



Stefano Pierini's brief CV

Personal web site

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- I was born in Rome in 1954. I am married with one son. I am an Italian citizen.
- I am a Physicist. I am an expert in Physical Oceanography and Theoretical Climatology.

EDUCATION

- I received my "Laurea" in Physics "Magna Cum Laude" at the "La Sapienza" University of Rome on December 1977.
- At that time a formal PhD did not exist yet in the Italian University system (it was later introduced by the "Legge n. 28, 21/02/1980"; the first 3-year PhD cycle started in 1984). The Laurea and a subsequent research activity in Italy and/or abroad (supported mainly by the Consiglio Nazionale delle Ricerche - CNR) was the typical training of Italian scientists. I carried out my post-Laurea research activity at the Department of Physics of the "La Sapienza" University of Rome and at the Department of Applied Mathematics and Theoretical Physics of the University of Cambridge (UK), with support from the CNR.

PROFESSIONAL EXPERIENCE

- I benefited from several research scholarships that allowed me to visit the following Universities as a visiting scientist:
 - University of Cambridge (Cambridge, UK) for 20 months (1981-82);
 - University of Florida (Gainesville, FL, USA) for 6 months (1985-86);
 - Massachusetts Institute of Technology (Cambridge, MA, USA) for 8 months (1987).
- In the last two decades I have visited the following universities and research centres in the framework of European Commission projects and for other projects:
 - CNRS (Grenoble, France) for 2 months (1997, 2019);
 - Hamburg University (Hamburg, Germany) for 2 months (1998);
 - SINTEF (Trondheim, Norway) for 2 months (2003, 2008);
 - Utrecht University (Utrecht, The Netherlands) for 2 months (2007).
 - Institut Henri Poincaré (Paris, France) for 2 months (2019)
- More recently I have visited China (Qingdao), France (Paris), U.S.A. (Los Angeles) and Hungary (Budapest) for other projects and collaborations.
- I have held the following positions at Italian Universities:
 - 1984-1997: Ricercatore Universitario (Tenured Assistant Professor) at the Istituto Universitario Navale of Naples (Institute of Meteorology and Oceanography);
 - 1997-2002: Associate Professor at the University of L'Aquila (Department of Physics);
 - 2002-2006: Associate Professor at the University of Naples Parthenope (Department of Environmental Sciences);
 - 2006-present: Full Professor at the University of Naples Parthenope (Department of Science and Technology).

RESEARCH INTERESTS

- One of my main current research interests is (i) the analysis of the pullback attractors of nonautonomous chaotic nonlinear dynamical systems and (ii) the role the knowledge of such time-dependent attractors may play in improving our understanding of the system's intrinsic variability. The nonlinear mathematical tools used in the numerical analyses include both low-dimensional systems of coupled ordinary differential equations and the partial differential equations describing the fluid motion of large-scale oceans in a rotating reference frame.
- In recent years I have conducted process-oriented modeling studies on nonlinear western boundary currents -and on the intrinsic low-frequency variability of their extensions- through both a hierarchy of mathematical models (ranging from low-order models to the primitive equations of geophysical fluid dynamics) and laboratory experiments with rotating platforms. I have paid particular attention to the Kuroshio Extension and the Gulf Stream. The analyses are based on geophysical fluid dynamics and nonlinear dynamical systems theory, are validated through altimetric data and are carried out in the general context of climate dynamics.
- Other model studies are concerned with the Antarctic Circumpolar Current (and, more in general, the Southern Ocean) and the coastal circulation in the Southern Tyrrhenian Sea, with particular attention to the Campania Coastal System and the Gulf of Naples.
- Other less recent researches have been concerned with (i) linear aspects of the wind-driven ocean circulation, including Rossby wave propagation; (ii) regional and coastal oceanographic modelling; (iii) nonlinear and dispersive long wave modelling based on the Kadomtsev–Petviashvili (KP) equation; (iv) nonlinear stability analysis of geophysical flows.

