LAOF
RESEARCH AIRCRAFT

Overview

NSF/NCAR C-130

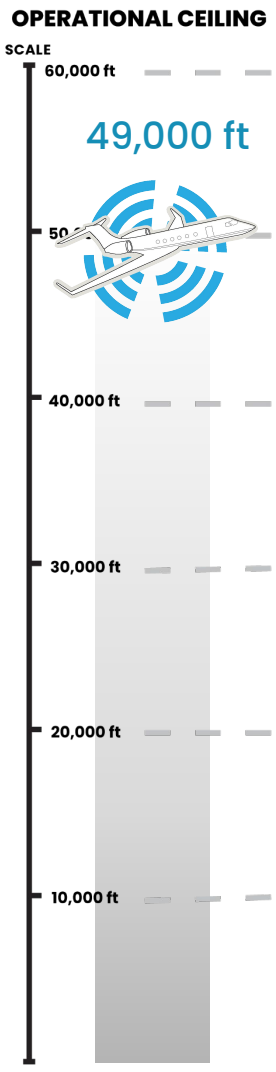
The NSF/NCAR C-130 is a four-engine, medium-size utility aircraft that has been extensively modified for research applications. The aircraft is ideal for studies of the lower to middle troposphere, especially those that require large payloads and long flight durations.

NSF/NCAR HIAPER GV

The NSF/NCAR HIAPER research aircraft is an extensively modified Gulfstream-V business jet. Capable of reaching altitudes up to 49,000 feet and with a range of 4,000 nautical miles, it enables scientists to collect data at both the top of storms and at the lower edge of the stratosphere, while traveling to remote parts of the globe.

UW King Air 2

The University of Wyoming's Next Gen King Air 2 (UWKA-2) is a modern Beechcraft King Air 350i with more than 50 modifications specifically designed for accommodating existing and new research instrumentation, including radars and lidars, cloud physics, air chemistry, and aerosol in-situ probes.



NSF/NCAR HIAPER

The **NSF/NCAR High-performance Instrumented Airborne Platform for Environmental Research (HIAPER)** aircraft is the preeminent airborne research platform for researchers interested in the upper troposphere and lower stratosphere. HIAPER has demonstrated success in collecting data required to meet a broad range of scientific studies and objectives, including chemical composition, transport and processes; atmospheric dynamics and thermodynamics on synoptic and mesoscales; cloud properties and processes; atmospheric predictability; electrification of the atmosphere; and even solar eclipses.

Quantitative Characteristics

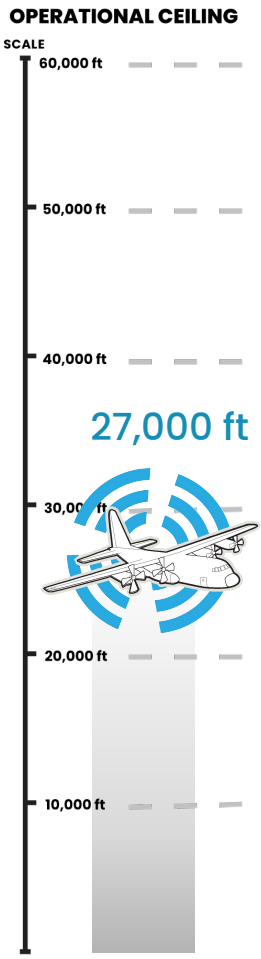
- Endurance: 10 hrs
- Range: 4,000 nmi
- Flight Ceiling: 49,000 ft
- Maximum Payload: 5,600 lbs

Scientific Capabilities

The aircraft's flight characteristics, plus the ability to carry up to 5,600 pounds of instrumentation, make the HIAPER GV a versatile airborne laboratory for scientific discovery. Scientists are able to bring an entire suite of instruments to the upper edges of storm systems, offering unprecedented details for studying powerful weather events. The aircraft enables researchers to study critical chemical processes from the Earth's surface to the stratosphere, often in remote locations. These types of data are essential for understanding environmental changes, for example those caused by air pollution. The HIAPER GV has also supported remote sensing measurements in remote locations that played a crucial role in the calibration and validation of satellite instruments. Due to its long range, the HIAPER GV is particularly useful for bridging high resolution in-situ data with broad coverage satellite data, and with global scale models to help enhance their accuracy.

