

# Rachel Wegener

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## EDUCATION

**UNIVERSITY OF MARYLAND**  
**MS IN ATMOSPHERIC AND**  
**OCEANIC SCIENCE [IN PROGRESS]**  
2021 - present | College Park, MD  
College of Computer, Natural and  
Mathematical Sciences

**UNIVERSITY OF DENVER**  
**BS IN PHYSICS AND**  
**ENVIRONMENTAL SCIENCE**  
2012 - 2017 | Denver, CO  
College of Natural Sciences and  
Mathematics  
Cum Laude, with Distinction in Physics  
GPA: 3.75 / 4.0

## LINKS

LinkedIn:// Rachel Wegener  
Github:// [rwegener2](#)  
Twitter:// [@rwegener2](#)

## COURSEWORK

**UC SAN DIEGO - EXTENSION**  
Sept 2019 - Mar 2019  
Fundamentals of Data Science  
Linear Algebra for Machine Learning

## SKILLS

### PROGRAMMING

Python • Docker • QGIS  
Amazon Web Services • git/Github  
Postgres/PostGIS

## LEADERSHIP

**NASA DEVELOP AMBASSADOR**  
Jan 2018 - Apr 2019

**RESIDENCE ASSISTANT (RA)**  
Aug 2016 - June 2017,  
Aug 2014 - Jun 2015

**SOCIETY OF PHYSICS STUDENTS**  
*Outreach Coordinator, 1 year*  
Sept 2012 - June 2017

**ENVIRONMENTAL SUSTAINABILITY**  
**LIVING AND LEARNING COMMUNITY**  
Sept 2012 - June 2013

## WORK EXPERIENCE

### NASA SARP INTERNSHIP PROGRAM | CODING MENTOR

Jun 2021 - Aug 2021

- Develop instructional materials to teach core coding concepts to undergraduate students as they develop earth science research projects
- Set up collaborative work environments to promote communication skills
- Work individually with students to guide code skill development based on their personal and research interests
- Coordinate with the full mentor team to ensure a smooth and fulfilling program experience

### DEVELOPMENT SEED | CLOUD ENGINEER

Jan 2020 - May 2021

- Research, select and use the most applicable technologies to process and archive data based on the needs of each project. Frequently built cloud systems for data processing
- Manage project teams to ensure that developers have guidance and support. Ensure project deadlines are communicated to partners and met.
- Assist in business develop opportunities and project proposals for new work
- Participate in the collective ownership of the company by identifying and pursuing initiatives that better the organization

### MAXAR | GEOPYTHON DEVELOPER - EMERGING TECHNOLOGIES

July 2018 - Dec 2019

- Work in a team of 6 to prototype new geospatial analytics products built on top of DigitalGlobe high resolution satellite imagery. Integrate external public data sources
- Build scaled data processing solutions as a part of a team
- Develop algorithms for new capabilities using remote sensing and data science techniques

## RESEARCH EXPERIENCE

### NASA DEVELOP

#### USING CMIP5 GLOBAL CLIMATE MODELS TO PROJECT FUTURE MONSOON AND EXTREME WEATHER EVENTS IN THE PACIFIC

Working in a team of 3 under Michael Kruk,

NOAA's National Center for Environmental Information | Sept 2017 - Nov 2017

This 10-week long study provided an initial outlook at regional trends in the location of the monsoon and distribution of the extremes in wind speed and rainfall over the course of the 21st century. Select Global Climate Models (GCMs) from the Coupled Model Intercomparison Project Phase 5 (CMIP5) were verified against historic NOAA satellite data. This project used the future simulations to calculate the projected changes in magnitude for extreme values of wind speed and rainfall rate, return interval frequency for rainfall and wind speed, and distribution of monsoon events. The results include gridded maps of monsoon distribution and extreme wind and rain values, as well as return interval plots for virtual stations within the USAPI and Hawai'i Exclusive Economic Zones on a decadal basis for the years 2030-2100.