FUNDING

- Role in projects funded by the European Commission:
 - Coordinator of the task entitled "Wind Driven Adjustment Processes in the Mediterranean" of the European Commission Project MERMAIDS-II (Contract MAS2-CT93-0055, years 1993-1996);
 - Coordinator of the task entitled "Sicily Strait Modelling" of the European Commission Project MATER (Contract MAS3-CT96-0051, years 1996-1999);
 - Coordinator of a project (Contract HPRI-CT-1999-50042, 1997) of the European Commission Programme HYDRALAB-HYDRIV;
 - Coordinator of a project (Contract HPRI-CT-1999-00060, 2003) of the European Commission "Programme for Improving the Human Research Potentials/Access to Major Research Infrastructures";
 - Coordinator of a project (Contract RII3-CT-2003-506079, 2007) of the European Commission Programme "High Performance Computing - Europa" - HPCE;
 - Coordinator of a project (Contract 022441, 2008) of the European Commission Programme HYDRALAB-III;
 - Coordinator of a project (19GAPWEBS, Contract HORIZON 2020-EU.1.4.1.2, 2019) of the European Commission Programme HYDRALAB+.
- Role in projects funded by Italian institutions:
 - Coordinator of several projects funded by the Physical Sciences Committee of the Italian National Research Council (years 1988-1994);
 - Coordinator of several projects funded by the Italian Ministry of Education (Projects MURST 60% e 40%, years 1996-1998);
 - Coordinator of a research unit of a project of the Italian "Programma Nazionale di Ricerche in Antartide" - PNRA (years 1998-2002);

- Coordinator of research units of projects of the Italian Space Agency - ASI (years 2001-2004);
- Coordinator of tasks of projects SINAPSI (years 2000-2004) and VECTOR (years 2007-2010) funded by the Italian Ministry of Education;
- Coordinator of a project funded by the "Regione Campania" of Italy (years 2007-2010);
- Coordinator of a research unit of a project of the COSMO-SkyMed Program of the Italian Space Agency - ASI (years 2010-2013);
- Coordinator of the MATH-ACC project of the Italian "Programma Nazionale di Ricerche in Antartide" - PNRA (years 2011-2013);
- Coordinator of the research unit SP3-WP4-AZ1-UO03 of the RITMARE Flagship Project funded by the Italian Ministry of Education (years 2012-2016);
- Coordinator of a research unit of the MOMA project of the Italian "Programma Nazionale di Ricerche in Antartide" - PNRA (years 2018-present);
- Coordinator of a research unit of the IPSODES-YOPP project of the Italian "Programma Nazionale di Ricerche in Antartide" - PNRA (years 2019-present);
- Coordinator of several local projects funded by the Università di Napoli Parthenope.

TEACHING

- I teach/taught the following University courses (from the most recent ones):
 - Fluid Dynamics (University of Naples Parthenope, my current undergraduate teaching)
 - Meteorological, Oceanographic and Climate Modelling (University of Naples Parthenope, my current M.Sc. teaching);
 - Chaos and Climate (University of Naples Parthenope, my current Ph.D. teaching);
 - Oceanic and Atmospheric Fluid Dynamics (University of Naples Parthenope);
 - Statistics and Stochastic Processes (University of Naples Parthenope);
 - Physical Oceanography (University of Naples Parthenope);
 - Mathematical Methods for Physics (University of L'Aquila);
 - Climatology and Meteorology (University of L'Aquila);
 - Fluid Mechanics (Istituto Universitario Navale);
 - Oceanography (Istituto Universitario Navale).
- I have tutored about 150 undergraduate/MSc/PhD students.
- I am a member of the international Ph.D. course in "Environmental Phenomena and Risks" at the University of Naples "Parthenope".
- I was a member of the Ph.D. course in "Marine Science and Engineering" of the University at Naples Federico II.
- I carried out tutorial activities in the Ph.D. courses in "Physics" at the University of L'Aquila and in "Environmental Sciences" at the University of Messina.
- I have given invited seminars in Universities and scientific institutions in:
 - UK (University of Cambridge - Dept. of Applied Math. and Theoretical Physics);
 - USA (MIT - Center for Meteorology and Physical Oceanography; Woods Hole Oceanographic Institution);
 - France (LODYC-Université de Paris V; LEGI-CNRS - Grenoble; EPOC-CNRS - Bordeaux; École Normal Supérieur – Paris; Institut Henri Poincaré - Paris);
 - Germany (Hamburg University);
 - Norway (SINTEF - Trondheim);
 - The Netherlands (Utrecht University);

