United States Department of the Interior

BUREAU OF LAND MANAGEMENT

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Request for Public Input

Dear Interested Party:

This letter is a request for comments on a proposed Temporary Use Permit (TUP) application filed by Vanda Grubisic, Ph.D., working at the Desert Research Institute, Division of Atmospheric Sciences, in Reno, Nevada. Comments will be used to identify issues and concerns for analysis of the proposal in an environmental assessment.

I have enclosed the proposal by Ms Grubisic for your review. The proposal includes several aerial flights over the Inyo Mountain Wilderness. These flights would be between 1000-3000 feet above ground level (AGL). There would be up to 20 flights during a 60 day period during, of which about 10 minutes of each flight would be over Wilderness. The flights would be used to disperse dropsondes, meteorological instruments composed of a 15" long cylinder with electronics and 9" long parachute. The dropsondes are bio-degradable except for the circuit board. It is conceivable that 10-15 dropsondes might land within Wilderness boundaries. The BLM would stipulate that reasonable attempts be made to recover any dropsondes landing within the Wilderness boundary.

This proposal is part of a large scale project funded by the National Science Foundation and the National Center for Atmospheric Research, a federal government agency, to study large wind-generated rotor events in the Owens Valley. This project has been on-going for 2 years and the BLM, U.S. Forest Service and LADWP have previously issued permits for a number of temporary, ground-based, measuring systems near Independence in support of this project. The project is expected to provide important scientific data, contributing to a better understanding of wind-generated rotor events with the potential to increase general aviation safety. The Owens Valley is considered to be the ideal project site due to the steep slopes of the Sierra Nevada and Inyo Mountains that precipitate frequent wind-generated rotor events.

Due to the short time-frame of this proposal, I am requesting that any comments be received in this office by January 31, 2006. If you need more information, please contact Larry Primosch at this office 760 872-5031.

Sincerely,

Bill Dunkelberger
Field Manager

Introduction

This permit application is for aircraft operations within the restricted airspace above the BLM Wilderness Areas of the White-Inyo Mountains to collect special atmospheric measurements. Two types of operations are requested. 1) Occasional aircraft flights into the restricted airspace at or below 3000 ft above ground level (AGL) over the Wilderness Areas; these flights would only be done within prudent flight safety considerations and at least 1000 ft AGL. 2) Vertical measurements of atmospheric conditions including wind direction and speed, pressure, temperature and humidity using expendable packages released from aircraft flying over the Wilderness Area, with the possibility that a small number of the expendable dropsonde units may land within the Wilderness boundaries.

The flight tracks and sounding profiles provide critical measurements that define the upstream structure of the lower atmospheric layer that flows over the Sierra Nevada topographic barrier and produces the large-amplitude mountain wave and strong rotors over the Owens Valley. Detailed measurements of the upstream atmospheric layers are the defining properties that permit accurate computer simulations of the mountain wave structure and its prediction.

