William G.K. Martin

NASA Goddard Institute for Space Studies, 2880 Broadway, New York NY 10025

office: (212) 678-5567 mobile: (503) 332-7227 email: wgm2111@columbia.edu

Objective

I am looking to apply mathematics and programming skills to data-driven decision making problems. I have a passion for developing mathematical and statistical models in Python and solving the convex optimization problems that arise in training models to fit data. I hope to join a team of data scientists and engineers and write code that serves up on-target solutions for practical problems facing people today.

Education

Columbia University, New York NY, USA

Doctor of Philosophy, Applied Mathematics, October 2014

Thesis: Advancements for 3D remote sensing of the atmosphere

Master of Science, Applied Mathematics, May 2009

Oregon State University, Corvallis OR, USA

Bachelor of Science, Mathematics, *cum laude*, June 2007

Research Positions

2014-present Postdoctoral Research Scientist in the Department of Applied Physics and Applied Mathematics, Columbia University, New York NY.

2008-2014 Graduate research assistant working with Brian Cairns and Guillaume Bal in the Applied Physics and Applied Mathematics, Columbia University, New York NY.

Projects

2012-present Derived formulas for scalable derivative calculations in 3D retrievals of cloud structure from space-borne images. Results reduced the number of model calls from O(n) to O(1) and made 3D retrievals a reasonable alternative to current 1D methods.

2010-present Wrote codes in Python to model the light scattering of airborne particles, and analyzed the sensitivity of noisy measurements to particle size and type. The statistical analysis helped guide instrument design efforts at the University of Maryland.

2008-2009 Developed 3D radiative transfer codes with accurate multiple scattering calculations using Python. Used group theory to exploit symmetries in the grid structure, reducing the cost of interpolation by a factor of 48.

Teaching Experience

2011 Intro to Partial Differential Equations Assisted professor Ian Langmore by grading all exams and presenting three review sessions for a class of thirty five students.

2010 Intro to Numerical Methods Assisted professor Edmond Chow by grading all exams and presenting one lecture and two review sessions for a class of eighty five students.

Awards and Fellowships

2010-2013 NASA Earth and Space Science Fellowship

2007-2009 NSF Fellowship awarded by Columbia's IGERT program

2007 Meritorious winner in the COMAP math modeling competition(top 13% of submissions)

2006 Joel Davis award for excellence in mathematics (given to one undergraduate each year)

Skills

Programing: Python (Scipy, IPython, stats, Pandas, cvxopt), FORTRAN, LaTeX, emacs.

Methods: Object oriented programing. Methods for solving PDEs and ODEs (spectral, finite element, finite difference). Numerical optimization and statistical inverse problems.

Operating systems: Unix, Linux (Ubuntu), MacOSX, Windows

Publications (selected)

Martin, William, 2014: Advancements for three-dimensional remote sensing of the atmosphere. PhD thesis. Columbia University. (defended June 5, 2014)

Martin, William, B. Cairns, and G. Bal, 2014: Adjoint methods for adjusting three-dimensional atmosphere and surface properties to fit multi-angle/multi-pixel polarimetric measurements." *Journal of Quantitative Spectroscopy and Radiative Transfer*, 144, 68-85.

Conferences and Invited Presentations

Goddard Institute for Space Studies lunch seminar. Oral presentation. *Adjoint methods for 3D remote sensing.* December 3, 2014; Goddard Institute for Space Studies, New York NY.

Netherlands Institute for Space Research. Oral presentation and visiting scientist. *Adjoint methods for 3D remote sensing.* September 16-18, 2014; Utrecht, Netherlands.

Laboratoire d' Optique Atmospherique. Oral presentation and visiting scientist. *Adjoint methods for adjusting 3D cloud and aerosol properties to fit multi-pixel polarimetric measurements.* September 8-12, 2014; University Lille 1, Lille France.

Workshop on Multi-Angle Spectropolarimetry of Atmospheric Aerosol. Oral presentation. *Adjoint methods for adjusting 3D cloud and aerosol parameters to fit multi-pixel polarimetric measurements..* September 1-5, 2014; International Space Sciences Institute, Bern, Switzerland.

DLR German Aerospace Center. Oral presentation and visiting scientist. *Adjoint methods for adjusting 3D cloud and aerosol properties to fit multi-pixel polarimetric measurements.* August 25-29, 2014; DLR Oberpfaffenhofen, Wessling Germany.

Goddard Space Flight Center. Oral presentation. *Advancements for three-dimensional remote sensing of the Earth's atmosphere.* August 6, 2014; NASA Goddard Space Flight Center, Greenbelt MD.

American Meteorological Society 14th Conference on Atmospheric Radiation. Oral presentation. *Adjoint methods for adjusting three-dimensional atmosphere and surface properties to fit multi-angle/multi-pixel polarimetric measurements.* July 10, 2014; Boston MA, USA.

American Meteorological Society 14th Conference on Atmospheric Radiation. Poster presentation. *Polarization helps characterize aerosol mixtures, but small particles are hard to see: measure volume-absorption and in the UV.* July 7, 2014; Boston MA, USA.

Workshop on Multi-Angle Spectropolarimetry of Atmospheric Aerosol. Oral presentation. *Aerosol retrievals from single-scattering measurements in the visible spectrum: resolved microphysical properties, fundamental limitations, and the benefits of polarization.* July 15-19, 2013; International Space Sciences Institute, Bern, Switzerland.

NATO Advanced Study Institute on Polarimetry and Remote Sensing. Oral presentation. *From particles to single scattering and back.* September 21, 2010; Kyiv, Ukraine.

Goddard Institute for Space Studies lunch seminar. Oral presentation. *Simulating 3D radiative transfer for remote sensing and high resolution climate modeling.* October 14, 2009; Goddard Institute for Space Studies, New York NY.

References

Brian Cairns PhD
NASA Goddard Institute for Space Studies
(212) 678-5625
bcairns@giss.nasa.gov

Guillaume Bal PhD
Applied Physics and Applied Mathematics, Columbia University, New York NY
(212) 854-4731
gb2030@columbia.edu

Edmond Chow PhD
School of Computational Science and Engineering, Georgia Institute of Technology
(404) 894-3086
echow@cc.gatech.edu

Ian Langmore PhD
Software Engineer at Google, New York NY
ianlangmore@gmail.com