WWRP Introduction

Chris Davis – Chair of WWRP Science Steering Committee

4 November, 2024

WORLD METEOROLOGICAL ORGANIZATION

WWRP

Advancing Weather Research to Reduce Risk to Societies (AWAR^{3}E)

Most Relevant to WGNE/WGSIP, 2025-

Projects (8)

Basic research to applications (R2O)

PCAPS – POLAR COUPLED ANALYSIS AND PREDICTION FOR SERVICES

InPRHA

SAGE

Urban Prediction

Working Groups (7)

Convening the scientific community to discuss and advance the latest science (feed into projects)

- Nowcasting & Mesoscale Research
- Predictability, Dynamics and Ensemble Forecasting
- Forecast Verification Research
- Data Assimilation and Observing Systems

Endorsed and Partner Projects (14)

Expand the scope of WWRP; promote excellent research worldwide

Nowcasting in Africa

ADVANCE

- WISER – EWSA
- CREWS Central Africa
- ANDel
- CREWS East Africa

WMO OMM

PCAPS

Co-chairs: Daniela Liggett (NZ) and Jørn Kristiansen (Norway)

Note: All WWRP Core Projects are co-chaired by at least one social scientist

PCAPS
POLAR COUPLED ANALYSIS AND PREDICTION FOR SERVICES

- Enhance environmental services (SERVICES)
- Enable informed decision-making to enhance human safety and mitigate environmental risk (SUSTAINABILITY)
- Provide more accurate and reliable analyses and predictions (PREDICT) (incl. coupled data assimilation)
- Strengthen partnerships through transdisciplinary coordination and cooperation (PARTNERSHIPS)
- Inclusivity and capacity development enable a wide range of actors to participate in and benefit from PCAPS (INCLUSIVITY)

WMO OMM

SAGE (Subseasonal Applications for Agrculture and Environment)

Co-chairs: Steve Woolnough (UK) and Victor Marchezini (Brazil)

Focus Sectors: Agriculture, Energy, DRR, Health

Objectives:

O1: Advance our understanding of how and where sub-seasonal to seasonal forecast information is and can be used to support decision-making

O2: Advance our understanding of the skill and uncertainty and their sources in impact relevant sub-seasonal to seasonal forecasts.

O3: Develop methods for incorporating sub-seasonal forecasts and their associated uncertainty into decision-making and evaluating the worth of forecast information

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Integrated Prediction Of Precipitation And Hydrology For Early Actions (InPRHA)

Co-chairs: Céline Cattöen Gilbert (NZ) and Rachel Hogan Carr (USA)

Improve the integrated forecast of precipitation, hydrology, and human systems

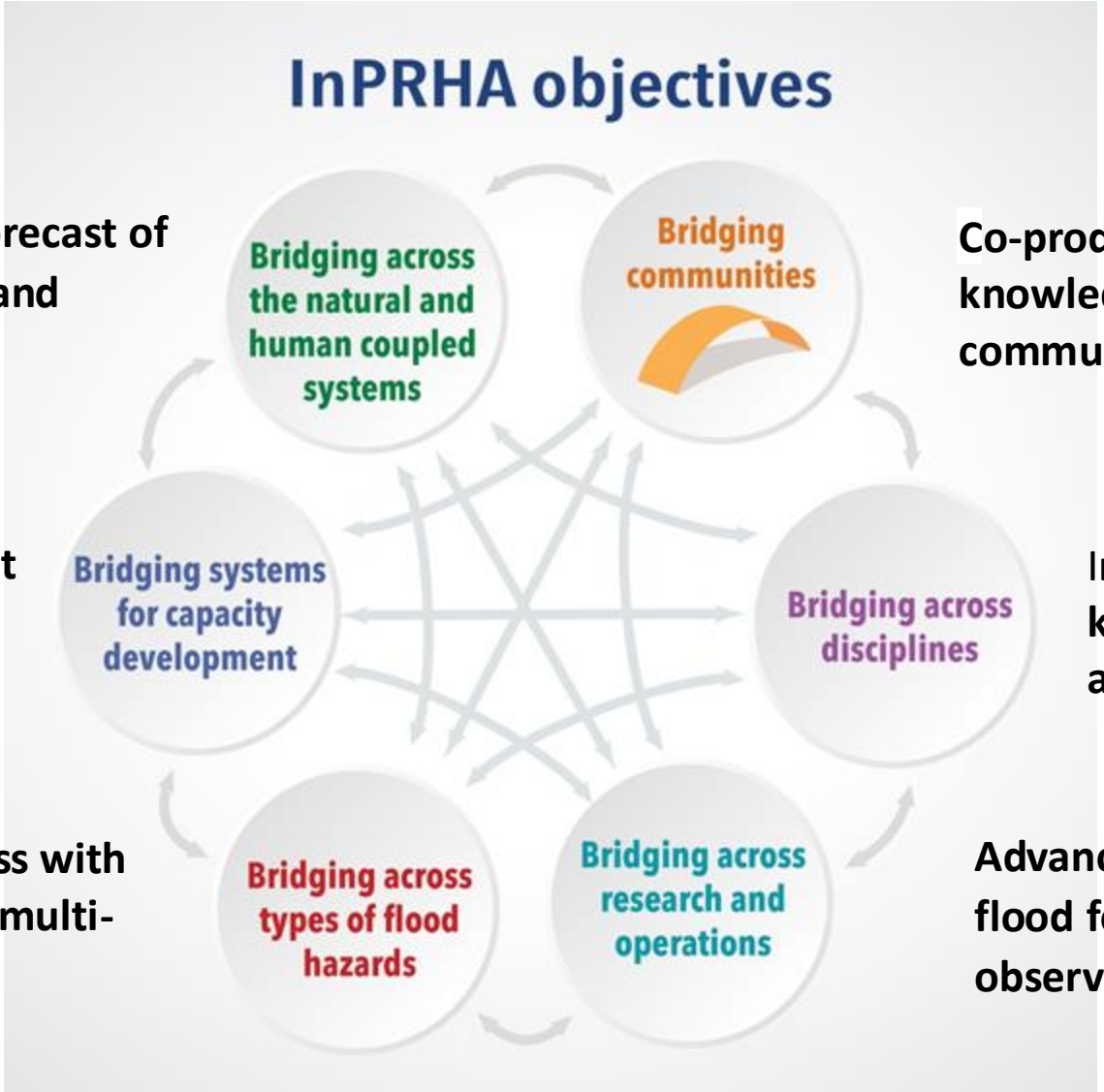
Co-produce new knowledge with existing communities of practice

