# WWRP Update
# Progress on New Implementation Plan

WGNE/JWGFVR Meeting

Chris Davis
Chair of the WWRP Scientific Steering Committee

28 November, 2023

WORLD METEOROLOGICAL ORGANIZATION

1873 2023 IMO-WMO

WWRP WORLD WEATHER RESEARCH PROGRAMME

# New Implementation Plan (2024-2027)

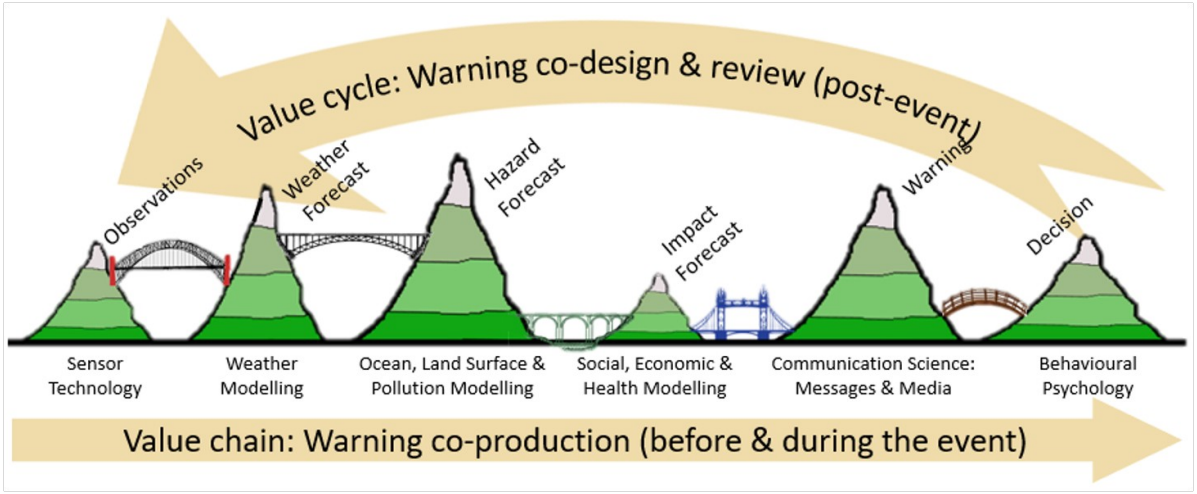
World Weather Research Programme Implementation Plan 2024-2027

## Goals

Advance Earth-system Science for Services, minutes to months

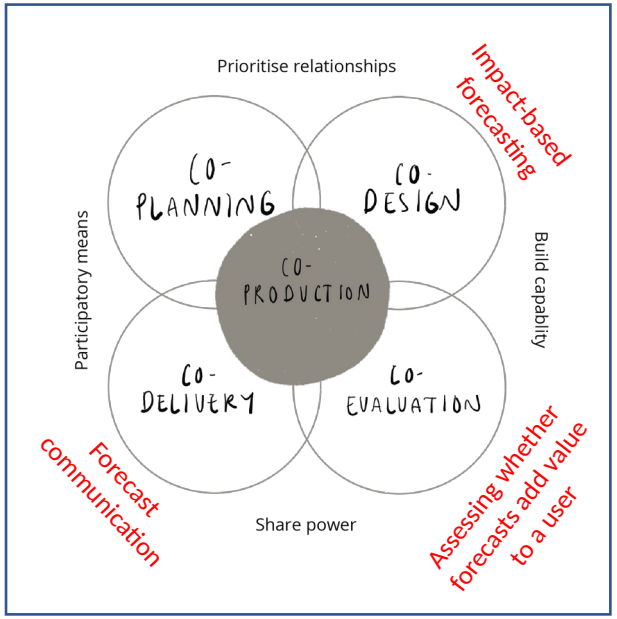
Revolutionize the warning process in a changing climate

Quantify, reduce and communicate prediction uncertainty




## Value cycle approach

Users are not “end users” but rather valuable partners in co-designing product information that is useful for a variety of situations.



