Francesco Ferrari

Curriculum vitae

Francesco Ferrari
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Email address: *francesco.ferrari@unige.it*
Date of birth: 28-11-1986, Genova, Italy
Nationality: Italian and Swiss
Driving license: A1, B

EDUCATION

- 30 March 2017: PhD in Civil, Chemical and Environmental Engineering, curriculum in Fluid-dynamics and Environmental Engineering at University of Genova
  - thesis title: *Exploiting the WRF-ARW model for the prediction of flash-floods events over Liguria: a validation strategy and an investigation of the role of the sea surface temperature* (supervisor: prof. Andrea Mazzino)
- 18 July 2013: Master Degree in Physics at University of Genova
  - thesis title: *Study of the sensitivity of a meteorological model to parameterization schemes of clouds microphysics* (supervisor: prof. Andrea Mazzino)

WORK EXPERIENCES

- 1/3/2023 - present: RTDA at University of Genova.
- 1/1/2022 - 28/2/2023: RTDA at University of Milano.
- 2018 - 2021: postdoc at University of Genova.

SCIENTIFIC ACTIVITIES

- Study by means of WRF numerical model simulations of extreme events, with specific focus on floods that affected Liguria Region in past years. Investigation of the role of different features that were expected to play a fundamental role in triggering, development and localization of intense convective system, as microphysical parameterization schemes, Sea Surface Temperature, Cloud Condensation Nuclei concentration (WRF-Chem) and atmospheric boundary layer turbulence.
- Energetic application of WRF simulations. Mapping of wind and waves potentials of the whole Mediterranean basin. Identification of areas where wind and wave events are not time-correlated in order to plan coupled energy extraction from wind and waves. Production and analysis of a 40-years long wind and wave hindcast of the Mediterranean Basin.
- Evaluation of WRF high resolution simulations performances over complex terrain, finalized to the forecast optimization of wind farms output. Evaluation of the impact of observed nudging in simulation performances (in progress).
- Integration of artificial intelligence techniques with numerical weather models to improve forecast reliability.

PARTICIPATION IN RESEARCH PROJECTS

- Sicomar Plus - SIstema transfrontaliero per la sicurezza in mare COntro i rischi della navigazione e per la salvaguardia dell'ambiente MARino. (Cross-border system for maritime safety against the risks of navigation and for the protection of the marine environment). Financed by Intereg - Marittimo EU
  - contribution to development of a meteo-maritime operational model chain.
- SINDBAD - Sicurezza Navigazione da Diporto (Safety recreational and sport yachting). Financed by PORFESR
  - WRF model configuration and optimization on Amazon Web Service Cloud Computing System.
- ENDAS - Enhancement of data assimilation and data driven modeling to improve the meteorological predictions at different space and time scales.

TEACHING EXPERIENCES

- 2015/2016: Teaching assistant. General Physics course for the bachelor degree in Pharmacy and Chemical and Pharmaceutical Technologies at University of Genova.
- 2016/2017: Teaching assistant. General Physics course for the bachelor degree in Biology at University of Genova.
- 2019/2020: Teaching assistant. General Physics course for the bachelor degree in Electronic Engineering at University of Genova.

- 2020/2021: Teaching assistant. General Physics course for the bachelor degree in Electronic Engineering at University of Genova.
- 2020/2021: Teaching assistant. Ocean Science and Engineering course for the bachelor degree in Maritime Science and Technology at University of Genova.
- 2021/2022: Teaching assistant. General Physics course for the bachelor degree in Electronic Engineering at University of Genova.
- 2021/2022: Teaching assistant. Ocean Science and Engineering course for the bachelor degree in Maritime Science and Technology at University of Genova.
- 2022/2023: Professor. Ocean Science and Engineering course for the bachelor degree in Maritime Science and Technology at University of Genova.
- 2022/2023: Professor. Data analytics, forward and inverse modeling: geophysical and environmental fluid dynamics course for the master degree in Geophysics at University of Milano.
- 2023/2024: Professor. Ocean Science and Engineering course for the bachelor degree in Maritime Science and Technology at University of Genova.
- 2024/2025: Professor. Ocean Science and Engineering course for the bachelor degree in Maritime Science and Technology at University of Genova.
- 2024/2025: Professor. Water and Wind for Clean Energy course for the master degree in Environmental Engineering at University of Genova.

