

Curriculum vitae Lorenzo Sangelantoni

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RESEARCH INTERESTS/QUALIFICATIONS

Climate modelling; Dynamical downscaling; Ensemble weather predictions; Model Output Statistics techniques.

PROFESSIONAL EXPERIENCE

- Aug. 2022 – present **Junior scientist:** Euro-Mediterranean Center on Climate Change (CMCC) – Climate Variability and Prediction division – Bologna, Italy
- Performing and analyzing present and future climate simulations with the high-resolution CMCC fully coupled global climate model (CMCC-ESM2).
 - Design and implementation of climate diagnostic algorithms applied to CMIP6 and CORDEX climate simulations (ECMWF-funded project C3S2-520).
 - Extratropical windstorm detecting/tracking algorithms implementation for the ECMWF windstorm service (ECMWF-funded project C3S2-413).
 - Statistical downscaling of global climate simulations in H2020 projects GoNEXUS and Nexogenesis H2020 projects.
- Aug. 2021 – Mar. 2022 **Guest scientist:** Bjerknes Center for Climate Research - NORCE- University of Bergen, Norway.
- Jan. 2020 – Jul. 2020
- Investigating heatwaves mechanisms in an ensemble of km-scale models within Cordex-FPS Convection: present-day evaluation and future climate change signal.
- Aug. 2019 – Jul. 2022 **Researcher-assistant professor:** CETEMPS-Centre of excellence in telesensing for environment and model prediction of severe events, Physical and Chemical Sciences Department of L'Aquila University, Italy.
- Km-scale climate modelling with focus on heat waves and floods scenarios at regional and local scales (WRF model).
 - Exploring modulation of sea-atmosphere and land-atmosphere interactions in km-scale seasonal climate predictions (WRF/RegCM models).
 - Assistant Professor in Atmospheric Dynamics: meteorological and climate modelling. International master's degree in Atmospheric Science and Technology (Sapienza University of Rome and University of L'Aquila).
- Jan. 2018 – Jul. 2019 **Postdoctoral research fellow:** CETEMPS-Centre of excellence in telesensing for environment and model prediction of severe events, Physical and Chemical Sciences Department of L'Aquila University, Italy.
- Implementation of an operative ensemble weather forecast system based on GFS-WRF modelling chain (http://magritte.aquila.infn.it/meteo/wrf9km_gefs/).
 - Regional-scale dynamically downscaled seasonal climate forecast system based on RegCM numerical model.
 - Statistical bias correction (quantile mapping) of climate model simulations (Euro-Cordex) for defining regional-scale climate scenarios.

- Jan. 2017 – Dec. 2017 **Postdoctoral research fellow:** Polytechnic University of Marche, Ancona, Italy.
Advanced statistical bias correction and downscaling methodologies for regional to local scale climate scenarios.
- Feb. 2015 **Visiting Scholar:** Consortium on Regional Climatology and Adaptation to Climate Change 550 Sherbrooke West, Montréal (QC), Canada.
Statistical bias correction of Regional Climate Models simulated wind components time series.
- Jan. 2014 – Apr. 2014 **Visiting Scholar:** Consortium on Regional Climatology and Adaptation to Climate Change 550 Sherbrooke West, Montréal (QC), Canada.
 - Copula-based multivariate analysis of simulated and observed temperature and precipitation relationship in the context of Canadian Arctic climate.
 - Univariate and multivariate statistical bias correction of Global Climate Models simulated temperature and precipitation time series.
- Jan. 2013 – Jun. 2014 **Student's tutor:** Polytechnic University of Marche, Department of Life and Environmental Sciences, Ancona (Italy).
Physics students tutor.
- Nov. 2011 – Dec. 2011 **Internship:** CNR - IRPI, Torino (Italy).
 - Alpine glaciers retreat spatial analysis from the last little ice age (LIA) to present.
 - Historical report of Monviso glaciers, Cozie Alps, from LIA to present.
 - Glacial surface mapping (ArcGis software).
 - Management of "GlaRiskAlp" project database.
- Oct. 2009 – Dec. 2009 **Internship:** Società Meteorologica Italiana - SMI (Italian Meteorological Society), Bussoleno (TO) (Italy)
 - Analysis of historical time series of climate data.
 - Computation of temperature and rainfall anomalies of last four decades.
 - Historical time series processing (Nimbus n.53-54).