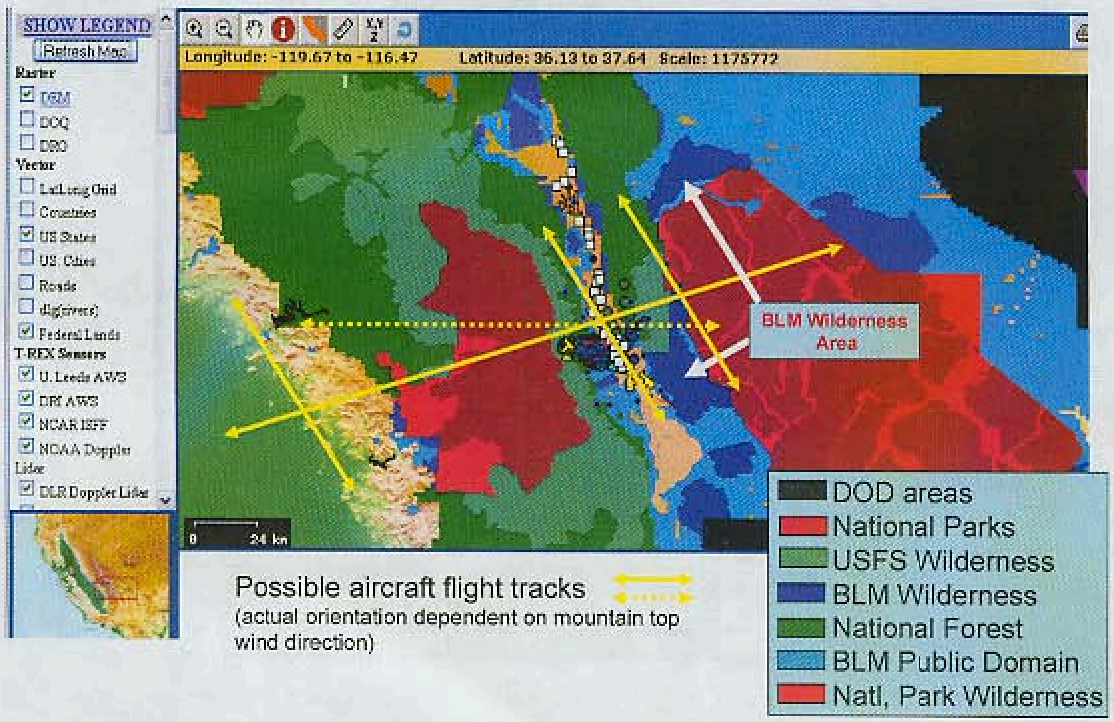
Measurement Platforms

The Terrain-induced Rotor Experiment (T-REX) is an NSF-funded project to study the coupled mountain-wave, rotor, and boundary-layer system. Three research aircraft are being utilized in the T-REX Project, a Gulfstream V operated by the National Center for Atmospheric Research, a King Air 200 operated by the University of Wyoming and a Bae-246 operated by the University of Leeds and British Meteorological Office.

The King Air and Bae-146 will make flight level measurements from about 1000 ft AGL to 25,000 ft MSL along the flight tracks shown in Fig.1. The exact track will be determined by the mean wind direction of the over-mountain flow, with the requirement that the flights pass over the ground based observing network centered on Independence in the Owens Valley. The flight tracks in Fig.1 show the regions in which the research aircraft might propose to make limited passes in the restricted airspace over the Wilderness areas. The duration of any aircraft within this airspace will be quite limited. The aircraft crews have considerable experience in flying near terrain to study boundary layer conditions. Any of these flights will be done in a safe manner in appropriate visual flight rules (VFR) conditions no lower than 1000 ft AGL. Given the number of flight hours available to the aircraft, it is unlikely that more than 10 min during each of 20 flights over a 60 day period would be in this airspace.

The Gulfstream V and Bae-146 aircraft are equipped with Global Positioning System (GPS) dropsonde deployment systems. A dropsonde is a meteorological instrument package launched from aircraft. It descends through the atmosphere by parachute and provides detailed vertical structure of atmospheric winds, pressure, temperature and humidity. Information is relayed via telemetry link to the launch aircraft. The package is small (41 cm long, 7 cm diameter) and weighs less than 400 g. A picture of the package and detailed specifications are included in the attached Vaisala Dropsonde RD93 specification sheet (see attachment). The two aircraft will deploy the dropsondes from flights between 25,000 and 45,000 ft MSL. Location and orientation of track (shown in Fig. 1) will vary based on cross-barrier wind direction and speed and the location of cloud features of interest (e.g. rotors and wave clouds) but will always pass over the Owens Valley network centered on Independence. We estimate that no more than 10-15 expendable dropsondes will land in the combined BLM White-Inyo Mountains Wilderness Areas.

