Webinar Series: Linking Science to Services

WMO RA IV - Research and Earth System Modeling

Wednesday July 3rd, 14h00-16h00 UTC
08h00-10h00 Costa Rica; 10h00-12h00 Barbados; 09h00-11h00 Perú

English/Spanish interpretation

Register here: https://forms.office.com/e/vyhezMPqHK

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Session title	**Machine Learning (ML)/Artificial Intelligence (AI) in Weather Prediction**
Date and Time	**Wednesday July 3rd, 08h00-10h00 Costa Rica; 10h00-12h00 Barbados; 09h00-11h00 Perú; 14h00-16h00 UTC**
Key objectives	1. Discuss how ML/AI works in relation to weather/climate prediction. 2. Identify the prospects of ML/AI in predicting weather and climate events 3. Examine the best use of Artificial Intelligence Weather Prediction (AIWP) versus other numerical prediction methods. 4. Identify the challenges faced in applying AIWP in regions with limited data availability.
Expected outcomes	It is expected that the presentations will: • Enhanced understanding of how ML/AI operates in weather prediction. • Insights provided into the performance of AIWP compared to traditional dynamical models. • Identified challenges associated with applying AIWP in weather forecasting, particularly in data-sparse regions.
Expected audience.	The webinar is aimed at National Meteorological Services, research scientists, regional organizations, and their technical teams, as well as risk management experts, government authorities and non-governmental organizations in WMO RA IV and beyond.

Agenda

Machine Learning (ML)/Artificial Intelligence (AI) in Weather Prediction		
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Time UTC	**Topic/questions to the panelists**	**Presenter/panelist:**
1400-1410	Introduction and Opening Remarks	**Mr. Rodney Martínez** WMO Representative for North America, Central America, and the Caribbean
1410-1420	WMO RA IV activities on Research and Earth System Modeling – Overview of Webinar Series	**Dr. Arlene Laing** WMO RA IV Focal Point on Research and Earth System Modeling (FP-RM) PR of the British Caribbean Territories with WMO and Coordinating Director Caribbean Meteorological Organization (www.cmo.org.tt)
1420-1430	A Canadian Meteorological Service's perspective on navigating data-driven weather forecasts	**Dr. Veronique Bouchet** Chair of the WMO Research Board Task Team on AI DG - Canadian Centre for Meteorological and Environmental Prediction (CCMEP), ECCC
1430-1450	Some thoughts about the Application of Machine Learning Weather Prediction in Data Sparse Regions	**Dr. Paul Roebber** Distinguished Prof. University of Wisconsin – Milwaukee Program Director, Bachelor of Science in Data Analytics and Master of Science in Data Science Director and Founder, Innovative Weather CIRA Senior Research Associate
1450-1510	Evaluation of Tropical Cyclone Track and Intensity Forecasts from Artificial Intelligence Weather Prediction (AI-WP) Models	**Dr. Mark DeMaria** CIRA/CSU Senior Research Scientist, Colorado State University American Meteorological Society (AMS) Fellow
1510-1530	Satellite Images and Artificial Intelligence for Natural Disaster Management	**Dr. Fernando Pech**

|		Researcher and professor from Superior Technological Institute of Los Rios, Tabasco, Mexico Member of the Topic Group AI for Flood Monitoring and Detection at the International Telecommunication Union (ITU).
1530-1540	Questions and answers and online survey	**Mr. Richard Agyeman** WMO RA IV Vice Focal Point on Research and Earth System Modeling (FP-RM) Global Institute for Water Security, University of Saskatchewan
1540-1550	Closing remarks	**Dr. Arlene Laing** WMO RA IV Focal Point on Research and Earth System Modeling (FP-RM) Coordinating Director Caribbean Meteorological Organization (www.cmo.org.tt)

Biographies of Presenters
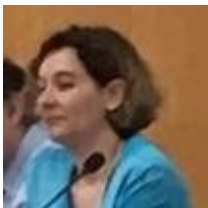
Dr. Véronique Bouchet is Director General of the Canadian Centre for Meteorological and Environmental Prediction (CCMEP), one of the four directorates of the Meteorological Service of Canada (MSC) at Environment and Climate Change Canada. CCMEP is responsible for the 24/7 development and operation of numerical weather and environmental prediction (NWEP) systems on government's state-of-the-art High-Performance Computing (HPC) system. One of its many international roles is being a Volcanic Ash Advisory Centre (VAAC) responsible for specialized forecasting for aviation safety during volcanic eruptions. CCMEP is also responsible for MSC's meteorological internship program and for developing forecaster tools and applications.