Promote capacity development in flood early warning knowledge and technology

Integrate methods, knowledge, and approaches

Re-envision the warning process with consideration of impacts from multi-hazard interdependencies

Advance R2O within flood forecasting and observing systems



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WWRP Urban Prediction Project

Co-chairs: Fei Chen (HK, China) and Soledad Garcia Ferrari (UK)

(launching in 2025)

- Understand the dynamic (time varying) exposure and vulnerability inherent among subsets of the population
- Urban-scale multi-hazard prediction and warning systems (transportation, energy, heat waves, heavy rainfall, and other hazards)
- Deploying and utilizing novel urban observations
- Development, application, and evaluation of sub-kilometer urban modeling techniques
- Potential for AI/ML applications

Focus on heat, air quality and flooding (with InPRHA)

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Joint Working Group on Forecast Verification Research (JWGFVR)

Joint with WGNE

co-chairs, Barbara Casati (Canada) and Caio Coelho (Brazil)

Promote good verification practices :

- Web-page
- Tutorials
- Software
- WMO recommendation reports and verification standards for operational centers -> INFCOM

Advance verification research:

- Spatial verification method intercomparisons
- International verification methods workshops
- Verification challenges
- Special issues & publications

Support verification activities in **WWRP and WGNE/WCRP**

- AvRDP2
- TC-PFP
- HIW
- Paris 2024
- URBAN
- SAGE
- PCAPS
- InPRHA
- PEOPLE
- ADVANCE

WCRP: WGNE, WGSIP, WGCM

Operational Verification of AI-forecasts:

- developing methods for verifying the physical coherence / relationship between variables
- Switch from verif. against analysis to verif. against obs (underway)