Each HIAPER GV payload is customized to meet the scientific objectives and research goals of a specific mission.

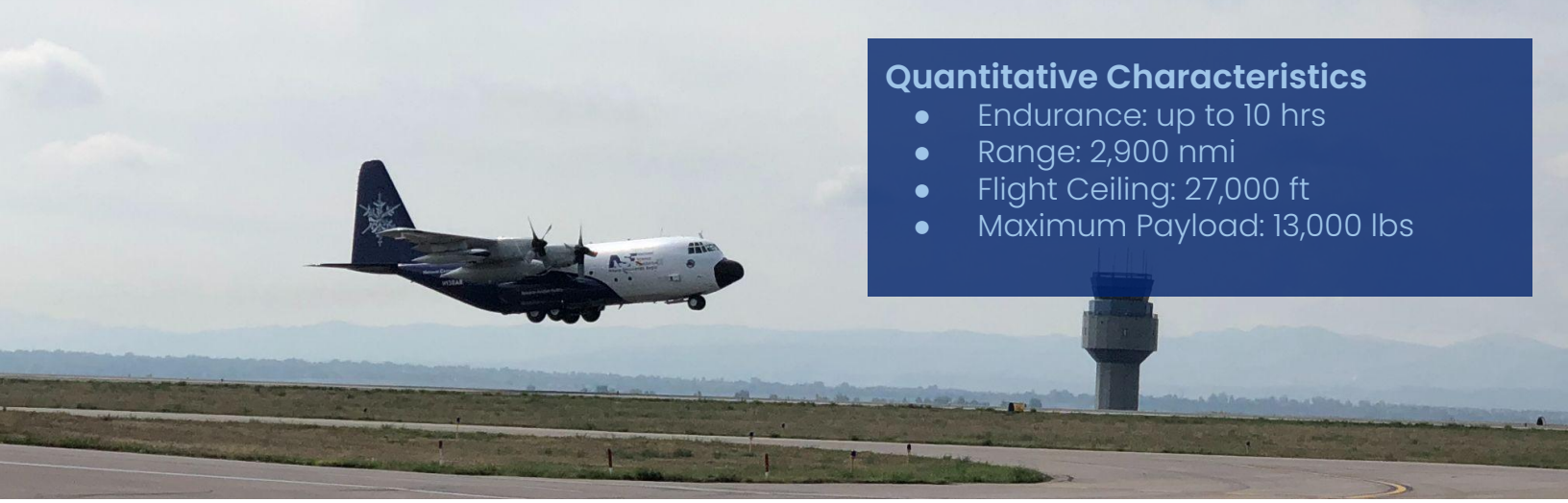
The HIAPER GV is maintained and operated on behalf of NSF by the National Center for Atmospheric Research (NCAR). HIAPER is based in Broomfield, Colorado, USA, and is managed by EOL's Research Aviation Facility (RAF).



NSF/NCAR C-130

The **NSF/NCAR Lockheed C-130Q Hercules** is a four-engine, medium-size utility aircraft that has been extensively modified for research applications. Upgrades to this versatile aircraft include air-conditioning and electrical improvements, with 40 kilowatts available for research.

The NSF/NCAR C-130 is ideal for studies of the lower to middle troposphere. With its 13,000-pound payload capability, a 2,900 nautical mile range at 27,000 feet, and up to 10-hour flight endurance, the C-130 is suitable for a variety of research missions, especially in the planetary boundary layer.