Over the course of her career, Dr. Bouchet has held the positions of Director of Air Quality Research, Director of Meteorological Research, Director of National Operations, and Executive Director of National Development. With a PhD in atmospheric modelling applied to air quality, Dr. Bouchet was responsible, early in her career, for the development of numerical prediction application programs, including air quality forecasting and regulatory decision support programs. Dr. Bouchet has been on various international committees since 2009, most recently as a member of the WMO Research Board and liaison with the Infrastructure Commission with mandates as Chair of the Study Group on Future Data Infrastructure (SG-FIT) of the WMO Infrastructure Commission (2023 -) and Chair of the Task Team on Artificial Intelligence for Prediction on Weather timescales (AI4WX) of the WMO Research Board (2024 -).
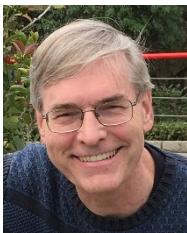
Dr. Paul Roebber holds advanced degrees in meteorology from MIT and McGill University. He is a Distinguished Professor of Atmospheric Sciences at the University of Wisconsin at Milwaukee's (UWM) School of Freshwater Sciences. He also serves as Program Director for UWM's interdisciplinary Bachelor of Science in Data Analytics and Master of Science in Data Science. Roebber's funded research contributes to the U.S. National Weather Service's (NWS) data science efforts, which seek to improve weather forecast information for the nation.

Dr. Roebber publishes extensively in the scientific literature, with 80 papers and book chapters in print, and is a co-author of a book in MIT Press on Expert Forecasting. Roebber has won 43 grants from Federal and State agencies, as well as the private sector and the Government of Canada. He has directed 33 thesis students at the doctoral and masters level at UWM since 1994.

Dr. Mark DeMaria is a Senior Research Scientist at the Cooperative Institute for Research in the Atmosphere at Colorado State University. His current research interests are development of methods for tropical cyclone analysis and forecasting, with an emphasis on satellite observations, and estimating forecast uncertainty using model ensembles and machine learning techniques. He spent most of his career at NOAA working in research and operations at the NWS National Hurricane Center, NESDIS/STAR and the OAR Hurricane Research Division. Dr. DeMaria was the lead developer on several guidance models used at the National Hurricane Center, including their tropical cyclone wind speed probability model and several statistical tropical cyclone intensity forecast models. He received several awards from NOAA and the American Meteorological Society (AMS) and is an AMS Fellow. Since 1981, DeMaria has authored or co-authored more than 100 articles on tropical cyclones, numerical weather prediction, and satellite and mesoscale meteorology in the refereed literature.

Dr. Fernando Pech May is a researcher and teacher at the Instituto Tecnológico Superior de los Ríos in Tabasco, México. He completed his master's degree in Artificial Intelligence at the Center for Research and Advanced Studies of the National Polytechnic Institute (CINVESTAV) in 2009. He specialized in the Semantic Web at the University of Chile. In 2019, he earned his PhD in Computer Science from the Centro Nacional de Investigación y Desarrollo Tecnológico (CENIDET).

Dr. Pech May's research interests include natural Language Processing, information Extraction and Retrieval, the Semantic Web, and Deep Learning. He is currently working on projects related to crop and body water monitoring using AI. He has published various research articles in both national and international journals.

Dr. Pech May is a member of the Topic Group AI for Flood Monitoring and Detection at the International Telecommunication Union (ITU).