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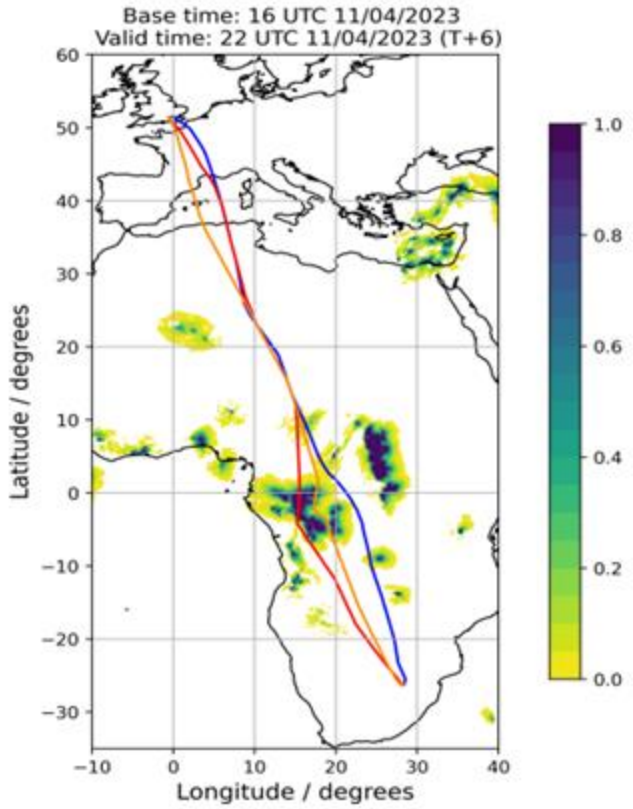
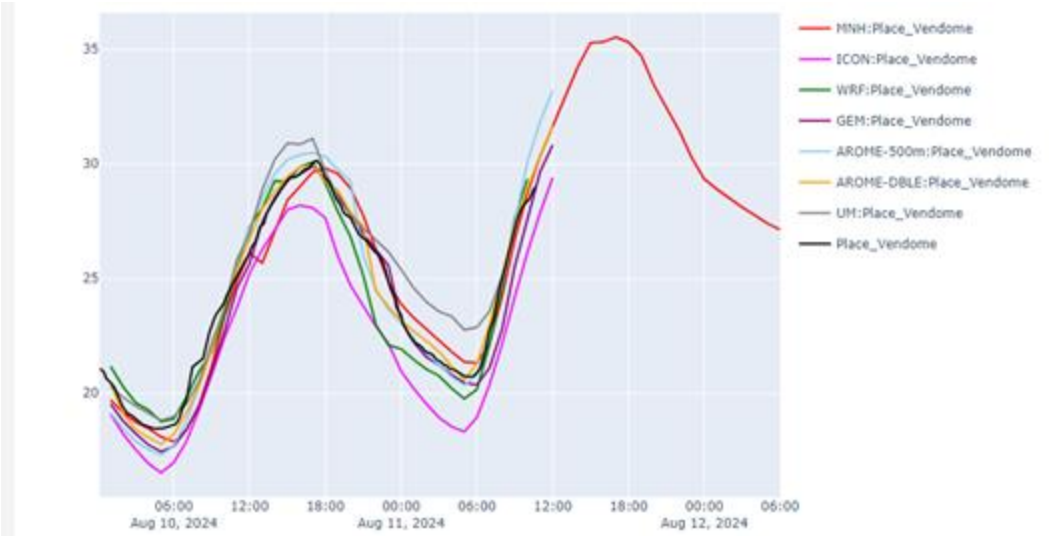
Nowcasting and Mesoscale Research Projects



Aviation RDP-2

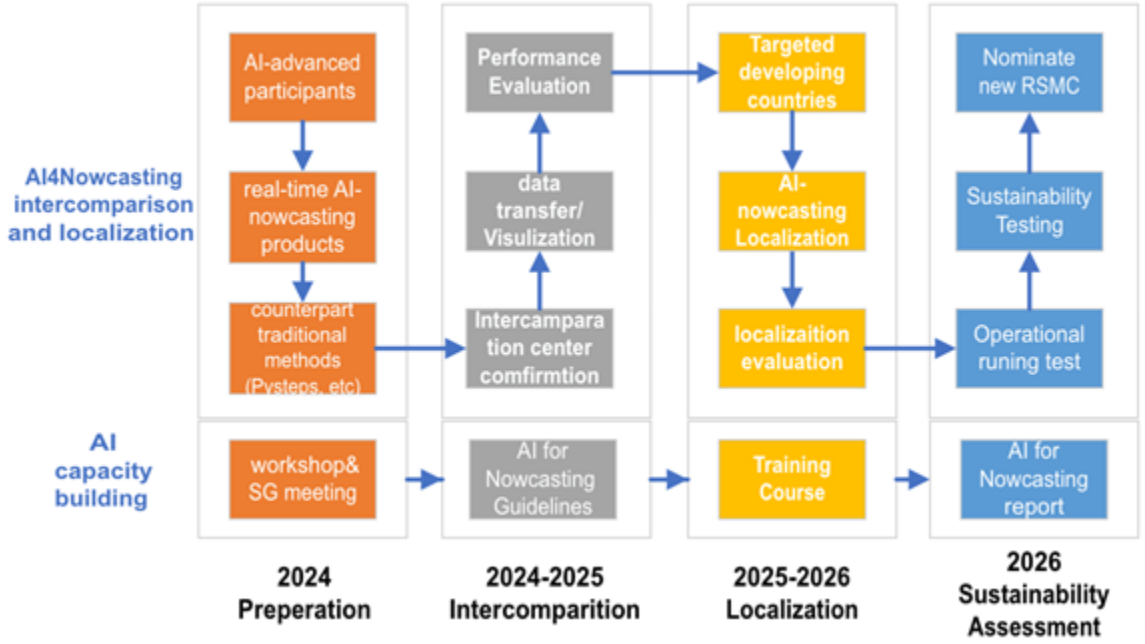
Co-chairs: Paola Salio (Argentina) and Charmaine Franklin (Australia)

