

# CV: Jhayron S. Pérez-Carrasquilla

College Park, MD | [jhayron@umd.edu](mailto:jhayron@umd.edu) | [Google Scholar](#) | [Website](#)

## EDUCATION

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### Atmospheric and Oceanic Science Ph.D. Student

College Park, Maryland, U.S.

*University of Maryland*

2021 - present

Second-year student and graduate research assistant in climate and extremes data science.

### Master of Science in Water Resources

Medellín, Colombia

*Universidad Nacional de Colombia*

2018 - 2020

Funded by the Facultad de Minas Scholarship

Masters' thesis entitled “**Tropical cyclone rapid intensification: variability, environmental control, and inner-core convective dynamics.**” Advisor: Carlos D. Hoyos Ph.D. Evaluation committee: David S Nolan, Ph.D. and Alex M Kowaleski, Ph.D.

### Civil Engineer

Medellín, Colombia

*Universidad Nacional de Colombia*

2013 - 2018

Undergraduate thesis entitled “**Using back-trajectories to study the origin of precipitation for regions of hydric interest.**” Advisor: Carlos D. Hoyos Ph.D.

## ACADEMIC AND PROFESSIONAL EXPERIENCE

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### Research Assistant

2022 - Present

*University of Maryland*

*Atmospheric and Oceanic Science Department, Climate and Extremes Data Science*

- Atmospheric dynamics, atmospheric predictability, and machine learning
  - Manager: María Molina Ph.D - [mjmolina@umd.edu](mailto:mjmolina@umd.edu)

### Teaching Assistant

2021 - 2022

*University of Maryland*

*Atmospheric and Oceanic Science Department*

- AOSC200 - Weather and Climate
  - Manager: Timothy Canty Ph.D - [tcanty@umd.edu](mailto:tcanty@umd.edu)

### Research Scientist

2021 - 2022

*Corporación Clima*

*CORPCLIMA*

- Meteorological data analysis, reports development, and forecasts development.
  - Manager: Carlos David Hoyos Ortiz Ph.D - [choyos@corporacionclima.com.co](mailto:choyos@corporacionclima.com.co)

### Research project: Forecasting PM2.5 concentration in the Aburrá Valley

2021

*Early warning system of Medellín and the Aburrá Valley*

*SIATA*

- Developing an statistical model for hourly forecasting of PM2.5 concentration ML techniques; with GFS, CAMS and ground-base stations as inputs.
  - Independent contractor for SIATA.

### Research project: Hurricane-related Risk in Colombia

2021

*Universidad Nacional de Colombia, Medellín*

*Geosciences and Environment Department*

- Developing temporal and spatial downscaling algorithms for rainfall using IMERG, radar data, in-situ data, and ML techniques.
- Performing statistical analysis of rainfall at the region and analyzing specific extreme events, including Iota (2020).
  - Project managers: Carlos David Hoyos Ortiz Ph.D - [cdhoyos0@unal.edu.co](mailto:cdhoyos0@unal.edu.co), Ruben Dario Montoya Ramirez, Ph.D - [rdmontoya1@gmail.com](mailto:rdmontoya1@gmail.com), Andrés Osorio, Ph.D - [afosorioar@unal.edu.co](mailto:afosorioar@unal.edu.co)

### Development of wind, radiation and flowstream forecasts for CELSIA

2020

*Corporación Clima*

*CORPCLIMA*

- Developing statistical models for daily and hourly forecasting of flow stream and meteorological variables for CELSIA (energy generation company) using both conventional statistics and ML techniques.
  - Manager: Carlos David Hoyos Ortiz Ph.D - [cdhoyos0@unal.edu.co](mailto:cdhoyos0@unal.edu.co)

## Development of Operational Hurricanes Reports for SURA

2019 - 2020

*Corporación Clima*

*CORPCLIMA*

- Carrying out automatic reports for hurricanes threatening land in Central America for SURA (insurance company) by using IMERG, HWRP, and NHC official data.

– Manager: Carlos David Hoyos Ortiz Ph.D - cdhoyos0@unal.edu.co

## Teaching Assistant

2018 - 2021

*Universidad Nacional de Colombia, Medellín*

*Geosciences and Environment Department*

- Teaching python to undergraduate and graduate students at the department.
- Developing several python modules for fluid mechanics exercises, and statistical analysis.
- Performing workshops and teaching sessions for students of fluid mechanics, grading exams and lab reports, and advising students.

