

WWRP 2022 - 1

Fifteenth session of the Scientific Steering Committee for the World Weather Research Programme Report

Hybrid meeting
25–26 August 2022

WEATHER CLIMATE WATER



WORLD
METEOROLOGICAL
ORGANIZATION



**FIFTEENTH SESSION
OF THE SCIENTIFIC STEERING COMMITTEE FOR THE
WORLD WEATHER RESEARCH PROGRAMME**

**Hybrid meeting
25–26 August 2022**

REPORT



© World Meteorological Organization, 2022

The right of publication in print, electronic and any other form and in any language is reserved by WMO. Short extracts from WMO publications may be reproduced without authorization, provided that the complete source is clearly indicated. Editorial correspondence and requests to publish, reproduce or translate this publication in part or in whole should be addressed to:

Chair, Publications Board
World Meteorological Organization (WMO)
7 bis, avenue de la Paix
P.O. Box 2300
CH-1211 Geneva 2, Switzerland

Tel.: +41 (0) 22 730 84 03
Fax: +41 (0) 22 730 81 17
Email: Publications@wmo.int

NOTE

The designations employed in WMO publications and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of WMO concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The mention of specific companies or products does not imply that they are endorsed or recommended by WMO in preference to others of a similar nature which are not mentioned or advertised.

The findings, interpretations and conclusions expressed in WMO publications with named authors are those of the authors alone and do not necessarily reflect those of WMO or its Members.

TABLE OF CONTENTS

1. Meeting Report – High-Level Outcomes and Actions of WWRP SSC 2021	3
2. Day 1: Thursday 25 August	4
2.1 Feedback from community on the new Implementation plan	4
2.2 HIWeather (Brian Golding and Sally Potter)	5
2.3 PPP (Thomas Jung).....	6
2.4 S2S (Frederic Vitart and Andrew Robertson).....	7
2.5 DAOS (Ulrich Löhnert and Sarah Dance).....	8
2.6 NMR (Paola Salio and Rachel Albrecht)	8
2.7 PDEF (Judith Berner and John Methven)	9
2.8 SERA (Carla Mooney and Jane Rovins).....	9
2.9 TMR (Zhuo Wang and Yukari Takayabu)	10
2.10 WxMOD (Andrea Flossmann and Steven Siems)	10
2.11 JWGFVR (Caio Coelho and Barbara Casati).....	11
3. Day 2: Friday 26 August 2022	12
3.1 Report on the Tropical Cyclone projects: EXOTICCA, SCMREX, UPDRAFT, TLFDP and TC-PFP (Zhuo Wang)	12
3.1.1 EXOTICCA, SCMREX, UPDRAFT, TLFDP:.....	12
3.1.2 TC-PFP:.....	12
3.2 TeamX (Mathias Rotach).....	12
3.3 Waves to Weather (Michael Riemer)	12
3.4 MedCyclones (Emmanouil Flaounas)	13
3.5 YESS (Valentina Rabal and Hodo Orok).....	13
3.6 Paris Olympics 2024 RDP (Valery Masson)	13
3.7 AvRDP Phase II RDP (Piers Buchanan).....	14
3.8 Wrap up.....	14
Annex 1 – List of Participants	15
Annex 2 – Agenda.....	17

1. Meeting Report – High-Level Outcomes and Actions of WWRP SSC 2021

No.	WWRP open meeting	Responsibility
1.	In the new projects, both the physical and social science aspects must be addressed and co-designed	SSC and project leaders
2.	Funding sources should be pursued	SSC and project leaders
3.	The scope of the Public Engagement for Practitioners, Learners and Educators (PEOPLE) project needs to be better defined. Along with social science, the communication and outreach aspects should also be addressed, while keeping these integrated into all projects	SSC and project leaders
4.	The new Working Group (WG) on Hydrology and Precipitation must be well defined, and should include links to the Hydrology and Precipitation project	SSC and project leaders
5.	There is need for more, novel and well-positioned observations, and their assimilation, and these must be well integrated into all projects and the proposed WG	SSC
6.	Links with other WMO Departments, specifically SERVICES, need to be sought and exploited when designing current and new activities	SSC and WG and project chairs
7.	ECS (through YESS) should play a more prominent role in WWRP, and further connections ought to be made, including involvement in activities or groups	SSC and WG and project chairs

This is not intended to be a detailed report of the meeting, and the content of the presentations is not generally repeated. Only the main discussion points, conclusions and action are addressed.

