Jacopo Busatto

WORK EXPERIENCE

[01/03/2023 – Current]

Research Fellowship

Intitute of Marine Science (ISMAR), National Research Council (CNR)

City: Rome

Country: Italy

In my research fellowship activities, I developed a Lagrangian anallysis methodologi for the characterization of the trajectory dispersion in an oceanographic environment, focusing on the Brazil Current and the Agulhas Current

[01/03/2020 – 28/02/2023]

Research associate

Intitute of Marine Science (ISMAR), National Research Council (CNR)

City: Rome

Country: Italy

In occasion of my PhD fellowship at Roma Tre University, I worked with the ISMAR institute of the CNR in the environment of physical oceanography and data analysis.

[01/10/2021 – Current]

Tutors

Roma Tre University

City: Rome

Country: Italy

1. *Academic Year 2023-2024:* Tutor for **General Physics 1** course in the Civil, Informatic and Aeronautics technology Department;
2. *Academic Year 2023-2024:* Tutor for **Calculus 2** course in the Civil, Informatic and Aeronautics technology Department;
3. *Academic Year 2022-2023:* Tutor for **General Physics 1** course in the Civil, Informatic and Aeronautics technology Department;
4. *Academic Year 2021-2022:* Tutor for **Calculus 1** course in the Civil, Informatic and Aeronautics technology Department;
5. *Academic Year 2021-2022:* Tutor for **General Physics 1** course in the Civil, Informatic and Aeronautics technology Department;

EDUCATION AND TRAINING

[11/10/2019 – 04/12/2023]

PhD

'Roma Tre' University, Rome, Department of Engineering

Address: Via Vito Volterra, 62, 00146, Roma, Italy

Field(s) of study: Geophysical Flows | Data analysis | Lagrangian tracking | Fluid Mechanics

XXXV cycle.

Thesis: "Investigations of the Variability of the Agulhas Current by using satellite observations and climate models"

During the PhD course I focused my research on the Agulhas Region.

- I started using satellite data (ESACCI SST dataset) to calculate temperature trends in the Agulhas Current and in the Sub Tropical region.
- I developed a Sea Surface Temperature gradient method to identify the Sub Tropical Front.
- I included reanalysis data (ERA5, ORAS5 and GLOREAN) of heat fluxes, wind stress and current velocitiy to provide further definitions for the Sub Tropical Front and to connect those quantities together.
- I investigated the impact of the resolution on global coupled climate models (CMIP6) in the simulation of air-sea interaction in the Agulhas Region, where the ocean dynamics cannot be neglected in the heat excange processes (**see pubblications**).
- Using Reanalysis current velocity data, I performed lagrangian simulations to describe some physical properties of the Agulhas Current.
- I developed several Python codes that analyze trajectories to obtain several physical and statistical quantities from lagrangian simulations (**see Programming Skills**)

[01/10/2017 – 23/10/2019]

Master's degree in Theoretical Physics (110/110).

'La Sapienza' Univeristy, Rome

City: Roma
Country: Italy
Field(s) of study: Theoretical physics | General Relativity
Final grade: 110/110
Thesis: Geodesic motion around scalarized black holes in scalar Gauss-Bonnet gravity.

[01/10/2014 – 21/09/2017]

Batchelor's Degree in Physics (110/110 cum laude). Excellence course.

'La Sapienza' University, Rome

City: Roma
Country: Italy
Field(s) of study: General Physics
Final grade: 110/110 cum laude
Thesis: Numerical solution of a natural convection problemi under the Boussinesq approximation
Excellence Course is an internal scholarship awarded to those students with the highest grades. They have to complete a project every year under the tutorship of a Full Professor.

LANGUAGE SKILLS

Mother tongue(s): Italian

Other language(s):

English

LISTENING C1 **READING** C1 **WRITING** C1

SPOKEN PRODUCTION C1 **SPOKEN INTERACTION** C1

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

PUBLICATIONS

[2022]

Yang, C., Cagnazzo, C., Artale, V., Buongiorno Nardelli, B., Buontempo, C., Busatto, J., et al. - Independent Assessment of Essential Climate Variables: Lessons learnt from Copernicus Climate Change Service

Bulletin of the American Meteorological Society (published online ahead of print 2022).

[2022]

Busatto J., Adduce C., Bellucci A. & Yang C., (2022), Numerical Model's Resolution Impact for Heat Exchange Interaction Over Agulhas Current

Conference Proceedings at 39th IAHR World Congress

[2022]

Busatto J., Adduce C., Bellucci A. & Yang C., (2022), Atmosphere – Ocean interaction in the Agulhas Current Region

Conference Proceedings at 7th IAHR Europe Congress

CONFERENCES AND SEMINARS

[17/11/2020 – 18/11/2020] **1st IAHR Young Professionals Congress**

I presented my work about the role of the Agulhas System in the global climate

[30/11/2021 – 02/12/2021] **2nd IAHR Young Professionals Congress**

I presented my results about the air-sea interaction and the resolution impact of numerical model data in the Agulhas system.

