

### **C. RUF EXTERNAL FUNDING HISTORY**

06/30/1992 to 04/30/1996; "GEOSAT Follow-On water vapor radiometer engineering support," Applied Physics Laboratory, Johns Hopkins University; \$156,156; PI.

06/30/1992 to 05/01/1997; "Support of the TOPEX/Poseidon Microwave Radiometer science and engineering verification team," NASA Jet Propulsion Laboratory; \$144,996; PI.

09/02/1993 to 11/01/1994; "Synthetic Aperture Radiometer Digital Correlator Study," NASA Jet Propulsion Laboratory; \$14,993; PI.

06/01/1994 to 12/31/1994; "An Observational Study of Continental Stratocumulus," National Science Foundation; \$575,339 (\$40,899 to Ruf); Co-I (PI is B. Albrecht, PSU Dept. of Meteorology).

01/01/1995 to 08/31/1997; "Miami Stratus," University of Miami (sub-contracted from NSF); \$198,051 (\$75,000 to Ruf); Co-I (PI is H. Verlinde, PSU Dept. of Meteorology).

05/01/1996 to 09/30/1998; "GEOSAT Follow-On water vapor radiometer verification support," ARL/SPAWAR/US Navy; \$750,000/yr (\$70K/yr to Ruf); Co-I (PI is C. Kilgus, PSU Applied Research Laboratory).

01/01/1997 to 12/31/1997; "TOPEX Microwave Radiometer Drift Analysis," NASA Jet Propulsion Laboratory; \$20,000; PI.

03/01/1997 to 09/30/1999; "Design study and error analysis for a Synthetic Aperture Interferometric Radiometer," NASA GSFC; \$115,983; PI.

05/12/1997 to 06/30/1999; "ARM Cloud Radar Studies," Dept. of Energy; \$500,000 (\$75,000/yr to Ruf); Co-I (PI is T. Ackermann, PSU Dept. of Meteorology).

07/01/1997 to 06/30/1999; "Characterization of Sigma-0 blooms as constraints on calm water emission," NASA WFF; \$41,546; PI.

04/01/1998 to 06/30/2000; "JASON Microwave Radiometer Flight Algorithm Support," NASA Jet Propulsion Laboratory; \$149,804; PI.

04/01/1998 to 12/31/2000; "Jason-1 Microwave Radiometer On Orbit Validation," NASA Jet Propulsion Laboratory; \$13,800; PI.

07/01/1998 to 09/30/2000; "Conical-Scanning Microwave Imager/Sounder Development Program," Ball Aerospace and Technology Corporation; \$86,982; PI.

01/15/1999 to 01/14/2001, "A small, lightweight radiometer to improve the temporal sampling of rainfall," NASA Goddard Space Flight Center; \$215,817; PI.

07/01/2000 to 06/30/2002; "Design Study of a Synthetic Aperture Precipitation Radiometer," NASA Goddard Space Flight Center; \$290,000; PI.

08/01/2000 to 05/31/2002, "Jason-1 Microwave Radiometer Flight Algorithm Support," NASA Jet Propulsion Laboratory; \$67,478; PI.

08/01/00 - 08/31/04, "Jason-1 Microwave Radiometer On Orbit Validation," National Aeronautics and Space Administration, \$209,551; PI.

10/01/2000 to 01/31/2001, "Small Lightweight Rainfall Radiometer to Improve the Temporal Sampling," NASA Goddard Space Flight Center; \$21,630; PI.

04/01/2001 to 06/30/2002, "Design Study of a Synthetic Thinned Aperture Radiometer for Hurricane Impact Prediction, NASA Langley Research Center, \$65,000; PI.

02/01/2002 to 01/31/2005, "Next Generation Lightweight Rainfall Radiometer Synthetically Thinned Aperture Radiometer Instrument Development," NASA Goddard Space Flight Center; \$1,180,344; PI.

12/01/2002 to 11/30/2003, "Aquarius Instrument Science Calibration During the Risk Reduction Phase," NASA Goddard Space Flight Center; \$19,764; PI.

04/01/2003 to 03/31/2006, "GEOSTAR Prototype Digital Processor," NASA Goddard Space Flight Center; \$975,361; PI.

06/01/2003 to 05/31/2005, "WindSat SDR and EDR Calibration and Validation," Naval Research Laboratory, \$218,796; PI.

