

Opportunity Title: Spaceborne radar observation of clouds and precipitation: mission concept performance analysis and science product definition

Opportunity Reference Code: 0162-NPP-NOV23-JPL-EarthSci

Organization National Aeronautics and Space Administration (NASA)

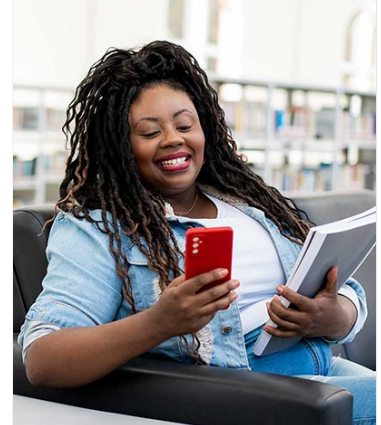
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Application Deadline 11/1/2023 6:00:59 PM Eastern Time Zone

Description With the success of the TRMM (Tropical Rainfall Measuring Mission), GPM (Global Precipitation Measurement) and CloudSat missions a vast community of atmospheric scientists has been able to identify both the strengths and the limitations of active remote sensing of clouds and precipitation (in particular at Ku-, Ka- and W-band) either in isolation, or when combined with other observations (passive microwave and sub-mm systems, as well as active or passive visible or IR systems). At the same time the available technological solutions for microwave remote sensing (active and passive) of clouds and precipitation from space have advanced significantly and therefore have opened the doors to a variety of observing system configurations. Concurrently, simulation tools (i.e., atmospheric models as well as scattering and propagation simulators) have advanced rapidly hence allowing to explore the space of possible solutions in a cost-effective way. Furthermore, experiments (such as the IPHEX/RADEX'14 and OLYMPEX/RADEX'15 campaigns, jointly conducted by the GPM Ground Validation program and the Aerosol/Clouds/Ecosystem mission concept science working group) have specifically targeted the acquisition of multi-wavelength active and passive observations of clouds and precipitations to test retrieval algorithms and validate their products and define the related uncertainties. This opportunity is to build and analyze these datasets, to refine and validate the requirements that new mission concepts for active and passive remote sensing of clouds and precipitation should adopt in order to advance our current understanding of cloud and precipitation processes with cost-effective notional mission concepts. This effort will focus on the assessment of the scientific impact of notional instrument configurations defined by their high-level parameters, in order to provide a quantitative assessment of performance for a portfolio of candidate solutions.

References:

Leinonen J., M. D. Lebsock, S. Tanelli, K. Suzuki, H. Yashiro, and Y. Miyamoto (2105): Performance assessment of a triple-frequency spaceborne cloud-precipitation radar concept using a global cloud-resolving model. *Atmospheric Measurement Techniques Discussions* 8, no. 4. Houze, R. A., Jr., L. McMurdie, W. Peterson, M. Schwaller, W. Baccus, J. Lundquist, C. Mass, B. Nijssen, S. Rutledge, D. Hudak, S. Tanelli, J. Mace, M. Poellot, D. Lettenmaier, J. Zagrodnik, A. Rowe, J. DeHart, L. Maddaus and H. Barnes, 2016: Olympic Mountains Experiment (OLYMPEX). *Bull.Amer.Meteor.Soc.*, accepted. Sy, O.O.; Tanelli, S.; Takahashi, N.; Ohno, Y.; Horie, H.; Kollias, P., 2014a, ""Simulation of EarthCARE Spaceborne Doppler Radar Products Using Ground-Based and Airborne Data: Effects of Aliasing and Nonuniform Beam-Filling"", *IEEE Trans. Geoscience and Remote Sensing*, vol.52, no.2, pp.1463,1479, Feb. 2014
Tanelli S., S. L. Durden, E. Im, G. M. Heymsfield, P. Racette, and D. O. Starr, 2009: Next-generation spaceborne cloud profiling radars. *Proc. IEEE*



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Radar Conf., Pasadena, CA, May 2009, pp. 1-6. Battaglia A. and S. Tanelli,
(2011): Doppler Multiple Scattering Simulator (DOMUS), IEEE Trans.
Geosc. and Rem Sens., Vol. 49, no. 1, Jan. 2011, p 442-450.

Location:

Jet Propulsion Laboratory
Pasadena, California

Field of Science: Earth Science

Advisors:

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Applications with citizens from Designated Countries will not be accepted at this time, unless they are Legal Permanent Residents of the United States. A complete list of Designated Countries can be found at: <https://www.nasa.gov/oair/export-control>.

Eligibility is currently open to:

- U.S. Citizens;
- U.S. Lawful Permanent Residents (LPR);
- Foreign Nationals eligible for an Exchange Visitor J-1 visa status; and,
- Applicants for LPR, asylees, or refugees in the U.S. at the time of application with 1) a valid EAD card and 2) I-485 or I-589 forms in pending status

Eligibility Requirements

- **Degree:** Doctoral Degree.