

# Shane Grigsby

## Remote Sensing Scientist & Data Architect

Applied scientist with 12+ years of remote sensing algorithm innovation. Doctoral specializations in glacial hydrology, laser remote sensing, machine learning and geostatistics. Masters specializations in atmospheric correction, remote sensing of vegetation, hyperspectral and thermal remote sensing.

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## WORK EXPERIENCE

### Research & Development Scientist

National Geospatial Intelligence Agency

11/2021 - Present

Worked on developing cloud native analytic capabilities to deploy at scale. Planned program milestones, metrics, and execution. Evaluated technical approaches. Intelligence officer with staff access (TS//SI with Polygraph)

- Program Manager for 'AMOB' project
- Machine Learning and Remote Sensing Subject Matter Expert

### Assistant Scientist at NASA

Goddard Cryospheric Sciences Laboratory

01/2021 - 11/2021

Developed anomaly detection capabilities within the ICESat-2 data catalog for polar science applications. This includes tracking the evolution of ice divide boundaries over space and time in the polar regions.

- Continuing collaboration with "Jupyter meets the Earth" project, developing cloud native workflows for the geosciences.

### Postdoctoral Researcher

Colorado School of Mines, Dept. of Geophysics

08/2019 - 01/2021

Interdisciplinary research on scaling existing remote sensing algorithms on GPUs, with application to polar hydrology. This included porting both stochastic simulation via covariance methods, and edge detection algorithms to run on NVIDIA CUDA frameworks.

- External reviewer, NASA Algorithm Theoretical Basis Document (ICESat-2 mission, product ATL11)
- Assessed Airborne Topographic Mapper (NASA lidar system) data for azimuthal biases
- Taught Machine Learning and Python Programming in the Jupyter Notebook at the [ICESat-2 Hackweek](#)

### Research Associate

CIRES

06/2014 - 01/2021

Developed a novel processing pipeline and "roughness" data product for the NASA ICESat satellite. Our project used millions of laser waveforms collected over multiple years to map the location and character of crevasses on the Greenland ice sheet for the first time.

- Developed novel unsupervised method of classifying hundreds of thousands of unlabeled raster tiles from compressed data
- Specified high performance computing hardware requirements, and developed algorithmic capabilities for project

### Team Lead & Data Architect

Orbital Micro Systems

07/2018 - 02/2019

Led the data ingest team through the design phase of a satellite startup that aims to provide low latency operational weather data.

- Provided leadership porting scientific MATLAB radiative transfer code to production python for deployment to the AWS cloud
- Architected spatial indexing schema for petabyte scale rasters

## EDUCATION

### PhD in Geography

University of Colorado, Boulder

08/2014 - 05/2019

Greenland Surface Roughness Retrieval and Status

- Advisor: Waleed Abdalati

### MS in Geography

University of California, Santa Barbara

08/2011 - 08/2014

Improved surface temperature estimates with MASTER/AVIRIS sensor fusion

- Advisor: Dar Roberts

## SCHOLARSHIPS

(Competitive/Merit based funding only)

Awards from:

- US Geospatial Intelligence Foundation
- US Department of State
- GeoEye (formally DigitalGlobe, now Maxar)

## SCIENTIFIC CONTRIBUTIONS

**Publication Metrics (see following page for publication list):**

Published 6 papers since 2015; current h-index of 5, with 300+ citations

**Journals I review for:**

Remote Sensing of Environment, IEEE Transactions on Geoscience and Remote Sensing, IEEE Journal of Selected Topics in Applied Earth Observation, Earth and Space Science, Remote Sensing, Ecological Processes, The Cryosphere

**Invited Talks:**

NASA Goddard (2020), US Army Corps (CRREL, 2019), ISAR5 (Tokyo, 2018), AGU (New Orleans, 2017), Scipy (Austin, 2017), NASA Goddard (2017), AGU (San Francisco, 2015), NASA Ames (2014), FOSS4G (Denver, 2011), Google (Boulder, 2010)

**Open source contributions:**

- Sklearn, primary author of the OPTICS clustering algorithm (PR 1984)
- CuPy, Multivariate Normal Speed Enhancements (PR 3018)
- Mortie and GeoStacks libraries, Maintainer and Core Contributor

**NASA Panel Membership (Ad Hoc)**

- Open source software tools, libraries, and frameworks.
- Cryospheric Sciences

## LANGUAGES

Spanish ● ● ● ○ ○  
Python ● ● ● ● ●  
Git / Nix ● ● ● ● ○

## WORK EXPERIENCE

### Research Analyst

'BigData' Intel Science and Technology Center

09/2013 - 08/2014

*Developed driving remote sensing applications and science use cases for SciDB, an array-database for distributed storage and high performance linear algebra operations on sparse multidimensional arrays. Our science dataset was one year of raw MODIS data.*

- Developed data ingest scripts and schema for preprocessing and importing MODIS data granules
- Prototyped spacio-temporal indexing for fast lookup and retrieval of image subsets

