Supervisor Project Idea

Supervisor

GIORGIO PASSERINI (https://orcid.org/0000-0002-1524-7933)

Link to brief CV:
https://www.univpm.it/Entra/Engine/RAServeFile.php/f/P003302/Curriculum/Passerini_Short_CV_EN_20221219.pdf

Total number of publications 146. Link to complete list of publications:
http://prodapps.econ.univpm.it/iris/index.php?docente=GIORGIO+PASSERINI&sb_pagina=1&from=0&to=100&authorID=1989

Relevant Publications:

1. https://doi.org/10.1016/j.atmosres.2017.10.022
2. https://doi.org/10.3390/ijerph17114051
3. https://doi.org/10.1016/j.atmosres.2020.105207
4. https://doi.org/10.5194/gmd-15-6311-2022
5. https://doi.org/10.3390/rs15020435

Funded projects

Supervisor and manager for funding granted by

- Marche Polytechnic University (Yearly Funds and Grants from 1999 to now)
- Fondazione Cassa di Risparmio di Jesi (2001/02); 100,000Euro
- General Impianti Srl (2000-2002); 70,000Euro
- Fondazione Cassa di Risparmio di Jesi (2002/03); 35,000Euro
- Ancona Municipality (several in 2003 2006 2007 2009); about 60,000 Euro
- SEA Srl (2006-2008); 25,000 Euro
- Eumatica Srl (2007-2008); 10,000 Euro
- Ministry of Environment through Marche Regional Authority (2007/08); 120,000 Euro
- Multiservizi Srl (2010 e 2011); 20,000 Euro
- Fondazione Cariverona (2010-2013). 45,000 Euro
- SIMAM Srl (2016-2018); 27,000 Euro
- Marche Regional Authority (2018-2020) 150,000 Euro
- Marche Regional Authority (2021-) 130,000 Euro
- Marche Environmental Agency (2023-) (ARPAM) 50,000 Euro
- CNR/ENI 310,000 Euro (2024-)

Research Group Description

The research group was established in the early 1990s to study physics and chemistry of the lower atmosphere. Today the research group runs the Environmental Analysis Laboratory at the Department of Industrial Engineering and Mathematical Sciences of the Marche Polytechnic University (https://diism.univpm.it/en/home-english/).
Prof. Passerini has actively contributed to the birth of the research group and the laboratory, being part of it from the beginning and actively collaborating, especially for the aspects related to the analysis and implementation of new generation models.
To date, the research group carries out its activity focused on the analysis, development, and interfacing of environmental models for the study of air pollution dynamics including diagnostic and prognostic techniques related to atmospheric dynamics of Atmospheric Boundary Layer. The main areas of interest include: (i) numerical modelling of airborne pollutants transport and deposition; (ii) local and mesoscale meteorology and parameterization of the Atmospheric Boundary Layer; (iii) mesoscale analysis and forecast focused on extreme weather events; (iv) geographic information systems for georeferenced data management and postprocessing; (v) assessment of health risk posed by anthropogenic emission of airborne pollutants; (vi) assessment and estimate of anthropogenic and biogenic emissions.
Since 1998, the research group actively works in partnership with Italian Research Council (CNR), namely with the former "FISBAT-CNR" and today with "CNR-ISAC" with whom there are also established research agreements.
Currently, the research team includes the supervisor, a Senior Researcher at CNR-ISAC, one Postdoc Researcher, and four PhD Candidates.

Prof. Giorgio Passerini	https://www.univpm.it/Entra/Docenti_1/Ingegneria_1/docname/idsel/267/docname/GIORGIO%20PASSERINI https://www.researchgate.net/profile/Giorgio-Passerini
Umberto Rizza, (S.R.)	https://www.isac.cnr.it/en/users/umberto-rizza https://www.researchgate.net/profile/Umberto-Rizza
Simone Virgili, (PostDoc.)	https://www.researchgate.net/profile/Simone-Virgili
Alessandra Chiappini (PhD Cand.)	
Silvia Di Nisio (PhD Cand.)	
Diletta Bevilacqua (PhD Cand.)	
Martina Tommasi (PhD Cand.)	

The Department of Industrial Engineering and Mathematical Sciences hosts many laboratories dedicated to Environmental studies and many others dedicated to the diverse branches of industrial engineering. Between all, regarding Environmental studies, DIISM hosts a full-size environmental wind tunnel, various atmospheric sounding systems including Sodar and Sonar, atmospheric monitoring stations, and several other facilities. More in general, DIISM offers state-of-the-art facilities for fast prototyping and rapid manufacturing, a complete workshop with specialized personnel able to produce and/or to adapt virtually any piece of technology, and many other facilities to facilitate experimental activities. A complete list of labs in Italian is available at link: https://diism.univpm.it/en/laboratori-2/

Research thematic area

MSCA Panel Chemistry (CHE) - Economic sciences (ECO) - Information Sciences and Engineering (ENG) - Environmental and Geosciences (ENV) - Life Sciences (LS) - Mathematics (MAT) - Physics (PHY) - Social Sciences and Humanities (SOC)	**MSCA Keywords**	**Free keywords**	**Free text**
ENV	Meteorology, atmospheric physics and dynamics		
	Climatology and climate change		
	Earth observations from space/remote sensing		
	Atmospheric chemistry, atmospheric composition, air pollution		

Contact details

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Title and goals

Applicability and tuning of numerical models to evaluate

extreme weather and air-pollution events

Climate Change is altering the state and the evolution of the Earth atmosphere rapidly and profoundly. This poses several challenges and possible stresses to atmospheric modelling. First, the modelling community and the models themselves struggle to keep up with rapidly changing weather patterns. Then, today models often operate in borderline conditions to predict and/or diagnose extreme events that are becoming increasingly frequent and intense. Extreme weather and air pollution events represent a risk both in the short and in long term through direct and indirect effects. The short-term effects are readily visible including flash floods and Medicanes (i.e., tropical–like cyclones that occur over the Mediterranean Sea). Extreme meteorological settings also trigger intense pollution episodes mainly due to the persistence of exceptional environments (e.g. extremely high temperatures and pressures exacerbate photochemical smog episodes) but also due the transport of air masses (e.g. Saharan dust intrusions).

At our laboratory, the analysis of extreme events is routinely performed through regional meteorological models such as the Weather Research and Forecasting model also coupled with chemistry (WRF-Chem), space-borne observations, local monitoring and meteorological reanalysis.

In this framework, the candidate MSCA Postdoc will focus on the performance and the likely tuning of the physical parameterization of the above models to enhance their applicability and robustness in the Mediterranean Basin and other comparable environments.