Figure 1. T-REX Project Flight Operations Area



Impacts and Benefits

The primary impact of the low-level flights will be a very brief aircraft noise as the aircraft passes over head. Every effort will be made to avoid gatherings of wildlife such as elk, mountain sheep, and raptors.

The dropsondes pose no threat of impact damage since they fall slowly by parachute. The device is constructed of cardboard and nylon which will decay over time, except for a small (6.7x27 cm) circuit board located within the cardboard cylinder. There are no hazardous materials. Since the chute (approx. 30 cm2) and cylinder are made of non-conducting materials they do not present a risk of producing an electrical arc across power transmission lines. The entire train of chute, suspending nylon string and cylinder is less that 60 cm long. These sondes have been deployed in severe weather studies across the Great Plains area of the Central U.S. without any reports of impacts on people or property. They have also been used for several decades in hurricane research.

The following benefits to the White-Inyo Mountains and its operations are expected from the data collection and analysis of T-REX data:

- Improved forecasting/warning of severe surface weather in the higher elevations of the Sierra Nevada and White-Inyo Mountains and in the Owens Valley area
- Improved forecasts/warnings to commercial, military, recreational, and search and rescue aviation operations, in, and near the higher elevations of the Sierra Nevada and White-Inyo Mountains and the Owens Valley area
- Greatly improved scientific understanding of atmospheric processes over lee slopes of the Sierra Nevada, windward slopes of the White-Inyo Mountains and the Owens Valley including downslope windstorms, mountain waves and rotors
- Better understanding of pollution episodes derived from Owens Valley sources and improved forecasting/monitoring of events where air quality is an issue
- The research findings from T-REX will be applicable to other lee side locations worldwide where nearby mountains influence the weather to a large extent
- Availability of a rich T-REX data archive fully open and accessible to researchers in this region and elsewhere.

Schedule

The T-REX observational campaign is planned to take place across the Sierra Nevada and White-Inyo Mountains and in the Owens Valley, during 1 March to 30 April 2006. The March-April time frame is best suited for the entirety of the T-REX scientific objectives because the position of the boundary between the polar and subtropical jets provides the optimal conditions for development of large-amplitude mountain waves and rotors (Holmboe and Klieforth 1957); it is also suggested by a recent cloud satellite climatology (Grubišić and Cardon 2002). Together, March and April include many days with conditions favorable for generation of mountain waves and rotors and also many days when it will be possible to document terrain-induced boundary-layer circulations in the Owens Valley under more quiescent conditions.

Contacts

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Collaborating Investigators

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Vaisala Dropsonde RD93

- **For use with Vaisala AVAPS and AVAPS Lite dropsonde receiving systems**
- **Manufactured under license from NCAR**
- **Widely used since 1997**

The Vaisala Dropsonde RD93 is a general-purpose, precision dropsonde meant for high-altitude drops from high-speed aircraft. It transmits PTU and wind data at a high data rate.

WHAT IS A DROPSONDE?

The Vaisala Dropsonde RD93 is a meteorological device that is launched from an aircraft. Descending through the atmosphere by parachute, it measures atmospheric pressure, temperature, relative humidity (PTU) and wind from the point of launch to the ground. The RD93 is used with the Vaisala AVAPS and AVAPS Lite dropsonde receiving systems. The RD93 transmits data over a telemetry link to the onboard receiving system. The onboard GPS receiver tracks the dropsonde's horizontal movement as it is borne by the wind. The dropsonde electronics board has a microprocessor for measuring and controlling the sensor module and data transmission. The narrowband transmitter can be set anywhere in the 400 MHz meteorological band.

STABLE DESCENT

A parachute with a patented square-cone design deploys immediately upon launch. It slows and stabilizes the RD93's descent and ensures that it does not descend with a pendulum motion. The rate of descent is approximately 11 m/s. Mid-sized and large parachutes, available as options, provide descent rates of 7 m/s and 5 m/s respectively.

WHAT ARE THE VAISALA AVAPS AND AVAPS LITE?