– Professors: Jose Fernando Jimenez Ph.D - jfjimene@unal.edu.co; Julián David Rojo Hernandez Ph.D - jdrojoh@unal.edu.co; Evelio Andres Gomez Ph.D - eagomezgi@unal.edu.co

## Meteorological and Air-Quality Data Analysis and Research

2018 - 2021

*Early warning system of Medellín and the Aburrá Valley*

*SIATA*

- Contributing to the study the origin of aerosols using back-trajectories, ground-based sensors and satellite information. Analyzing the relationships between fires far-located from the city and the air quality variability.
- Contributing to the investigation of the meteorological conditions leading to the 2015 Salgar flash flood. We used radar, satellite, and back-trajectories analysis. <https://doi.org/10.5194/nhess-19-2635-2019>
- Correcting attenuation in the polarimetric variables from a C-Band radar.
- Coordinating several radio-sounding campaigns.
- Contributing to the analysis of the atmospheric thermodynamic structure, and its influence over the probability of local convective rainfall formation, and deep convection structure.
- Studying how to identify fires plumes from the C-Band Radar's polarimetric variables.
- Contributing to study the effects of atmospheric gravitational stability on the air quality conditions using a micro-wave radiometer and radiosondes.
- Developing several public graphics and reports, giving talks, and offering workshops regarding the topics mentioned above.

– Managers: Carlos David Hoyos Ortiz Ph.D - cdhoyos0@unal.edu.co

## Research project: Climate Trends for Energy Generation

2018

*Universidad Nacional de Colombia, Medellín*

*Geosciences and Environment Department*

- Performing long-term statistical analysis of wind and radiation fields from sub-scaled global models' outputs to identify regions with potential for energy generation in Colombia, and their variation under climate change scenarios.

– Manager: Carlos David Hoyos Ortiz Ph.D - cdhoyos0@unal.edu.co

## Operation of a Real Time Hydro-Meteorological Monitoring Center

2018

*Early warning system of Medellín and the Aburrá Valley*

*SIATA*

- Performing short-term rainfall forecasts, and sending continuously meteorological, hydrological, and air-quality reports. I had to be aware that the dense SIATA measuring network worked properly during the 12-hours shifts.

– Manager: Carlos David Hoyos Ortiz Ph.D - cdhoyos0@unal.edu.co

## Analysis and Forecasting of Water Resources for ISAGEN

2017 - 2018

*Universidad Nacional de Colombia, Medellín*

*Geosciences and Environment Department*

- Developing statistical forecast models for monthly flow stream at the ISAGEN energy generation stations.
- Developing an automatic operational report on the Atlantic and Pacific Oceans' sea surface temperature.
- Performing back-trajectory analysis and using satellite data in order to understand the origin of precipitation in the ISAGEN basins

– Manager: Carlos David Hoyos Ortiz Ph.D - cdhoyos0@unal.edu.co

## Undergraduate Fluid Mechanics Assistant

2016 - 2017

*Universidad Nacional de Colombia, Medellín*

*Geosciences and Environment Department*

- Performing workshops and teaching sessions for fluid mechanics students, grading exams and lab reports, and advising.  
– Professor: Jose Fernando Jimenez Ph.D - jfjimene@unal.edu.co

## Special Academic Project: Compressible Flow

2016

Universidad Nacional de Colombia, Medellín

Geosciences and Environment Department

- Developing an experimental device for compressible flow at the fluid mechanics laboratory of the university.  
– Professor: Luis Fernando Carvajal Serna M.Sc - lfcarvaj@unal.edu.co

## MANUSCRIPTS

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- (PAPER UNDER REVIEW) J., Pérez-Carrasquilla, Montoya P., Sánchez J. M., Ramírez M., Forecasting 24-hour-averaged PM2.5 concentration in the Aburrá Valley using tree-based ML models, global forecasts, and satellite information. *Advances in Statistical Climatology, Meteorology and Oceanography* (currently under review)
- (MASTERS' THESIS) J., Pérez-Carrasquilla & Hoyos, C. D. (2021, March). Tropical cyclone rapid intensification: spatio-temporal variability, inner-core dynamics and environmental control. Evaluation committee: David S Nolan, Ph.D. and Alex M Kowaleski, Ph.D.  
<https://repositorio.unal.edu.co/handle/unal/79714>
- (PAPER) Hoyos, C. D., Ceballos, L. I., Pérez-Carrasquilla, J. S., Sepúlveda, J., López-Zapata, S. M., Zuluaga, M. D., ... & Zapata, M. (2019). Meteorological conditions leading to the 2015 Salgar flash flood: lessons for vulnerable regions in tropical complex terrain. *Natural Hazards and Earth System Sciences*, 19(11), 2635-2665.