## RESEARCH EXPERIENCE (CONT.)

### NASA STUDENT AIRBORNE RESEARCH PROGRAM (SARP) IMPACTS OF COASTAL AND CLIMATOLOGICAL PROCESSES ON PRIMARY PRODUCTIVITY IN THE COLUMBIA RIVER PLUME

Working under Dr. Raphael Kudela, UC Santa Cruz | Jun 2016 - Aug 2016

In this 6-week long research experience the impact of persistent drought on primary productivity in Columbia River Plume was examined using monthly MODerate Resolution Imaging Spectroradiometer (MODIS) imagery collected between 2003-2015. Chlorophyll concentrations are compared to several drought indices, although only correlated to the Precipitation Index (PCP), Palmer Z-Index (ZNDX), and sediment concentration (as determined by MODIS Rrs\_645). The monthly chlorophyll values were then compared to VGPM primary productivity in order to confirm that chlorophyll is a good proxy for phytoplankton growth.

### SENIOR THESIS ICE NUCLEATION OF PARTICLE SAMPLES FROM REUNION ISLAND

Working under Dr. J. Alex Huffman, University of Denver Department of Chemistry | Jan 2016 - Jun 2017

In order to better understand the formation and presence of clouds in the atmosphere, this study assessed the ice nucleation abilities of particulates collected off Reunion Island, an island situated off the east coast of the African continent which is exposed to the open ocean. Data collected from the micro-orifice uniform deposit impactor – droplet freezing technique (MOUDI-DFT) was used to observe ice nucleation particles (INP) as a function of size and temperature.

## SOFTWARE PROJECTS

### Engineering Roles

In these projects I employed open source software tools to build a new end product.

### SMALLSAT USER INTERFACE AND DATA PROCESSING | Jan 2020 - Jan 2021

PROCESS DATA ARCHIVE OF NASA PURCHASED COMMERCIAL SATELLITE DATA AND COORDINATE USER ACCESS  
Development Seed in collaboration with the NASA CSDA Program

#### Technologies

Python: FastAPI, pydantic, sqlalchemy, alembic, AWS Cloud Development Kit

#### Datasets

Planet imagery, Spire GNSS

#### Skills

STAC specification

### SHIP DETECTION DATABASE & API | Aug 2019 - Dec 2019

PARSE AND CATALOG AIS TRANSMISSIONS FOR QUERY

Maxar

#### Technologies

Postgres Database; AWS: Lambda, API Gateway; Python: pycpg2

#### Datasets

commercial AIS

#### Skills

system prototyping, ShapeUp development framework

### VECTOR INFORMATION PRODUCT ENHANCER | Jan 2019 - Dec 2019

GENERATE BUILDING ATTRIBUTES BASED ON INPUT DATASETS

Maxar

#### Technologies

GDAL; AWS: ECS; Python: luigi, rasterio, shapely, pyproj

#### Datasets

stereo-derived DEM, building footprint vectors

#### Skills

algorithm development, geospatial processing

### FLOODWATCH FLOOD DETECTION TOOL | Jul 2018 - Jan 2019

LOCATE FLOODED AREAS AFTER A SEVERE WEATHER EVENT

Maxar

#### Technologies

TauDEM; Python: rasterio

#### Datasets

DigitalGlobe imagery, USGS HUC boundaries

#### Skills

algorithm development, statistics

### ANIMATED MAP VISUALIZATION OF BUILDING ENERGY USE | Jan 2018 - May 2018

VISUALIZE BUILDING ENERGY USE OVER TIME

U.S. Department of Energy's National Renewable Energy Lab (NREL) internship

#### Technologies

QGIS; Docker; bash; Python: argparse CLI

#### Datasets

US census boundaries, ComStock building energy model

#### Skills

technical report, poster creation, documentation writing, development for scientific application

## Project Management Roles

In these projects I coordinated the development and execution of project vision. This involved supporting developers and communicating with project partners.

