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SUMMARY

Barbara G. Grant, M. S. is author of *Getting Started with UAV Imaging Systems: A Radiometric Guide* published in 2016 by SPIE Press. She also authored *Field Guide to Radiometry* (2011) and co-authored *The Art of Radiometry* (2010). Both previous books have been SPIE bestsellers. Grant has taught short courses to professional technologists since 2009 at SPIE Conferences, through Georgia Tech Professional Education, Santa Clara University, and for government agencies.

Grant received the master's degree in optical sciences from The University of Arizona in 1989, where her graduate work focused on remote sensing systems and calibration. She received the bachelor's degree in mathematics from San Jose State University in 1983 and studied electrical engineering in the graduate program at Santa Clara University designed for working professionals.

Prior to becoming an electro-optics consultant in 1995, she was employed in the aerospace and defense industry, holding engineering positions at Lockheed-Martin and NASA-Goddard contractors, among others. She received two NASA awards for her work on the integration and test phase of the GOES weather satellite imager and sounder. In 2016, she formed Grant Drone Solutions, LLC, to apply the concepts in her current book to the emerging UAV marketplace. She is a Senior Member of SPIE a UC-Irvine Distinguished Instructor in UCI's Optical Engineering and Optical Instrument Design Certificate Program, and an Affiliate Instructor with Georgia Tech Professional Education

CAPABILITIES

- * **Applying the concepts of radiometry and photometry to a diverse spectrum of problems across the spectrum of UAS technology development. Conceptual studies, trade studies, and technology needs assessment studies, among other efforts.**
- * **Radiometric calibration test planning, implementation, and data analysis**

- * **Requirements definition, proceeding from mission requirements, for systems with electro-optical payloads including on autonomous vehicles**
- * **Trade studies for E-O and IR systems on UAV and manned platforms**
- * **Conceptual system design and development of test plans**

Teaching

UC Irvine Division of Continuing Education—Distinguished Instructor Award, December, 2016

“Introduction to Radiometry: the Propagation and Measurement of Optical Radiant Energy” taught online in Spring Quarter of each year since 2014

Georgia Tech Professional Education

“Radiometry and Applications” first taught in 2012 a 2 ½ day short course conducted either at GT or onsite at client’s location

SPIE—The International Society for Optics and Photonics

Teaching short courses since 2009, including on-site teachings for defense community clients

Current SPIE courses include

SC 1073 “Radiometry and its UAV Applications”

SC 1123 “The Building Blocks of IR Instrument Design

SC 1143 “Component-Level Calibration: Sources, Detectors, and Measurement Hardware” dealing with the electro-optical hardware underlying instrument design, build, test and measurement.

EMPLOYMENT

- * **Self-employed consultant 1995-present**
Grant Drone Solutions, LLC (present)
Lines and Lights Technology, 1995 – 2016.

- * **Projects have included**
 - * **FLIR image analysis**
 - * **Product development with miniature fiber-optic USB spectrometer**
 - * **Visible imaging detector selection and analysis**
 - * **Uncooled thermal imager studies (microbolometer, pyroelectric, etc.)**
 - * **Test and characterization of lamps used in indoor tanning industry, and analysis of data to separate source (lamp) and platform (testbed) issues**
 - * **Production of two volumes of market research on spectroscopic instruments integrated into factory process lines**
 - * **Disparity Studies**

- * **Customers have included**

- * **University of California-Irvine Continuing Education**
- * **Georgia Tech Professional Education**
- * **NASA Johnson Space Center**
- * **Santa Clara University**
- * **Nikon Research Corporation of America**
- * **UVR Research Institute**
- * **BCC Research, Inc.**
- * **The University of Arizona Cancer Center**
- * **MGT of America, Inc.**
- * **D. Wilson Consulting Group**
- * **SPIE, the International Society for Optics and Photonics**

- * **NASA Contractor, 1992 - 1994, Two NASA Group Achievement Awards for the GOES Weather Satellite Program, 1994 and 1995**

Swales and Associates, Greenbelt MD and Palo Alto, CA 1992 – 1994
Spacecraft Instrumentation Engineer

On-site NASA representative at Space Systems/Loral in Palo Alto, CA, overseeing integration and test phase of GOES-8 and -9 imager and sounder. Analyzed test data and performed special tests at the spacecraft level in both thermal vac and ambient conditions, and in specialized test environments such as solar simulator.

