Valerio Lembo

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QUALIFICATIONS

Ph. D. in Climate Sciences

University of Salento

- \cdot Doctoral thesis "Evolution of the Energy Budget in the $20^{\rm th}$ Century and its Role in the Inter-Hemispheric Temperature Contrast"
- · Academic Guest (Jan 2015 Apr 2015) at "Climate and Water Cycle" group of the Institute for Atmospheric and Climate Sciences of the Swiss Federal Institute of Technology, Zürich, Switzerland

M. Sc. in Physics of the Atmosphere and Meteorology University of Bologna

· M. Sc. thesis "Surface Temperature as a Climate Index: Relations with Mid-latitude Tropospheric Baroclinicity"

B. Sc. in Physics and Astrophysics *University of Rome La Sapienza*

· B. Sc. thesis on "Influence of Atmospheric Gravity Waves on ground-based Solar Irradiance Measures"

CURRENT EMPLOYMENT

ISAC-CNR

Permanent Researcher

 \cdot Member of the "Global Change" unit of the Earth system science and environmental technologies Department at CNR, within the Institute for Atmospheric Sciences and Climate (ISAC).

EMPLOYMENT HISTORY

CEN, University of Hamburg

Postdoctoral Researcher

· Project "Energy Transfers in the Atmosphere and Ocean".

- $\cdot\,$ Research on diagnostics and metrics for the assessment of climate models.
- $\cdot\,$ Participation to ESMValTool community diagnostics for the analysis of IPCC model ensembles.

CINFAI

Research Associate

 \cdot Research on the seasonal cycle of atmospheric baroclinic activity in mid-latitudes

ISAC-CNR

Internship

June 2012 - October 2012 Bologna, Italy

 $\cdot\,$ Research activity related to the M. Sc. thesis at the University of Bologna

AWARDS AND CERTIFICATES

Page 1 of 6

October 2020 - Present

Bologna, Italy

November 2016 - August 2020 Hamburg, Germany

March 2016 - September 2016

Lecce, Italy

Lecce, Italy

July 2016

December 2009 Rome, Italy

October 2012

Bologna, Italy

Seal of Excellence for MSCA-IF proposal

European Research Council

Ph.D. Grant on "Ecology and Climate Change"

University of Salento - CMCC

ONGOING COLLABORATIONS

- $\cdot\,$ Dr. Tamas Bodai, IBS, Busan, South Korea
- $\cdot\,$ Dr. Susanna Corti, ISAC-CNR, Bologna, Italy
- $\cdot\,$ Dr. Federico Fabiano, ISAC-CNR, Bologna, Italy
- $\cdot\,$ Dr. Davide Faranda, LSCE-IPSL, Gif sur Yvette, France
- · Prof. Rune Graversen, Arctic University of Norway, Trondheim, Norway
- · Prof. Valerio Lucarini, University of Reading, United Kingdom
- · Prof. Gabriele Messori, University of Uppsala, Sweden
- \cdot Dr. Lenka Novak, Cal
Tech, Pasadena, USA

SKILLS

Computer Languages	C++, Fortran, HTML, MATLAB, NCL, Python, UNIX-Bash
Protocols	FTP, SSH
Databases	GRIB, NetCDF
Tools	CDO, GitHub, LaTeX, NCO

SELECTED CONFERENCE ATTENDANCE (FROM 2017)

European Geosciences Union (EGU) General Conference 2023 April 2023 Vienna, Austria Talk: "Extremes of meridional energy transports in Northern Hemisphere mid-latitudes across zonal wavenumbers and dominant weather regimes" Convener: "Climate dynamics, energetics and prediction: from the tropics to the high latitudes" Short course presenter: "Thermodynamics and energetics of the oceans, atmosphere and climate" Workshop on "Development and Application of climate emulators" April 2023 Vienna, Austria Co-organizer Invited Talk: "Response Operators to predict long-term climate response in Coupled Global Climate Models" Academic Guest at LSCE-IPSL March 2023 Paris. France Invited Talk: "Meridional heat transports and the general circulation: from global scale to extremes" Erice International School of Non-equilibrium Phenomena July 2022 Erice, Italy Invited Talk: "Meridional energy transports, extremes and weather regimes in Northern Hemisphere midlatitudes"

European Geosciences Union (EGU) General Conference 2022May 2022Vienna, AustriaVienna, Conference 2022