PUBLICATIONS

- F. Cassola, F. Ferrari and A. Mazzino, *Numerical simulations of Mediterranean heavy precipitation events with the WRF model: A verification exercise using different approaches*, Atmospheric Research, 164-165: 210 - 225 (2015)
- F. Cassola, F. Ferrari, A. Mazzino and M.M. Miglietta, *The role of the sea on the flash floods events over Liguria (northwestern Italy)*, Geophysical Research Letters, 43: 3534 - 3542 (2016)
- F. Ferrari, G. Besio, F. Cassola, and A. Mazzino, *Optimized wind and wave energy resource assessment and offshore exploitability in the Mediterranean Sea*, Energy (2020)
- E. Ottaviani, N. Gjeci, A. Novellino, P. D'angelo, M. Alba, P. Brotto, F. De Leo, F. Ferrari, G. Besio, A. Mazzino, M. Figari, R. Zaccone, L. Corgnati, C. Mantovani, M. Berta, M. Magaldi, *SINDBAD: a new operational service for a safer leisure and boating navigation*, Conference Paper, IMEKO TC-19 International Workshop on Metrology for the Sea, Genova, October 2019.
- F. Ferrari, F. Cassola, Peter Enos Tuju, Alessandro Stocchino, Paolo Brotto and A. Mazzino, *Impact of Model Resolution and Initial/Boundary Conditions in Forecasting Flood-Causing Precipitations*, Atmosphere (2020).
- F. Ferrari, F. Cassola, P. E. Tuju, and A. Mazzino, *RANS and LES face to face for forecasting extreme precipitation events in the Liguria region (northwestern Italy)*, Atmospheric Research (2021).
- A. Lira-Loarca, F. Ferrari, A. Mazzino, G. Besio, *Future wind and wave energy resources and exploitability in the Mediterranean Sea by 2100*, Applied Energy (2021).
- L. Cavaleri, L. Bertotti, G. Besio, F. Ferrari, *The 29 October 2018 storm in Northern Italy: its multiple actions in the Ligurian Sea*, Progress in Oceanography (2022).
- G. Casciaro, F. Ferrari, D. Daniele Lagomarsino-Oneto, A. Andrea Lira-Loarca, A. Mazzino, *Increasing the skill of short-term wind speed ensemble forecasts combining forecasts and observations via a new dynamic calibration*, Energy (2022).
- P.E. Tuju, F. Ferrari, G. Casciaro, A. Mazzino, *The added value of high-resolution downscaling of the ECMWF-EPS for extreme precipitation forecasting*, Atmospheric Research (2022).
- G. Casciaro, F. Ferrari, M. Cavaiola, A. Mazzino, *Novel strategies of Ensemble Model Output Statistics (EMOS) for calibrating wind speed / power forecasts*, Energy Conversion and Management, 271: 116297 (2022).
- M. Cavaiola, P.E. Tuju, F. Ferrari, G. Casciaro, A. Mazzino, *Ensemble Machine Learning greatly improves ERA5 skills for wind energy applications*, Energy and AI, 13, 100269 (2023).
- E.C. Maggioni, T. Manzoni, A. Perotto, F. Spada, A. Borroni, M. Giurato, M. Giudici, F. Ferrari, D. Zardi, R. Salerno, *WRF data assimilation of weather stations and lightning data for a convective event in northern Italy*, Bulletin of Atmospheric Science and Technology, 4, 8 (2023).
- F. Ferrari, E.C. Maggioni, A. Perotto, R. Salerno, M. Giudici, *Cascade sensitivity tests to model deep convective systems in complex orography with WRF*, Atmospheric Research, 295: 106964 (2023).
- M. Cavaiola, F. Cassola, D. Sacchetti, F. Ferrari, A. Mazzino, *Hybrid AI-enhanced lightning flash prediction in the medium-range forecast horizon*, Nature Communications, 15: 1188 (2024).
- F. Ferrari, U. Rizza, M. Morichetti, F. Cassola, M. M. Miglietta, A. Mazzino, *The role of atmospheric aerosols on severe convective precipitation in a Mediterranean coastal region*, Atmospheric Research, 305: 107421 (2024).

Genova,
10/7/2024