



WORLD  
METEOROLOGICAL  
ORGANIZATION



# 25th Anniversary of The World Weather Research Programme (1998 - 2023)

**Chris Davis**, Chair of the Scientific Steering Committee  
**Estelle de Coning**, Head of WWRP



David Afari WMO Flickr



1998 - 2023

**Weather Science for:**

**Boosting the Economy**

**Securing Sustainability**

**Protecting life & property**

# 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



Sciences for Service Projects



Aviation RDP



Paris 2024 RDP



TC-PFP RDP



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



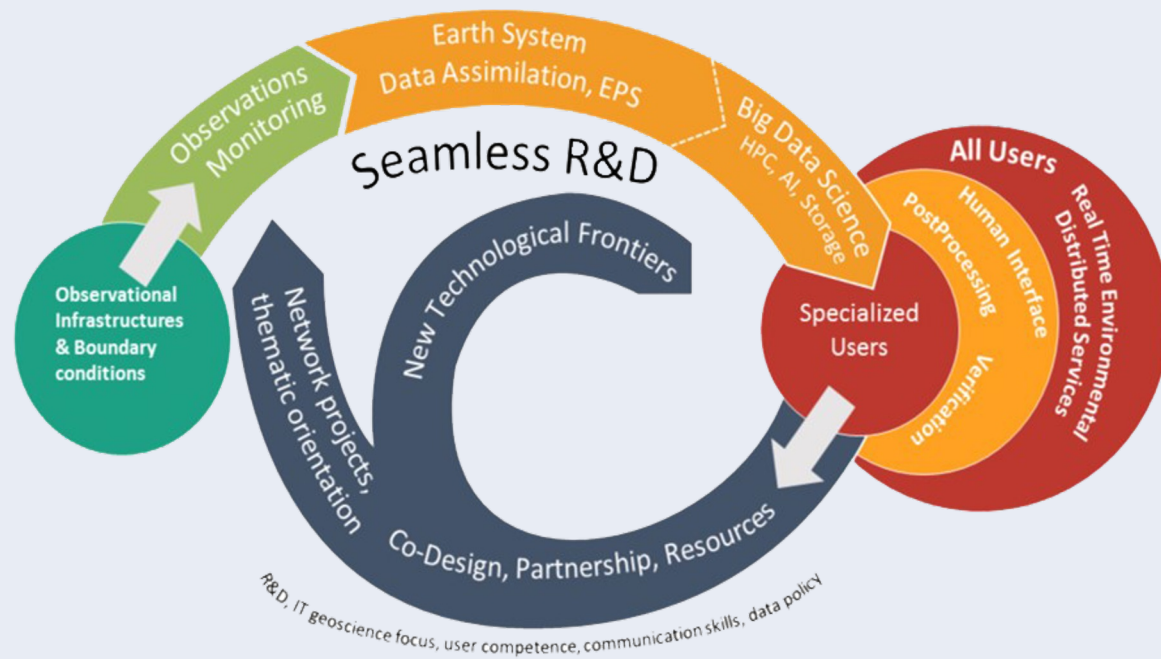
Enhance the warning process in a changing climate



Quantify, reduce and communicate prediction uncertainty



## The Value Cycle Approach





# 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



**EARLY WARNINGS FOR ALL**  
The UN Global Early Warning Initiative for the Implementation of Climate Adaptation

**Executive Action Plan 2023-2027**

**WMO STRATEGIC PLAN**

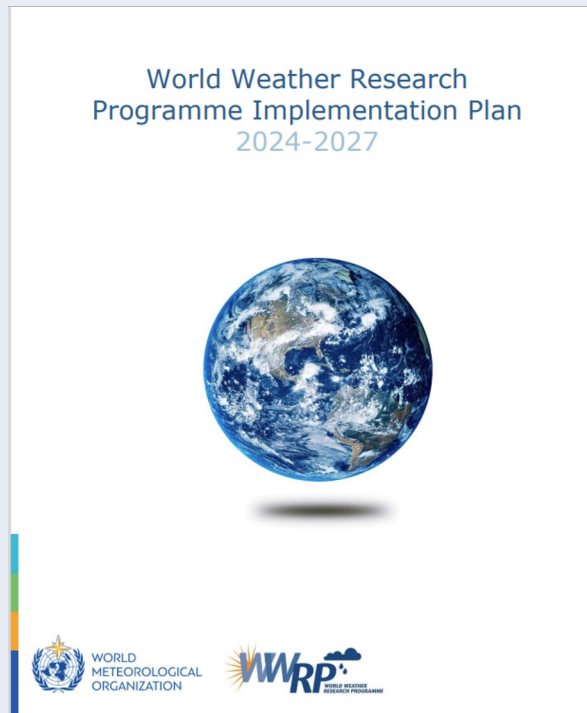
**Sendai Framework for Disaster Risk Reduction 2015 - 2030**

