat and notify the Chair as applicable.
- Presentations and reports will be made available in advance of the meeting. Due to the limited meeting time, please make sure you read through the full presentations beforehand. In most cases only a short summary presentation will be made. See <https://www.wcrp-climate.org/jsc41-about>.
- Many of the partner and other discussions that were scheduled for Day 4 in the initial face-to-face JSC-41 meeting agenda will be moved to a series of bilateral meetings.
 - **All times are quoted in Geneva/Paris time. Please see e.g. <https://www.timeanddate.com/worldclock/meeting.html> for the correct times in your area.**

Day 1 (18 May): 13:00-16:00, Geneva/Paris time

13:00 – 13:30 Session 1: JSC Opening Session

(Chair Detlef, Rapporteur Mike, Chat Moderator Mich)

- Official Welcome from JSC Chair and Vice-Chair [5 mins] *(Detlef, Helen)*
- Chairs, with input from WCRP Secretariat as needed, to describe guidelines for the smooth running of the JSC via videoconference [5 mins] *(Detlef, Helen, Gwen)*
- Welcome from Co-sponsors [3 mins each] *(Elena, Heide, Vladimir)*
- Goal of the Session [5 mins] *(Detlef, Helen)*
- Approval of Agenda [5 mins] *(Detlef, Helen)*

The JSC Members will be invited to adopt the agenda, with revision if required.

13:30 – 16:00 Session 2: WCRP Strategy Implementation and Transition

(Chair Helen, Rapporteur Narelle, Chat Moderator Mike)

Report on Progress and Discussion on Way Forward:

- Update on Implementation Process [60 mins] *(Detlef and Helen)*
- (including WCRP 40th Science Week, Hamburg High-level Science Questions and Flagship Workshop, and next steps/way forward)

- *(20 min break around 14:30)*

- Discussions on WCRP structure and elements [70 mins] *(Detlef and Helen)*

Attendees will be invited to comment on progress with the implementation process and provide feedback as appropriate.

End of Day 1

Day 2 (19 May): 20:00-23:00, Geneva/Paris time

20:00-20:30 Session 3: WCRP Strategy Implementation and Transition (cont.):

(Chair Detlef; Rapporteur Mike; Chat Moderator Narelle)

- Summary of main Recommendations from Task Teams (Modelling, Data, Regional Information for Society) [5 mins each] *(Paco; Susann; Daniela)*
- Recap (as needed) of Day 1's discussion, esp. Elements and Structure
- What further steps are required to reach our goals? [15 mins total] *(Detlef and Helen to lead the discussion)*

Attendees will be invited to discuss the further steps required to make the implementation and transition process a success, including how the recommendations of the task teams feed into the process.

20:30 – 23:00 Session 4: WCRP Business - Activity Reports

(Chair Jens; Rapporteur Narelle; Chat Moderator Mike)

In these sessions each activity will show two slides focusing on (i) where they see their activities fitting into the new WCRP strategy and structure and (ii) any issues that require JSC attention

- CliC [20 mins] *(James)*
- GC Melting Ice [10 mins] *(Tim)*
- SPARC [20 mins] *(Neil)*
- CLIVAR [20 mins] *(Sonya)*
- GC Sea Level [10 mins] *(Robert)*
- WCRP and the UN Ocean Decade [10 mins] *(Detlef, Sonya and IOC)*
- GEWEX [20 mins] *(Graeme)*
- GC Water [10 mins] *(Jan)*
- GC Extremes [10 mins] *(Xuebin)*
- Discussion [10 mins] *(Jens)*

(10 min break around 21:30)

All attendees are invited to give their thoughts, in as succinct a way as possible, on how WCRP activities will fit into the new WCRP strategy and proposed initiatives such as the Light House Activities. The JSC are invited to comment on any issues arising.

End of Day 2

Day 3 (20 May): 13:00-16:30, Geneva/Paris time

13:00 – 15:30 Session 5: WCRP Business - Activity Reports (cont.)