EDUCATION

- 2012 – 2016 **Ph.D. in Sciences**
 Scientific sector: GEO/12 - Oceanography and atmospheric physics, Polytechnic University of Marche, Ancona (Italy).
 Definition of 21st century climate scenarios from regional to local scale through statistical downscaling and bias-correction techniques applied to regional climate model ensembles.
Thesis: "From regional to local climate scenario: toward an integrated strategy for climate impacts reduction".
- 2010 – 2012 **Master of Science** in Environmental Sciences (final grade 110/110 cum laude). Polytechnic University of Marche, Ancona (Italy).
Thesis: "Climate Projections analysis over Marche region (Central Italy) to 2050".

PUBLICATIONS

Peer review journals

Ricchi A, **Sangelantoni L**, Redaelli G, et al (2023) Impact of the SST and topography on the development of a large-hail storm event, on the Adriatic Sea. *Atmospheric Research* 296: <https://doi.org/10.1016/j.atmosres.2023.107078>

Sangelantoni L, Sobolowski S, Lorenz T, Hodnebrog Ø, Cardoso RM, Soares PMM, Ferretti R, Lavín-Gullón A, Fernandez J, Goergen K, Milovac J, Katragkou E, Kartsios S, Coppola E, Pichelli E, Adinolfi M, Mercogliano P, Berthou S, de Vries H, Dobler A, Belušić D, Feldmann H, Tölle M. Bastin S (2023) Investigating the representation of heatwaves from an ensemble of km-scale regional climate simulations within CORDEX-FPS Convection. *Climate Dynamics*. <https://doi.org/10.1007/s00382-023-06769-9>

Karypidou M, Sobolowski S P, **Sangelantoni L**, Nikulin G, and Katragkou E, (2023) The impact of lateral boundary forcing in the CORDEX-Africa ensemble over southern Africa. *Geosci. Model Dev.*, 16, 1887–1908, <https://doi.org/10.5194/gmd-16-1887-2023>.

Bonaldo D, Bellafiore D, Ferrarin C, Ferretti R, Ricchi A, **Sangelantoni L**, Vitelletti ML (2023) The summer 2022 drought: a taste of future climate for the Po valley (Italy)? *Reg Environ Chang* 23:1–6. <https://doi.org/10.1007/s10113-022-02004-z>

Vitelletti ML, Manea E, Bongiorno L, Ricchi, **Sangelantoni L**, Bonaldo D. (2023) Modelling distribution and fate of coralligenous habitat in the Northern Adriatic Sea under a severe climate change scenario. *Front Mar Sci* 10:1–19. <https://doi.org/10.3389/fmars.2023.1050293>

Sangelantoni L, Ricchi A, Ferretti R, Redaelli G (2021) Dynamical downscaling in seasonal climate forecasts: Comparison between RegCM- and WRF-based approaches. *Atmosphere* 12:1–23. <https://doi.org/10.3390/atmos12060757>

Ferretti R, Lombardi A, Tomassetti B, **Sangelantoni L**, Mazzarella V, Maiello I, Verdecchia M, Redaelli G (2020) A meteorological-hydrological regional ensemble forecast for an early-warning system over small Apennine catchments in Central Italy. *Hydrology and Earth System Sciences* 24:3135–3156. <https://doi.org/10.5194/hess-24-3135-2020>

Shen J, Copertaro B, **Sangelantoni L**, Zhang X, Suo H, Guan (2020) An Early-Stage Analysis of Climate-Adaptive Designs for Multi-Family Buildings under Future Climate Scenario: Case Studies in Rome, Italy and Stockholm, Sweden. *Journal of Building Engineering*, 27, 100972, doi:10.1016/j.jobbe.2019.100972

Sangelantoni L, Ferretti R, Redaelli G (2019) Toward a Regional-Scale Seasonal Climate Prediction System over Central Italy based on Dynamical Downscaling. *Climate* 7:120. <https://doi.org/10.3390/cli7100120>