2. Day 1: Thursday, 25 August 2022

2.1 Feedback from community on the new Implementation Plan

- The question arises as to how we should structure the projects that are reliant on voluntary contributions, because they will certainly be quite different from the usual research project in which we try to create an excellent project that corresponds with what people are already doing on a daily basis. Exploring the means by which such voluntary efforts are usually structured and implemented will help in setting up the projects appropriately
 - The steering group for each project will play a key role: it will be crucial to select people who have an interest in the topic, and who may be able to apply some of their research for the benefit of the project. It might be an iterative process to figure out what our focus should be, based on what we can reasonably achieve, and who would be capable of carrying it out. After this Plan is approved, a small team, comprised of members who are knowledgeable and interested in the subject, will be formed, and they will determine the composition of the steering group based on the interests of the participants, who will help to detail the plan of each project. It will be essential for the steering group to shape the project.
- In the current Implementation Plan there are three trust funds for our three core projects. From 2024, there will be one Trust Fund for WWRP and, of course, we will have to negotiate how the Trust Fund is to be used. Our projects are fortunately staggered, since not everyone needs money at the same time, but Trust Funds remain dependent on voluntary contributions. We can also influence calls for scientific topics in different areas. We have held discussions with the European Commission on some of the topics. Members of these new projects may apply for funding. We will be able to use funding received through endorsed projects to contribute to the WWRP goals
- One of the issues that was raised in our meeting yesterday was whether the voice of SERA Working Group (WG) members would be heard. It will be essential to look at the leaders of the projects to determine the position of SERA members in that hierarchy in order to ensure that SERA has a voice. Another concern was how to expand the SERA footprint. While we appreciate the financial implications, ten persons are not enough to support the ambitious Implementation Plan as it currently stands. Four natural science projects and one social science project is not the balance that we were seeking. How could the projects be structured to ensure that the social sciences are not drowned out by the presence of nine natural scientists at the table?
 - It would be fitting to consider broader membership within SERA. However, we need to make this compatible with the financial implications. This underscores the importance of identifying the participants in this steering group. We can also consider bringing in expertise on social science from outside the SERA WG, perhaps from the user communities in SERCOM
 - The PEOPLE project seemingly has two aspects: one is communication, education and outreach, and the other is the social science aspect such as citizen science and indigenous knowledge. One suggestion could be to include communication, education and outreach in each project, regardless of the topic. Social science however should not "stand-alone", but should also be integrated into all the projects. Certainly, High-Impact Weather (HIWeather) has attracted a lot of people interested in the social sciences who are not SERA members but who could be on the projects' steering committees, not only in order to highlight the importance of those parts of the projects, but also to use the context of the projects as an opportunity to conduct social science research.

- Is there a risk that the HAP WG will not be established, and that the burden will have to be spread to other WGs? There is a clear need for improved observations across all the projects and the DAOS WG lacks the needed expertise – perhaps we can also consider expanding this Working Group in order to fill that need
 - It is envisaged that once our IP is approved, observational expertise would be incorporated into this new Working Group (HAP) as well. Remote sensing expertise must be part of this WG, both ground-based and space-based. This is something for all WGs to think about as new members need to be chosen. Consideration should be given to new membership within the context of the projects and the needs underlying those projects. This WG should support not only the new Hydrology and Precipitation project, but also other projects.
- It is important to see what common questions exist across the new projects, and specifically in the case of observations, we need to know the appropriate choice and placement of observations for maximum effect. We should consider both observation and methodology
- How do we interact with Services? Do they have social scientists?
 - Aviation RDP Phase II is a good example of how we can work with Services. It is a shared effort between the Services Commission (especially the Standing Committee on Aviation) and WWRP, so it is not just a matter of representatives sitting at the table. We need to consider the co-design of our projects as being joint in order to be successful. It is worth mentioning that SERCOM's expert team has produced a review of impact-based services, while WWRP/HIWeather has a new flagship project which is looking at research gaps on impact-based forecasting. WWRP and SERCOM's expert team work together on this topic now, it is therefore important to keep in touch with the initiatives that are being launched in each other's areas and to engage proactively. Some of these links take time to establish, but it is worth it.
- Do we have a strategy for getting young scientists involved in our projects?
 - YESS could be approached and involved since they have ECS from all disciplines in their network. We should also make WWRP and YESS communities more aware of each other's activities, for example, webinars. We should consider the possibility that PhD students could theoretically work on the themes of the projects. We could also consider recommending that each WG should have one ECS as a member
- Next steps in the IP:
 - Prospectus to be completed by 12 September
 - All further inputs and changes and suggestions accepted until 12 September
 - Submission to RB by 15 September
 - Discussion and approval by the RB at the meetings of 29 and 30 September
 - Preparation of documents for EC and Cg in 2023
 - Smaller teams to meet in order to start mapping out the detailed plans during 2023.

