



NASA SBIR 2014 Phase I Solicitation

S3.04 Unmanned Aircraft and Sounding Rocket Technologies

Lead Center: GSFC

Participating Center(s): AFRC, ARC, GRC, JPL, KSC, LaRC

Unmanned Aircraft Systems

Breakthrough technologies that will enhance performance and utility of NASA's Airborne Science fleet with expanded use of unmanned aircraft systems (UAS) are sought. Desired performance envelope expansion over existing capabilities includes lower and higher altitudes, longer range and endurance, and flight in hazardous conditions (hurricanes, tornadoes, and volcano plumes, for example). Novel airborne platforms incorporating tailored sensors and instrumentation suitable for supporting NASA's Earth science research goals are encouraged. Additionally, innovative subsystem elements that will support existing or future UAS are desired. Potential concepts include:

- Coordinated (Matrixed) Platforms: Systems that enable multiple measurements from several vantage points to increase spatial and temporal coverage.
- Optical or radio frequency system networks that will enable multiple unmanned aircraft systems to communicate with a global communication systems.
- Sense and avoid systems that enable flights in the National Airspace System.
- Attitude and navigation control for highly turbulent conditions.
- Low cost, high precision inertial navigation systems (< 0.10 degree accuracy, resolution).
- Small, easily transportable systems requiring a crew of one or two.
- Novel propulsion approaches targeting increased range and endurance, flight in adverse conditions, reduced operating costs, and/or minimum sampling contamination (NASA's SIERRA requires 25 to 40 hp, for example).
- Guided Drogsondes.

Sounding Rockets

The NASA Sounding Rocket Program (NSRP) provides low-cost, sub-orbital access to space in support of space and Earth sciences research and technology development sponsored by NASA and other users by providing payload development, launch vehicles, and mission support services. NASA utilizes a variety of vehicle systems comprised of military surplus and commercially available rocket motors, capable of lofting scientific payloads, up to 1300lbs, to altitudes from 100km to 1500km. NASA launches sounding rocket vehicles worldwide, from both land-based and water-based ranges, based on the science needs to study phenomenon in specific locations.

NASA is seeking innovations to enhance capabilities and operations in the following areas:

- High data rate telemetry and on board recording (greater than 20Mb/s).

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- High-accuracy, small, and affordable attitude, acceleration, and rate sensors for guidance, navigation and control systems.
 - High capacity, small, light-weight, operationally safe, and affordable batteries for on-board power systems.
 - Autonomous vehicle environmental diagnostics system capable of monitoring flight loading (thermal, acceleration, stress/strain) for solid rocket vehicle systems.
 - Location determination systems to provide over-the-horizon position of buoyant payloads to facilitate expedient location and retrieval from the ocean.
 - Flotation systems, ranging from tethered flotation devices to self-encapsulation systems, for augmenting buoyancy of sealed payload systems launched from water-based launch ranges.