### **LOW COST SENSORS DASHBOARD INTERFACE** | Sept 2020 - Feb 2021

**INTEGRATE LOW COST SENSOR DATA INTO THE OPENAQ DATA ACCESS PLATFORM**

Development Seed, in collaboration with [OpenAQ](#) and the [Environmental Defense Fund](#)

### **NASA AIRBORNE DATA CATALOG SEARCH INTERFACE** | Mar 2020 - May 2021

**BUILD A SEARCH INTERFACE FOR NASA FIELD CAMPAIGN METADATA**

Development Seed, in collaboration with the [NASA IMPACT Team](#)

## Community Programming

### **OCEANHACKWEEK** | August 2021

Work on a team to expand the example gallery of the `cmip6_preprocessing` Github repository.

## ACADEMIC EXPERIENCES

### **CRITICAL LANGUAGE SCHOLARSHIP PARTICIPANT - ARABIC** | Jun 2017 - Aug 2017

American Councils for International Education, U.S. Department of State

- Intensively studied Arabic with 30 other selected students while living in Tangier, Morocco.
- Integrated self into the culture through interactions with host family, connections at the local university, and through the routine of daily life.

### **PROJECT COORDINATOR** | Jan 2016 - Jun 2017

University of Denver, Center for Sustainability

- Coordinated with other student leaders to raise awareness of environmental issues on campus and promote sustainable lifestyles.
- Projects included co-directing the Residence Hall Energy Challenge and acting as the lead researcher for the Real Food Challenge campaign, which brought local and sustainably produced food to campus.

### **FIELD QUARTER PARTICIPANT** | Sep 2015 - Nov 2015

University of Denver Department of Natural Sciences and Mathematics

- During this field course the class spent 10 weeks working in off campus locations in three countries with 11 other students in a range of disciplines. The goal was to provide authentic hands-on experiences that challenged participants as scientists as well as provide an integrated, international view of the scientific world that extended beyond the laboratory.
- Coursework included conservation efforts in diverse ecosystems, urban geography, western U.S. geology, and desert ecology.
- Projects included digging soil pits, extracting several meters of peat cores, and independently carrying out a research project assessing the impact of ENSO on local fisheries in the Baja peninsula of Mexico.

### **PHYSICS TUTOR** | Sep 2013 - Jun 2014, Sept 2016 - Mar 2019

University of Denver; Tutor.com

- Provided learning support to students with diverse physics backgrounds using a collaborative teaching environment while working as a University of Denver Help Desk Learning Assistant.
- Worked privately with high school students 1-2 times per week to provide homework help and concept explanation.
- Approached concepts in several ways to help better explain material and show applications to increase student interest.

## AWARDS

### **UNDERGRADUATE PROGRAM AWARDS** | Jun 2017

Outstanding Senior in Physics	For outstanding overall performance in the physics program
Environmental Science Program Award	For outstanding overall performance in the environmental science program
Thomas M. Stephen Memorial Award	For outstanding academic achievement in the physics program

### **OUTSTANDING PHYSICS TUTOR AWARD** | Nov 2016

# PUBLICATIONS & CONFERENCE PRESENTATIONS

## PUBLICATIONS

Duflot, V., Tulet, P., Flores, O., Barthe, C., Colomb, A., Deguillaume, L., Väitilingom, M., Perring, A., Huffman, J. A., Hernandez, M. T., Sellegri, K., Robinson, E., O'Connor, D. J., Gomez, O. M., Burnet, F., Bourrienne, T., Strasberg, D., Rocco, M., Bertram, A. K., Chazette, P., Totems, J., Fournel, J., Stamenoff, P., Metzger, J.-M., Chabasset, M., Rousseau, C., Bourrienne, E., Sancelme, M., Delort, A.-M., **Wegener, R. E.**, Chou, C., and Elizondo, P.: Preliminary results from the FARCE 2015 campaign: multidisciplinary study of the forest–gas–aerosol–cloud system on the tropical island of La Réunion, *Atmos. Chem. Phys.*, 19, 10591–10618, <https://doi.org/10.5194/acp-19-10591-2019>, 2019. Publ: Aug. 21, 2019

## CONFERENCE PRESENTATIONS

STAC AND CLOUD-OPTIMIZED DATA: PUBLICLY ACCESSIBLE COGS FOR WEB DATA EXPLORATION  
Earth Systems Information Partners (ESIP) | Jul 2020