
Chris Davis, Chair of the Scientific Steering Committee
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Weather Science for:
Boosting the Economy
Securing Sustainability
Protecting life & property

WORLD METEOROLOGICAL ORGANIZATION
WWRP WORLD WEATHER RESEARCH PROGRAMME
The WWRP

**MISSION**

Promote international and interdisciplinary research for accurate and reliable forecasts, expanding weather science to enhance society’s resilience to high-impact weather from minutes to months.

**VISION**

Seamless Prediction by increasing convergence between weather, climate and environmental approaches.

**LTG 3 APPROACH**

Under the Research Board’s guidance, the WWRP, coordinates international research projects related to weather prediction addressing Long Term Goal 3 of the WMO strategic plan.
Implementation Plan (2016 – 2023)

High-Impact Weather

Water

Urbanization

New Technologies

Core Projects

Aviation RDP

Paris 2024 RDB

TC-PFP RDP

Sciences for Service Projects

Working Groups

Nowcasting and Mesoscale Research

Predictability, Dynamics and Ensemble Forecasting

Forecast Verification Research

Data Assimilation and Observing Systems

Expert Team on Weather Modification

Societal and Economic Research Applications

Tropical Meteorology Research
New Implementation Plan (2024–2027)

**Goals**

- Advance Earth-system Science for Services, minutes to months
- Enhance the warning process in a changing climate
- Quantify, reduce and communicate prediction uncertainty

**The Value Cycle Approach**

Enhance the warning process in a changing climate.
Drivers for the New IP

- Global Multi-hazard Alert System, Early Warnings for All, and Disaster Risk Reduction
- WMO: WMO Strategic Plan, 2024-2027
- WMO: Support Stronger Climate Action
- WMO: Hydrology and water management
- WMO: Global Basic Observing Network
- WMO: Earth System Science
New Projects

EC-76 recommended that our IP will be adopted by Cg-19 in May/June 2023

- Polar Coupled Analysis and Prediction for polar Services
- Sub-seasonal Applications for Agriculture and Energy
- Understanding vulnerability, ultra-fine-scale prediction for multi-hazards in cities
- Science of Hydrology, precipitation and Weather for Risk reduction
- Public Engagement of Practitioners, Learners and Educators
- Satellite-based Nowcasting in Africa
Polar Coupled Analysis and Prediction for Services

Themes

• Research on the southern and northern hemisphere polar regions with attention to “polar” communities

• Improve coupled models of the atmosphere/ocean/sea-ice/land-ice state, noting the evolving climate state

• With novel observations and data assimilation, represent the atmosphere/ocean/sea-ice/land-ice state at km-scale resolution

• Predict fine-scale impacts in the coupled system relevant to (mainly Indigenous) inhabitants, and transportation (shipping and tourism)
Sub-seasonal to seasonal Applications for aGriculture and Energy

Themes:
• **Build on successes of S2S project** (S2S database and pilot applications)
• **Knowing where forecasts will/will not exhibit skill for extreme weather**
• **Users knowing appropriate actions under uncertainty**
• **Effective forecast development and communication**
• **Tailored and co-produced products for specific user groups**
  • Agriculture
  • Water resources
  • Health
  • Renewable energy
• **Metrics of effective use are co-designed with users.**
Hydrology and Precipitation

Themes:

• Integrated prediction of precipitation and hydrological processes on short time scales (minutes to days)

• Advancement of warning strategies associated with multi-hazards and their interdependencies affecting the water cycle.

• Socio-hydrometeorology: dynamic interactions and feedbacks between weather, water and people, and citizen science

• Builds on the goals of the hydrology initiative in WMO to ensure that communities are prepared for flooding events of different types.
Urban Prediction

Themes:

• **Urban-scale prediction**, integrating transportation, energy and hazards to create sustainable cities.

• **Novel observations**

• Development, application and **evaluation** of sub-kilometer modeling techniques

• Understand the dynamic (time varying) **vulnerabilities** inherent among subsets of the population

• Advance the concept of **digital cities** as a companion to initiatives like Digital Earth and Digital Twins (WCRP).
Public Engagement of Practitioners, Learners, and Educators (PEOPLE)

Themes

• The role of various knowledges adding to WWRP knowledge creation and outputs (e.g. indigenous knowledge use).