2.2 HIWeather (Brian Golding and Sally Potter)

Presentation summary

- Citizen Science Flagship: Wrote guidance note on conducting citizen science projects, published in Special Issue of [HIWeather Citizen Science](#), gathering demonstration stories of citizen science projects, and held joint workshop with Value Chain project
 - Value Chain flagship: Wrote annotated summary of value chain literature, compiled glossary of terms, developed and tested case study template, White paper by Lazo & Mills, collaborated with aligned initiatives (e.g., WMO-CHE, TC-PFP, Citizen Science Flagship project, UCL Warnings Research Centre)
 - Published "Towards the Perfect Weather Warning", which discusses bridging disciplinary gaps through partnership and communication; 50 authors from 13 countries with more than 14,000 chapter downloads to date
 - New Flagship project 2022-2023: Impact-based Warnings to identify gaps in research and operation. Three international virtual webinars planned for October 2022 to explore gaps, and findings to be published (writing workshop around April 2023).
- Consideration could be given to connecting to the work that has been done in Africa, linking more closely to the S2S forecasting topic (connected to the funded projects of the IRI in West Africa), for example
 - The work of HIWeather should certainly continue in the new WWRP IP, building on the connections made
 - The book "Towards the Perfect Weather Warning" will certainly influence some decision-making on impact-based forecasts and the principle of a full value chain/cycle. This will be a true legacy of HIWeather
 - Consider addressing the quantification of the value chain and some attribution in future plans
 - Automation of some of the warning process could be considered, but when one communicates, you need to tell a story that will convince people. Relating a story that convinces people has to be done by people.

2.3 PPP (Thomas Jung)

Presentation summary of plans up to 2023

- Plans for PPP/YOPP by the end of 2023:
 - Analysis and publication of YOPP-SH 2022 winter SOP results
 - Further developments from MIIP activities
 - Publications: PPP/YOPP final publication, YOPP Final Summit publication, publications on MODF and MMDF, publications on MIIP, publication of the Polar Predictions Matter blog material
 - Continued enhancements, and further promotion of YOPP Data Portal
- Extension of two YOPP activities:
 - Cluster 1 (lead David Bromwich):
 - Analysis and write-up of YOPP-SH TOPs in Antarctic winter 2022
 - Cluster 2 (lead Gunilla Svensson):
 - Further creation and curation of MMDF and MODF files
 - MOSAiC and YOPP MIIP using MMDF and MODF data
 - Development and support of the YOPP Data Portal
 - Analysis and write up of the Arctic TOP/SOP field campaigns.

- WWRP SSC extended gratitude to Thomas and everyone in the PPP team over 10 years for the wonderful work done
- Maintenance of YOPP data portal will be continued by Met Norway
- Consideration should be given to the connection between the PPP community and SG-Cryo, EC-PHORS, as well as the requirements from Members stated in the *new Strategic Objective 1.5: Accelerate the development of integrated systems and services to address global risks associated with irreversible changes in the cryosphere and downstream impacts on water resources and sea level rise*
- Consideration could be given to closer links to the High Mountain regions in terms of connecting to the communities living there, as well as possible super-sites
- Other core projects could consider preparing evaluation brochures, similar to those of the PPP in order to provide a summary of accomplishments; contribution to the WWRP Implementation Plan, and outputs from the contributions to the Trust Fund. See https://www.polarprediction.net/fileadmin/user_upload/www.polarprediction.net/user_upload/YOPP-Booklet-Final.pdf.

