NASA SBIR 2018 Phase I Solicitation

S1.08 In-situ Sensors and Sensor Systems for Earth Science

Lead Center: LaRC

Participating Center(s): ARC, GSFC, JPL

Technology Area: TA8 Science Instruments, Observatories & Sensor Systems

NASA seeks measurement capabilities that support current satellite and model validation as well as targeted airborne science program field campaign activities as discussed in the ROSES solicitation. Data from such sensors not only validates models, but informs process studies, and is used to improve models. Topics include air quality, aerosol absorption and optical properties (e.g., brown carbon), and cloud probes suitable for discriminating and characterizing ice and liquid particles in super-cooled and mixed-phase clouds.

In-situ sensor systems can comprise stand-alone instrument and data packages; instrument systems configured for integration on NASA's Airborne Science aircraft fleet or commercial providers, UAS, or balloons, ground networks; or end-to-end solutions providing needed data products from mated sensor and airborne/surface/subsurface platforms. An important goal is to create sustainable measurement capabilities to support NASA's Earth science objectives, with infusion of new technologies and systems into current/future NASA research programs. Instrument prototypes as a deliverable in Phase II proposals and/or field demonstrations are encouraged.

Complete instrument systems are desired, including features such as remote/unattended operation and data acquisition, and minimum size, weight, and power consumption. Desired sensors or mated platform/sensors include:

- Spectrally resolved absorption and extinction of atmospheric aerosols (size 0.1 to 10 micron).
- Aerosol scattering as a function of scattering angle (phase function).
- Aerosol refractive index.
- Aerosols and cloud particle number and size distribution covering the diameter size range of 0.01 micron to 200 micron with 10% accuracy. Probes targeting cloud particles in the lower end of this size range (0.01-5 micron) are particularly encouraged.
- Cloud probes able to differentiate and quantify non-sphericity and phase of particles.
- Liquid and ice water content in clouds with calibrated accuracy and precision.
- Spectrally resolved cloud extinction.
- Static air temperature to better than 0.1^{o} C accuracy.
- Liquid and ice water path, precipitable water path.
- Ice nucleating particle (INP) concentration suitable for airborne deployment.
- Innovative, high-value sensors directly targeting a stated NASA need may also be considered.