Office of STEM Engagement
Goddard Institute for Space Studies

Spring 2021 NASA GISS Internships

NASA Internships are competitive awards to support educational opportunities that provide unique NASA-related research and operational experiences for high school, undergraduate, and graduate students, as well as educators. These opportunities serve students by integrating interns with career professionals emphasizing mentor-directed, degree-related tasks, while contributing to the operation of a NASA facility or the advancement of NASA's missions.

We currently have five internship opportunities at the NASA GISS for the Spring 2021 session, open to undergraduate and graduate students.

Application Process

Students must submit an application on the NASA internship website: https://intern.nasa.gov/. They will be asked to upload a transcript (can be unofficial), a resume and at least one letter of recommendation. A video tutorial on how to apply can be found on the NASA internship website's home page.

Application Deadline

11/6/2020

Virtual / In-person Programming

Due to impacts related to the COVID – 19 pandemic, the spring session will be conducted remotely.

Program Dates:

1/11/2021 - 4/30/2021

Requirements:

- U.S. Citizen
- Cumulative 3.0 GPA (on a 4.0 scale)
- Undergraduate or graduate students must be enrolled in a degree-granting program at an accredited college or university.

Project Descriptions:

Advancing cloud-masking capabilities for satellite imagery over snow

The first step in the analysis of satellite imagery is most often the discrimination of cloud-contaminated pixels. This task is notoriously challenging over snow. With the help of previous interns, we have initiated the testing and validation of a flexible (neural-network-based) cloud mask, which has proven efficient when applied to MODIS satellite images acquired over Greenland and polar regions in general. As a validation tool, we have exploited the Vertical Feature Mask (VFM) provided by the CALIOP spaceborne lidar onboard the CALIPSO satellite. We are seeking for a highly motivated student to continue this work, and undertake several scientific analyses ranging from the determination seasonal cloudiness in polar regions to the feasibility of including thermal-channels information in the cloud mask workings. As cloud-contaminated pixels can be flagged and rejected, based on the student performance we might be able to attempt retrievals of snow properties for the pixels classified as cloudless. While not absolutely required, proficiency in Python coding, basic knowledge of HDF-type of files and some experience with data analysis are preferred.

Arctic - El Niño teleconnection and its Impacts on Extreme Weather Events

In addition to increasing global temperature, the key consequences of rising CO2 include unprecedented sea ice loss accompanied with amplified warming over the Arctic in recent decades. At the same time, an increasing frequency of extreme weather events across North America and Europe, such as cold snaps, persistent droughts and strong heat waves, has gained a lot of socio-economic attention. Numerous studies have suggested a potential relationship between the diminishing Arctic sea ice and extreme weather events across Northern Hemisphere (NH). Several other processes, such as El Niño-Southern Oscillation (ENSO) events, have long been identified for regional weather variability. The teleconnection between the rapidly changing Arctic and ENSO events can affect the atmospheric circulation and associated temperature and precipitation fields, which are important in modulating extreme events. Our research seeks to examine the combined influence of Arctic-ENSO on the potential changes in atmospheric circulation in association with persistent extreme temperature/precipitation events across NH. The student intern is expected to analyze a combination of satellite observations and outputs from global climate models.

Code development for retrieval of snow properties from satellite observations

The retrieval of snow properties and their evolution in polar regions is a very important component of climate research. As part of NASA activities, we are in the process of developing a new retrieval scheme that exploits for the first time the polarization state of the light measured by satellite sensors, rather than measurements of intensity only. The basic code available from

the mentor is written in the proprietary IDL language, and it is our desire to port it into Python. We are therefore looking for a skilled student to start duplicating and testing different modules of the original code. Preference will be given to individuals well versed in Python and programming style, and with experience of github, handling of HDF/NetCDF files and data analysis. Knowledge of IDL (the syntax is similar to that of all major languages) is not expected given the very limited spread of such software, but obviously highly valued if the student happened to have used it.

Research Scanning Polarimeter Monitoring and Data Management – IDL

NASA GISS Airborne Research Scanning Polarimeter (RSP) is often flown in field deployments. It remotely collects data to measure aerosol and cloud properties. During a field deployment RSP needs to be monitored to make sure it is healthy and collecting data properly. In addition, we can do real-time retrievals so our team can contribute to the discussion of interesting scenes we observe so that perhaps we can look into it deeper. Currently, the data is processed using code written in IDL (Interactive Data Language). IDL is not commonly known language and also it is not easily portable as it requires license which most people do not have. We would like to convert this code to JavaScript and/or python. This way the code becomes more usable and shareable.

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For more information, please contact:

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