Paris RDP



2-m Temperature at Place Vendome

AI for Nowcasting Pilot Project (AINPP) - WIPPS



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Predictability, Dynamics and Ensemble Forecasting (PDEF)

Priorities

co-chairs: Laure Raynaud (France) and Judith Berner (USA)

- **Ensemble design and propagation of uncertainty** - Develop reliable ensemble forecasts at global and regional scales, from minutes to months Understand and quantify the predictability of diabatic processes on different time scales

- **ML for predictability and ensemble forecast** - Revisit the challenge of predictability and uncertainty quantification with ML forecasts, support TIGGE-ML database?

- **Promoting the use and extracting value of operational ensemble forecast data** in research, operations and applications - Make ensemble forecasts used, useful and usable by a wide range of end-users Maintain TIGGE, support TIGGE-ML?

Data Assimilation and Observing Systems (DAOS)

Mission

co-chairs: Sarah Dance (UK) and Ulrich Loehnert (Germany)

- Promote research related to observing systems of the WWRP projects such as the development of observing systems…, network design aspects…, and scientific methods to quantify the value of observations in numerical weather prediction and beyond.
- Promote research related to data assimilation of the WWRP projects such as data assimilation techniques for earth system prediction systems including coupled data assimilation (including hydrological data assimilation), urban scale prediction (e.g., heat, air quality) and for severe weather events such as heavy precipitation.
- **(NEW):** Promote the research of [cross-cutting and disruptive applications of] Artificial Intelligence and Machine Learning with data assimilation and observing systems.

Get Involved with WWRP

SUBSCRIBE TO OUR NEWSLETTER AND STAY UPDATED ON OUR LATEST ACTIVITIES.

TO REQUEST PARTNERSHIP OR ENDORSEMENT FOR A PROJECT

OPEN CALL

The World Weather Research Programme of the WMO is inviting applicants to join its Working Groups.

- **Working Group on Data Assimilation and Observing Systems (DAOS)**
- **Working Group on Tropical Meteorology Research (TMR)**
- **Working Group on Predictability, Dynamics, and Ensemble Forecasting (PDEF)**
- **Working Group on Nowcasting and Mesoscale Research (NMR)**
- **Joint Working Group on Forecast Verification Research (JWGFVR)**

Deadline: 13th November

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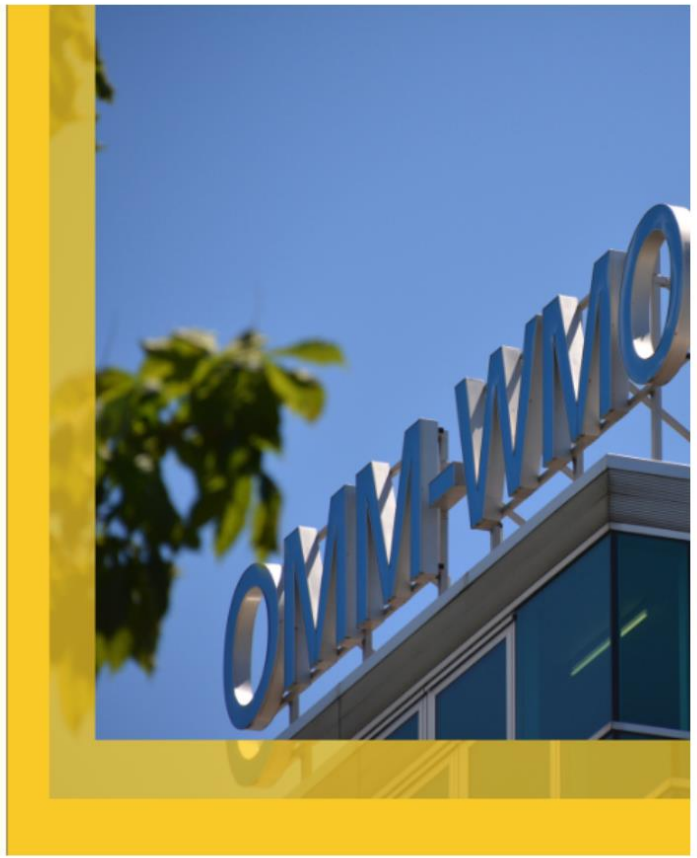

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World Weather Research Programme

Thank you

WWRP SSC 2024 group photo

https://community.wmo.int/en/activity-areas/wwrp

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