**SUSTAINABLE DEVELOPMENT GOALS**

1 NO POVERTY  
2 ZERO HUNGER  
3 GOOD HEALTH AND WELL-BEING  
4 QUALITY EDUCATION  
5 GENDER EQUALITY  
6 CLEAN WATER AND SANITATION  
7 AFFORDABLE AND CLEAN ENERGY  
8 DECENT WORK AND ECONOMIC GROWTH  
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE  
10 REDUCED INEQUALITIES  
11 SUSTAINABLE CITIES AND COMMUNITIES  
12 RESPONSIBLE CONSUMPTION AND PRODUCTION  
13 CLIMATE ACTION  
14 LIFE BELOW WATER  
15 LIFE ON LAND  
16 PEACE, JUSTICE AND STRONG INSTITUTIONS  
17 PARTNERSHIPS FOR THE GOALS

# New Projects

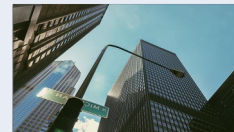
EC-76 recommended that our IP will be adopted by Cg-19 in May/June 2023



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

(Images courtesy Wayne Twine, Wits Rural Facility)



## 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)

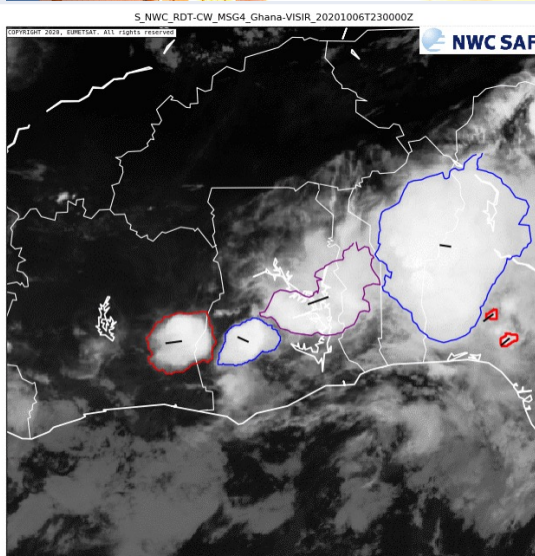
## Themes

- 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.





Launch of MTG,  
courtesy ESA



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NWC SAF

NWC GEO RDT-CW

# 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*



WWRP Projects	Partners
HIWeather (through 2024)	SERCOM and the Standing Committee on Disaster Risk Reduction and Public Services (SC-DRR)
Paris Olympics RDP (through 2024)	SERCOM SG-URB and GAW for air quality prediction
Aviation RDP-2 (through 2025)	SERCOM and the Standing Committee on Services for Aviation (SC-AVI)
TC-PFP (through 2025)	INFCOM through the Data Processing for Applied Earth System Modelling and Prediction & Projection (SC-ESMP); SERCOM (RSMCs) and SC-DRR
PCAPS (2024-2028)	<b>WCRP (ESMO/WGNE/CLiC, SCAR etc)</b> , EC-PHORS, INFCOM/SC-ESMP, JET-EOSDE GCW-AG
SAGE (2024-2028)	<b>WCRP (ESMO, GEWEX, WGSIP)</b> ; SERCOM and the Standing Committee on Services for Agriculture (SC-AGR), INFCOM JET-EOSDE
URBAN (2025-2029)	<b>WCRP/Digital Earth</b> , GAW (GURME) for air quality and urban boundary layer research and SG-URBAN, INFCOM/JET-OWR, JET-HYDMON, JET-EOSDE, JET-ABO
Hydrology and precipitation (2024-2028)	<b>WCRP (GEWEX/GPEX etc)</b> , 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
PEOPLE (2023 – 2027)	YES; <b>WCRP (Rifs, MCR)</b> , WMO/ETR, WMO/Comms
Satellite Nowcasting (2023-2027) (joint project)	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

## 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



**Chris Davis**  
Chair, WWRP Scientific  
Steering Committee



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



For any queries, please contact:  
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For more information, consult  
World Weather Research Programme  
(WWRP) | World Meteorological  
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