## POSTERS AND PRESENTATIONS

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- (POSTER) J., Pérez-Carrasquilla, Montoya P., Sánchez J. M., Ramírez M. (2022, Dec). Use of two operational ML models for forecasting 24-hours-average PM2.5 concentration in the Aburrá Valley, Colombia, using global forecasts and satellite information. AGU Fall Meeting, 2022.
- (POSTER) J., Pérez-Carrasquilla, Betancur A., Hoyos C., Herrera L., Gómez L.A., Hernández-Mendoza D. A. (2022, Dec). Back-trajectories analysis for characterizing the origin and spatio-temporal variability of precipitation in Colombia, and the implications for the local electrical energy markets. AGU Fall Meeting, 2022.
- (POSTER) Sepúlveda, J., Pérez-Carrasquilla, J. S., Zapata, M., & Hoyos, C. D. (2021, May). Climatology of the Internal Structure of Tropical Cyclones at Different Life Cycle Stages: CloudSat and Airborne Reflectivity Data. In 34th Conference on Hurricanes and Tropical Meteorology. AMS.  
<https://ams.confex.com/ams/34HURR/meetingapp.cgi/Paper/373962>
- (PRESENTATION) Pérez-Carrasquilla, J. S., & Hoyos, C. D. (2021, May). Characterization of the Thermodynamics, Life Cycle and Influence Over the Mean Flow of Inner Core Processes in Tropical Cyclones: Observational and Idealized Modelling Approach. In 34th Conference on Hurricanes and Tropical Meteorology. AMS.  
<https://ams.confex.com/ams/34HURR/meetingapp.cgi/Paper/373619>
- (PRESENTATION) Zapata, M., Sepúlveda, J., Pérez-Carrasquilla, J. S., & Hoyos, C. D. (2021, May). Climatology of Cloud Population in Tropical Cyclones. In 34th Conference on Hurricanes and Tropical Meteorology. AMS.  
<https://ams.confex.com/ams/34HURR/meetingapp.cgi/Paper/373959>
- (PRESENTATION) J., Pérez-Carrasquilla & Hoyos, C. D. (2021, March). Convección e intensificación rápida en ciclones tropicales: Casos de estudio usando información de Infrarrojo de GOES-R y GLM. In Congreso Internacional de Variabilidad y Cambio Climático, Bogotá, Colombia.
- (POSTER) Perez, J. S., & Hoyos, C. D. (2020, January). Tropical Cyclones Internal Dynamics and its Influence over the Intensity Changes: WRF Idealized Simulation in a Quiescent Environment and GOES-R IR and GLM Data Analysis. In 100th American Meteorological Society Annual Meeting. AMS.

## AWARDS AND SCHOLARSHIPS

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- Exploratory Allocation at the US National Center for Atmospheric Research (NCAR) High-Performance Computing (HPC) System (2022).
- College of Computer, Mathematical, and Natural Sciences Dean's Fellowship at the University of Maryland, College Park (2021).
- Facultad de Minas Scholarship at Universidad Nacional de Colombia: 100% graduate tuition scholarship for master's studies (2018-2020).

## SERVICE

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- Reviewer for Journal of Geophysical Research: Atmospheres (2023).
- Part of 'Fresh Eyes on CMIP.' A project from the World Climate Research Programme (WCRP, 2023).

## TECHNICAL TOOLS

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**Programming languages:** Python, Unix.

**Numerical modeling:** WRF, CM1, back-trajectories Lagrangian analysis.

**Data-driven modeling:** Artificial neural networks, convolutional neural networks, gradient boost, random forest, support vector machine, spectral analysis (Fourier, wavelets), principal component analysis, k-means clustering.

**Databases used:** TRMM/IMERG, MODIS, AIRS, ERA Reanalysis, NCEP/NCAR Reanalysis, GFS, ECMWF forecasts, CAMS, HWRF outputs, HMON outputs, global downscaled climate scenarios derived from the General Circulation Model (GCM) runs conducted under the Coupled Model Intercomparison Project Phase 6 (CMIP6).

**Data from sensors used:** C-Band polarimetric radar, radiosondes, micro-wave radiometer, disdrometers, air quality sensors, rain gauges, meteorological stations, flow stream stations.