# Reuben Demirdjian

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## Profile

I am interested in exploring how quantum computing may advance numerical solutions of partial differential equations (PDEs). Achieving this could lead to a major breakthrough in simulating fluid dynamics, which is approaching a barrier in both power consumption and computational power. To that end, I have dedicated my early career to implement a variational method to solve a nonlinear PDE on a real system (cited below). These efforts are further supported by my experience in building weather models using classical numerical methods.

## Education

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| Sept 2014 – May 2020 | **PhD in Oceanography**, University of California at San Diego |
| Sept 2010 – June 2012 | **BSc in Mathematics**, University of California at Santa Barbara |
| Sept 2010 – June 2012 | **BSc in Physics**, University of California at Santa Barbara |

## Work History

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| July 2023 – Present | **Meteorologist – Naval Research Laboratory** |
| Sept 2020 – July 2023 | **Postdoctoral Fellow – Naval Research Laboratory**<br>Investigate how quantum computing can be used for numerical weather prediction.<br>Numerical methods for classical weather model development. |
| April 2014 – May 2020 | **Graduate Student Research – University of California at San Diego**<br>Dissertation – Marty Ralph: *Mesoscale Dynamics of Atmospheric Rivers* |
| June 2012 – Oct 2013 | **Quality Assurance – Bruker Nano** |

## Computational Skills

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| Operating Systems | Linux, High-performance computing environments |
| Languages | Fortran, Python, Bash, NCAR Command Language |
| Tools & Software | QISKIT, Jupyter notebooks |
| Numerical Methods | Spectral methods for PDEs, Explicit & implicit iterative methods |

## Selected Publications (Full list: Google Scholar)

**Demirdjian**, R., J. D. Doyle, P. M. Finocchio, and C. A. Reynolds, 2023: Preconditioning and Intensification of Upstream Extratropical Cyclones through Surface Fluxes. *J. Atmos. Sci.*, **80**, 1499–1517,

**Demirdjian**, R., Gunlycke, D., Reynolds, C. A., Doyle, J. D., & Tafur, S. (2022). Variational Quantum Solutions to the Advection-Diffusion Equation for Applications in Fluid Dynamics. Quantum Inf Process 21, 322. (link to arXiv)

**Demirdjian**, R., Doyle, J. D., Finocchio, P. M., & Reynolds, C. A. (2022). On the Influence of Surface Latent Heat Fluxes on Idealized Extratropical Cyclones. Journal of the Atmospheric Sciences 79(9), 2229-2242.

**Demirdjian**, R., Rotunno, R., Cornuelle, B. D., Reynolds, C. A., & Doyle, J. D. (2021). The Circulation Response of a Two-Dimensional Frontogenetic Model to Optimized Moisture Perturbations. Journal of the Atmospheric Sciences, 78(2), 459-472.

**Demirdjian**, R., Doyle, J. D., Reynolds, C. A., Norris, J. R., Michaelis, A. C., & Ralph, F. M. (2020). A Case Study of the Physical Processes Associated with the Atmospheric River Initial-Condition Sensitivity from an Adjoint Model. Journal of the Atmospheric Sciences, 77(2), 691-709