JÚLIA KAISER SANT' ANNA MSc Ocean Engineering, BSc Oceanography

Júlia is a researcher at CMCC's GOCO division since 2024. She is an oceanographer with an M.Sc. Degree in Ocean Engineering from the Federal University of Rio de Janeiro, obtained in 2020. Júlia has extensive experience in metocean data analysis (buoys, ADCPs, weather stations, tide gauges, satellite data, etc.), numerical modeling of waves and winds, and programming for environmental data processing. Currently, she contributes to advancing 3D finite element modeling of the river-sea continuum, integrating hydrological modeling, and analyzing estuarine dynamics.

LANGUAGES

Portuguese - First language **English** - Proficient **Spanish** - Intermediate

COMPUTATIONAL EXPERTISE

Programming

Python, Matlab, Bash script, Shell script, LaTeX, R, Fortran

Numerical models

WAVEWATCH III, SWAN, WRF, ADCIRC, DELFT, SHYFEM, Air2Stream

GIS softwares

ArcGIS, QGIS

Others

UNIX/Linux, Windows, MS-Office, Cloud computing; Operational metocean forecast systems, scatterometers and altimeters data processing, spectral analaysis of wave buoy data.

EXPERIENCE

Researcher – Ocean Modeller

Centro Euro-Mediterraneo sui Cambiamenti Climatici | 2024 - Present

- Developing 3D ocean simulations for estuarine regions along the Italian coast using a finite element model;
- Validating 3D model results using in-situ observations and satellite data;
- Estimating the salt wedge intrusion length to assess impacts and contribute in the development of long-term nature-based solutions.

Researcher - Oceanographer

Fundação COPPETEC | 2019 - 2024

- Processing and analyzing data from various sources, including buoys, ADCP, weather stations, remote sensing, and model output;
- Responsible for conducting hindcast and forecast wave simulations for both coastal and offshore applications;
- Quality-checking of measured metocean datasets (mainly waves, winds, tidal, and currents);
- Production of bulletins reporting operational windows according to environmental criteria;
- Perform statistical analyses to establish operational metocean criteria and support design values;
- Write reports on research findings and attending international conferences.

Research Fellow (Master Level) – Coastal and Ocean Engineering

CAPES - Coord. de Aperf. de Pessoal de Nível Superior | 2018 - 2020

- Analysis of spectral wave data from directional buoys;
- Analysis of sea wave height from altimetry and wind data from scatterometers to track generation swell areas;
- Responsible for conducting numerical wave model simulations;
- Assist in metocean data analysis activities in R&D projects.

EDUCATION

Master of Science - Coastal and Ocean Engineering

Federal University of Rio de Janeiro | 2018-2020

- Dissertation title: OCEAN SWELL DECAY OBSERVED OVER RELATIVELY SHORT DISTANCES WITH DIRECTIONAL BUOYS.

Bachelor Degree - Oceanography

Rio de Janeiro State University | 2013-2018

ADDITIONAL COURSES

Advanced Numerical Methods for Hyperbolic PDE

University of Trento | 2025

- Short course offered by the Department of Civil and Environmental Engineering covering theoretical lectures and computer laboratory exercises on advanced numerical methods for hyperbolic partial differential equations with applications in engineering and science.

Machine Learning in Weather & Climate

European Centre for Medium-Range Weather Forecasts | 2023

- Course offered in partnership with IFAB. Topics covered included concepts and practical machine learning applications such as forecast model, data assimilation, post-processing, and ocean & climate.

Waves Summer School

University of Maryland | 2019

- Course offered by the Waves Group from NCEP/NOAA in partnership with University System of Maryland. Topics covered included wave dynamics and modeling, basics of the WAVEWATCH III® model, grid structures, numerics, and oceanic and nearshore applications.

RECENT PROJECTS

FOCCUS – Forecasting and observing the open-to-coastal ocean for Copernicus users

AdriaClimPlus – Adriatic coastal areas science-based solutions for climate adaptation

CMCC | 2024 - Present

- Development of unstructured grid for the Ofanto river-sea continuum region;
- Configuration and implementation of SHYFEM in 3D mode to represent estuarine dynamics;
- Analysis of salinity, temperature, density, and currents vertical profiles and spatial distributions;
- Validation of model simulations using in situ and satellite data;

Meteoceanographic forecast system for the Port of Tubarão - ES and Port of Ilha Guaíba - RJ. Brazil Vale S.A. | 2018 - 2024

- Implementation and operation of wave forecast system using SWAN (structured and unstructured grids) nested in WAVEWATCH III;
- Implementation and operation of wind forecast system using WRF model;
- Analysis of wind results from global models (GFS, ICON, ERA5, CFSR);
- ADCP data process (wave and currents) and quality control;
- Quality control of meteorological data from weather stations;
- Validation of model simulations using satellite and buoys data;
- Perform harmonic tidal analysis and tidal predictions;
- Assist the activities related to hydrodynamic forecast using ADCIRC model;
- Delivery of daily bulletins (98% deliveries on time) with metocean forecast to support port operations;
- Producting assessment reports to aid maneuvering, loading, berthing, and unberthing for different ship classes, including Valemax vessels;

Characterization of meteorology and wave climate of the Santos Basin

Petrobras (The Brazilian Oil Company) | 2019 - 2023

- Producing a 20-years wave hindcast using WAVEWATCH III for wave climate categorization;
- Wave buoy data processing and quality control;
- Spatial model calibration using altimetry data;
- Regional frequency analysis of model output;
- Numerical modeling using SWAN (unstructured grid);
- Analysis of extreme wave events;
- Characterization of the sediment mobilization patterns induced by wave action;
- Support the characterization of longshore currents using Delft-FLOW and Delft3D-WAVE;
- Attending the "First statistics and machine learning workshop focused on applications in meteoceanography" lectured by Ricardo Campos in partnership with Petrobras.

Meteoceanographic characterization of the region adjacent to Porto Açu – Rio de Janeiro Prumo | 2018

- Metocean data analysis considering model output;
- Nearshore environmental data analysis considering both model output and in situ data;
- Producing a 10-years wave hindcast using WAVEWATCH III and SWAN (specific scenarios);
- Operational downtime calculation for the port approach channel according to environmental conditions.

ACADEMIC SUPERVISION

Academic advisor - BSc. level

Rio de Janeiro State University | August 2021 - May 2022

- Responsible for guiding the undergraduate thesis development, including technical tasks and writing reviews;
- The work involved analysis of wave and sediment data, in addition to stationary simulations made with SWAN;
- Title: Mobilization of bottom sediments due to the action of wind-generated waves in the Santos Basin region.

TEACHING EXPERIENCE

Python for geoscientist: from theory to practice, 2021

In partnership with Brazilian Association of Oceanography (https://aoceano.org.br/)

2 weeks course, including theory explanation and hands-on activities.

PEER-REVIEWED INTENATIONAL PUBLICATION

Gonçalves, L.; **Kaiser, J.**; Palmeira, R.; Gallo, M.; Parente, C. E. 2024. Evaluation of a High Resolution WRF Model for Southeast Brazilian Coast: The Importance of Physical Parameterization to Wind Representation. Atmosphere, 15, 533p. (2024), <u>https://doi.org/10.3390/atmos15050533</u>

Kaiser, J.; Nogueira, I. C. M; Campos, R. M.; Parente, C. E.; Martins, R. P.; Belo, W. C., 2022. Evaluation of wave model performance in the South Atlantic Ocean: a study about physical parameterization and wind forcing calibration. Ocean Dynamics, 72, 137–150 (2022), <u>https://doi.org/10.1007/s10236-021-01495-4</u>