



## NASA SBIR 2009 Phase I Solicitation

### S3.09 Technologies for Unmanned Atmospheric Platforms

Lead Center: AFRC

Participating Center(s): ARC, GRC, GSFC, JPL, LaRC

Unmanned Aerial Vehicles (UAVs) offer significant potential new capabilities for scientific earth exploration over a large range of mission durations, altitudes, and geographical locations. UAVs can carry earth resources remote sensing and atmospheric sampling instruments on scientific investigations including the Polar Regions. The potential for these robotic systems has just begun to be realized, and to date their earth observation and atmospheric sampling capabilities are in a state of infancy when compared to platform requirements needed to address national concern over global climate and environmental changes. Current UAV operations are restricted from operations in inclement weather particularly when airframe icing or freezing of fuel may become issues. Airframe icing limits both aircraft flight envelope and may affect scientific payload operations.

UAVs must adhere to regulatory requirements for flight operations within the national airspace. These regulatory issues pose challenges to the trade space of potential solutions. UAVs can be roughly categorized into 1) larger/high value assets and 2) smaller/lower value or expendable assets. Such categorization of UAVs may drive different technology solutions to meet the technology needs as described below.

- Precision flight path control for highly repeatable terrain monitoring over daily, seasonal or multi-year cycles;
- Highly accurate UAV platform attitude control with corresponding science payload instrument stability and pointing accuracy;
- Lower-cost over-the-horizon telemetry alternatives for real-time collaborative data sharing and decision-making involving multiple in-flight and ground-based instruments;
- Drop-sonde and surface sampling probes remote from the unmanned aircraft;
- Airframe icing detection and mitigation to enable UAV severe weather flight operations;
- UAV flight systems to enable long endurance inclement weather operations; systems such as fuel anti-freezing thermal management will be needed.

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Proposals should show an understanding of one or more relevant science needs, and present a feasible plan to fully develop a technology and infuse it into a NASA program.