AMANDA MONTANARO

PhD student - Politecnico di Milano
@ amanda.montanaro@polimi.it

CMCC affiliate - Centro Euro-Mediterraneo sui Cambiamenti Climatici
amanda.montanaro@cmcc.it

ABOUT ME

I am a Science of Climate graduate interested in anthropogenic climate change and extreme events, specifically droughts. During my master's degree, I have gained in-depth knowledge on atmosphere and ocean dynamics, numerical modeling of the Earth's system, radiative processes, and dynamical systems theory. Additionally, I approached topics such as climate variability, air-sea interactions, physical processes and surface responses to anthropogenic climate change, and machine learning. During my internship, I gained valuable experience in a research-oriented environment, which taught me to ask the right scientific questions and develop structured criteria to approach problems analytically. In the same context, and later in my master's thesis, I delved deeper into the connection between atmospheric variability and droughts, focusing on European drought-related processes and machine learning applications for climate sciences. I am deeply interested in these topics and intend to continue developing my expertise in these subjects.

STRENGHTS

Critical thinking | Curiosity | Dedication | Team work

KNOWLEDGE

Atmospheric dynamics | Climate variability | Climate change | Climate Modeling | Extreme event attribution | Climate Predictions | Machine Learning | Thermodynamics | Dynamical systems

PROGRAMMING LANGUAGES

Python | Fortran | LaTeX

SKILLS

Large datasets manipulation (NetCDF, xarray)
Data analysis (numpy, scipy)
Data Visualization (matplotlib, cartopy)

EDUCATION

Master's degree in Science of Climate | Department of Physics and Geophysics - University of Bologna
2025 — Bologna, IT

Bachelor's degree in Astronomy | Department of Physics and Geophysics - University of Bologna
2022 — Bologna, IT

INTERNSHIP

3 months Internship | University of Cologne
Supervisor: Claudia Acquistapace
March 2024 - June 2024 — Cologne - DE

MASTER'S THESIS

Title

A SOM-based analysis of the atmospheric drivers of major European droughts: a framework for extreme event attribution

Supervisors: Dr. Salvatore Pascale, Dr. Cristina Iacomino

Description

My master's thesis work focuses on three drought events analysis in Europe using Self-Organising Maps (SOM)s, which are an unsupervised machine method. After isolating the most recurrent atmospheric patterns over the European domain, I focused on the 1974-1975 UK drought event, the 2004-2005 Iberian drought

Empirical Orthogonal Functions (EOFs)

Principal Component Analysis (PCA

Correlation and Regression Analysis

Machine Learning and AI

Ensemble statistics

event, and the most recent 2022-2023 Euro-Mediterranean drought event. For each case, I identified which patterns could be considered dry, wet or neutral using the Standardized Precipitation Index (SPI) and the Standardized Precipitation Evapotransipiration Index (SPEI) as criteria. With this characterization, I quantified the exceptionality of the events in terms of percentage by showing how rare the occurrence of each category was. This type of quantification cannot be accomplished using traditional methods for drought analysis, but most importantly, it sets the stage for future attribution studies.

LANGUAGES

Italian: Mother Tongue

English: Cambridge Advanced Certificate / C1

German: Beginner / A2