(Chairs Pascale and Jim; Rapporteur Mich; Chat Moderator Mike)

In these sessions each activity will show two slides focusing on (i) where they see their activities fitting into the new WCRP strategy and structure and (ii) any issues that require JSC attention

(i) 13:00 Chair : Pascale

- GC Clouds [10 mins] *(Bjorn)*
- GC Carbon [10 mins] *(Tatiana)*
- S2S [10 mins] *(Andy)*
- WGSIP [10 mins] *(Bill)*
- GC NTCP [10 mins] *(Adam)*
- WDAC [10 min] *(Susann)*
- Discussion [15 mins] *(Pascale)*

(10 min break around 14:15)

(ii) 14:25 Chair: Jim

- Regional climate (WGRC) [10 mins] *(Clare)*
- CORDEX [10 mins] *(Silvina)*
- WMAC [10 mins] *(Paco)*
- WGCM + CMIP [10 mins] *(Cath S)*
- WGNE: [10 mins] *(Keith)*
- Discussion [15 mins] *(Jim)*

All attendees are invited to give their thoughts, in as succinct a way as possible, on how WCRP activities will fit into the new WCRP strategy and proposed initiatives such as the Light House Activities. The JSC are invited to comment on any issues arising.

15:30 – 16:30 Session 6: Other WCRP Business

(Chairs Detlef and Helen; Rapporteur Narelle; Chat Moderator Mich)

- WCRP Carbon Footprint [15 mins] *(Pierre)*
- Partner comments [20 min] *(all partners)*
- WCRP 2020/21 budget briefing [10 mins] *(Detlef, Helen, Mike)*

- Other topics as proposed by the JSC [10 mins] *(TBD)*
- Wrap-up and close of the open session of JSC-41 [5 mins] *(Detlef and Helen)*

The attendees are asked to comment on the recommendations from the Carbon Footprint report, including the increased use of virtual meetings, the consideration of carbon emissions across all its activities, and the formation of a Task Team to develop a Carbon Strategy by December 2020. Attendees are also asked to comment on the WCRP budget briefing and other matters arising.

End of Day 3 and end of Open Session of JSC-41

Day 4 (21 May): Free

(JSC Chairs, officers and WCRP Secretariat may schedule additional discussions)

Day 5 (22 May): 13:00-16:30, Geneva/Paris time

Attendance (by invitation): WCRP JSC and WCRP Secretariat

13:00- 13:30 Internal JSC only

13:30- 16:30 WCRP-JSC Business

(Chairs Detlef and Helen; Rapporteur Narelle; Chat Moderator Mich)

- WCRP Secretariat session: budget, staff planning etc. *(Mike) [15 mins]*
- Updated Co-sponsor agreement *(Detlef) [15 mins]*
- JSC membership and leadership renewal *(Helen) [20 mins]*
- Membership process: process, timing, approach *(Detlef and Helen) [20 mins]*
- Core-activity memberships *(Detlef, Helen, Mike) [30 mins]*
- CMIP office and Monsoons office *(Detlef and Helen) [20 mins]*
- Other strategic topics for discussion (e.g. interactions with e.g. Belmont, Future Earth etc.) *(Detlef and Helen) [20 mins]*
- AOB [10 mins] *(all)*
- Closing *(Detlef and Helen)*

(20-30 min break around 1430)

The JSC are asked to comment and approve as applicable.

