Evidence for Policy in Disaster Risk Management (DRM) Summer School 2026

Tallinn, 26-28 May 2026

Class No. 6
The multiple uses of artificial intelligence and machine learning for preparedness

Class will take place in room S 243 – 2nd floor of the Silva building

Class Coordinator

Arthur H. ESSENFELDER
Scientific officer at the European Commission's Joint Research Centre (EC-JRC) under the Disaster Risk Management unit

Dr. Arthur H. ESSENFELDER is a scientific project officer at the European Commission's Joint Research Centre (EC-JRC) under the Disaster Risk Management unit. Arthur contributes to the Copernicus Emergency Management Service (CEMS), the European Drought Observatory (EDO) and the Global Drought Observatory (GDO). He is responsible for the scientific development of indicators related to drought hazard and risk detection and monitoring with a particular focus on the incorporation of Artificial Intelligence (AI) methods for supporting these tasks. He was the lead researcher on the exploratory research project AI-enhanced Agro-Climate Service (AIACS) in collaboration at the JRC. He previously was the lead researcher on the assessment of disaster risk reduction strategies at the Euro-Mediterranean Centre on Climate Change (CMCC) and

a lecturer at the Ca'Foscari University of Venice on Climate Damage Modelling and Assessment. Dr. Essenfelder has also previously contributed as an expert to the European Environmental Agency's European Topic Centre on Climate change impacts, vulnerability and adaptation (ETC-CCA) and as consultant to the World Bank Group.

Michele RONCO
Scientific Project Officer at the European Commission in AI for Disaster Risk Management

Michele Ronco is a Scientific Project Officer at the European Commission and an Invited Professor at the Politecnico di Torino, specializing in Artificial Intelligence (AI) for Climate Change. With a PhD in Theoretical Physics, he transitioned to leveraging machine learning for climate science. His contributions to EU-funded projects include the advancement of transparent AI models for wildfire prediction in the Mediterranean and studying the impacts of extreme weather on human displacement in low-income countries. Currently, he is exploring the complex interplay between climate stressors, migration, conflicts, and food insecurity, while developing multi-hazard risk assessment methods. An expert in combining machine learning with remote sensing, his work elucidates the nuanced dynamics of climate-human interactions and is instrumental in formulating informed strategies for climate change mitigation and adaptation.

Class assistant
Cyrsten Rohumaa

Speakers

Maria Vittoria GARGIULO
Postdoctoral Researcher in DRM, University of Salerno, Italy

Dr Maria Vittoria Gargiulo is a physicist and interdisciplinary researcher committed to evidence-informed policymaking and international collaboration. With a PhD in Mathematics, Physics, and Applications (Doctor Europaeus), she works at the intersection of science, policy, and society. Fluent in several languages and IMI-qualified mediator, she facilitates inclusive science-policy dialogues and capacity-building initiatives. She has contributed to EU-funded projects, leading tasks, work packages and producing policy-relevant outputs on resilience and governance. Elected Deputy Early Career Union-level Representative (2026–27) at the European Geosciences Union, she supports connecting early-career researchers with policy. In 2025, she co-convened the EGU25 Natural Hazards Great Debate on Responsible AI in hazard assessment. Her work bridges research and practice to support inclusive, participatory policymaking.

Lorenzo NAVA
Senior Lecturer in AI for Disaster Risk Management, King's College London

Lorenzo is a Senior Lecturer and AI+ Academic Senior Fellow at King's College London working at the intersection of AI, Earth observation, and natural hazard science. His research focuses on how complex hazard systems evolve and on developing AI-driven methods to monitor, forecast, and manage cascading mountain risks, with a particular emphasis on landslide monitoring, dynamic behaviour analysis, and runout forecasting.

He also serves as Chair of the Working Group on Educational Materials within the UN Global Initiative on Resilience to Natural Hazards through AI Solutions, where he coordinates international activities on capacity building for AI use in disaster risk reduction. Before joining King's, Lorenzo was a Research Associate at the University of Cambridge on multihazard remote sensing. He holds a PhD in Geosciences from the University of Padova.

Aim(s) of the Class

Artificial Intelligence (AI) has become an invaluable tool in disaster risk management (DRM), significantly enhancing resilience, preparedness, and response capabilities to disasters. This class will explore AI's critical role across a range of phases of DRM, demonstrating its ability to rapidly process data, support risk modelling, and optimise preparedness and response. Participants will learn how AI improves data analysis and decision-making in an engaging and interactive manner. Additionally, the class will examine AI's impact on humanitarian crisis management, and real-time disaster analysis. By showcasing these applications and engaging with participants, the class aims to highlight AI's transformative potential in DRM.

Recommended readings

- Reichstein, M., Camps-Valls, G., Stevens, B., Jung, M., Denzler, J. & Carvalhais, N. Deep learning and process understanding for data-driven Earth system science. *Nature* **566**(7743), 195-204 (2019): https://www.nature.com/articles/s41586-019-0912-1
- Fleming, S.W., Watson, J.R., Ellenson, A., Cannon, A.J. & Vesselinov, V.C. Machine learning in Earth and environmental science requires education and research policy reforms. *Nat. Geosci.* **14**, 878–880 (2021): https://www.nrcs.usda.gov/sites/default/files/2023-03/Machine%20learning%20in%20Earth%20and%20environmental.pdf
- Ghaffarian, S., Taghikhah, F. R. & Maier, H. R. Explainable artificial intelligence in disaster risk management: Achievements and prospective futures. *International Journal of Disaster Risk Reduction* **98**, 104123 (2023): https://www.sciencedirect.com/science/article/pii/S2212420923006039
- Kuglitsch, M. M., Albayrak, A., Luterbacher, J., Craddock, A., Toreti, A., Ma, J., Padrino Vilela, P., Xoplaki, E., Kotani, R. & Berod, D. When it comes to Earth observations in AI for disaster risk reduction, is it feast or famine? A topical review. *Environ. Research Letters* **18**, 093004 (2023): https://iopscience.iop.org/article/10.1088/1748-9326/acf601
- European Commission, Joint Research Centre (JRC) (2020): EDO Combined Drought Indicator (CDI) (version 1.6.1, dismissed). European Commission, Joint Research Centre (JRC): *http://data.europa.eu/89h/e83b19ce-08c2-4e0c-b93a-5fd62be21e5e*