Opportunity Title: Remote Measurement and Analysis for Modeling Sediment Transport and Accumulation
Opportunity Reference Code: 0190-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 There is an urgent need to understand and mitigate the impact of relative sea-level rise (RSLR) on coastal deltas. Left unchecked, RSLR could have devastating consequences for the livelihood of the half billion people who live in these low-lying coastal regions. This will require accurately understanding and modeling the maintenance of land by: (a) trapping of mineral sediment from the river network; and (b) accumulation of organic soils as plants grow. The Delta-X project is a NASA-selected Earth Venture Suborbital (EV-S) investigation that will provide the critical measurements to understand these processes: a combination of in-situ instrumentation, remote airborne radar interferometry, and remote airborne imaging spectroscopy. Over an extended campaign in the Mississippi River network, the campaign will acquire terabytes of remote measurement data for analysis. Airborne imaging spectroscopy is particularly informative with respect to vegetation properties such as species, functional type, areal coverage fractions and canopy structure. This is important because vegetation could be a critical control on deltaic growth or subsidence. Depending on the condition and type of vegetation, plants can contribute to soil accretion rates directly through organic matter production, both above ground (litter) and below ground (roots). Vegetation also contributes indirectly to positive accretion by slowing flow, thereby promoting capture of sediments and limiting their re-entrainment. At the mesoscale, however, vegetation can reduce hydrological connectivity by increasing friction, resulting in more water and sediment retained in the channel network, rather than overflowing onto islands. The latter effects decrease sediment deposition rates, and can even lead some areas to become sediment-starved. The combined effect is not well constrained by existing measurements. Advection length is expected to vary greatly with vegetation type (marshes, mangroves, cypress, pine, etc.), so it will be important to accurately characterize the vegetation types and densities of channel networks. With the imaging spectroscopy measurements, Delta-X will develop models relating these key vegetation factors to accretion rates, determining whether deltaic areas without vegetation will ultimately drown, and if vegetation productivity is indeed critical to sustainability. The candidate will advance the state of the art for imaging spectrometer data analysis in coastal wetland and river delta environments, while building models linking remotely-measured vegetation parameters (species, health, areal coverage) to accretion rates. This will involve a detailed analysis of remote sensing data to evaluate subtle vegetation condition and type signatures in the imaging spectroscopy data. It will likely involve BRDF uniformity transformations for spectral reflectance cubes from by NASA's Next Generation Airborne Visible Infrared Imaging Spectrometer (AVIRIS-NG), as well as identifying and mapping critical vegetation species or functional groups, and validation with direct field measurements of the explanatory variables. The candidate will use the AVIRIS-NG imaging

spectrometer data, working directly with co-advisors David R. Thompson and Marc Simard, and other scientists to interpret and use airborne SAR Data. The candidate will also take advantage of historical datasets where appropriate.

Location:
Jet Propulsion Laboratory
Pasadena, California

Field of Science: Earth Science

Advisors:
David R Thompson
david.r.thompson@jpl.nasa.gov
412-983-4024

Marc Simard
marc.simard@jpl.nasa.gov
818-354-6972

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.