Annex 3 – Acronyms

AGU	American Geophysical Union
AI	Artificial Intelligence
AIMES	Analysis, Integration and Modelling of the Earth System
AOPC	Atmospheric Observation Panel for Climate
AR6	Sixth Assessment Report (IPCC)
BCCR	Bjerknes Centre for Climate Research
C3S	Copernicus Climate Change Service
CAS	WMO Commission for Atmospheric Sciences (WMO)
CDS	Climate Data Store
CEOS	Committee on Earth Observation Satellites
CGMS	Coordination Group for Meteorological Satellite
CliC	Climate and Cryosphere (WCRP)
CLIVAR	Climate and Ocean Variability, Predictability and Change (WCRP)
CMIP	Coupled Model Intercomparison Project
CMIP6	CMIP Phase 6
CMIP7	CMIP Phase 7
CORA	Coordination Office for Regional Activities (WCRP)
CORDEX	Coordinated Regional Climate Downscaling Experiment
COVID-19	Coronavirus Disease 2019
CP	Core Project (WCRP)
DAOS	Data Assimilation and Observing Systems (WWRP)
ECR	Early Career Researcher
EEl	Earth Energy Imbalance
ENSO	El Niño-Southern Oscillation
ESA	European Space Agency
ESM	Earth System Model
ESMValTool	Earth System Model Evaluation Tool
FoCI	Frontiers of Climate Information
FIO, MNR	First Institute of Oceanography of the Ministry of Natural Resources (China)
FPS	Flagship Pilot Study (CORDEX)
GASS	Global Atmospheric System Studies (GEWEX)
GAW	Global Atmosphere Watch (WMO)
GC	Grand Challenge (WCRP)
GC Carbon	GC on Carbon Feedbacks in the Climate System (WCRP)
GC Clouds	GC on Clouds, Circulation and Climate Sensitivity (WCRP)
GC Extremes	GC on Weather and Climate Extremes (WCRP)
GC Melting Ice	GC on Melting Ice and Global Consequences (WCRP)
GC NTCP	GC on Near-term Climate Prediction (WCRP)
GC Sea Level	GC on Regional Sea-Level Change and Coastal Impacts (WCRP)
GC Water	GC on Water for the Food Baskets of the World (WCRP)
GCOS	Global Climate Observing System (WMO)
GCM	Global Climate Model
GDAP	GEWEX Data and Analysis Panel
GERICS	Climate Service Center Germany
GEWEX	Global Energy and Water Exchanges (WCRP)
GFCS	Global Framework for Climate Services
GHP	GEWEX Hydroclimatology Panel
GLASS	Global Land/Atmosphere System Study
GOOS	Global Ocean Observing System (IOC-UNESCO)
IASC	International Arctic Science Committee
ICMPO	International CLIVAR Monsoon Project Office
ICRC	International Conference on Regional Climate (CORDEX)
IOC-UNESCO	Intergovernmental Oceanographic Commission of UNESCO
IPCC	Intergovernmental Panel on Climate Change
IPO	International Project Office

ISC	International Science Council
ISCCP-NG	International Satellite Cloud Climatology Project - Next Generation
IT	Information Technology
JCRF	Joint Climate Research Fund (WCRP)
JSC	Joint Scientific Committee (WCRP)
JSC-38	38th Session of the JSC
JSC-40	40th Session of the JSC
JSC-41	41st Session of the JSC
JSC-42	42nd Session of the JSC
LA	Lighthouse Activity
MIP	Model Intercomparison Project
MoU	Memorandum of Understanding
NASA	National Aeronautics and Space Administration
OOPC	Ocean Observations Physics and Climate
OSE	Observing System Experiment
OSSE	Observing System Simulation Experiment
PAGES	Past Global Changes
PCMDI	Program for Climate Model Diagnosis and Intercomparison
PDEF	Predictability Dynamics and Ensemble Forecasting (WWRP)
RB	Research Board (WMO)
RCM	Regional Climate Model
RHPs	Regional Hydroclimate Projects
S2D	Sub-seasonal to Decadal (S2D)
S2S	Subseasonal to Seasonal Prediction Project (WCRP, WWRP)
SDG	Sustainable Development Goal (UN)
SCAR	Scientific Committee on Antarctic Research
SOLAS	Surface Ocean - Lower Atmosphere Study
SNAP	SPARC Network on Assessment of Predictability
SoilWat	Soil and Water
SPARC	Stratosphere-troposphere Processes And their Role in Climate (WCRP)
SROCC	Special Report on the Ocean and Cryosphere in a Changing Climate (IPCC)
SSG	Scientific Steering Group (WCRP)
TOPC	Terrestrial Observation Panel for Climate
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization (UN)
UNFCCC	United Nations Framework Convention on Climate Change (UN)
WCRP	World Climate Research Programme
WDAC	WCRP Data Advisory Council (WCRP)
WGI	Working Group I (IPCC)
WGCM	Working Group on Coupled Modeling (WCRP)
WGIRS	Working Group on Information for Regions and Society
WGNE	Working Group on Numerical Experimentation (WCRP, CAS)
WGRC	Working Group on Regional Climate (WCRP)
WGSIP	Working Group on Subseasonal to Interdecadal Prediction (WCRP)
WMAC	WCRP Modelling Advisory Council (WCRP)
WMO	World Meteorological Organization
WWRP	World Weather Research Programme
YESS	Young Earth System Scientists Community

**The
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(WCRP)**

*facilitates analysis and
prediction of Earth system change
for use in a range of practical
applications of direct relevance,
benefit and value to society.*

