

Machine Learning in Climate Change Mitigation Scenarios

From Model Development to Ensemble Analysis

20 March 2025, 14:00- 18:00

AULA FDS, 4th floor
Department of Mathematics
Politecnico di Milano

Speakers:

Alaa Al Khourdajie (Imperial)

Jacopo Ghirri (PoliMi)

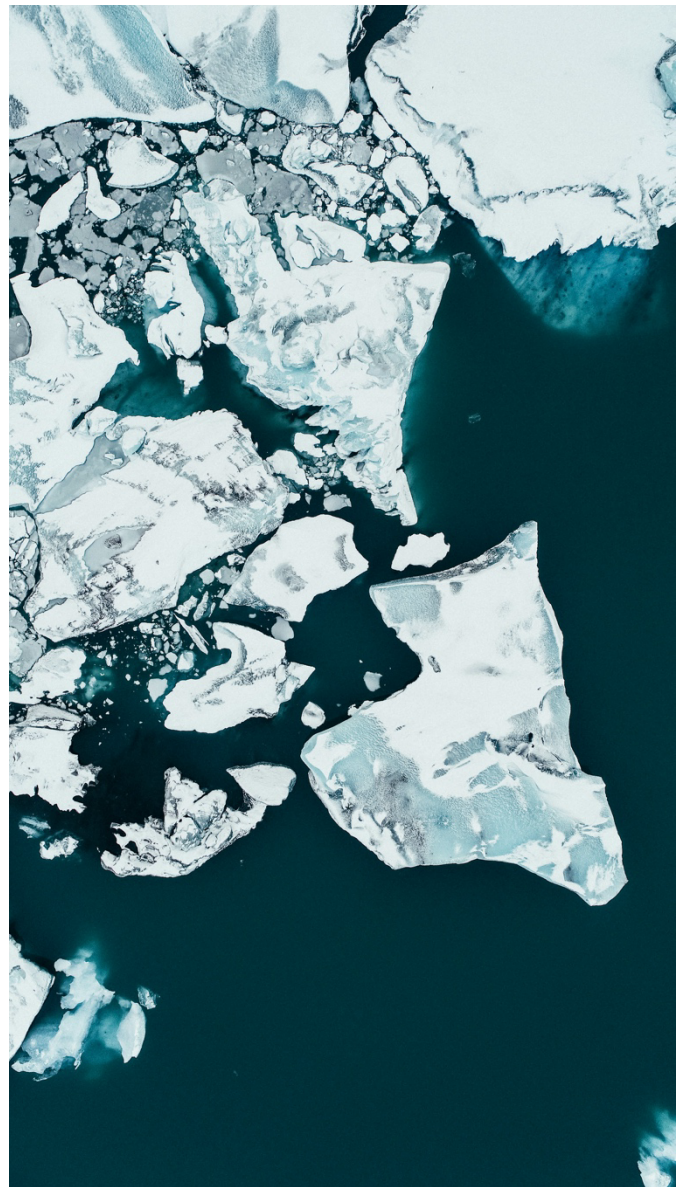
Sara Giarola (UniBS/EIEE)

Francesco Nappo (PoliMi)

Moderator: Massimo Tavoni (PoliMi/EIEE)

Funding:

This event is part of the project VINCE – Vetting Implicit Normativity in Climate Economics under the MSCA PF scheme.



Support:

EFFEDIESSE- Laboratorio di Formazione e Sperimentazione Didattica

EUNICE – ERC Consolidator Grant

META- Social Sciences and Humanities for Science and Technology

Organizer:

Francesco Nappo (PoliMi)



**POLITECNICO
MILANO 1863**

DIPARTIMENTO DI MATEMATICA

Concept

Machine learning (ML) has emerged as a critical tool in contemporary climate research. This workshop will explore prospects for ML tools to enhance the design and assessment of medium- and long-term scenarios of greenhouse gas emissions. We will cover some of the latest applications, from the use of ML in the development of integrated assessment models (IAMs) of climate change to the opportunities of ML to assist the construction and evaluation of large ensembles of emission scenarios. Due to the specific nature of ML tools, the workshop will also be an occasion to reflect on emerging issues of opacity and the potential challenges in the implementation of ML in influential exercises of climate policy evaluation, such as those of the IPCC.

Specifically, the workshop will address the following questions:

- DATA ENHANCEMENT: Can ML tools be used to streamline the collection and curation of data to feed the models (IAMs) that produce emission scenarios?
- MODEL ENHANCEMENT: Can neural networks and equations discovery tools integrate standard numerical modeling approaches in re-designing IAMs?
- POST-PROCESSING: Are ML emulators fit for detecting bias and infilling missing dimensions of uncertainty in large ensembles of emission scenarios?
- ASSESSMENT: What are the consequences of the use of ML tools on the informativeness and trustworthiness of assessments of large scenario ensembles?

We look forward to the participation of engineers, mathematicians, and other researchers with an expertise in ML. One of the workshop's aims is to build further capacity to assist climate research, exploring connections across emerging fields.

The workshop will be held in Aula FDS, IV Floor, Department of Mathematics, Politecnico di Milano. Participation is free of charge. Registration is not required.

See you soon in Milan!

Program

- 14:00-14:45 **Alaa Al Khourdajie** (Imperial College London)
Keynote. 'Mitigation scenarios and ML: An (incomplete) research agenda'
- 14:40-15:30 **Jacopo Ghirri** (Politecnico di Milano)
'Climate policy under fear of model misspecification'
- 15:30-16:00 *Break*
- 16:00-16:45 **Sara Giarola** (Università di Brescia / EIEE)
'Evaluating mutual dependencies of uncertainties in energy transitions'
- 16:45-17:30 **Francesco Nappo** (Politecnico di Milano)
'The open ensemble'
- 17:30-18:00 *Discussion*
Moderator: **Massimo Tavoni** (Politecnico di Milano / EIEE)

Support

The workshop is made possible by the following generous contributions:

Conceptualization: Alaa Al Khourdajie, Sara Giarola.

Funding: This event is funded by the project *VINCE – Vetting Implicit Normativity in Climate Economics* under the Marie Skłodowska-Curie Postdoctoral Fellowship scheme.

Organizational support & communication: EFFEDIESSE, Laboratorio di Formazione e Sperimentazione Didattica, Politecnico di Milano; META – Social Sciences and Humanities for Science and Technology, Politecnico di Milano.