Summer School on
"Prediction Across Timescales: Predictability Assessment and Communication of Uncertainty for Applications in Environment and Society"

Date: 23-27 February, 2026

Location: Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Buenos Aires, Argentina.

Background

Forecasts on sub-seasonal to inter-decadal timescales have a diverse range of applications in climate services, including disaster preparedness, and short- mid- and long-term planning. However, the complexity of methods, uncertainty assessment and ways to merge forecasts across timescales presents a significant knowledge and skill gap.

The Summer School on Climate Prediction Across Timescales aims to address these gaps, and it is designed for early-career researchers and advanced students interested in the science and application of climate predictions. The school will offer foundational and advanced lectures in the mornings and interactive, hands-on lab sessions in the afternoons.

The target audience of the school is: Graduate students and postdocs in atmospheric, climate, and data sciences; and junior researchers and professionals working in climate services or operational prediction. Participants are expected to have a basic background in climate science, statistics, or a related field; basic programming skills are expected, proficiency in Python is encouraged but not required.

Objectives and outcomes

- Foster understanding of key concepts including predictability, forecast skill, sources of predictability, and cross-timescale interactions
- Provide an overview of novel tools to determine the predictability and assess forecast skill.
- Introduce emerging tools in machine learning and AI for forecasting.
- Develop practical skills through interactive lab sessions focused on real data

Participants will:

- Gain new theoretical and technical skills
- Engage in group discussions and applied exercises with real (i.e. not synthetic) data.

Tentative Programme

Monday 23 February

Welcome and introduction Overview of climate prediction across timescales, explaining its motivation, goals, and methodologies. Participants will also learn about seamless prediction systems and the current capabilities of state-of-the-art models.		
9:00-9:10	Welcome	
9:10-10:30	Introduction to Prediction Across Timescales: what, why and how?	Ángel Muñoz (ICTP)
	Seamless predictions and modelling: state of the art	Andrea Molod (NASA)
	Introduction to S2S prediction	Marisol Osman (UBA) Bill Merryfield (ECCC)
	Introduction to interannual to decadal prediction	Leon Hermanson (MetOffice)
10:30-11:00	Coffee Break	
Preprocessing forecasts Focused on identifying and correcting model biases, this session explores statistical calibration methods that improve the accuracy and usability of forecasts.		
11:00-12:30	Systematic errors, errors correction	Andrea Molod (NASA)
	Model calibration	Marisol Osman (UBA)
12:30-14:00	Lunch	
14:00-15:30	Hands-on session *The first hands-on session introduces participants to key datasets and tools, providing a practical complement to the morning's theoretical foundations.*	
15:30-16:00	Coffee Break	
16:00-18:00	*Poster & connect session. Participants are invited to bring a poster on their research and they will receive feedback from WGSIP members and peers*	
Tuesday 24 February		
Understanding and measuring predictability This session introduces the land as a source of predictability across timescales and presents new methods to assess predictability, including emerging approaches based on causality and information theory.		
9:00-10:30	Sources of predictability across timescales	Constantin Ardilouze (Météo France)
	Identifying Sources of Predictability via Causality and Information Theory	Yuhei Takaya (JMA)
10:30-11:00	Coffee Break	
Predictions across timescales Participants will explore how signals across different timescales interact—either destructively or		

constructively—and learn strategies for integrating these into coherent forecasts.		
11:00-12:30	Cross-timescale Interference: Theory, Mechanisms, and Implications	Laurel DiSera (ICTP)
	Bridges of Opportunity to Merge Predictions Across Timescales	Àngel Muñoz (ICTP)
12:30-14:00	Lunch	
14:00-15:30	Hands-on session *Applied exercises related to predictability diagnostics and strategies for merging forecast information from multiple timescales.*	
15:30-16:00	Coffee Break	
16:00-17:00	Hands-on session	
Wednesday 25 February		
Novel methods in climate forecasting This session highlights the role of machine learning and AI in modern forecasting systems, including interpretability challenges and the identification of high-opportunity events.		
9:00-10:30	The ML/AI Renaissance: Data-Driven Models for Forecasting	Debbie Hudson (Bureau of Meteorology)
	Explainable AI and Forecasts of Opportunity	Kirsten Mayer (NSF NCAR)
10:30-11:00	Coffee Break	
Forecast evaluation Focuses on tools and metrics to evaluate forecast quality, especially in probabilistic frameworks, and emphasizes clear communication of uncertainty.		
11:00-12:30	Verification of forecasts	Marisol Osman (UBA) Ángel Muñoz (ICTP)
	Probabilistic predictability assessment	Yuhei Takaya (JMA)
12:30-14:00	Lunch	
14:00-15:30	Hands-on session *Practical implementation of ML algorithms, verification tools and probabilistic assessment using real-world forecast data.*	
15:30-16:00	Coffee Break	
16:00-17:00	Hands-on session	

Thursday 26 February		
Climate prediction in practice Review of global framework and international initiatives for climate services, and introduces co-production approaches that engage forecast users in the generation of prediction products.		
9:00-10:30	Coordination for Climate Prediction (WMO/WIPPS)	Yuhei Takaya (JMA)
	Co-production of Climate Information	Leandro Diaz (UBA)
10:30-11:00	Coffee Break	
11:00-12:30	Science communication for climate prediction *Discusses best practices for communicating forecasts and uncertainty to diverse audiences, from policymakers to the general public*	Bimochan Niraula (ESMO IPO, DKRZ)
12:30-14:00	Lunch	
14:00-15:30	Hands-on session *Participants engage in exercises focused on designing communication strategies and co-developing forecast products with end users.*	
15:30-16:00	Coffee Break	
16:00-17:00	Hands-on session	
Friday 27 February		
9:00-10:30	Participant's presentations	
10:30-11:00	Coffee Break	
11:00-12:30	*Participant's presentations* *Closing remarks*	
12:30-14:00	Lunch	