Research and Data Systems Corp., Greenbelt, MD 1992
Senior Optical Scientist

Analyzed calibration issues for MODIS sensor on EOS/Terra platform;

developed calibration handbook.

- * **Lockheed Missiles and Space Co, Sunnyvale, CA 1989 – 1992**
Senior Research Engineer

Analyzed system requirements and hardware configuration for EO instrument package and performed post flight data analysis. Compared calibration procedures and facilities to understand system artifacts appearing in flight data. Performed trade studies on interferometer system for detector selection.

- * **Optical Sciences Center, Remote Sensing Group, University of Arizona, Tucson, AZ 1987 - 1989**
Graduate Research Assistant

Performed research on the absolute radiometric calibration of spaceborne sensors such as Landsat Thematic Mapper and NOAA AVHRR. Fieldwork at White Sands, N. M. and other locations to gather solar and ground reflectance data for use in atmospheric radiative transfer models. Use of radiative transfer codes and orbital mechanics programs.

- * **Litton Applied Technology, San Jose, CA 1986 – 1987**
Senior Engineer. Research and development of spread spectrum communications signals.

- * **ESL, Inc. Sunnyvale, CA 1983 - 1986**
Engineer. Analytical studies in orbital mechanics, radiative transfer, and signal processing.

EDUCATION

- * **M. S. Optical Sciences, The University of Arizona, 1989**
- * **MSEE coursework, Santa Clara University, 1985 - 1987**
- * **B. A. Mathematics, San Jose State University, 1983**

SELECTED PUBLICATIONS

Books

Grant, B. G., *Getting Started with UAV Imaging Systems: A Radiometric Guide*, SPIE Press, Bellingham, WA, July 20, 2016.

Grant, B. G., *Field Guide to Radiometry*, SPIE Press, Bellingham, WA (November 2011).

J. M. Palmer and B. G. Grant, *The Art of Radiometry*, SPIE Press, Bellingham, WA (2009).

Conference Papers

Grant, B. G., "UAV Imagery Analysis: Challenges and Opportunities," Proceedings of SPIE 10204, Long Range Imaging II, 1020406 (May 1, 2017); doi:10.1117/12.2264138

Grant, B. G., "Imagery analysis and the need for standards", Proceedings of SPIE Vol. 9195, 91950B (2014) [SPIE Digital Library](#)

Grant, B. G., and D. T. Hardy, "Muzzle flash issues related to the Waco FLIR analysis," *Targets and Backgrounds VII: Characterization and Representation*, Proc. SPIE 4370, pp. 314-324, 2001.

Che, N. B., B. G. Grant, D. E. Flittner, P. N. Slater, S. F. Biggar, R. D. Jackson, and M. S. Moran, "Results of calibrations of the NOAA-11 AVHRR made by reference to calibrated SPOT imagery at White Sands, N. M.," *Calibration of Passive Remote Observing Optical and Microwave Instrumentation*, Proc. SPIE 1493, pp 182-194, 1991.

B.L. Markham, J.R. Irons, D.W. Deering, R.N. Halthore, R.R. Irish, R.D. Jackson, M.S. Moran, S.F. Biggar, D.I. Gellman, B.G. Grant, J.M. Palmer and P.N. Slater, "Radiometric calibration of aircraft and satellite sensors at White Sands, NM," Proc. IGARSS'90, 515, Washington DC, 1990.

Grant, B. G. "Calibration of the Advanced Very High Resolution Radiometer," M. S. Thesis, The University of Arizona, 1989.

SPIE Newsroom

Barbara Grant, "Getting Started with UAV Imaging Systems: A Radiometric Guide," 6 April 2017, SPIE Newsroom. DOI: 10.1117/2.2201704.01

Barbara Grant, "Imagery Analysis: Standards Needed for the Drone Age," Defense and Security, 21 August 2014, SPIE Newsroom. DOI: 10.1117/2.1201408.005594