2.4 S2S (Frederic Vitart and Andrew Robertson)

- Presentation summary of plans up to 2023
 - Plans for 2022-23: Complete science project activities and coordinated experiments; document Real-Time Pilot main findings; include 2 new models in S2S database (IITM, NASA) and resume archiving of BoM S2S forecasts and re-forecasts; maintain S2S AI/ML challenge data and computing environment
 - Write final report on S2S Phase 2 activities; write follow-up paper on S2S database: What did we learn from the S2S database? Organize S2S Summit – 3-7 July 2023 University of Reading
 - Legacy of the S2S project will be through the Applications for aGriculture and Energy (SAGE) project, but there will also be S2S activities in the Polar Coupled Analysis and Prediction project as well as the WWRP/WCRP Monsoon project Office activities
 - Legacy of the S2S database: Lead Centre for sub-seasonal to seasonal Forecast (LC-LSSF) and possibly the eEstablishment of a new lead centre for databases.
- Consider tracking the use of the S2S website since there is valuable information about the pilot projects and a large number of publications from this project
- Good to note the training that has been done in developing countries through the IRI library and tools such as SubX
- Cloud computing was explored during the S2S Summer School at NCAR to make data more accessible to anyone who does not have access to supercomputers. This should be further explored in the future
- The International Monsoons Office in India offered a training event on S2S data for monsoons in November 2021
- For future consideration – reduce lead time to under three weeks
- The shift to more application-oriented work on the sub-seasonal to seasonal time scale is welcomed for the new WWRP IP

- S2S leadership is congratulated on their progress and we look forward to the S2S Summit in 2023 to celebrate their success.

2.5 DAOS (Ulrich Löhnert and Sarah Dance)

Presentation summary of plans up to 2023

- Up to 2023: Coordinate informal working group, including members of WGNE, OMDP, S2S, OceanPredict, and other interested parties, to identify strategies for initializing the ocean component of coupled models for predicting the MJO and active contributions to UAS Demo campaign

Review paper on observation impact in DA for convection-permitting NWP (collaboration with NMR, PDEF and HiWeather)

Co-leadership of roles in planning of workshop/conference – Major conference (EMS, AGU, EGU?) session on observation system design. Next “Adjoint workshop” (expected to be held in 2024); MLDADS (Machine learning & DA)

Launch new (non-technical) MOOC “Dare to discover data assimilation”.

- Input provided for an INFCOM document by JET-ESODE, as a high-level guidance document on the evolution of the global observing systems, is appreciated, and could serve as a two-way communication to provide scientific input to both research and observation communities (including the use of new observations such as drones)
- Perhaps there is a general lack of understanding on some of the nuances and details in terms of the appropriate tools to use, or perhaps there has been a misinterpretation of results. The group might wish to consider formulating guidance and recommendations on a synthesis of the tools when deemed appropriate: how to use and interpret them
- It still seems that research is taking place on its own - in a silo - and it is difficult to measure how and where investments need to be made in order to truly facilitate significant advancements in the methodology behind coupled DA. Ocean and ice DA as well as AI/ML could be considered for the future
- DA related to hydrology and discharge could be considered in the future, but is not a priority at the moment.

2.6 NMR (Paola Salio and Rachel Albrecht)

- Presentation summary of plans up to 2023
 - Nowcasting Capacity Course (online material for the 2024 Nowcasting School); international collaborative experiments for MCS in the Seoul Metropolitan area; contribution to the Paris Olympics RDP on urban scale measurements, PBL measurements, modelling and analysis of large datasets from an AI perspective.
- A new member in NMR is specialized in AI and he will present new ideas on how it will help to design future projects, especially the ADVANCE project in Africa
- Much work has been done in recent years in the field experiments, surveys and webinars. In the coming years we should focus more on research activities because there are open questions, especially for urban environments. Perhaps a balance between these different types of activities could be considered
- Survey: considerations for the future (perhaps a second phase) is to go closer to the actual early warning service provision. Spreading the survey to other regions is of

course optimal, but there needs to be a person in the region who could facilitate this, otherwise response will be minimal. We should bear in mind that WMO circulates many questionnaires and surveys that could also provide useful information on nowcasting and the value cycle. One also has to keep in mind that surveys are not always easily accessible, and that some people might not wish, or do not have the knowledge, to complete them. Cross referencing is necessary to ensure that the answers provided are accurate and true.