# WWRP: 2024-2027

## AWAR3E
## Advancing Weather Research to Reduce Risk to Societies

### Core Projects

- HIWeather — Through 2024
- PCAPS
- InPRHA
- SAGE
- PEOPLE
- URBAN (2025)

### Sciences for Services Projects

- Aviation RDP (through 2025)
- Paris RDP (through 2024)
- TC-PFP RDP (through 2025)

### Working Groups

- Nowcasting & 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 — New Working Group

### Endorsed and Partner Projects

- TEAMx — Team X
- MedCyclones
- WISER — Weather and Climate Information Services — WISER- EWSA

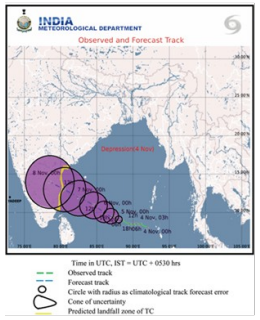
# Tropical Cyclone Probabilistic Forecast Products

JWGFVR rep: Dr Raghavendra Ashrit

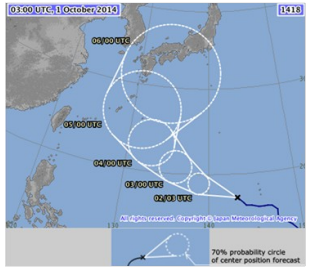
- To coordinate across RSMCs, TCWCs and other forecast & NWP centers to identify best practice guidance for probabilistic tropical cyclone forecasts, to **promote the transfer of research-to-operations and provide better services to users**.
- Arose from International Working Group on Tropical Cyclones (IX), 2018

**Similar products; differing interpretations**

NIO




WNP

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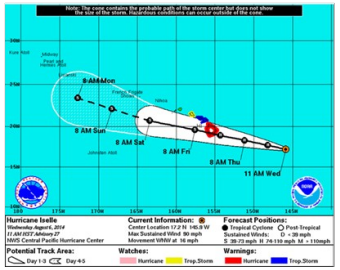
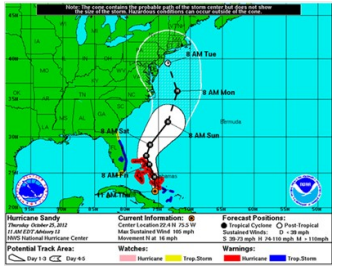



ESP/ATL

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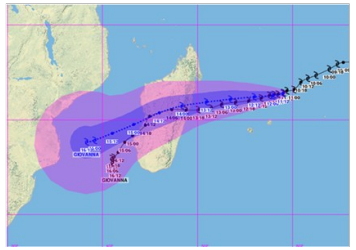

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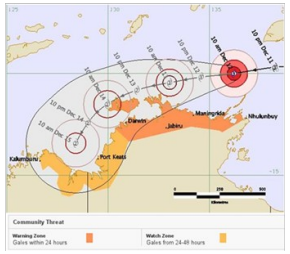
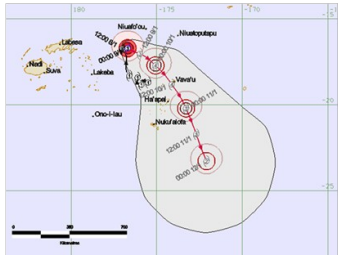
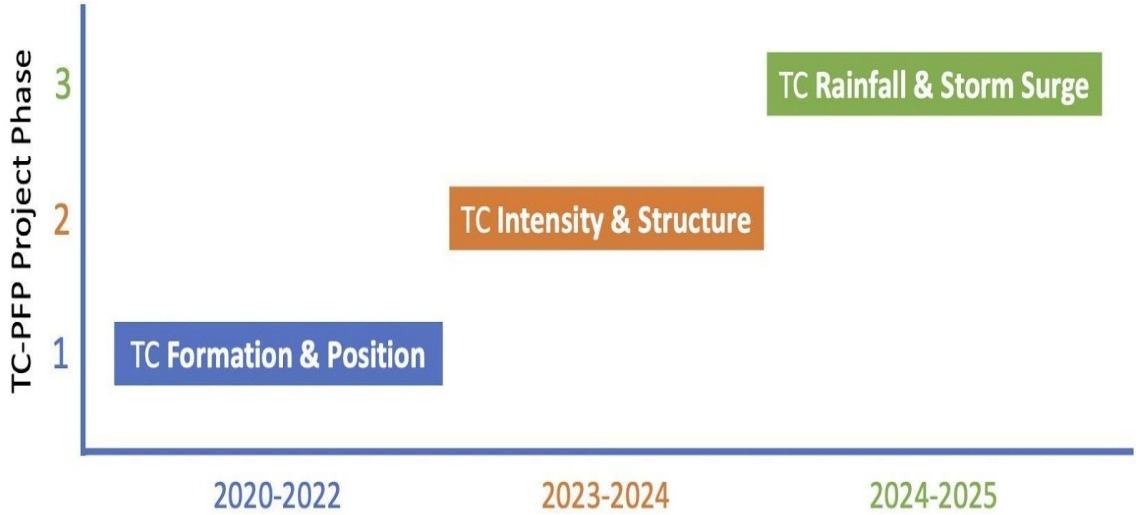
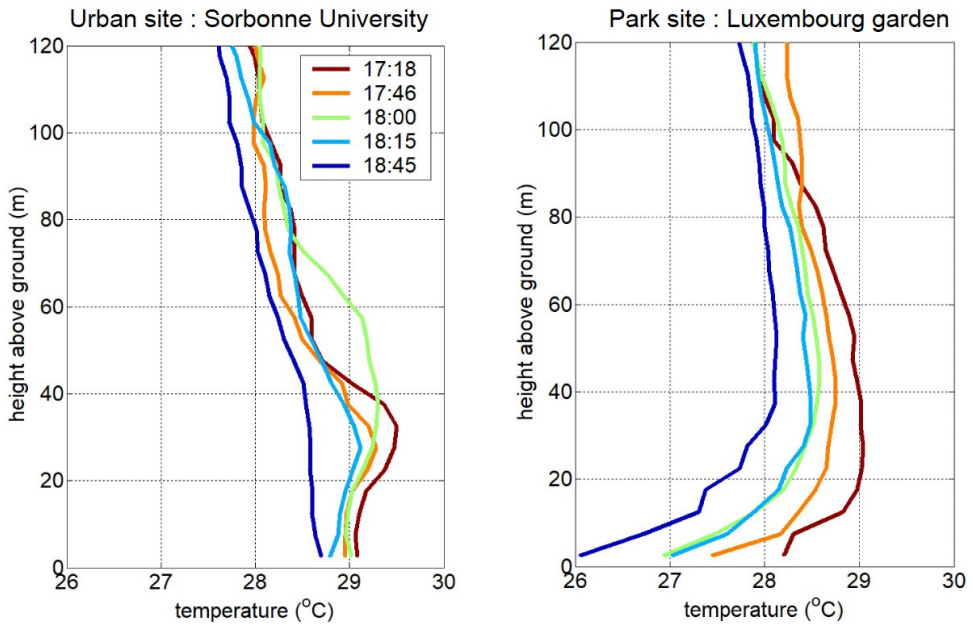