January 2013

Talk: "Meridional energy transport extremes and the general circulation of NH mid-latitudes: dominant weather regimes and preferred zonal wavenumbers"

Convener: "Energy and dynamics in the climate system"

Short course presenter: "Thermodynamics and energetics of the oceans, atmosphere and climate"

American Geosciences Union (AGU) Fall Meeting 2021 online	December 2021
Talk: "Meridional Energy Transport Extremes and Dominant Modes of Mid-latitudin ability in the Northern Hemisphere"	nal Weather Vari-
European Geosciences Union (EGU) General Conference 2021 online	April 2021
Invited PICO Talk: "Predicting Climate Change through Response Operators in a Circulation Model"	Coupled General
Convener: "Energy and moisture cycles: interactions and changes with large-scale oceanic circulation"	atmospheric and
Short course presenter: "Thermodynamics and energetics of the oceans, atmosphere	and climate"
American Geosciences Union (AGU) Fall Meeting 2020 online	December 2020
Talk: "Beyond Forcing Scenarios: Predicting Climate Change through Response Opera General Circulation Model"	ators in a Coupled
European Geosciences Union (EGU) General Conference 2020 online	May 2020
Talk: "Predicting Climate Change through Response Operators in a Coupled Ge Model"	neral Circulation
Convener: "Global energy and water exchanges: implications for the atmospheric and tion"	d oceanic circula-
USClivar Workshop on Large Ensembles Boulder, Colorado, USA	July 2019
Poster: "Prediction of the long-term climate response in a coupled climate model using	response theory"
EUCP Workshop on Climate Prediction in the Atlantic-Arctic sector Bergen, Norway	June 2019
Poster: "Prediction of the long-term climate response in a coupled climate model using	response theory"
European Geosciences Union (EGU) General Conference 2019 Vienna, Austria	April 2019
- Co-convener	
 Short course presenter Talk: "Inter-hemispheric differences in the energy budgets and its components, during the 20th Century" 	and its evolution
Joint Workshop: Conservation Principles, Data, and Uncertainty in Atm Modelling Potsdam, Germany	April 2019

Scientific organizer

CMIP6 Model Analysis Workshop

Barcelona, Spain

Poster: "A new diagnostic tool for the energy budgets and transports in climate models"

World Climate Research Program (WCRP) workshop: The Earth's Energy Imbalance and its implications November 2018 Toulouse, France

Poster: "A New Diagnostic Tool for Water, Energy and Entropy Budgets in Climate Models"

1st Congress of the Italian Association for Atmospheric Sciences and Meteorology (AISAM) September 2018

Bologna, Italy

Talk: "A Novel Diagnostic Tool for Thermodynamics of Climate Models"

CliMathNet Conference 2018

Reading, United Kingdom

Talk: "Annual and Semiannual Cycles of Near-surface Temperature and Baroclinic Activity in Midlatitudes"

European Geosciences Union (EGU) General Conference 2018April 2018Vienna, Austria

Poster: "Wavenumber Decomposition of Midlatitude Meridional Energy Transports and Extremes"

5th International Conference on Reanalysis November 2017 Rome, Italy November 2017

Poster: "Annual and Semiannual Cycles of Midlatitude Near-surface Temperature and Tropospheric Baroclinicity: Reanalysis Data and AOGCM Simulations"

CliMathNet Conference 2017

Reading, United Kingdom

Talk: "A Flexible Tool for Diagnosing Energy, Water and Material Entropy Production in Climate Models"

European Geosciences Union (EGU) General Conference 2017April 2017Vienna, AustriaVienna, Conference 2017April 2017

Poster: "Inter-hemispheric Differences in Energy Budgets and Surface Temperature Anomalies during the 20th Century: the Role of Cross-equatorial Transport Anomalies"

September 2018

September 2017

MISCELLANEOUS

Projects	PNRR CN-HPC Spoke 4 "Earth and Climate" (MUR, 2022-) OptimESM (Horizon Europe, 2023-) CN-HPC, Spoke 4 "Earth and Climate" (PNRR-MUR, 2023-) Destination Earth (EU-ESA-ECMWF, 2022-) Roadmap (JPI, 2021-) TRR181 (DFG, 2016-2020)
Roles	CMIP7 Model Benchmarking Task Team (WCRP, 2022-)
	CNR-ISAC Commission on Communication (CNR, 2021-)
Editor	Nonlinear Processes in Geophysics
	Frontiers in Climate
	Oxford Open Climate Change
Reviewer	Earth System Dynamics,
	Geophysical Research Letters,
	Meteorology and Atmospheric Physics
	Journal of Climate
	Weather and Climate Dynamics
	Climate Dynamics
	Physical Review E
	International Journal of Climatology
Memberships	European Geosciences Union (2013-)
_	Associazione Italiana per le Scienze dell'Atmosfera e Meteorologia (2016-2018)
	Centro Euro-Mediterraneo per i Cambiamenti Climatici (2013-2016)