2.7 PDEF (Judith Berner and John Methven)

- Presentation summary of plans up to 2023
 - Ongoing: MUMIP (model uncertainty inter-comparison) project, Impact of stochastic parameterizations on S2S forecasts (jointly with S2S), TC Probabilistic Forecast Products (TCPFP) project (TCPFP through 2025), Arctic Summertime Cyclones/ THINICE
 - Planned: Participation in NAWDIC (North Atlantic Waveguide, Dry Intrusion and Downstream Impact Campaign). Participation in 6th WGNE workshop on systematic errors in weather and climate models, 31 October - 4 November 2022.
- The great effort in organizing a series of workshops and colloquia during the past two years was acknowledged. WWRP endorsed and provided funding for early-career scientists from various countries to attend the summer schools, and this is appreciated
- TIGGE was successful in demonstrating that enabling infrastructure and accessing data was critically important. WWRP should continue this kind of activity moving forward
- PDEF has been particularly good at cross-working group coordination and collaboration. For instance, PDEF actually has a data simulation expert and this has helped to facilitate collaboration with DAOS
- PDEF is losing three working group members this year, which is a challenge and an opportunity. With regard to the idea of increasing the number of members per working group, we need to reflect on the optimal size of a working group so that we really get to know the participants and to ensure that everyone has ample opportunity to hold discussions. This aspect could be raised with social scientists in order to establish the optimal overlap of knowledge
- WMO and WWRP should encourage the funding agencies to set up a project that is international, e.g. European-US projects could be beneficial to research
- With regard to the new projects, it was suggested that it would be productive to train the new project leaders in basic management.

2.8 SERA (Carla Mooney and Jane Rovins)

Presentation summary of plans up to 2023

- Make a contribution to value chain (VC) high-level framework tool, guidance and tools for context-specific use of VCs, glossary, catalogue of HIW events, reports and publications; living database of HIW events linked to WMO-CHE and other databases. The VC Framework is a key focus for SERA and three of its members are participating in a writing workshop from 29 August to 1 September

- Ensure the inclusion and integration of social science into the new Implementation Plan and proposed projects throughout the entire lifecycle of the Plan and projects; promote greater understanding within WWRP of the ways in which social science could enhance the other working group agendas; and meaningfully integrate social science into the range of projects and programmes planned. Furthermore, SERA seeks to ensure that scientific projects are of relevance to communities and users, that the term 'user' is adequately defined, and that NHMS understands users and their needs.
- The great success of the first SERA Weather and Society Conference was acknowledged
- New projects of WWRP should state what *kind* of social science needs to be included in their work
- The PEOPLE project should obviously not be exclusively about communication, but should also elicit feedback from the other working groups on their potential input. It should also be concerned with putting science into practice and with making concepts understandable
- SERA receives a large number of requests to work, not only on WWRP projects, but also in other areas of the WMO. Membership and funding therefore become an issue. An increase in membership could be considered in order to open access to additional funding opportunities.

2.9 TMR (Zhuo Wang and Yukari Takayabu)

Presentation summary of plans up to 2023

- Publish a special collection of review papers on monsoons (following the IWM-7)
- Continue to coordinate IWTC-10 (Dec 2022) and the post-workshop reports
- Continue to coordinate the TC-PFP: TC-PFP will transition to Phase II in 2023
- Promote research and operations on monsoon S2S prediction in collaboration with the S2S core project and IMPO, and wrap up TC projects
- Define the legacies and ensure a smooth transition to TC-PFP.
- Heat waves related to the meanders of jet streams, which are certainly amplifying these days, are part of the S2S prediction, while heat waves in the tropics should be considered
- TMR Co-Chairs consider focusing on the monsoon climate, for which it is very important to understand the heatwave and extreme precipitation related to large-scale circulation patterns
- TMR Co-Chairs asked if tropical cyclones could be included in S2S prediction as this is considered an important research question that also has strong social impacts. They would like to see this aspect included in the next Implementation Plan.

2.10 WxMOD (Andrea Flossmann and Steven Siems)

- Mention was made of the lack of resources to promote scientific conferences on weather modification, as in the working group ToRs. Science projects on weather modification are very difficult to fund, therefore operational professionals are taking the lead on this topic

- The ET could be involved in the planned working group on hydrology and precipitation as it requires expertise on cloud dynamics
- Switching from expert team to working group was mentioned, but the benefits were not clear
- It was suggested that the ET could be integrated into the various projects of the new Implementation Plan
- Adding the social aspect of the impacts of weather modification to the research of the expert team might get more traction - more focus on people rather than technology
- A higher-level conversation about the ET and its overlaps and links with geo-engineering (in WCRP) is required.

2.11 JWGFVR (Caio Coelho and Barbara Casati)

Presentation summary of plans up to 2023

- Contribute to WWRP projects (HIW, S2S, TC-PFP, Paris RDP, Aviation RDP-2) and WWRP 2024-2027 IP; finalize nomination of new JWGFVR members in alignment with new projects of the WWRP 2024-2027 IP

The aim is to have one member for each project

Organize the next International Verification Methods Workshop (IVMW) and tutorials

Advance process-based verification & spatial verification

Advance collaboration with DAOS WG to address representativeness and observation uncertainty.