- China (Institute of Oceanology of the Chinese Academy of Science - Qingdao; Ocean University of China - Qingdao);
- Hungary (Institute of Theoretical Physics, Eötvös Loránd University - Budapest);
- Italy (in several Universities and CNR institutes).

MISCELLANEOUS

- Currently I am an Editor of the peer-reviewed journals “Nonlinear Processes in Geophysics” (European Geosciences Union-American Geophysical Union), “Bollettino di Geofisica Teorica e Applicata” (O.G.S.) and “AIMS Environmental Science” (AIMS Press). In the past, I have been Editor of “Advances in Oceanography and Limnology” (Taylor & Francis) and “Il Nuovo Cimento B” (Società Italiana di Fisica).
- In the last decade I have been convener/co-convener of sessions of 15 international conferences:
 - European Geosciences Union (EGU) General Assembly, Vienna, 2009-2019;
 - International Union of Geodesy and Geophysics (IUGG) - International Association for the Physical Sciences of the Oceans (IAPSO): 2013 (Gothenburg, Sweden), 2015 (Prague, Czech Republic), 2017 (Cape Town, South Africa);
 - Asia Oceania Geosciences Society Conference, 2014 (Sapporo, Japan).
- From 2011 to 2019 I was Science Officer of the Programme "Dynamical Systems Approaches to Problems in the Geosciences" of the Programme Group “Nonlinear Processes in Geosciences" of the European Geosciences Union.
- I am the coordinator of the B.Sc. in “Nautical, Aeronautical and Meteorological-Oceanographic Sciences” of the University of Naples Parthenope since 2019.
- I was the coordinator of the M.Sc. in “Navigation Science and Technology” of the University of Naples Parthenope from 2014 to 2019.
- I am the representative for the University of Naples Parthenope to the “Consorzio Nazionale Interuniversitario per le Scienze del Mare” (CoNISMa, which includes 35 Italian Universities involved in marine sciences).

PUBLICATIONS

- I am the author of about 320 publications: 68 publications are in the world's leading ISI-JCR journals of my research area (I am the senior author of 33 of them: 24 are single-author papers while in 9 I am the principal author), about 50 publications are in books and in other international and national journals and about 200 are communications (several of which as invited speaker) in international and national conferences.
- I satisfy, since many years, the benchmark required for European Research Council - Advanced Grants proposals, consisting in “10 Publications as Senior Author in Major International Peer-Reviewed Journals in the last 10 Years”. Here I report the most recent list of 10 publications:

10 Publications as Senior Author in Major International Peer-Reviewed Journals in the last 10 Years* (2011-2020)

* benchmark required for *European Research Council - Advanced Grants* proposals

01. **PIERINI S., 2020:** Statistical significance of small ensembles of simulations and detection of the internal climate variability: An excitable ocean system case study. *Journal of Statistical Physics*, **179**, 1475-1495. <https://doi.org/10.1007/s10955-019-02409-x>.