PUBLICATION LIST

- Fabiano, F., Davini, P., Meccia, V., Zappa, G., Bellucci, A., Lembo, V., Bellomo, K., and Corti, S., 2023, Multi-centennial evolution of the climate response and deep ocean heat uptake in a set of abrupt stabilization scenarios with EC-Earth3, Earth Syst. Dynam. Discuss. [preprint], https://doi.org/10.5194/esd-2023-15, in review
- Lembo, V., Fabiano, F., Galfi, V.M., Graversen, R., Lucarini, V., and G. Messori, 2022, Meridional energy transport extremes and the general circulation of NH mid-latitudes: dominant weather regimes and preferred zonal wavenumbers, Weather Clim. Dyn., 3(3), 1037-1062
- Franzke, Christian LE, Franzke, C. L., Blender, R., O'Kane, T. J., and V. Lembo, 2022, Stochastic Methods and Complexity Science in Climate Research and Modeling, Frontiers in Physics, 521
- · Ragone, C., Lembo, V., Lucarini, V., Vérard, C., Kasparian, J., and M. Brunetti, 2022, Robustness of competing climatic states, J Atm Sciences, 35(9), 2769-2784
- Faranda, D., Alberti, T., Arutkin, M., **Lembo, V.**, and V. Lucarini, 2021, Interrupting vaccination policies can greatly spread SARS-CoV-2 and enhance mortality from COVID-19 disease: The AstraZeneca case for France and Italy, Chaos, 31(4), 041105
- · Qiyun, M., Lembo, V., and C.L.E. Franzke, 2021, The Lorenz energy cycle: trends and the impact of modes of climate variability, Tellus A: Dyn Met and Oc, 73:1, 1-15
- · Vissio, G., Lembo, V., Lucarini V., and M. Ghil, 2020, Evaluating the Performance of Climate Models Based on Wasserstein Distance, Geophys. Res. Lett., 47, e2020GL089385.
- Lembo, V., Ragone F., and V. Lucarini, 2020, Beyond Forcing Scenarios: Predicting Climate Change through Response Operators in a Coupled General Circulation Model, Sci Rep 10, 8668.
- Eyring, V. et al., 2020, Earth System Model Evaluation Tool (ESMValTool) v2.0 an extended set of large-scale diagnostics for quasi-operational and comprehensive evaluation of Earth system models in CMIP, Geosci. Model Dev., 13, 3383–3438.
- Lembo V., Lunkeit F., and V. Lucarini, 2019, TheDiaTo (v1.0) A new diagnostic tool for diagnosing water, energy and entropy budgets in climate models, Geosci. Model Dev., 12, 3805–3834
- · Lembo V., Messori G., Graversen R., and V. Lucarini, 2019, Spectral decomposition and extremes of atmospheric meridional energy transport in the Northern Hemisphere midlatitudes, Geophys. Res. Lett., 46, 7602-7613
- · Lembo V., Folini D., Wild M., and P. Lionello, 2019, Inter-hemispheric differences in energy budgets and cross-equatorial transport anomalies during the 20th Century, Clim. Dyn., 53: 115
- Faranda D., Lembo V., Kuzzay D., Daviaud F. and B. Dubrulle, 2017, Computation and characterization of local energy transfers in atmospheric flows, J. Atm. Sciences, 75, 2175–2186
- · Lembo V., Bordi I., and A. Speranza, 2017, Annual and semiannual cycles of midlatitude surface temperature and baroclinicity: reanalysis data and AOGCMs simulations, Earth Sys. Dyn., 8, 295-312
- Lembo V., Folini D., Wild M. and P. Lionello, 2016, Energy budgets and transports: global evolution and spatial patterns during the 20th Century in two AMIP-like experiments, Clim. Dyn., 48, 1793-1812