

Philip William Dabney

phildabney@gmail.com 240-461-1451

Professional Summary

I have been leading the development of multi/hyper-spectral passive and active LIDAR optical remote sensing systems to provide new measurement capabilities and products to the portfolios of NASA and other end user agencies. I have been using engineering and physics knowledge and skills, combined with knowledge gained by working with preeminent scientists, to devise new remote sensing methodologies and instrumentation to enhance understanding of Earth systems science and solar system dynamics and contribute to applications benefiting human welfare.

I have served as Instrument Scientist for several airborne and spaceflight sensors, developing, designing, constructing, demonstrating and applying new capabilities. My role includes understanding the processes to be observed, how they manifest themselves in the optical domain, and applying knowledge of the physics of light interacting with materials to establish requirements to derive desired information. I have lead teams of discipline engineers to conceive instrument designs to meet the measurement requirements. When technology gaps are identified that prevent realization of a design, I have lead and/or guided technology maturation activities. My deep knowledge of radiometry, instrumentation design, and optical technologies; have enabled me to predict advances in measurement performance to help application scientist envision breakthrough uses of new capabilities.

Research and Development Experience

1987-Present

NASA/Goddard Space Flight Center - Earth Science & Planetary Science Divisions

Instrument Scientist (2003-Present): *Sustainable Land Imaging (SLI) which includes Landsat 8 and 9, Landsat-Next, SLI-Technology; and Structure and Function of Ecosystems (SAFE)*

- Work with end users, customers, and Subject Matter Experts to develop Science Traceability Matrices (STMs), Algorithm Theoretical Basis Documents (ATBDs) and Science Measurement Requirements Documents (SMRDs)
- Develop rigorous instrument and spacecraft requirements
- Direct modeling of product performance vs. measurement parameters
- Lead instrument concept design studies to develop realistic designs of varying technical maturity
- Provide necessary information and technical readiness level (TRL) assessments to cost analysts, and identify technology developments needed to achieve the measurements
- Direct or specify technology development to achieve necessary TRLs for future systems

Instrument Systems Engineer and Calibration Scientist (1990-Present): *Multi-kilohertz Micro-Laser Altimeter (MMLA), Slope Imaging Multi-polarization Photon-counting Lidar (SIMPL), Advanced Topographic Laser Altimeter System (ATLAS), Miniaturized Spectroradiometer (MiniSpec)*

- Develop instruments to meet measurement requirements
- Integrate instruments and other necessary systems, such as Inertial Navigation Units and context cameras, to form airborne prototype packages to collect data in support of new science and measurement methodologies
- Create, execute calibration plans; develop algorithms to provide calibrated sensor data to researchers
- Collaborate with application scientist to interpret data, refine measurements, and update requirements

Aerospace Technologist/EE (1988-2000): *Airborne Laser Polarization Sensor (ALPS), Advanced Solid-state Array Spectroradiometer (ASAS), MMLA, Satellite Laser Ranging 2000 (SLR2K), Asynchronous Laser Transponder, Landsat7/ETM+*

- Developed subsystems and ground support equipment for prototype airborne multi/hyper-spectral and lidar sensors. Served as field operations and calibration engineer.

Co-op Student Engineer (1987-1988): *ALPS*

- Designed, assembled, and calibrated polarized optical telescope assembly for ALPS
- Integrated subsystems and flew engineering and science flights on NASA P3B and UH1 helicopter

Education

M.S. Electro-Physics, University of Maryland College Park (UMDCP) 1995
Master's Thesis: "The Design and Analysis of a Theoretically Limited Signal-to-Noise CCD Based Imaging Spectroradiometer"

B.S. Electrical Engineering, University of Maryland College Park (UMDCP) 1988

B.A. Physics, Columbia Union College {CUC}, Takoma Park, MD 1988

Select Peer Reviewed Publications

Christopher J. Crawford, Jeannette van den Bosch, Kelly M. Brunt, Milton G. Hom, John W. Cooper, David J. Harding, James J. Butler, Philip W. Dabney, Thomas A. Neumann, Craig S. Cleckner, and Thorsten Markus; *"Radiometric Calibration of a Non-imaging Airborne Spectrometer to Measure the Greenland Ice Sheet Surface"*, 26 March 2019; Atmospheric Measurement Techniques 12(3):1913-1933

Jacqueline Le Moigne, Carl Adams, Philip Dabney, Michael Johnson, David Leisawitz, Frank Lemoine, Sreeja Nag, Wesley Powell, Danford Smith, Kurtis Thome, Steven Tompkins, Warren Wiscombe, *"An Overview of Distributed Spacecraft Missions (DSM)"*, IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing (J-STARS) 2017

Christopher Crawford, Milton G. Hom, John F. Cooper, Kelly M. Brunt, Thomas A. Neumann, Dave J. Harding, Philip W. Dabney, James J. Butler, *"Calibration of Spectroscopic Snow, Ice and Liquid Water Measurements for the Airborne SIMPL/AVIRIS-NG 2015 Greenland Campaign"*, Journal of Applied Optics, 2017

Ute C. Herzfeld, Thomas Trantow, David Harding, Phil Dabney, *"Surface-Height Determination of Crevassed Glaciers - Mathematical Principles of an Auto-Adaptive Density-Dimension Algorithm and Validation Using ICESat-2 Simulator (SIMPL)"*, IEEE Transactions on Geoscience and Remote Sensing (Volume: 55, Issue: 4, April 2017)

Stephen M. Merkowitz, Philip W. Dabney, Jeffrey C. Livas, Jan F. McGarry, Gregory A. Neumann, Thomas W. Zagwodzki, *"Laser Ranging for Gravitational, Lunar, and Planetary Science"*, International Journal of Modern Physics D 01/2008; DOI:10.1142/S0218271807011565

Technical Skills

Remote Sensing Methodologies/Capabilities

- Mission Architecture Optimization
- New and Emerging Active and Passive Remote Sensing Applications
- Hyperspectral and Multispectral Remote Sensing
- Precision Laser Ranging, Epoch Time transfer, and Reflectometry for Lidar Remote Sensing

Instruments Concept & Development

- Laboratory and Airborne Proof-of-concept Passive and Active Instruments
- Technology development
- Radiative & Photon Counting Detectors; Photonics Devices; laser systems; RT Processing and Sensing
- Data Analysis and Interpretation

Requirements development

- User Needs assessment
- Science Traceability and Requirements Flow Down
- Algorithm Theoretical Basis Documents (ATBDs)
- Modeling of product performance

Systems Engineering

- Design of Electro-optical Imaging Systems
- Instrument Systems Modeling & Optimization
- Systems level requirements flow down and allocation
- I&T, V&V, and Cal/Val planning and execution
- Calibration and Characterization

Select Awards

- 2022 Landsat-9 Certificate of Recognition
- 2019 Silver Achievement Award – ICESat2 Project Team
- 2019 Group Achievement Award – IceSat2/ATLAS I&T Team
- 2013 Robert H. Goddard Award Exceptional Individual Achievement in Engineering
- 2013 Robert H. Goddard Award Exceptional Team Achievement in Science
- 2008 Center Director's Team Recognition Award

Affiliations

- American Geophysical Union (AGU)
- Photo-Optical Instrumentation Engineers (SPIE)
- Optical Society of America (OSA)
- International Society of Electrical and Society of Electronic Engineers (IEEE)