02. **PIERINI S., CHEKROUN M. D., GHIL M., 2018:** The onset of chaos in nonautonomous dissipative dynamical systems: A low-order ocean–model case study. *Nonlinear Processes in Geophysics*, **25**, 671-692.
<https://www.nonlin-processes-geophys.net/25/671/2018/>.
03. **PIERINI S., GHIL M., CHEKROUN M. D., 2016:** Exploring the pullback attractors of a low-order quasigeostrophic ocean model: the deterministic case. *Journal of Climate*, **29**, 4185-4202.
<https://doi.org/10.1175/JCLI-D-15-0848.1>.
04. **PIERINI S., 2015:** A comparative analysis of Kuroshio Extension indices from a modeling perspective. *Journal of Climate*, **28**, 5873-5881.
<https://doi.org/10.1175/JCLI-D-15-0023.1>.
05. **PIERINI S., 2014:** Kuroshio Extension bimodality and the North Pacific Oscillation: a case of intrinsic variability paced by external forcing. *Journal of Climate*, **27**, 448-454.
<https://doi.org/10.1175/JCLI-D-13-00306.1>.
06. **PIERINI S., 2014:** Ensemble simulations and pullback attractors of a periodically forced double-gyre system. *Journal of Physical Oceanography*, **44**, 3245-3254.
<https://doi.org/10.1175/JPO-D-14-0117.1>.
07. **PIERINI S., DIJKSTRA H.A., MU M., 2014:** Intrinsic low-frequency variability and predictability of the Kuroshio Current and of its extension. *Advances in Oceanogr. and Limnol.*, **5**, 79-122.
<https://doi.org/10.1080/19475721.2014.962091>.
08. **PIERINI S., 2012:** Stochastic tipping points in climate dynamics. *Physical Review E*, **85**, 027101.
<https://doi.org/10.1103/PhysRevE.85.027101>.
09. **PIERINI S., 2011:** Low-frequency variability, coherence resonance and phase selection in a low-order model of the wind-driven ocean circulation. *Journal of Physical Oceanography*, **41**, 1585-1604.
<https://doi.org/10.1175/JPO-D-10-05018.1>.
10. **PIERINI S., FALCO P., ZAMBARDINO G., MCCLIMANS T. A., ELLINGSEN I., 2011:** A laboratory study of nonlinear western boundary currents, with application to the Gulf Stream separation due to inertial overshooting. *Journal of Physical Oceanography*, **41**, 2063-2078.
<https://doi.org/10.1175/2011JPO4514.1>.

Recent Publications

Here are my most relevant publications over the last few years:

New De Ruggiero P., G. Esposito, E. Napolitano, R. Iacono, S. Pierini and E. Zambianchi, 2020: Modelling the marine circulation of the Campania Coastal System (Tyrrhenian Sea) for the year 2016: Analysis of the dynamics. *Journal of Marine Systems*, **210**, 103388.
<https://doi.org/10.1016/j.jmarsys.2020.103388>.

New Castagno P., P. De Ruggiero, S. Pierini, E. Zambianchi, A. De Alteris, M. De Stefano and G. Budillon, 2020: Hydrographic and dynamical characterization of the Bagnoli-Coroglio Bay (Gulf of Naples, Tyrrhenian Sea).

Chemistry and Ecology, **36**, 598-618.

<https://doi.org/10.1080/02757540.2020.1772244>.

New Wang Q., and S. Pierini, 2020: On the role of the Kuroshio Extension bimodality in modulating the surface eddy kinetic energy seasonal variability.

Geophysical Research Letters, **47**, e2019GL086308.

<https://doi.org/10.1029/2019GL086308>.

New Wang Q., M. Mu and S. Pierini, 2020: The fastest growing initial error in prediction of the Kuroshio Extension state transition processes and its growth.

Climate Dynamics, **54**, 1953-1971.

<https://doi.org/10.1007/s00382-019-05097-1>.

New Pierini S., 2020: Statistical significance of small ensembles of simulations and detection of the internal climate variability: An excitable ocean system case study.

Journal of Statistical Physics, **179**, 1475-1495 (in the Special Issue on the [Statistical Mechanics of Climate](#)).

<https://doi.org/10.1007/s10955-019-02409-x>. [PDF](#)

Wang Q., S. Pierini and Y. Tang, 2019: Parameter sensitivity analysis of the short-range prediction of Kuroshio Extension transition processes using an optimization approach.

Theoretical and Applied Climatology, **138**, 1481-1492.

<https://doi.org/10.1007/s00704-019-02911-y>. [PDF](#)

Durante S., K. Schroeder, L. Mazzei, S. Pierini, M. Borghini, and S. Sparnocchia, 2019: Permanent thermohaline staircases in the Tyrrhenian Sea.

Geophysical Research Letters, **46**, 1562-1570.