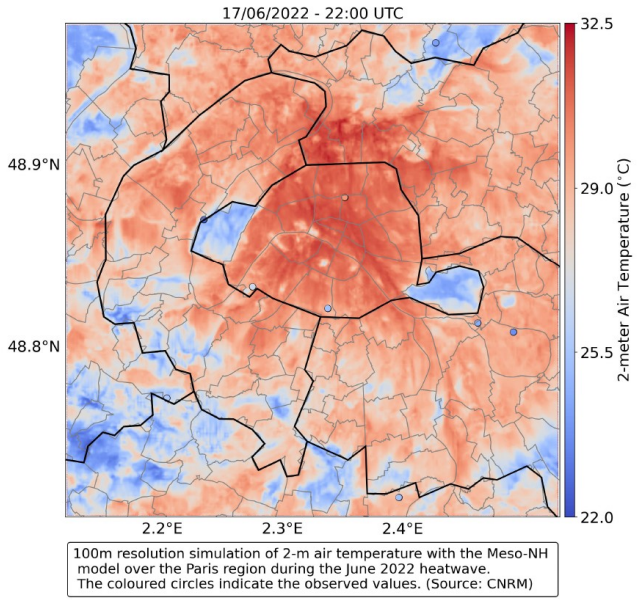
SPC





# Paris Olympics Research and Development Project




100m resolution simulation of 2-m air temperature with the Meso-NH model over the Paris region during the June 2022 heatwave. The coloured circles indicate the observed values. (Source: CNRM)

