



Special Temporary Authority to Test Radar Instrumentation

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A. Purpose of Operation and Need for License

The purpose of operation is snow radar depth measurements

B. Locations of Proposed Operation

Project Summary: The project aims to conduct airborne radar snow depth measurements over a drainage basin in the Black Hills National forest. These measurements will be used in hydrological models for improved seasonal prediction of streamflow.

Proposed Locations: Measurements will be conducted within a 17 mile radius of (44° 4'56.25"N, 103°49'3.42"W). The KU Cessna C-172 will fly three types of missions (KML files with preliminary way points attached) of approximately 4-5 hours each, as indicated in the table in the figure and illustrated by the inset image. Flights 1 and 2 construct a grid of flight lines spaced 1.5 km that will be used for assimilation into the hydrology model. This spacing was primarily dictated by the range of the aircraft. For the SNOTEL multipass flights, each red line represents five flight lines offset by 100m. These measurements will provide sufficient coverage for us to compare repeat lines with the SNOTEL sensors. The orange square consists of variable terrain. The NE and SW portions of the area consists of various levels of vegetation and relief. The relatively flat and tree-less area in the middle will help us verify snow depth measurements in the vegetated and steep terrain. We plan to fly three parallel tracks across this area with five repeat lines per track. Finally, the blue lines represent relatively flat and tree-less valleys that feed into the stream gauge locations. The length of each valley will be flown once. Ideally, all flights will be flown at 500 m above the highest terrain on a given flight line, but we will coordinate this with the pilot. Assisting the pilot with flight line accuracy will be a radar engineer, using an existing GPS-based program and LED display.

Dates: January/February 2021. We are planning 3 different flights of 4-5 hours each over a two-week span. If the weather is favorable, we will repeat the flight.

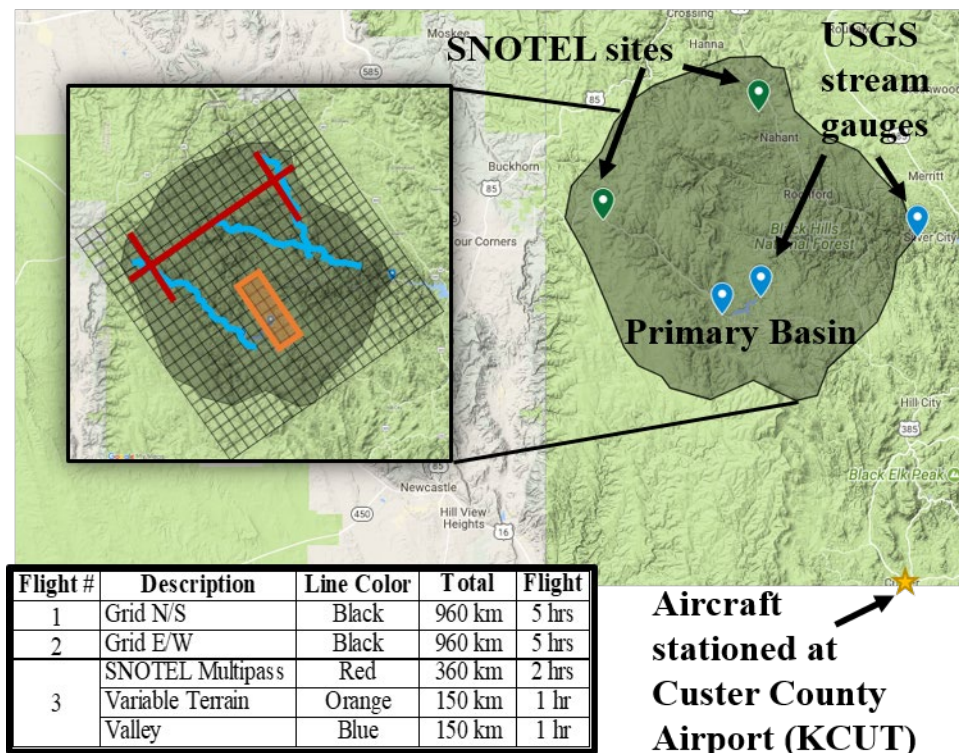


Image 1. Test area over Black Hill State Forest

C. Technical Specifications

1. Frequency of Operation

CReSIS requests authorization to operate in 2-18 GHz bands.

2. Effective Radiated Power (ERP)

The effective radiated power (ERP) will not exceed 1 W

3. Modulation Signal Description and Emissions

The system is a frequency modulated continuous wave radar that emits a 2-18 GHz chirp. the chirp duration is 1 μ s and the pulse repetition frequency is 2 kHz. The primary emission designator is 16GOMON/16GOGON

4. Antenna Information

The antenna used directive horn antenna mounted on the wing struts of a C-172.

5. Equipment Utilized

Equipment used for this system is custom built at CReSIS.

6. Station Class

This station will be Aeronautical Mobile in the areas described in section C, with a nominal altitude of 1500-4500 feet AGL.

E. Contact Information

For questions about this application or in the unlikely event interference concerns should arise, please contact:

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