- It was suggested that one way of bringing in additional verification capacity to help support the new projects was through the identification of key verification issues within projects. Thereby, one person from the working group could act as the focal point, and that person could try to bring together other non-official members, who are involved in research, to contribute to the work
- The projects present a great opportunity for a two-way exchange in the sense that JWGFVR provides verification expertise. On the other hand, the projects and topics bring important aspects to the WG for verification, including information on what data sets are used in the community
- For future recommendations on spatial verification, process-based verification, representativeness and observation uncertainty could be considered. Both verification and evaluation are needed and this could be considered as part of the new projects.

3. Day 2: Friday, 26 August 2022

3.1 Report on the Tropical Cyclone projects: EXOTICCA, SCMREX, UPDRAFT, TLFDP and TC-PFP (Zhuo Wang)

3.1.1 EXOTICCA, SCMREX, UPDRAFT, TLFDP:

- Project legacy includes data collected from field campaigns, advanced science understanding and improved model physics/DA, capacity building via workshops, and data-sharing platforms that can be leveraged by TC-PFP
- Recommendations from the TC Project Science Meeting in March 2022, such as linkage between TC-PFP and TLFDP, and tropical cyclone research areas to be further promoted were shared.

3.1.2 TC-PFP:

- It is exciting that the trackers are now receiving this level of attention, after having been a source of uncertainty for a very long time. It is encouraging to note that this will be one of several positive outcomes
- Question: Have you thought about the possible benefits of using sub-kilometer models to detect some of the mesoscale details in the features of tropical cyclones? Answer: I think that's an excellent point and it would cross-cut all the phases we discussed. Our aim is really to identify the best practices rather than to develop them. I think the answer is yes.

3.2 TeamX (Mathias Rotach)

- PBL's research areas have links to WWRP's various research activities. Linkage between TeamX and urban project of the new IP is encouraged
- New TeamX projects are planned - INTERFACE: SEB closure in complex terrain, kmMountains, PRACE – prolongation (PI Nikolina Ban, UIBK), ESTABLIS-UAS (ERC Starting Grant, PI Norman Wildman, DLR), drone swarms, SCHIRM, PI Helen Ward (UIBK), and so on

Pre-proposals were submitted by TEAMx-US: NSF (PI Stefan de Wekker ARM (PI Dan Kishbaum) and TEAMX-UK: NERC (PI Charles Chemel)

- Experimental plan (TOC) 2024-2025 – next version is available. Project plans/additional instrumentation to be substantially extended. Two additional documents: Aircraft Involvement in TEAMx + interactive map (kml). A long list of additional planned deployments for the TOC
- Outreach – BAMS essay titled "A Collaborative Effort to Better Understand, Measure, and Model Atmospheric Exchange Processes over Mountains".

3.3 Waves to Weather (Michael Riemer)

- W2W answers, and continues to try to answer, many research questions pertaining to HIWeather project. Mathematics and Weather workshop is a recent example of a good linkage with HIWeather
- Waves to Weather continues to deliver fundamental results for atmospheric predictability and to link with the broader scientific and operational community

- Enhancing networking – connection with the academic and operational communities, and WWRP (for example, continue inviting WWRP WG/ project chairs to W2W annual meetings)
- Research progress in many areas such as upscale error growth and the intrinsic limit, stochastic Galerkin method as an alternative to the Monte-Carlo ensemble, stochastic PBL scheme, and so on.

3.4 MedCyclones (Emmanouil Flaounas)

- Medcyclones are similar to polar low, so a linkage with the polar project can be considered
- The communication field has been, and will continue to be, strengthened by enhancing videos, animations, and the website
- Review Paper “Mediterranean cyclones: Current knowledge and open questions on dynamics, prediction, climatology and impacts” Wea.Clim.Dyn
- 1st MedCyclones workshop and Summer school in Athens, Greece, 27 June – 2 July 2022: ~80 participants, 35 students. 2nd MedCyclones workshop and Summer school: Organize with StormTracks workshop 2023 (France)
- Future activities include further development of the operational forecast inter-comparison site, enhancing collaboration with tropical cyclones programme and other cyclone communities, etc.

3.5 YESS (Valentina Rabal and Hodo Orok)

- Strong and direct collaboration between PEOPLE project and YESS is encouraged
- YESS video – Subtitles in six UN languages will be available
- YESS participation in international events (EGU 2022, SRI 2022, WCRP JSC-43, COP26) and initiatives (GEWEX/GASS Panel, WCRP LHAs, GAW SSC, WMO RB, FE Governing Council)
- Between June 2020 and July 2022, YESS organized 10 webinar series, with more than 30 webinars that are available online
- The challenge is to find a balance between the physical events and online activities, such as webinars and learning groups in order to ensure a vital and sustainable community.