*Source: CNRM*

Lead: Valery Masson
CNRM

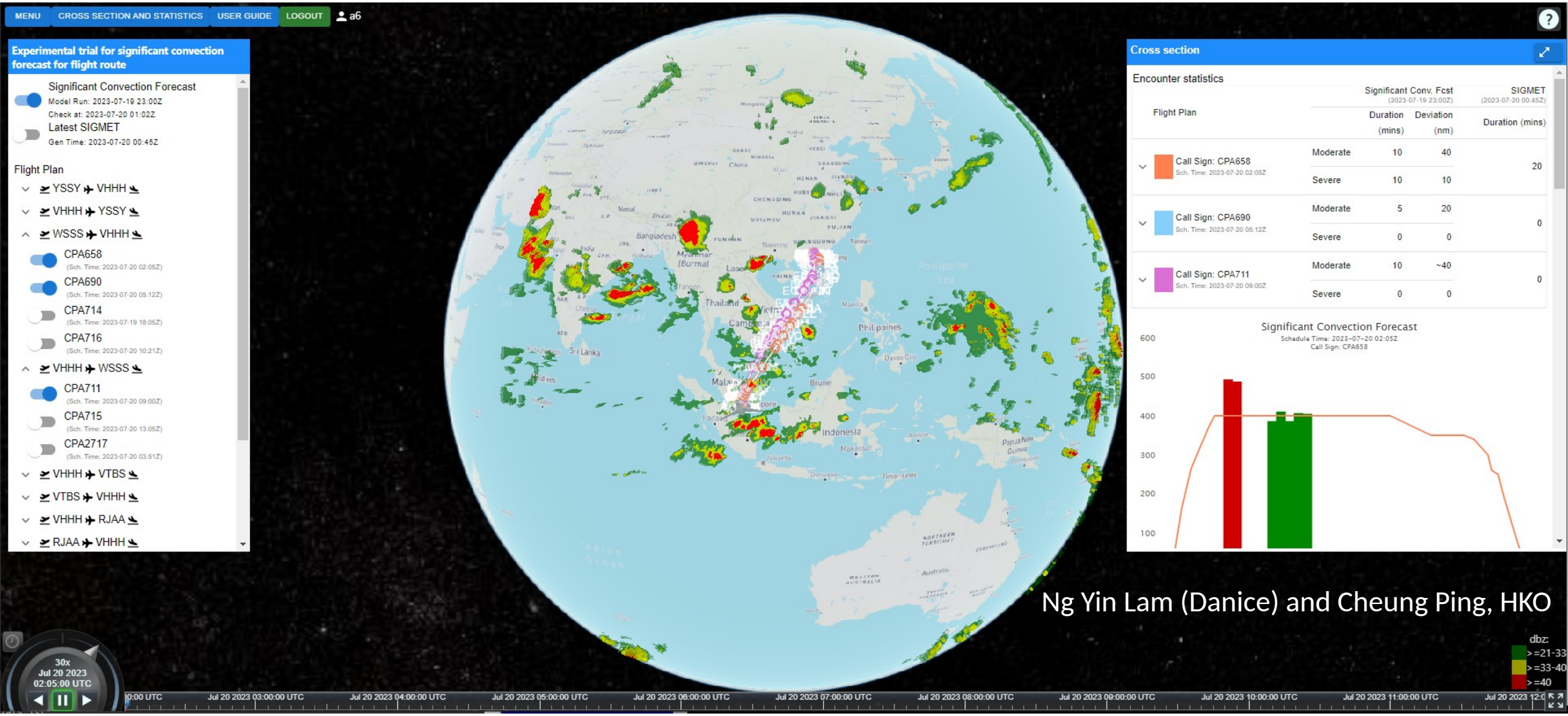
## Social science for Paris RDP: Interviews with Meteo-France forecasters

Team: Paul Abeille, Maria-Helena Ramos, Isabelle Ruin, Julie Demuth, Lina Rodriguez, Brian Golding + 2 master's students

- Develop understanding about:
  - Meteo France forecasters' forecast processes and forecast communication and decision-support processes for high-stakes, spatially-localized, large-event venue sporting events
  - "non-weather" factors
  - Importance of predictability limitations and uncertainty

- Interviews and analysis: spring/summer 2024

# AvRDP-2: HKG-SIN Routing Product for Convection




Ng Yin Lam (Danice) and Cheung Ping, HKO

JWGFVR rep: Stephanie Landman and Ramón De Elía

# New Projects

World Weather Research Programme Implementation Plan 2024-2027

WORLD METEOROLOGICAL ORGANIZATION

WWRP WORLD WEATHER RESEARCH PROGRAMME

Polar Coupled Analysis and Prediction for polar Services (PCAPS)

Sub-seasonal applications for AGriculture and Environment (SAGE)

Urban

Integrated Prediction of Precipitation and Hydrology for Early Actions (InPRHA)

Progressing EW4All Oriented to Partnerships and Local Engagement (PEOPLE)

Satellite-based Nowcasting for Africa

Projects are co-chaired by both physical and social scientists

# Polar Coupled Analysis and Prediction for Services

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

JWGFVR rep: Barbara Casati

**Vision:** Improve the salience, actionability, and the impact of environmental forecasting for human and environmental well-being in the Polar regions.

