Opportunity Title: Using satellite microwave observations to characterize and forecast convective storms
Opportunity Reference Code: 0077-NPP-NOV23-JPL-EarthSci

Organization National Aeronautics and Space Administration (NASA)

Reference Code 0077-NPP-NOV23-JPL-EarthSci

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

Description The algorithms that currently use real-time satellite data to detect and forecast the evolution of convective storms rely almost exclusively on geostationary IR data. Yet satellite measurements that are more directly sensitive to the convection below the cloud tops are available today, from low-Earth-orbit (LEO) microwave radiometers ? the main impediments to their systematic use are a) the difficulty in interpreting their measurements in terms of the cloud structure rather than mere surface rain, and b) the heterogeneity of the constellation of radiometers. The challenge is to estimate, from the instantaneous observations of each microwave radiometer, a common set of structural storm variables (describing the spatial distribution of condensed water), then merge these estimates with the IR cloud-top measurements to improve the analysis of these storms (detection and quantitative intensity characterization) and to improve the ability the predictability of their evolution in the near term.

References:

Z.S. Haddad, R. Sawaya, S. Kacimi, O.O. Sy, F. J. Turk and J. Steward, 2017: Interpreting mm-wave radiances over tropical convective clouds. J. Geophys. Res. ? Atmos. 122, 1650-1654 (doi:10.1002/2016JD025923) Z.S. Haddad, O.O. Sy, S. Hristova-Veleva, and G.L. Stephens, 2017: Derived observations from frequently-sampled microwave measurements of precipitation. Part I: Relations to atmospheric thermodynamics. IEEE Trans. Geosci. Rem. Sens. 55, 3441-3453 (doi: 10.1109/TGRS.2017.2672825) Fr?d?ric Auton?s, 2012: Algorithm Theoretical Basis Document for ?Rapid Development Thun-derstorms? (RDT-PGE11 v2.3). Technical Reports of the Nowcasting Satellite Application Fa-cility (NWC-SAF), SAF/NWC/CDOP/MFT/SCI/ATBD/11, M?t?oFrance, Toulouse, France, Issue 2, Revision 3 Thomas Fiolleau and Re?my Roca, 2013: An algorithm for the detection and tracking of tropical mesoscale convective systems using infrared images from geostationary satellite. IEEE Trans-actions on Geoscience and Remote Sensing, Volume 51 number 3, pages 4302-4315. DOI: 10.1109/TGRS.2012.2227762 Jia Liu, Chuancai Liu, Xingjian Gu and Danyu Qin, 2015: Detection of rapidly developing con-vection using rapod scan data from a geostationary satellite. Remote Sensing Letters, Volume 6 number 8, pages 604-612. DOI: 10.1080/2150704X.2015.1062160 Daniel Vila, Luiz Toledo Machado, Henri Laurent and Ines Velasco, 2008: Forecast and tracking the evolution of cloud clusters (ForTraCC) using satellite infrared imagery: methodology and validation. Weather and Forecasting, Volume 23, pages 233-245. DOI: 10.1109/TGRS.2012.2227762

Location:
Jet Propulsion Laboratory

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Pasadena, California

Field of Science: Earth Science

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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/oiir/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.