Sangelantoni L, Russo A, Gennaretti F (2019) Impact of bias correction and downscaling through quantile mapping on simulated climate change signal: a

case study over Central Italy. *Theoretical and Applied Climatology* 135:725–740. <https://doi.org/10.1007/s00704-018-2406-8>

Sangelantoni L, Tomassetti B, Colaiuda V, Lombardi A, Verdecchia M, Ferretti R and Redaelli G (2019) On the Use of Original and Bias-Corrected Climate Simulations in Regional-Scale Hydrological Scenarios in the Mediterranean Basin. *Atmosphere* 10:1–25

Sangelantoni L, Gioia E, Marincioni F (2018) Impact of climate change on landslides frequency: the Esino river basin case study (Central Italy). *Natural Hazards* 93:849–884. <https://doi.org/10.1007/s11069-018-3328-6>

Gennaretti F, **Sangelantoni L**, Grenier P (2015) Toward daily climate scenarios for Canadian Arctic coastal zones with more realistic temperature-precipitation interdependence. *Journal of Geophysical Research: Atmospheres* 120:11,862-11,877. <https://doi.org/10.1002/2015JD023890>

Other publications, book chapters and project reports

Copertaro B, Shen J, Sangelantoni L, Zhang X (2021) Building Renovation Adapting to Future Climate: A Potential Solution of Phase-Change Material to Building Envelope. In: Lackner M., Sajjadi B., Chen WY. (eds) *Handbook of Climate Change Mitigation and Adaptation*. Springer, New York, NY. https://doi.org/10.1007/978-1-4614-6431-0_144-1

Shen J, Copertaro B, Sangelantoni L, Zhang X (2021) Influence of Future Climate on Building Performance and the Related Adaptive Solution to New Building Design. In: Lackner M., Sajjadi B., Chen WY. (eds) *Handbook of Climate Change Mitigation and Adaptation*. Springer, New York, NY. https://doi.org/10.1007/978-1-4614-6431-0_143-1

RESPONSe - INTERREG Italy – Croatia Programme (2021) deliverables 3.1, 3.2.1, 3.2.2 reports (<https://www.italy-croatia.eu/web/response/docs-and-tools>)

Sangelantoni L, Lombardelli P (2016) Current Climate Baseline Assessment report for Macerata Municipality – LIFE SEC ADAPT (LIFE14 CCA/IT/000316). Action A1 report (<http://www.lifeseCADAPT.eu/>)

Sangelantoni L (2016) Current Climate Baseline Assessment report for Senigallia Municipality – LIFE SEC ADAPT (LIFE14 CCA/IT/000316). Action A1 report (<http://www.lifeseCADAPT.eu/>)

Danovaro R, Gambi C, Gatto B, Gioia E, Sangelantoni L., and Marincioni F (2013). Clima, ecosistemi marini e adattamento. *Ecoscienza*, vol. 5, p. 57-60, ISSN: 2039-0432

Sangelantoni L, Bertotto S., Chiarle M (2011), Ghiacciaio del Coolidge (Monviso): ricostruzione dell'evoluzione storica ed analisi territoriale. *Internal report* CNR-IRPI R.I. 2011/05

RECENT INTERNATIONAL CONGRESSES AND WORKSHOPS

2023

Sangelantoni L, Sobolowski S, and CORDEX FPS Convection teams: Heatwave future changes from an ensemble of km-scale regional climate models within CORDEX-FPS convection. In *The Seventh Convection-Permitting Modeling Workshop 2023 (CPM2023)* Bergen 29-31 August 2023 (poster).

Sangelantoni L, Sobolowski S, Ferretti R, Redaelli G, Ricchi A, Scoccimarro E: Land-atmosphere coupling in km-scale climate modeling: effects of resolution vs. land-surface model sophistication, EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023, EGU23-6829, <https://doi.org/10.5194/egusphere-egu23-6829>, 2023 (oral presentation).