<https://doi.org/10.1029/2018GL081747>. [PDF](#)

De Ruggiero P., E. Napolitano, R. Iacono, S. Pierini, and G. Spezie, 2018: A baroclinic coastal trapped wave event in the Gulf of Naples (Tyrrhenian Sea).

Ocean Dynamics, **68**, 1683-1694.

<https://doi.org/10.1007/s10236-018-1221-1>. [PDF](#)

Pierini S., M. D. Chekroun, and M. Ghil, 2018: The onset of chaos in nonautonomous dissipative dynamical systems: A low-order ocean-model case study.

Nonlinear Processes in Geophysics, **25**, 671-692 (in the Special Issue on [Numerical modeling, predictability and data assimilation in weather, ocean and climate](#))

<https://www.nonlin-processes-geophys.net/25/671/2018/>. [PDF](#)

Gentile V., S. Pierini, P. de Ruggiero, and L. Pietranera, 2018: Ocean modelling and altimeter data reveal the possible occurrence of intrinsic low-frequency variability of the Kuroshio Extension.

Ocean Modelling, **131**, 24-39.

<https://doi.org/10.1016/j.ocemod.2018.08.006>. [PDF](#)

De Ruggiero P., D. Zanchettin, M. Bensi, D. Hainbucher, B. Stenni, S. Pierini, and A. Rubino, 2018: Water masses in the Eastern Mediterranean Sea: An analysis of measured isotopic oxygen.

Pure and Applied Geophysics, **175**, 4047-4064.

<https://doi.org/10.1007/s00024-018-1850-9>. [PDF](#)

Wang Q., Y. Tang, S. Pierini and M. Mu, 2017: Effects of singular vector-type initial errors on the short-range prediction of Kuroshio Extension transition processes.

Journal of Climate, **30**, 5961-5983.

<https://doi.org/10.1175/JCLI-D-16-0305.1>. [PDF](#)

Zhang X., M. Mu, Q. Wang and S. Pierini, 2017: Optimal precursors triggering the Kuroshio Extension state transition obtained by the Conditional Nonlinear Optimal Perturbation approach.

Advances in Atmospheric Sciences, **34**, 685–699.

<https://doi.org/10.1007/s00376-017-6263-7>. [PDF](#)

De Ruggiero P., E. Napolitano, R. Iacono and S. Pierini, 2016: A high-resolution modelling study of the circulation along the Campania coastal system, with a special focus on the Gulf of Naples.

Continental Shelf Research, **122**, 85-101.

<https://doi.org/10.1016/j.csr.2016.03.026>. [PDF](#)

Pierini S., M. Ghil and M. D. Chekroun, 2016: Exploring the pullback attractors of a low-order quasigeostrophic ocean model: the deterministic case.

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<https://doi.org/10.1175/JCLI-D-15-0848.1>. [PDF](#)

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Journal of Climate, **28**, 5873-5881.

<https://doi.org/10.1175/JCLI-D-15-0023.1>. [PDF](#)

Pierini S., 2014: Ensemble simulations and pullback attractors of a periodically forced double-gyre system.

Journal of Physical Oceanography, **44**, 3245-3254.

<https://doi.org/10.1175/JPO-D-14-0117.1>. [PDF](#)

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Advances in Oceanography and Limnology, **5**, 79-122.

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Journal of Climate, **27**, 448-454.

<https://doi.org/10.1175/JCLI-D-13-00306.1>. [PDF](#)

Sgubin G., S. Pierini and H. A. Dijkstra, 2014: Intrinsic variability of the Antarctic Circumpolar Current System: low- and high-frequency fluctuations of the Argentine Basin flow.

Ocean Science, **10**, 201-2013.

<https://doi.org/10.5194/os-10-201-2014>. [PDF](#)

Montuori A., P. de Ruggiero, M. Migliaccio, S. Pierini and G. Spezie, 2013: X-band COSMO-SkyMed wind field retrieval, with application to coastal circulation modeling.

Ocean Science, **9**, 121-132.