Quantitative Characteristics

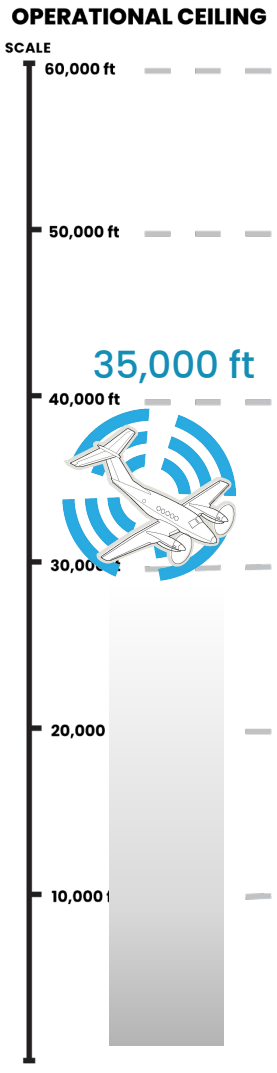
- Endurance: up to 10 hrs
- Range: 2,900 nmi
- Flight Ceiling: 27,000 ft
- Maximum Payload: 13,000 lbs

The C-130 is equipped with standard thermodynamic, wind and turbulence, microphysics, radiation, and trace gas instruments. The aircraft has a roomy fuselage with a sizable payload area, and can be equipped with a variety of versatile inlets, optical ports, and several wing pods. This allows the aircraft to carry advanced NCAR and community instrumentation, including the AVAPS Dropsonde system, the Wyoming Cloud Radar, and the Wyoming Cloud Lidar.

The NSF/NCAR C-130 is maintained and operated on behalf of NSF by NCAR. The C-130 is based in Broomfield, Colorado, USA, and is managed by EOL's Research Aviation Facility.

TYPICAL RESEARCH APPLICATIONS

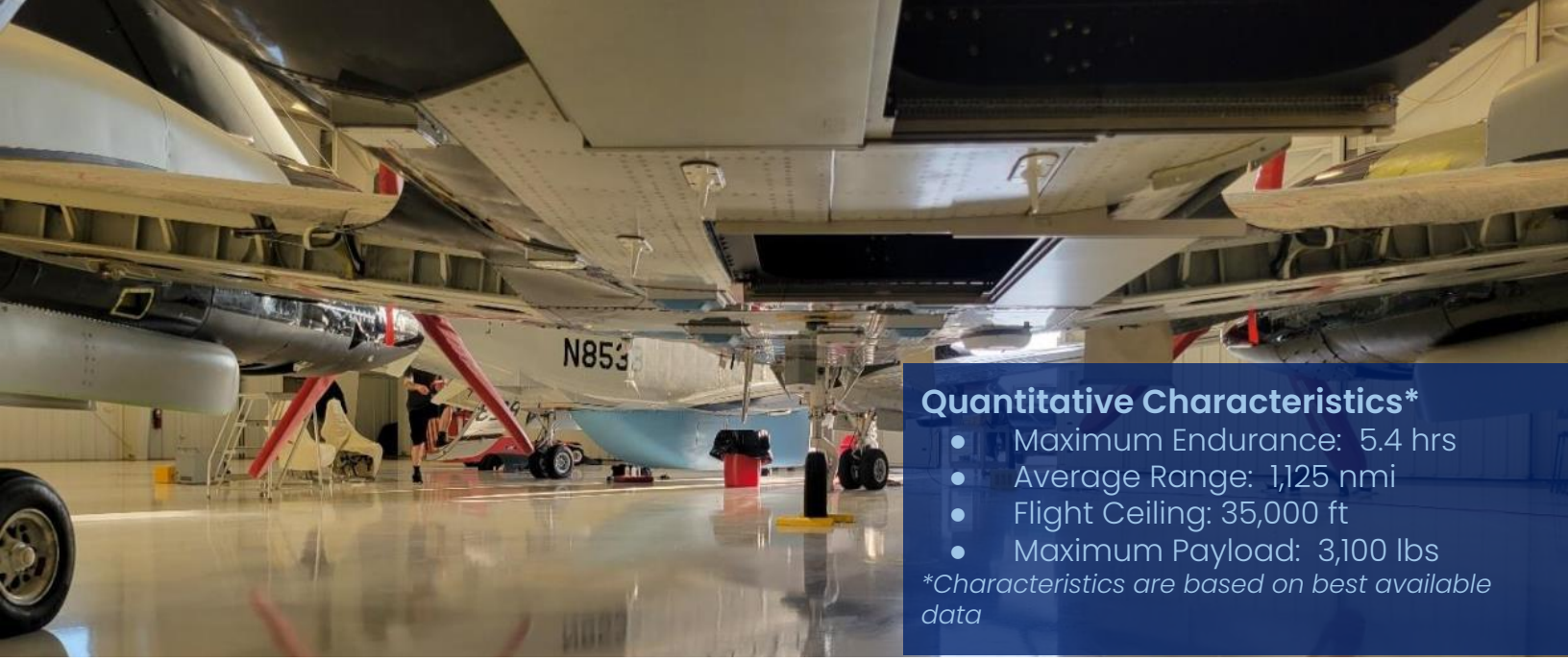
The NSF/NCAR C-130 is routinely used in field campaigns designed to study chemical processes in the atmosphere, e.g., sea surface-to-air exchange, and natural and anthropogenic air pollution. Its relatively low flight ceiling, along with its capacity for large research teams and instrument packages, make the aircraft ideal for gathering data in the lower parts of the atmosphere. Past programs have involved tracking the dependencies between the upper ocean currents and cloud circulation in the southeast Pacific; measuring the impact of cloud formation on sulfur levels in the marine troposphere; monitoring the emissions and evolution of wildfire plumes, and studying patterns of ice particle formation in clouds.