Sangelantoni L, Lanteri P, Scoccimarro E, Tibaldi S, Raj RP, Bonaduce A: Evaluation and Quality control of CMIP6 and CORDEX Climate Projections. WP4 ECMWF C3S2_520 project annual meeting, 29 of March 2023 Rome (oral presentation).

2022

Sangelantoni, L., Ferretti, R., Redaelli G., and Sobolowski, S.: Summer season convection inhibition and soil moisture memory in km-scale climate simulations. In EMS annual meeting. <https://doi.org/10.5194/ems2022-155>, 2022

Sangelantoni, L. and Sobolowski, S.: Exploring the effect of kilometer-scale climate modelling on the representation of historical and future heat waves. A multi-model ensemble perspective. In *EGU General Assembly 2022* EGU22-4318 (oral presentation).

2021

Sangelantoni L, Sobolowski S, and CORDEX FPS Convection teams (2021) Representation of heatwaves from an ensemble of km-scale regional climate models within CORDEX-FPS Convection. In *The Fifth Convection-Permitting Modeling Workshop 2021 (CPM2021) High-Resolution Climate Modeling and Hazards* (online) 7-10 and 14 September 2021 (poster).

Sangelantoni, L. and Sobolowski, S.: Investigating the representation of heatwaves in km-scale simulations. In *EGU General Assembly 2021*, online, 19–30 Apr 2021, EGU21-6318, <https://doi.org/10.5194/egusphere-egu21-6318>, 2021 (oral presentation).

Ricchi, A., Mazzarella, V., Sangelantoni, L., Redaelli, G., & Ferretti, R. (2021). Investigating triggering mechanisms for the large hailstorm event of July 10th, 2019 on the Adriatic Sea. In *EGU General Assembly 2021* (EGU21-3662).

SELECTED SOLICITED TALKS/SEMINARS

CORDEX Flag Ship Pilot Study Convection general assembly, Prague 1-2 December 2022: *Exploring the effect of kilometer-scale climate modeling on the representation of heat waves. Evaluation and future changes.*

CORDEX Flag Ship Pilot Study Convection annual meeting, 22-24 November 2021: *The representation of heat waves future changes from an ensemble of km-scale climate simulations.*

CORDEX Flag Ship Pilot Study Convection annual meeting, 1-2 December 2020: *Heat waves modulation from the non Convection-Permitting to the Convection-Permitting scale.*

DALARNA University - Borlänge, Sweden, 29 January 2020: *Climate extremes in a warmer climate: underlying principles and impacts.*

CMCC – Euro Mediterranean Center for Climate Change - Climate Simulation and Prediction division, Bologna, 26 July 2019: *Dynamical downscaling in seasonal climate forecasting: principles and applications.*

CICERO – International Center for Climate Research, Oslo, Norway, 10 May 2019: *Dynamical and statistical downscaling approaches in regional scale weather and climate predictions*

DALARNA University - Borlänge, Sweden, 20 February 2019: *Climate services for better managing climate change adaptation and mitigation.*

CETEMPS – Università dell’Aquila, 5 October 2017: *Connecting climate simulations to impact studies: effects of statistical bias correction/downscaling methods on climate scenarios.*

CMCC – Euro Mediterranean Center for Climate Change - Climate Simulation and Prediction division, Bologna, 6 October 2016: *Effects of a statistical bias correction method on a regional and local scale climate scenario.*