The Vaisala AVAPS and AVAPS Lite systems receive, display and store the dropsonde data. The Vaisala AVAPS can track up to four descending dropsondes at the same time. This is an essential ability in weather reconnaissance that is carried out with high-speed, high-altitude reconnaissance aircraft.

The Vaisala AVAPS Lite is a receiving system for receiving data from one dropsonde at a time. Small and lightweight, it can be operated with a laptop PC.

INTELLECTUAL PROPERTY RIGHTS AND DEVELOPMENT

The Atmospheric Technology Division (ATD) of the National Center of Atmospheric Research (NCAR) developed the hardware and software for the Vaisala RD93 Dropsonde, the Vaisala AVAPS and the Vaisala AVAPS Lite. The hardware and software are licensed to Vaisala Inc., USA. NCAR/ATD and Vaisala are committed to the continuous development of the AVAPS and AVAPS Lite hardware and software in accordance with the evolving requirements of our customers. Vaisala AVAPS and AVAPS Lite bring together world-leading GPS technology and PTU sensor technology, the results of Vaisala's 60+ years of expertise in atmospheric measurement.

Thousands of RD93 dropsondes are used every year in hurricane reconnaissance and research and other meteorological research projects.

TECHNICAL INFORMATION

VAISALA DROPSONDE RD93

Weight	< 400 g
Size	7 cm in diameter, 41 cm in length
Maximum deployment airspeed	250 kt IAS (= 125 m/s IAS)
Shelf life	1 year from delivery

TRANSMITTER

Frequency range	400 MHz to 406 MHz
Frequency stability	±3 kHz
RF power output	100 mW
Channel spacing	100 kHz
IF bandwidth	20 kHz
Harmonic & spurious output	>50 dB below the carrier level
Total modulation	>2.5 kHz, <3.5 kHz
Telemetry range with recommended receiving antenna	325 km

GPS RECEIVER

Type	Vaisala codeless GPS receiver GPS121
Channels	Tracks up to 8 satellites simultaneously
GPS data downlink	1200 baud, digital
Modulation	FSK
Error checking	CRC

PTU MODULATION

PTU data downlink	640 baud, digital
Error checking	CRC-16

BATTERY

Type	Six lithium CR-2 cells in series
Voltage	>15 VDC
Current	Max. 235 mA, 200 mA average
Life	2 hours (operating), 3 years (shelf)

PRESSURE SENSOR

Vaisala BAROCAP® silicon sensor	
Range	1080 hPa to 3 hPa
Resolution	0.1 hPa
Accuracy	
Repeatability*	0.4 hPa

TEMPERATURE SENSOR

Vaisala THERMOCAP® Capacitive bead	
Range	-90 °C to +60 °C
Resolution	0.1 °C
Accuracy	
Repeatability*	0.2°C
Response time (when used and measured in Vaisala Radiosonde RS80)	
6 m/s, 1000 hPa	< 2 s

RELATIVE HUMIDITY SENSORS

Vaisala H-HUMICAP® thin film capacitor, heated twin-sensor design	
Range	0 % to 100 % RH
Resolution	1 % RH
Accuracy	
Repeatability*	2 % RH
Response time (when used and measured in Vaisala Radiosonde RS90)	
6 m/s, 1000 hPa, +20 °C	< 0.5 s
6 m/s, 1000 hPa, -40 °C	< 20 s

HORIZONTAL WINDS

Range	0 m/s to 200 m/s
Resolution	0.1 m/s
Wind measurement accuracy	0.5 m/s RMS

DESCENT

Descent speeds	
RD93	~11 m/s at sea level
RD93M	~7 m/s at sea level with optional mid-size parachute
RD93L	~5 m/s at sea level with optional large parachute
Descent time for RD93	
From 14 km	~15 mins
From 7.5 km	~8 mins

* Standard deviation of differences between two successive repeated calibrations, k = 2 confidence level

VAISALA
Reliable.

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