3.6 Paris Olympics 2024 RDP (Valery Masson)

- YESS may be involved in communicating outcome and science of the PO RDP to schools. Hodo Orok and Valentina Rabanal are to follow up with YESS members in France
- Heat aspects of the RDP are closely linked to health. Joy Shimake-Guillemot (Lead of the WMO/WHO Joint Climate and Health Office) is to be contacted in this regard
- The impacts of weather, not just on weather forecasting, and opportunities to link that to the proposed social science work are important
- Paris Olympics RDP: Scientific Goal and Objectives - To advance research on the “future Meteorological Forecasting systems at 100m (or finer) resolution for urban

areas". In summer 2022, Multi-projects Experimental campaign, PANAME2022, was carried out

- 1st Paris 2024 RDP General Assembly will take place from 28 to 30 November in Paris.

3.7 AvRDP Phase II -DP (Piers Buchanan)

- Aviation-specific verification in impact-based and probabilistic approaches should get sufficient attention
- High Altitude Ice Crystals (HAIC), which cause engine icing, is a big challenge – difficult to observe
- Phase II aims at building on the work of the AvRDP, but is focused on weather forecasts of significant convection for the entire duration of an aircraft's flight ('gate to gate')
- Great team effort – Science Group from Services Commission (Aviation Division) and World Weather Research Programme (WWRP) and Community Advisory Group
- Project meeting is planned for the end of September 2022 in Exeter, UK.

3.8 Wrap up

- The immediate goal is the submission of the new Implementation Plan, but that is just the first step. The subsequent steps are important: how the programmes complement each other; the integrated nature of working groups and projects: physical and social science, and research and operations
- Include early-career researchers with energy, enthusiasm and excitement in the projects and working groups. We must recognize that they are the future of what we are striving to achieve. We have a great responsibility in terms of mentoring and guiding early-career researchers
- Ulrich highlighted the need to set up a Working Group on the Atmospheric Water Cycle - not only on Hydrology and Precipitation - within WWRP, and not to leave this subject exclusively to WCRP. This means including surface-atmosphere interactions and atmospheric boundary layer (ABL) processes, their observations and modelling. What happens at the surface and in the ABL is highly relevant to extreme weather, urban and polar processes
- Some may say that collaboration with WCRP is not sufficient, but it is progressing, albeit slowly. In fact, we will work with the WCRP through the projects in the new IP, and the Chairs of the WWRP/SSC and the WCRP/JSC will engage in dialogue and attend meetings with each other. WWRP and WCRP communicate well within the Secretariat
- It was a pity that not many working group members participated online. It is the working group members who will actually be involved in the projects. The Co-Chairs are requested to inform the working group members of the discussions that took place at this symposium
- Documents submitted to the Research Board will be shared with everyone, including working group members.

Annex 1 – List of Participants

1. SSC Members

Name	Organization	Email address
DAVIS, Chris (Chair of the Scientific Steering Committee)	NCAR	cdavis@ucar.edu
ALCÁNTARA-AYALA, Irasema (online)	National Autonomous University of Mexico	ialcantara@igg.unam.mx
EBERT, Beth	Bureau of Meteorology	beth.ebert@bom.gov.au
LEHMANN, Volker	DWD	volker.lehmann@dwd.de
KLEIST, Daryl	NOAA	
RAMOS, Maria-Helena	INRAE	maria-helena.ramos@inrae.fr
SAHAI, Atul Kumar	Indian Institute of Tropical Meteorology	sahai@tropmet.res.in
SBII, Siham	Morocco Met Service	sihamsbii@gmail.com
VOGEL, Coleen	University of Witwatersrand	coleen.vogel@wits.ac.za
YONEYAMA, Kunio	JAMSTEC	yoneyamak@jamstec.go.jp

2. Core Project Chairs

Name	Title	Email address
JUNG, Thomas	Chair, Polar Prediction Project	thomas.jung@awi.de
VITART, Frederic	Co-Chair, Sub-seasonal to Seasonal Project	Frederic.Vitart@ecmwf.int
ROBERTSON, Andrew	Co-Chair, Sub-seasonal to Seasonal Project	awr@iri.columbia.edu
POTTER, Sally	Co-Chair, High Impact Weather Project	S.Potter@gns.cri.nz
GOLDING, Brian	Co-Chair, High Impact Weather Project	brian.golding@metoffice.gov.uk