UW KING AIR 2

In October 2019, the University of Wyoming was awarded a grant from NSF through the Mid-Scale Research Infrastructure Program to develop the **University of Wyoming's Next Gen King Air 2 (UWKA-2).** The aircraft replaces the now retired UWKA and will serve the NSF-funded observational community for the next several decades as the platform of choice for a broad range of investigations.

The UWKA-2 is a modern Beechcraft King Air 350i and includes more than 50 modifications specifically designed to accommodate an unprecedented suite of existing and new research instrumentation. It offers additional ports for a larger payload, greater power capacity, longer endurance, and improved investigator access.



Quantitative Characteristics*

- Maximum Endurance: 5.4 hrs
- Average Range: 1,125 nmi
- Flight Ceiling: 35,000 ft
- Maximum Payload: 3,100 lbs

**Characteristics are based on best available data*

TYPICAL RESEARCH APPLICATIONS

The standard equipment on the UWKA-2 measures temperature, including remotely sensed surface temperature; pressure; humidity; air motion; turbulent fluxes of momentum, heat, moisture, and carbon dioxide; and a variety of cloud and aerosol properties. The UWKA-2's remote sensing capabilities include the multiple-beam 95-gigahertz UW Cloud Radar (WCR) and the upward and downward-pointing, 355-nanometer UW Cloud Lidar (WCL) system.

Typical missions include studies of boundary layer structure, air-sea interactions, cloud and aerosol physics, troposphere profiling, and atmospheric chemistry. The WCR and WCL can provide vertical "curtain" views of cloud structure. Multiple beams on the WCR can be used to produce dual-Doppler wind analyses above and below flight level. The combination of in-situ cloud and kinematic observations with these capable remote sensing tools provide unique data sets for detailed microphysical studies.

The UWKA-2 is now available for deployment requests through the standard NSF facility and Instrumentation request process, and will be available for field programs in 2024.

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Online Resources:
www.eol.ucar.edu/research-facilities/research-aircraft

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