SELECTED CONFERENCES AND SPECIALIST COURSES

- Seventh Convection-Permitting Modeling Workshop 2023 (CPM2023), Bergen, Norway, 29-31 August 2023.
- EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023.
- CORDEX Flag Ship Pilot Study Convection general assembly, Prague 1-2 December 2022.
- European Geosciences Union General Assembly 2022, 23–27 April, Vienna.
- Fifth Convection-Permitting Modeling Workshop 2021 (CPM2021) High-Resolution Climate Modeling and Hazards (online) 7-10 and 14 September, online.
- ECMWF Computing Training Week, 17-21 May 2021, online.
- European Geosciences Union General Assembly 2021, 19-30 April, online.
- CORDEX Flag Ship Pilot Study Convection annual meeting 2020, 1-2 December, online.
- European Geosciences Union General Assembly 2020, 4-8 May, online.
- European Meteorological Society annual meeting and European conference on Applications of Meteorology, Copenhagen 9–13 September 2019.
- National Congress of the Italian Association of the Atmospheric and Meteorology Sciences, Bologna 12 September 2018.
- European Meteorological Society annual meeting and European conference on Applications of Meteorology, Budapest 3–7 September 2018.
- ISSAOS International Summer School on Atmospheric and Oceanic Sciences, CETEMPS, University of L’Aquila, 26-31 August 2018.
- CORDEX-FPS on Convection over Europe and the Mediterranean Annual meeting 22-24, November 2017 ICTP, Trieste.
- Regional Climate Tutorial at National Centre for Atmospheric Research (NCAR), 10-12 July 2017- Boulder, Colorado (USA).
- Climate Services Masterclass, 18-22 May 2015. Directors: C. Buontempo (ECMWF) e A. Dell’Aquila (ENEA), EURAC-Bolzano.
- Release of the IPCC report - Group II, 31 March 2014, Montreal, Québec, Canada.

TECHNICAL SKILLS

Programming languages

UNIX/LINUX shell scripting
MatLab, Python
NCAR Model Evaluation Tool (MET)
GrADS
CDO/NCO
Fortran

Numerical modelling

- Weather Research and Forecast Model (WRF)
- Regional Climatic Model (RegCM)
- Fully coupled CMCC Earth System Model (CMCC-CM3)

High-Performance Computing (HPC) environment

- MARCONI HPC Cluster (CINECA)

- Cray XC40 HPC system (ECMWF)
- National Infrastructure for High Performance Computing in Norway (UNINETT Sigma2)
- CMCC Super Computing Center HPC facilities

PROJECT MANAGEMENT EXPERIENCE

- ECMWF-Destination Earth Program (2024, under negotiation) Key personnel to WP1, contribute to WP2 and WP3. Probabilistic-based evaluation metrics for very high-resolution weather and climate simulations.
- COPERNICUS contract C3S2_413 - Enhanced Operational Windstorm Service (2023) (~250.000 €). Drafting entire proposal and WP1 leader.
- COPERNICUS contract C3S2_520 - Leader of the WP4 activities CMIP6 and CORDEX climate simulations.
- ECMWF Special project "ASIM-CPL - Air-Sea Interactions on the Mediterranean basin, using "atmosphere-ocean-waves" CouPLed numerical models (2021). Team member.
- PON-AIM - Attraction and international mobility (2019). Three-year research funding from European Regional Development Fund and European Social Fund (~360.000 €). Drafting and responsible for the project research activities.
- RESPONSe - INTERREG Italy – Croatia Programme (2018) (~250.000 €) <https://www.italycroatia.eu/web/response/> 01-02-2024
- Class B project: **CPSWCM** – HP10BRUALV at CINECA-ISCRA Italian Super Computing Resource Allocation (2018). Drafting and leading project activities.

PROFESSIONAL AFFILIATIONS AND SERVICE

Mentorship	<ul style="list-style-type: none"> • Supervisor: Giuseppe di Donato, Physics bachelor's degree thesis: <i>Climate extreme indices analysis and projected changes during the 21st century in the Mediterranean basin</i> • Co-supervisor: Martina Zapponini, Atmospheric Sciences and Technologies master's degree thesis: <i>Arctic winds and sea-ice drift in CMIP6 climate models: evaluation, trends, and mechanisms</i> • Co-supervisor: Arjun Vasukuttan, Atmospheric Sciences and Technologies master's degree thesis: <i>Effects of soil moisture initialization in the simulation of Indian summer monsoon using RegCM4.</i>
Member	<p>2009-present Italian Meteorological Society (SMI)</p> <p>2013-present European Geosciences Union (EGU)</p>
Reviewer	<p>Scientific Reports, Weather and Climate Extremes, Earth's Future, Climate Dynamics, SN Applied Sciences, Atmosphere, Geoscientific Model Development.</p>

LANGUAGES

Mother tongue	Italian
Foreign languages	English (fluent)
	French (basic)