**Components:**

- Coupled data assimilation and coupled predictions at km-scale
- Plan for the next IPY in 2032-2033
- Safer operations in the polar regions (environmental and human health)
- Development of better forecasts for wind

Kick-off Meeting in Hobart, Tasmania, in March 2024

# Sub-seasonal applications for AGriculture and Environment

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

## WHAT IS OUR AIM? (MAIN OBJECTIVE)

**To make S2S forecasts more useful, usable and used for decision-making;**

**driving the basic research from the user perspective**

## WHAT TO DO? (SPECIFIC OBJECTIVES)

- Identify decisions and the need for S2S information and products
- Analyze how S2S information is currently used and disseminated
- Identify the value of S2S information in decision making and what needs to be done to improve it
- Continue to develop and deliver training in the use and evaluation of S2S forecasts

- *Agriculture*
- *Water resources*
- *Health*
- *Renewable energy*

Kick-off Meeting in April, 2024

Urban Predic

# Progressing EW4All Oriented to Partnerships and Local Engagement

(Steering Group forming)

- Recognizing the elements of an effective expanded Early Warning System (EWS).
- Analyzing the structural and social processes needed for an effective articulated EWS.
- Considering knowledge and cultural systems for a more inclusive EWS.
- Supporting anticipatory action and governance.

# Integrated Prediction of Precipitation and Hydrology for Early Actions (InPRHA)

Co-chairs: Céline Cattoën-Gilbert (New Zealand) and Rachel Hogan (USA)

JWGFVR rep: James Bennett

1. Determine observational, research and operational needs for an integrated hydrometerological early warning system.
2. Determine the warning value cycle needs for communicating impacts from multi-hazard flood events
3. Understand what uncertainty information is most effective and salient (and quantifiable/reliable)
4. Public perception of multi-hazards and compound threats; how do multi-hazard warning systems cope with this perception?

Kick-off Meeting in Paris, France, April 2024

# Urban
**(starting in 2025)**

Urban Prediction

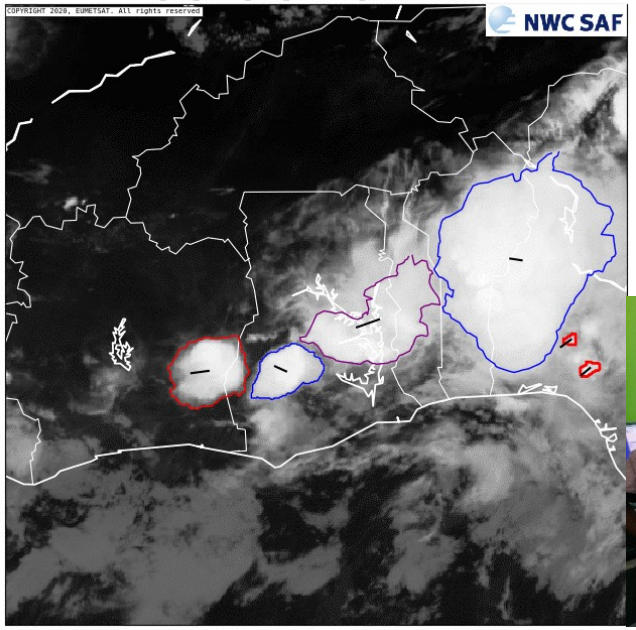
**Themes:**

- 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.

# Satellite based Nowcasting for Africa


- Meteosat Third Generation (MTG) launched 14 December, 2022: data every 10 minutes, with Lightning Imager
- Building on Lake Victoria and SWIFT initiatives

**Early Warnings for Southern Africa (ESWA: 2023-2025)**
**(Lead: Univ. of Leeds, Doug Parker)**



NWC GEO RDT-CW

Testbeds, February 2024 & 2025

Testing **in real time** of forecasting and nowcasting (0-48 hours).

- Forecasters, researchers and users will co-produce solutions.
- Forecasters and researchers jointly create forecasts.
- Evaluate methods from a user perspective.
- We generate Standard Operating Procedures.

WISER
Weather and Climate Information Services

See Fletcher et al. BAMS 2023

# Summary for WWRP Priorities through 2027

- Responding to WMO Member inputs, WMO strategic plan
- Physical and social science integration
- Next-generation warning systems; Early Warnings for All
- S2S applications: utility at the limit of predictability
- Data assimilation: convective-scale DA; coupled DA
- Probabilistic frameworks for forecast information
- Sub-km scale observations/prediction responding to urban population needs
- AI/ML: nowcasting, model emulation, forecast products