# Raphaël Savelli

**Los Angeles, CA | Lawful permanent resident**
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*I build geospatial, observation-constrained models that combine statistical and process-based modeling with satellite and in situ data to quantify and forecast carbon, water, and ecosystem dynamics. I fuse satellite covariates with mechanistic models, apply statistical and machine learning methods, and use sensitivity-based parameter optimization to reduce uncertainty. I'm seeking a data science role in climate tech—spanning Earth observation, climate risk, or carbon removal and MRV—where I can turn models into operational products.*

## Strengths

**Geospatial Analysis:** feature engineering from optical remote sensing; subsample processing; uncertainty quantification; fusing multidimensional datasets in data-model workflows

**Model–Data Fusion:** process-based (physics, biology, and biogeochemistry) and statistical modeling to extend spatial and temporal coverage of sparse in situ measurements

**Machine Learning:** Multivariate predictions, model evaluation & deployment

**Tools:** Python, R, MATLAB, Fortan, Git/GitHub, Google Earth Engine, Linux, high-performance computing

**Domain:** carbon pathways and budgets across soils, vegetation, atmosphere, rivers/estuaries, ocean; blue carbon; land–ocean coupling; biogeochemistry

**Communication:** impactful visuals; cross-functional collaboration with scientists, engineers, and stakeholders

## Experience

**Research Associate — San José State University / Moss Landing Marine Laboratories (2025–Present)**

- Built a machine-learning model for time-series reconstruction and hindcasting; executed sensitivity-based parameter optimization to reduce predictive uncertainty (extended 3 months of observations to 4 years of coverage; $R^2 = 0.71$, nRMSE = 8%).
- Optimized a Python process-based model to quantify the transformation of carbon through the land-to-ocean aquatic continuum (6× faster).

**Postdoctoral Scientist — NASA Jet Propulsion Laboratory (2022–2025)**

- Quantified terrestrial influences on the ocean carbon cycle using the data-assimilative ECCO-Darwin state estimate (analyzed terabytes of model global data).
- Advanced blue-carbon analyses in mangrove forests and built a carbon-flux model based on environmental covariates.

**Postdoctoral Scientist — La Rochelle Université, France (2020–2022)**

- Built statistical frameworks coupling downscaled IPCC outputs with a regional ecosystem model to assess climate impacts on coastal carbon sinks (11 GCM–RCM pairs × 2 RCPs × 2 sea-level scenarios).

**PhD Candidate — La Rochelle Université, France (2016–2020)**

- Developed an algorithm integrating in situ, high-resolution satellite observations (up to 2 m) and process-based modeling to map ecosystem-scale primary production (from 1 site to a 42 $km^2$ ecosystem).
- Trained extensively in biogeochemistry and carbon pathways across coupled land–ocean systems.

## Leadership

- Co-PI, NASA Carbon Monitoring System (CMS): collaborations with land-ecosystem and carbon-cycle scientists; methods alignment and deliverables.
- Contributor to the CEOS (Committee on Earth Observation Satellites) Aquatic Carbon Roadmap.
- Active network across ocean, land-ecosystem, and carbon cycle communities.

## Education

**PhD — Environmental Science** | La Rochelle Université (October 2016–December 2019)

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

# Selected publications

**Monitoring Present-day Ocean Carbon Cycling Response to Terrestrial Biogeochemical Fluxes with the ECCO-Darwin Data-Assimilative Global Ocean Biogeochemistry Model**
Savelli, R., Carroll, D., Menemenlis, D., Lauderdale, J., Dutkiewicz, S., Manizza, M., Bloom, A., Castro-Morales, C., Miller, C. E., Simard, M., Bowman, K. W., Zhang, H., (under review), *Geoscientific Model Development,* https://doi.org/10.5194/egusphere-2025-1707.

**Warming could shift the phenological responses of benthic microalgae in temperate intertidal zones.** Savelli, R., Le Fouest, V., Becker, M., Dupuy, C., Perrois, G., Rousset, F., Menemenlis, D., Simard, M., (2024), *Communications Earth & Environment*, https://doi.org/10.1038/s43247-024-01764-2.

**Potential impact of photoinhibition on microphytobenthic primary production on a large intertidal mudflat.** Savelli, R., Serodio, J., Cugier, P., Meleder, V., Polsenaere, P., Dupuy, C., Le Fouest, V., (2021), *Journal of Geophysical Research: biogeosciences*, https://doi.org/10.1029/2021JG006443.

**Mapping the intertidal microphytobenthos Gross Primary Production. Part II: Merging remote sensing and physical-biological coupled modeling.** Savelli, R., Meleder, Cugier, P., Polsenaere, P., Dupuy, C., Lavaud, J., Barnett, A., Le Fouest, V., (2020), *Frontiers in Marine Sciences*, https://doi.org/10.3389/fmars.2020.00521.

**Mapping the intertidal microphytobenthos Gross Primary Production. Part I: coupling multispectral remote sensing and physical modeling.** Meleder, V., Savelli, R., Barnett, A., Polseneare, P., Gernez, P., Cugier, P., Lerouxel, A., Le Bris, A., Dupuy, C., Le Fouest, V., Lavaud, J., (2020), *Frontiers in Marine Sciences*, https://doi.org/10.3389/fmars.2020.00520.

**Impact of chronic and massive resuspension mechanisms on the microphytobenthos dynamics in a temperate intertidal mudflat.** Savelli, R., Bertin, X., Orvain, F., Gernez, P., Dale, A., Coulombier, T., Pineau, P., Lachaussee, N., Polsenaere, P., Dupuy, C., Le Fouest, V., (2019), *Journal of Geophysical Research: biogeosciences*, https://doi.org/10.1029/2019JG005369.

**On biotic and abiotic drivers of the microphytobenthos seasonal cycle in a temperate intertidal mudflat: a modeling study.** Savelli, R., Dupuy, C., Barille, L., Lerouxel, A., Guizien, K., Philippe, A., Bocher, P., Polsenaere, P., Le Fouest, V., (2019), *Biogeosciences*, https://doi.org/10.5194/bg-15-7243-2018.