



NATIONAL SCIENCE FOUNDATION  
2415 EISENHOWER AVENUE  
ALEXANDRIA, VIRGINIA 22314

**NSF 19-055**

## **Dear Colleague Letter: Storm Penetrating Aircraft Capability - Concepts for Development and Operations**

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April 3, 2019

Dear Colleagues:

This Dear Colleague Letter (DCL) requests community responses on viable concepts for a Storm Penetrating Aircraft (SPA) capability. NSF supported the operation of a highly modified T-28 aircraft from the South Dakota School of Mines and Technology for over 30 years until the aircraft was retired in 2005. The T-28 collected many excellent in-storm observations during that period. However, scientific questions and technologies have evolved since the T-28 was last flown and NSF is interested in exploring opportunities to provide the research community with a platform that can help to meet current and anticipated future scientific needs in convective storm research.

Community consultations have indicated continuing interest in the capabilities offered by a Storm Penetrating Aircraft. The 2017 "Requirements for In Situ and Remote Sensing Capabilities in Convective and Turbulent Environments ([C-RITE](#)) Community Workshop" brought together over 100 community members to discuss next generation observational technologies and evolving scientific requirements. An outcome of that meeting was the development of a set of technical and operational requirements for a potential Storm Penetrating Aircraft that could be deployed as a multi-user facility for acquiring in-situ observations of key parameters associated with the evolution of severe convective storms. This DCL invites the community to submit viable ideas for the development and operation of platforms that can meet the following requirements:

- Altitude range of 35,000 to 40,000 feet
- Endurance of 5 hours or more
- 2 or more engines
- Ability to temporarily encounter and survive 2" hail
- Ability to encounter moderate icing (with de-ice or anti-ice systems)
- Ability to encounter moderate turbulence
- Science payload capacity of 1000 kg or greater

- Power availability for the science payload of 15 kW
- Ability to seat 1 or more science observers in addition to the flight crew
- Flight at speeds of 170 knots indicated airspeed (KIAS) or less at high altitudes while penetrating storms
- At least two wing hard points (one on each wing) to carry science payloads in pods

In all these categories, additional capabilities would further enhance the potential scientific missions.

NSF has the potential to access excess military aircraft, either currently flying or in storage, through interagency transfer to be operated as a public use aircraft. However, we do not want to exclude the possibility of non-military aircraft, nor do we require the SPA to be operated as an NSF-owned aircraft. NSF does not have a preconceived concept for management and operations, and we seek the community's input on ideas to proceed in this area, such as partnerships with other agencies (Federal or state) or commercial aviation organizations/companies. NSF encourages involvement by an academic or academic-related institution, but this is not a requirement. Businesses or Federal entities are welcome to respond to this DCL.

## **REQUEST FOR INFORMATION**

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NSF invites written responses by August 1, 2019. These should include the following:

- An overall concept for the development and operation of a Storm Penetrating Aircraft capability, including the potential airframe, expected capability, acquisition and development pathway, partnership arrangements, and operational model.
- Anticipated modifications required or upgrades for the potential airframe chosen to be capable of performing the Storm Penetrating Aircraft mission. Potential modifications might include hail armoring, lightning protection, turbulence handling, anti-/de-icing, communication (both voice and digital), radar support (airborne or terrestrial based), science payload to aircraft mechanical/electrical interfaces, science data storage, avionics upgrade, etc.
- A brief description of the submitting organizations' credentials for developing and managing the SPA, including ability to operate aircraft, expertise related to Federal Aviation Administration (FAA) certification if commercial aircraft is selected or operate in a public use status for non-commercial aircraft, ongoing maintenance, etc.

Responses to this request do not bind NSF to any further or specific actions related to this topic. This DCL is not a formal solicitation for proposals, and conveys neither a financial commitment nor a reflection of a final decision of the plans for an SPA. To the extent that the sender plans to provide any information that it considers proprietary, such status must be communicated unambiguously and clearly marked.

## PRIMARY CONTACT

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All responses to this Dear Colleague Letter should be directed to the NSF Division of Atmospheric and Geospace Sciences Lower Atmospheric Observing Facilities Program at [laof@nsf.gov](mailto:laof@nsf.gov).

Sincerely,

William E. Easterling  
Assistant Director for Geosciences