

## EXPERIENCE & SKILLS

### **GEOPHYSICS PhD CANDIDATE & TEACHING ASSISTANT** — Jan 2021 - May 2025

*University of Florida — Gainesville, FL*

- Developed, tested, and optimized 2D and 3D C++-based computational models of the deep Earth on the HiPerGator supercomputer
- Expanded the capabilities of the ASPECT codebase for mantle convection by generating a novel application in the "*chemical\_heterogeneity.cc*" plugin
- Created a collection of Python scripts for data visualization, quality control, multivariate analysis, and regression machine learning, successfully enhancing data analysis and predictive modeling skills on large heterogeneous datasets
- Proven proficiency in bash scripting and with Github, VSCode, and Paraview
- Authored research papers for peer-reviewed journals and delivered compelling presentations at major international conferences and symposia
- Teaching assistant to GLY1102, ESC1000, and GLY1880: grading, office hours, tutoring, proctoring

### **GEOLOGY GRADUATE RESEARCH INTERN** — Jun 2020 - Nov 2020

*University of Florida — Gainesville, FL*

- Developed computational models of the Andean subduction zone to assess the impact of slab properties on subduction patterns
- Wrote scientific code in Python for data visualization, QC, and analysis
- Authored an original Master's thesis which introduced novel numerical modeling techniques in the Department
- Gained proficiency in writing technical reports and theses and presenting results to academics and experienced professionals

### **PETROLEUM GEOLOGY INTERN** — Apr 2017 - Jul 2017

*GEPlan Consulting s.r.l. — Ferrara, Italy*

- Performed in-depth analysis of a hydrocarbon discovery onshore Italy in order to evaluate the viability of its development
- Reconstructed the 3-D architecture of a Jurassic carbonate platform in Petrel using seismic and well data
- Created a data-driven geological model using Petrel and completed reservoir volumetrics and mapping using Neura Map to quantify the economic potential of the discovery

## EDUCATION & OUTREACH

### **GEOPHYSICS, PhD** — Jan 2021 - May 2025

4.0/4.0 GPA

*University of Florida, Department of Geology — Gainesville, FL*

- Project: computational numerical modeling of the Hawaiian mantle plume, its ascent dynamics, and its relationship with mantle seismic discontinuities — Advisor: Prof. Raymond R. Russo.
- Main topics: Geophysics, Geodynamics, Numerical (Computational) Modeling (C++), Data Analysis (Python), Seismology.
- Outreach: invited Earth Science lecturer in public schools under the "*Scientist in every Florida school*" program.

- Certificates: University of Oslo, “Earth and planetary mineralogy and dynamics (GEO-DEEP 9200)”, 5 ECTS (Visiting PhD student).

## **EXPLORATION GEOLOGY, MSc** — Oct 2017 - Dec 2020

110/110 *Summa Cum Laude*

*Sapienza University — Rome, Italy*

- Thesis: “Subduction dynamics and role of mantle flow in Central South America: a 2D numerical modeling through ASPECT” — Advisor: Prof. Carlo Doglioni.
- Main topics: Geophysics, Seismic Interpretation, Geodynamics, Oil & Gas Exploration, Stratigraphy.
- Outreach: College tutor in physical sciences, calculus 1, and writing. Scientific and college-prep tutoring to high school students in public schools.

## **GEOLOGICAL SCIENCES, BSc** — Sept 2013 - Oct 2017

*University of Bologna — Bologna, Italy*

- Thesis: “The Bagnolo Mesozoic carbonate platform: characteristics and extension as inferred from well data” — Advisors: Prof. Alberto Riva (UniFe) and Prof. Rossella Capozzi (UniBo).
- Main topics: Geology, Geophysics, Structural Geology, Stratigraphy.

## SELECTED PUBLICATIONS

- Monaco M., Dannberg J., Gassmoeller R., Pugh S., 2023: *Linking geodynamic models of basalt segregation in mantle plumes to the X-Discontinuity observed beneath hotspots*, JGR Solid Earth
- Monaco M., Russo R., Brown H.: *The dynamic relationship between recycled eclogite in the Hawaiian mantle plume and the X-discontinuity: a novel computational approach*, in submission
- Monaco M., Russo R., Brown H.: *The thermochemical Hawaiian plume and its dynamic influence on upper mantle discontinuities*, EGU 2025 General Assembly, Vienna
- Monaco M.: *A Novel Implementation to Simulate Basalt Segregation in the Hawaiian Mantle Plume Overcomes Model Limitations and Elucidates the Origin of the X-discontinuity*, EGU 2024 General Assembly, Vienna
- Monaco M., Dannberg J., Gassmoeller R., Pugh S., 2022: *Recycled basaltic material in mantle plumes explains the appearance of the X-discontinuity in the upper mantle beneath the Hawaiian hotspot: 2D geodynamic numerical models*, American Geophysical Union Fall Meeting 2022, Chicago, IL, USA
- Monaco M., Dannberg J., Gassmoeller R., Pugh S., 2022: *Recycled basaltic material in mantle plumes explains the appearance of the X-discontinuity in the upper mantle: 2D geodynamic numerical models*, Ada Lovelace Workshop, Hévíz, Hungary, 2022
- Monaco M., Dannberg J., Gassmoeller R., 2021: *The Segregation of Recycled Basaltic Material Within Mantle Plumes Explains the Detection of the X-Discontinuity Beneath Hotspots: 2D Geodynamic Simulations*, American Geophysical Union Fall Meeting 2021, New Orleans, LA, USA

## LANGUAGES

- Italian (native)
- English (full proficiency)
- Spanish (full proficiency)
- French (basic-lower intermediate)
- Norwegian (basic)