TECHNICAL REPORTS

[31/05/2021]

Single Product Report on Sea Surface Temperature (SST) - ERA5 monthly averaged data on single levels from 1950 to 1978 (preliminary version)

Issued by: CNR /

Date: 31/05/2021

Ref: C3S_D511.5.1c.2_202105_SPQB_SST_ERA5BackExtension_v1

Official reference number service contract: 2017/C3S_511_CNR/SC3

Contributors:

CNR: Pisano A., Leonelli F. E., Yang C., Ciani D., Buongiorno Nardelli B., **Busatto J.**, Santoleri R.,

ENEA: Marullo S., De Toma V., Artale V.;

[31/05/2021]

Single Product Report on (Ocean) Surface Sensible Heat Flux - ERA5 Back Extension monthly average data on single levels from 1950 to 1978

Issued by: CNR

Date: 31/05/2021

Ref: C3S_D511.5.4c1.1_SPQB_Surface_Sensible_Heat_flux_ERA5_BE

Official reference number service contract: 2017/C3S_511_CNR/SC3

Contributors:

CNR: Le Merle E., **Busatto J.**, Pisano A., Leonelli F. E., Yang C.

ENEA: Marullo S., De Toma V.

[30/06/2021] **Thematic Assessment Report on Task 7.2**

Issued by: C3S_511_CNR/SC3 / Salvatore Marullo, Eva Le Merle, **Jacopo Busatto,** Chunxue Yang, Rosalia Santoleri

Date: 30/06/2021

Ref: C3S_D511.7.4b_20210630_Thematic_Task 7.2

Official reference number service contract: 2017/C3S_511_CNR/SC3

My contribution consisted in the calculation of the heat fluxes budget in the Mediterranean Sea. We analysed the “Mediterranean heat budget closure problem” in the ERA5 dataset.

PROGRAMMING SKILLS

Python - lagrangian post-processing

I developed a python software that optimizes memory usage and analyzes lagrangian trajectories.

It calculates:

- volume transport from one section to another,
- velocities and accelerations,
- autocorrelation in a geographical region,
- spatial density of tracers,
- "*retroflections*", i.e. changes of direction in a particular area,
- time scales,

Lastly, it creates plots and video footages.

Working in all environments (Linux, Conda, etc.)

Link: https://github.com/JacopoBusatto/PostProcessingLAGKINEMATIC

Python - physical quantities

I developed several algorithms that calculate many physical quantities, such as:

- curls (applied to wind stress data)
- stream function (applied to current velocity)
- cross correlation (used for sea surface temperature and heat fluxes)
- divergences of vector fields

Working in all environments (Linux, Conda, etc.)

Mathematica

During my Master's degree I used Wolfram Mathematica for different purposes, with a specific focus in the topic of my final thesis. I used this software to describe the trajectories of massive particles in a modified gravity theory.

I followed the course "Probability, statistical analysis and stochastic processes" where I used Wolfram Mathematica for developing tools applicable to data analysis.

C++

I ran a C++ code that performs lagrangian simulations from multi levels velocity fields.

It runs in Linux environments.

C

In my Batchelor's and Master's degree I studied this coding language. In my Batchelor's thesis I developed software that simulated a fluid inside a 2D box with dynamics driven by the thermal exchange with the walls.

MatLab

In the course of "Idraulica Ambientale" in the Civil engineering department, I conducted a MATLAB course on oceanographic data analysis. Provided hands-on training, enabling students to proficiently manipulate and analyze geographical data sets.

TEACHING

[01/09/2023 – Current]

Examining commission member of the "Idraulica Ambientale" course at Roma Tre University

Currently serving as a member of the examining commission for the 'Idraulica Ambientale' course at Roma Tre University. Actively participate in the evaluation and assessment of students.

The course gives a general overview on the mathematical aspects of geophysical fluid mechanincs, focusing both on oceanographic and atmospherical phenomena.

[01/09/2021 – 31/07/2023]

Examining commission member of the "Idraulica" course at Roma Tre University

Member of the examining commission for the 'Idraulica' course at Roma Tre University. Actively participate in the evaluation and assessment of students.

The course gives a general overview on the basis knowledge of fluid mechanincs.

TRAINING CERTIFICATES

[19/10/2023 – 21/10/2023] **BOSIET**

Succesfully completed the course OPITO approved and has been assessed the learnong outcomes.

BASIC OFFSHORE SAFETY INDUCTION AND EMERGENCY TRAINING WITH EMERGENCY BREATHING SYSTEM (5700)

This training course has taken place at APT Antincendio Srl - Italy

Jacopo Busatto