### Instructor

NASA Student Airborne Research Program

05/2012 - 08/2015

*Supervised and led teams of 8 to 10 STEM college upperclassmen through acquisition, validation, and processing of data collected by NASA Airborne assets.*

- Planned flight lines, vicarious calibration campaigns, and science objectives
- Deployed a novel photon-counting LiDAR system for its maiden airborne flight
- Instructed proper use of both field equipment and atmospheric correction techniques

### Linux Systems Administrator

UnixOps, CU Research Computing

10/2009 - 09/2011

*Administered Linux, Unix, Solaris systems and high performance clusters.*

- Maintained research computing hardware assets in support of university research computing
- Developed and maintained custom software builds for high performance computing clusters and resources

## FUNDED EXTERNAL PROJECTS

Observationally constrained simulations of the evolution of polar snow using a multi-sensor approach (\$1,166,497) (09/2020 - 05/2023)

- Solicitation (NASA): Interdisciplinary Research in Earth Science
- PI: Brooke Medley (NASA Goddard); Co-Is: Jan Lenarts (University of Colorado), **Shane Grigsby** (NASA Goddard), James Carton (University of Maryland), Matthew Siegfried (Mines), Thomas Overly (NASA Goddard), Jonathan Ryan (Brown), Tyler Sutterley (University of Washington)

Long-term validation of ICESat-2 range measurements with ground, air, and satellite surveys of salar de Uyuni, Bolivia (\$149,917) (06/2020 - 06/2022)

- NASA Unsolicited Proposals
- PI: Matthew Siegfried (Mines); Co-Is: **Shane Grigsby** (Mines), Gabriel Walton (Mines), Mike Willis (University of Colorado, Boulder)

## REFERENCES

Dr. Waleed Abdalati, Director

*"Cooperative Institute for Research in Environmental Sciences"*

Contact : waleed.abdalati@colorado.edu - 240.481.1259

Dr. Matthew Siegfried, Assistant Professor

*"Department of Geophysics, Colorado School of Mines"*

Contact : siegfried@mines.edu - 847.525.8487

Dr. Fernando Pérez, Open Source Community Leader

*"Jupyter Project, NumFocus, 2i2c"*

Contact : fernando.perez@berkeley.edu - 303.642.5486

## PUBLICATIONS

*Research Article*

**More than Skin Deep: Sea Surface Temperature as a Means of Inferring Atlantic Water Variability on the Southeast Greenland Continental Shelf Near Helheim Glacier**

*Tasha Snow, Fiamma Straneo, James Holte, Shane Grigsby, Waleed Abdalati, and Ted Scambos*

Journal of Geophysical Research: Oceans

07 April 2021

Volume 126, Issue 4

<https://doi.org/10.1029/2020JC016509>

*Research Article*

**Cascading lake drainage on the Greenland Ice Sheet triggered by tensile shock and fracture**

*Poul Christoffersen, Marion Bougamont, Alun Hubbard, Samuel H. Doyle, Shane Grigsby, and Rickard Pettersson*

Nature Communications

14 March 2018

9, Article number: 1064

<https://doi.org/10.1038/s41467-018-03420-8>

*Research Article*

**Derivation and validation of supraglacial lake volumes on the Greenland Ice Sheet from high-resolution satellite imagery**

*Mahsa Moussavi, Waleed Abdalati, Allen Pope, Ted Scambos, Marco Tedesco, Michael MacFerrin, and Shane Grigsby*

Remote Sensing of Environment

15 September 2016

Volume 183, Pages 294-303

<https://doi.org/10.1016/j.rse.2016.05.024>

*Review Article*

**Glacier crevasses: Observations, models, and mass balance implications**

*William Colgan, Harihar Rajaram, Waleed Abdalati, Cheryl McCutchan, Ruth Mottram, Mahsa S. Moussavi, Shane Grigsby*

Reviews of Geophysics

29 February 2016

Volume 54, Issue 1, Pages 119-161

<https://doi.org/10.1002/2015RG000504>

*Research Article*

**Estimating supraglacial lake depth in West Greenland using Landsat 8 and comparison with other multispectral methods**

*Allen Pope, Ted Scambos, Mahsa Moussavi, Marco Tedesco, Mike Willis, David Shean, and Shane Grigsby*

The Cryosphere

15 Jan 2016

10, 15–27

<https://doi.org/10.5194/tc-10-15-2016>

*Research Article*

**Improved surface temperature estimates with MASTER/AVIRIS sensor fusion**

*Shane P. Grigsby, Glynn C. Hulley, Dar A. Roberts, Christopher Scheele, Susan L. Ustin, and Maria Mar Alsina*

Remote Sensing of Environment

15 September 2015

Volume 167, Pages 53-63

<https://doi.org/10.1016/j.rse.2015.05.019>

## OTHER SKILLS

Executive board governance

Sensor Calibration/Validation

Data and sensor fusion

Polar expedition and field skills