3. Working Group Chairs

Name	Title	Email address
SALIO, Paola	Co-Chair, Working Group on Nowcasting and Mesoscale Research	salio@cima.fcen.uba.ar
TAKAYABU, Yukari	Co-Chair, Working Group on Tropical Meteorology Research	yukari@aori.u-tokyo.ac.jp
WANG, Zhuo	Co-Chair, Working Group on Tropical Meteorology Research	zhuowang@illinois.edu
COELHO, Caio	Co-Chair, Working Group on Forecast Verification Research	caio.coelho@inpe.br
ALBRECHT, Rachel	Co-Chair, Working Group on Nowcasting and Mesoscale Research	rachel.albrecht@iag.usp.br

Name	Title	Email address
CHASCO, Maria Julia	Co-Chair, Working Group on Societal and Economic Research Applications	jchasco@smn.gov.ar
CASATI, Barbara (online)	Co-Chair, Working Group on Forecast Verification Research	barbara.casati@canada.ca
FLOSSMANN, Andrea	Co-Chair, Expert Team on Weather Modification	andrea.flossmann@uca.fr
LOEHNERT, Ulrich	Co-Chair, Working Group on Data Assimilation and Observing Systems	loehnert@meteo.uni-koeln.de
BERNER, Judith	Co-Chair, Working Group on Predictability, Dynamics and Ensemble Forecasting	berner@ucar.edu
SIEMS, Steven	Co-Chair, Expert Team on Weather Modification	steven.siems@monash.edu

4. Secretariat

Name	Title	Email address
De CONING, Estelle	Head, World Weather Research Programme	edeconing@wmo.int
SPARROW, Michael (online)	Head, World Climate Research Programme	msparrow@wmo.int
YAMAGUCHI, Munehiko	Scientific Officer, World Weather Research Programme	myamaguchi@wmo.int
YOUDES, Lorraine	Scientific Officer, World Weather Research Programme	lyouds@wmo.int
RODRIGUEZ, Lina	Associate Scientific Officer, World Weather Research Programme	lrodriguez@wmo.int

5. External Speakers

Name	Role	Email address
Buchanan, Piers	Co-chair of AvRDP Phase II	piers.buchanan@metoffice.gov.uk
Masson, Valery	Leader of Paris Olympics 2024 RDP	valery.masson@meteo.fr
Rotach, Mathias	Leader of TEAMx	mathias.rotach@uibk.ac.at
Riemer, Michael	Leader of W2W	mriemer@uni-mainz.de
Flaounas, Emmanouil	Leader of MedCyclone	em.flaounas@hcmr.gr
Orok, Hodo	YESS guest	hodo.orok@gmail.com

Annex 2 – Agenda

	Thursday	Friday
0800-0830	Coffee	Coffee
0830-0930	Feedback session from ET/WGs and projects on the new IP	Report on the Tropical Cyclone projects: EXOTICCA, SCMREX, UPDRAFT, TLFDP (30 min)
		TC-PFP (15 min)
		Discussion (15 min)
0930-1000	HIWeather (15+15 min)	TeamX (15 min)
		W2W (15 min)
1000-1030	PPP (15+15 min)	MedCyclones (15 min)
		YESS (15 min)
1030-1100	Tea break	Tea break
1100-1130	S2S (15+15 min)	Paris Olympics 2024 (15+15 min)
1130-1200	DAOS WG (15+15 min)	AvRDP Phase II (15+15 min)
1200-1230	NMR WG (15+15 min)	Wrap up discussions (30 min)
1230-1400	LUNCH	LUNCH
1400-1430	PDEF WG (15+15 min)	SSC closed meeting
1430-1500	SERA WG (15+15 min)	
1500-1530	TMR WG (15+15 min)	
1530-1600	Coffee	Coffee
1600-1630	WxMOD (15+15 min)	SSC closed meeting
1630-1700	Verification WG (15+15 min)	
END of Day		

For more information, please contact:

World Meteorological Organization

Research Department

World Weather Research Programme

7 bis, avenue de la Paix – P.O. Box 2300 – CH 1211 Geneva 2 – Switzerland

Tel.: +41 (0) 22 730 81 11 – Fax: +41 (0) 22 730 81 81

E-mail: cpa@wmo.int

Website: http://www.wmo.int/pages/prog/arep/wwrp/new/wwrp_new_en.html