• Two-way dialogues on how various communities use, but also provide inputs to WWRP

• Enhance information for users through expertise in behavioural science, communication practices, etc.

• Expanding, extending and enhancing citizen science initiatives.

• Developing a communication and outreach strategy for WWRP.
Satellite-based nowcasting for Africa

Improved early warning, adaptation and resilience in Africa through the use of satellite (and other) data sources

• Using geostationary satellite products (limited radar coverage)
  • *Meteosat Second Generation* (MSG): 15 min updates
  • *Meteosat Third Generation* (MTG): launched 14 December, 2022: data every 10 minutes, with Lightning Imager

• Ensuring capacity is developed to meet the data challenge and to provide essential services

• Working in HUBS, to receive, process and disseminate the products

• Partnerships – EUMETSAT, Regional Office in Africa, NMHSs etc

• Application possibilities for Africa: aviation, hydrology, fisherfolk on Lake Victoria, reduce lightning related deaths, impact-based forecasting, EWS

Launch of MTG, courtesy ESA
### WWRP Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Partners</th>
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<tbody>
<tr>
<td>HIWeather (through 2024)</td>
<td>SERCOM and the Standing Committee on Disaster Risk Reduction and Public Services (SC-DRR)</td>
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<td>Paris Olympics RDP (through 2024)</td>
<td>SERCOM SG-URB and GAW for air quality prediction</td>
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<tr>
<td>Aviation RDP-2 (through 2025)</td>
<td>SERCOM and the Standing Committee on Services for Aviation (SC-AVI)</td>
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<tr>
<td>TC-PFP (through 2025)</td>
<td>INFCOM through the Data Processing for Applied Earth System Modelling and Prediction &amp; Projection (SC-ESMP); SERCOM (RSMCs) and SC-DRR</td>
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<td>PCAPS (2024-2028)</td>
<td>WCRP (ESMO/WGNE/CiC, SCAR etc), EC-PHORS, INFCOM/SC-ESMP, JET-EOSDE GCW-AG</td>
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<td>SAGE (2024-2028)</td>
<td>WCRP (ESMO, GEWEX, WGSIP); SERCOM and the Standing Committee on Services for Agriculture (SC-AGR), INFCOM JET-EOSDE</td>
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<td>URBAN (2025-2029)</td>
<td>WCRP/Digital Earth, GAW (GURME) for air quality and urban boundary layer research and SG-URBAN, INFCOM/JET-OWR, JET-HYDMON, JET-EOSDE, JET-ABO</td>
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<tr>
<td>Hydrology and precipitation (2024-2028)</td>
<td>WCRP (GEWEX/GPEX etc), SERCOM and the Standing Committees on Hydrological Services (SC-HYD) and Disaster Risk Reduction and Public Services (SC-DRR), INFCOM/ET-OWR, JET-HYDMON, JET-EOSDE, CoastPredict</td>
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<td>PEOPLE (2023 – 2027)</td>
<td>YESS; WCRP (Rifs, MCR), WMO/ETR, WMO/Comms</td>
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<td>Satellite Nowcasting (2023-2027) (joint project)</td>
<td>African NMHSs; EUMETSAT’s Nowcasting Satellite Applications Facility (NWC-SAF); WMO RA I Regional Office Space Systems and Utilization Division (INFCOM/SSUD) and Education and Training division (MS/ETR) and SERCOM/Global Multi-hazard Alert System</td>
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Not an exhaustive list, just a start
How Will Projects Work?

• Each project
  – Has a Steering Group
  – Nominal 5-year duration

• Projects integrate across disciplines
  – Should bridge physical and social science
  – Will involve multiple working groups

• Projects should include
  – research to ”operations” (INFCOM)
  – well defined “stakeholders (SERCOM)
Thinking Ahead

- Building on successes of Core Projects (S2S, PPP and HI-Weather)
- Advancing the “Science for Services” value cycle approach
- Centering improvement of early warnings as an outcome of research
- Strengthening partnerships across WMO and the community to realize WWRP goals
- Awaiting approval by WMO Congress in 2023

During 2023:

- Leaders for new projects identified
- WWRP SSC in August - brainstorming about more details of the Science plans
- Steering Groups to form, including partners (as listed in the table)
- Detailed plans to be written towards 2024
Thank You

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For more information, consult
World Weather Research Programme (WWRP) | World Meteorological Organization (wmo.int)

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