

# Raphaël Savelli

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*Ocean scientist and human enthusiast with over ten years of experience leading research on the numerical modeling of carbon sinks and sources in ocean and coastal ecosystems and their contribution to the global carbon budget.*

## Research, Carbon Science & Publications

### Land–Ocean Carbon Fluxes & Carbon Sink/Source Quantification

**Program/Project:** ECCO-Darwin

- Led the implementation of riverine carbon and nutrient fluxes into a data-assimilative global ocean biogeochemistry model, enabling quantification of land-to-ocean carbon fluxes and their impact on the ocean carbon cycle.
- Delivered new global-to-regional estimates of ocean carbon cycle response to terrestrial inputs, directly informing uncertainty in the global carbon budget.

**Selected Publication:** Implementing Riverine Biogeochemical Inputs in ECCO-Darwin: A Sensitivity Analysis of Terrestrial Fluxes in a Data-Assimilative Global Ocean Biogeochemistry Model. Savelli, R., et al, (in revisions), *Geoscientific Model Development*, <https://doi.org/10.5194/egusphere-2025-1707>.

### Carbon Transformation Across Estuaries & the Aquatic Continuum

**Programs:** NASA Carbon Monitoring System, NASA Interdisciplinary Research in Earth Science

- Leading the development of an integrated land-to-ocean module representing sources, sinks, and transformations of carbon and nutrients across rivers, estuaries, and coastal waters.
- This work reduces uncertainty in the global carbon budget by resolving land–ocean feedbacks and the leakage of carbon through connected systems.

**Selected Publication:** On the importance of Amazon Estuary biogeochemical transformations on open ocean air-sea CO<sub>2</sub> fluxes. Savelli, R., et al, (in preparation), *Geophysical Research Letters*.

### Carbon Fluxes in Coastal Ecosystems Under Environmental Change

**Programs:** NASA Coastal Resilience, NASA Land Cover and Land Use Change, Centre National d'Etudes Spatiales-Centre National de la Recherche Scientifique LEFE-EC2CO

- Developing process-based numerical models of tidal flats, kelp forests, and mangrove ecosystems to quantify environmental controls on carbon fluxes.
- Apply these models to assess ecosystems sensitivity to acute disturbances and long-term climate change, with direct implications for evaluating nature-based carbon removal solutions.

**Selected Publication:** Warming could shift the phenological responses of benthic microalgae in temperate intertidal zones. Savelli, R., et al, (2024), *Communications Earth & Environment*, <https://doi.org/10.1038/s43247-024-01764-2>.

## Skills

- **Modeling & Systems Analysis:** Carbon cycle modeling, time series forecasting, uncertainty quantification, Monte Carlo methods, parameter optimization, high-performance computing.
- **Data Analysis:** Large-scale, multi-dimensional datasets, geospatial and temporal analysis, multi-source data integration.
- **Programming & Tools:** Python, R, MATLAB, Fortran, C, Git/GitHub, Linux, GIS.
- **Visualization & Science Communication:** Data visualization, translating complex scientific concepts for nontechnical audiences, technical reporting, white papers and presentations.
- **Collaboration & Leadership:** Leading research projects, interdisciplinary teamwork, mentoring and strategic synthesis.

## Experience

- **Research Associate** — Moss Landing Marine Laboratories, San José State University & NASA Jet Propulsion Laboratory (2025–Present)
- **Postdoctoral Scientist** — NASA Jet Propulsion Laboratory (2022–2025)
- **Postdoctoral Scientist and Ph.D. candidate** — La Rochelle Université, France (2016–2022)

## Leadership and Working Groups

- Collaborate with **Isometric** on monitoring, reporting, and verification (MRV) requirements for **river alkalinity enhancement**.
- Contribute to the **Committee on Earth Observation Satellites (CEOS) Aquatic Carbon roadmap**.
- Serve as a reviewer for *Nature Climate Change*.
- Serve as a reviewer for the Coupled Model Intercomparison Project Phase 7 Earth System data request.

## Awards

- **NASA Research Opportunities in Space and Earth Sciences:**
  - **FORTE Science Team** (awarded, 2025), Co-Investigator: “Delivering an ECCO-FORTE Data-constrained Modeling Framework for Quantifying Land-to-ocean Biogeochemical and Ecosystem Variability Across the North Slope”.
  - **Carbon Monitoring System** (awarded, 2022), Co-Investigator: “Closing the Carbon Cycle Loop: Quantifying Land-to-Sea Carbon Fluxes”.
- **California Ocean Protection Council - Advancing 30x30 in Coastal Waters** (submitted), Co-investigator:
  - Advancing Kelp Forest Biodiversity through Marine Permaculture Modeling and Pilot Validation in the Santa Barbara Channel.
  - Regenerating Santa Barbara Channel Kelp Forest Ecosystem Services Using Marine Permaculture and Kelp Oasis Spore Baskets.

## Outreach and Teaching

- 2020 - The Fish Man: From Natural Mechanisms to the Technological Challenge, Fête de la Science – Public Lecture in collaboration with Danièle André, Associate Professor of U.S. Civilization and Popular Culture
- 2019 - Study of the Spatial and Temporal Dynamics of Microphytobenthos on the Mudflats of the Pertuis Charentais, Ma Thèse en 180 Secondes competition
- 2018 - Key Issues in Coastal Ecology, M.Sc., Lecturer, La Rochelle Université
- 2017 - Coastal Oceanography, M.Sc., Lecturer, La Rochelle Université
- 2017 - Biostatistics, B.Sc., Lecturer, La Rochelle Université
- 2017 - Ecology, B.Sc., Lecturer, La Rochelle Université

## Education

**Ph.D. in Environmental Science** | La Rochelle Université (2016–2019)

**M.Sc. in Oceanography** | Sorbonne Université (2013–2015)

**B.Sc. in Marine Biology** | La Rochelle Université (2011–2012)

**Bachelor of Business Administration** | Excelia (2009–2011)