NASA SBIR/STTR Technologies

Proposal No. S3.09-8972 – Expendable Guided Dropsonde

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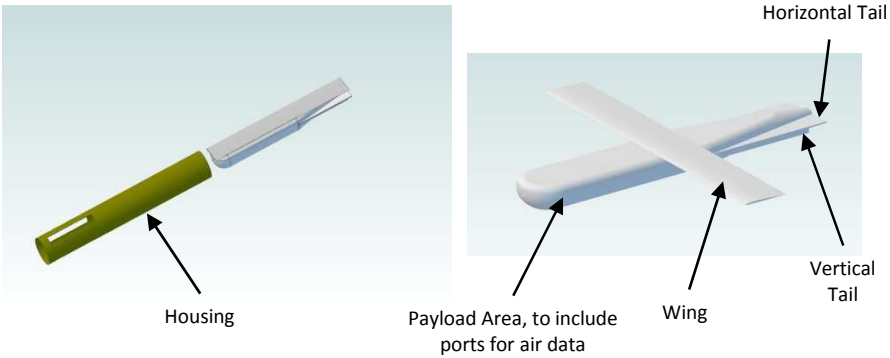
Identification and Significance of Innovation

Given the constraints associated with current airborne host platforms, a technological solution is needed for efficiently obtaining meteorological data at targeted locations and altitudes. A combination of using manned and unmanned aircraft with guided dropsondes is a promising and achievable path forward to meet this need. Guided dropsondes have significant implications to advance research in nearly all scientific disciplines requiring in situ atmospheric measurements. Compared to conventional free-fall dropsondes that rely on parachutes, guided dropsondes could offer speed controlled descents combined with loiter abilities. This can potentially yield time averaged data for a particular region—a feature not currently available with current dropsonde technology. The guided dropsonde's ability to move to targeted areas of interest gains sensors an unprecedented level of access to extreme areas and events. Being able to move to a designated area will also offer the potential to retrieve the guided dropsonde, giving it the capability to become an in situ sampler. For volcanic eruptions or pollution studies, this can become a powerful new tool where few options, if any, currently exist.

Expected TRL Range at the end of Contract (1-9): 6

Guided Dropsonde Conceptual Layout



Technical Objectives and Work Plan

The technical objectives of the proposed effort are to:

1. Show that a guided dropsonde body and controller can be developed and manufactured to meet the desired performance and cost objectives to end users.
2. Develop a plan to integrate the guided dropsonde into existing AVAPS systems with no hardware modifications and minimal software changes.
3. Develop a plan to integrate known and trusted sensors into the guided dropsonde payload bay.
4. Show that the end product can be used safely in the National Airspace (NAS) and develop a plan to apply for a COA allowing regular use of the guided dropsonde.

Latitude has divided the project into 6 key tasks to prove the feasibility of the proposed cost-effective guided dropsonde.

1. Define system requirements and notional mission profile
2. Design, prototype, and test a guided dropsonde.
3. Design, prototype, and test an inexpensive control system.
4. Install an off-the-shelf sonde package as a prototype sensor.
5. Work with sensor vendors to integrate existing sensor types into the payload and integrate with AVAPS.
6. Coordinate with FAA representatives to ensure that the resulting dropsonde will be acceptable for use in the NAS through a COA application.

NASA and Non-NASA Applications

Dropsondes have been employed to assist in validation of satellite data such as the NASA GloPac mission which included measurements for the Aura earth-monitoring satellite. The proposed guided dropsonde system would provide increased utility for this type of application. In polar regions where NASA balloon-based and airborne research is active, the proposed design would be versatile enough to be used with such host platforms.

Non-NASA applications include national and international universities, research institutes and government organizations involved in the full range of atmospheric and meteorological studies. All research and non-research groups currently using dropsondes in their programs are potential consumers, as well as those that have interest in small UAS. Commercial applications are numerous in such fields as agriculture, surveillance, fisheries and coastal monitoring, particularly if the guided system is recoverable and has reduced regulatory issues. Military agencies and the Department of Homeland Security are potential large-scale users of the proposed technology as it offers advantages in situational awareness and the ability to identify hazards without human risk or significant cost compared to conventional systems.

Firm Contacts

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NON-PROPRIETARY DATA