<https://doi.org/10.5194/os-9-121-2013>. [PDF](#)

Quattrocchi G., S. Pierini and H. A. Dijkstra, 2012: Intrinsic low-frequency variability of the Gulf Stream.

Nonlinear Processes in Geophysics, **19**, 155-164.

<https://doi.org/10.5194/npg-19-155-2012>. [PDF](#)

Pierini S., 2012: Stochastic tipping points in climate dynamics.

Physical Review E, **85**, 027101.

<https://doi.org/10.1103/PhysRevE.85.027101>. [PDF](#)

Kramer W., H. A. Dijkstra, S. Pierini and P. J. Van Leeuwen, 2012: Measuring the impact of observations on the predictability of the Kuroshio Extension in a shallow-water model.

Journal of Physical Oceanography, **42**, 3-17.

<https://doi.org/10.1175/JPO-D-11-014.1>. [PDF](#)

Pierini S., P. Falco, G. Zambardino, T. A. McClimans and I. Ellingsen, 2011: A laboratory study of nonlinear western boundary currents, with application to the Gulf Stream separation due to inertial overshooting.

Journal of Physical Oceanography, **41**, 2063-2079.

<https://doi.org/10.1175/2011JPO4514.1>. [PDF](#), [Video clip](#)

Pierini S., 2011: Low-frequency variability, coherence resonance and phase selection in a low-order model of the wind-driven ocean circulation.

Journal of Physical Oceanography, **41**, 1585-1604.

<https://doi.org/10.1175/JPO-D-10-05018.1>. [PDF](#)

Pierini S., 2010: Coherence resonance in a double-gyre model of the Kuroshio Extension.

Journal of Physical Oceanography, **40**, 238-248.

<https://doi.org/10.1175/2009JPO4229.1>. [PDF](#)

Pierini S. and H. A. Dijkstra, 2009: Low-frequency variability of the Kuroshio Extension.

Nonlinear Processes in Geophysics, **16**, 665-675.

<https://www.nonlin-processes-geophys.net/16/665/2009/>. [PDF](#)

Pierini S., H. A. Dijkstra and A. Riccio, 2009: A nonlinear theory of the Kuroshio Extension bimodality.

Journal of Physical Oceanography, **39**, 2212-2229.

<https://doi.org/10.1175/2009JPO4181.1>. [PDF](#)

Pierini S., 2008: On the crucial role of basin geometry in double-gyre models of the Kuroshio Extension.

Journal of Physical Oceanography, **38**, 1327-1333.

<https://doi.org/10.1175/2007JPO3924.1>. [PDF](#)

Pierini S., V. Malvestuto, G. Siena, T. A. McClimans and S. M. Løvås, 2008: A laboratory study of the zonal structure of western boundary currents.

Journal of Physical Oceanography, **38**, 1073-1090.

<https://doi.org/10.1175/2007JPO3706.1>. [PDF](#)

Pierini S., 2007: Low-frequency variability of the Kuroshio Extension: model studies in the context of climate dynamics and dynamical systems theory.

In: "*Science and Supercomputing in Europe*", Report 2007 of the "*High Performance Computing - Europa*" Project

ISBN: 978-88-86037-21-1, 516-521. [PDF](#)

Pierini S., 2006: A Kuroshio Extension System model study: decadal chaotic self-sustained oscillations.

Journal of Physical Oceanography, **36**, 1605-1625.

<https://doi.org/10.1175/JPO2931.1>. [PDF](#)

Pierini S., 2006: Seasonal and interannual variability of the North Pacific Ocean: modeling results and their validation through altimeter data.

In Proceedings of the *ESA-CNES* Symposium: "*15 Years of Progress in Radar Altimetry*". European Space Agency.

ISBN/ISSN: 92-9092-925-1/1609-042X, Vol. SP-614. [PDF](#)

Pierini, S., 2005: A model study of the spectral structure of boundary-driven Rossby waves, and related altimetric implications.

Journal of Physical Oceanography, **35**, 218-231.

<https://doi.org/10.1175/JPO-2680.1>. [PDF \(high resolution figures\)](#)