01/16/2004 to 07/31/2004, "Electronic Correlated Noise Calibration Standard for Interferometric and Polarimetric Microwave Radiometers," EMAG Technologies, Inc., Ann Arbor, MI (NASA Phase I SBIR partnership), \$23,284; PI.

03/01/2004 to 08/31/2004, "JMR Continuing On Orbit Validation," NASA; \$19,993; PI.

06/01/2004 to 09/30/2011, "Development of the Aquarius Science Algorithm and Calibration/Validation Plan," NASA; \$630,000; PI.

07/01/2004 to 06/30/2008, "Calibration and Validation of Microwave Radiometer Wet Path Delay Retrievals for TOPEX/Poseidon, Jason and OSTM," NASA; \$276,020; PI.

10/01/2004 to 09/30/2006, "Electronic Correlated Noise Calibration Standard for Interferometric and Polarimetric Microwave Radiometers," EMAG Technologies, Inc., Ann Arbor, MI (NASA Phase II SBIR partnership), \$303,650; PI.

- 02/01/2005 to 07/31/2005, "A C-band Radio Frequency Interference (RFI) Detection and Mitigation Testbed," EMAG Technologies, Inc., Ann Arbor, MI (NASA Phase I SBIR partnership), \$23,000; Co-I.
- 07/01/2005 to 06/30/2008, "Development of an Agile Digital Detector for RFI Detection and Mitigation on Spaceborne Radiometers," NASA, \$1,483,681; PI.
- 10/01/2005 to 09/30/2008, "Development of a Geosynchronous Temperature and Humidity Sounder/Imager," NASA, \$78,000; PI.
- 1/1/2006 to 6/30/2008, "Juno Science Support Phase B Activities," SWRI (MSFC), \$50,000, PI.
- 3/1/2006 to 5/31/2007, "FASR Year 1 Design and Development," NRAO, \$97,671, PI.
- 5/15/2006 to 11/14/2007, "Remote sensing of the Titan Methane Cycle: Sensitivity Analysis and Instrument Concept Design," NASA GSFC, \$25,000, PI.
- 7/26/2006 to 3/30/2008, "Support for Development of the NPOESS (National Polar-Orbiting Operational Environmental Satellite System) Conical Microwave Imager Sounder," NOAA, \$230,980, PI.
- 8/1/2006 to 2/28/2008, "Hurricane Imaging Radiometer (HiRad) UAV Prototype: Phase 1 Development," NASA MSFC, \$290,444, PI.
- 9/1/2006 to 8/31/2008, "Development of Antenna Stations for Low Frequency Interferometric Arrays," NRAO, \$105,811, PI.
- 11/30/2006 to 4/30/2007, "Juno Microwave Radiometer - Breadboard Calibrator," NASA JPL, \$30,534, PI.
- 1/1/2007 to 12/31/2009, "Intercalibration of Global Precipitation Constellation of Radiometers," NASA, \$385,156, PI.
- 1/15/2007 to .1/14/2008, "Digital Spectrometers for Microwave Radiometers," NASA JPL, \$30,516, PI.
- 2/1/2007 to 1/31/2008, "Practicum in a Multidisciplinary World," U-M Provost's Office, \$700,000, Co-I.
- 9/8/2007 to 10/9/2008, "OMEGA," NASA MSFC, \$150,000, PI.
- 11/2/2007 to 8/30/2008, "Juno Pre-launch Microwave Calibration System," NASA JPL, \$395,131, PI.
- 1/1/2008 to 12/31/2009, "PALS-ADD Radio Frequency Interference Mitigation System for Airborne Soil Moisture", NASA, \$199,760, PI.

9/18/2008 to 9/17/2011, “GeoSTAR ASIC Correlator Technology Development and Risk Reduction for PATH,” NASA JPL, \$858,356, PI.

9/26/08 to 9/25/2013, “Technical Support for NPOESS Microwave Imager Sounder Sensor Development and Requirements Specification,” NOAA, \$1,277,505, PI.

10/1/2008 to 12/1/2009, “IEEE Transactions Editorial Support,” IEEE, \$25,000, PI.

12/1/2008 to 3/15/2009, “An Application for: Collaborative R&D Initiative for the Gulf of Mexico – Development of Hurricane Forecasting Flight Instrument HIRAD”, Von Braun Center for Science and Innovation, \$180,000, PI.