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Mr. Garry Oye
District Ranger
Forest Service
Inyo National Forest
798 North Main Street
Bishop, CA 93514

September 13, 2005

Dear Mr. Oye,

This letter represents an umbrella application for permits for installing a suite of ground-based instruments on the Forest Service land in Owens Valley, CA that are planned to be used during the two month field campaign of the Terrain-induced Rotor Experiment (T-REX) in March and April 2006.

Project Background

Atmospheric rotors, low-level horizontal vortices that form along an axis parallel to and downstream of a mountain ridge crest in association with large-amplitude mountain waves, are known to pose a great hazard to aviation. They can also contribute significantly to lofting of dust and aerosol on the dry lee side of mountain ranges during high wind conditions that accompany waves and rotors. The T-REX field experiment and ensuing multi-year research program represent the second phase of a coordinated effort to study rotors and related atmospheric phenomena in complex terrain. The goal of this research is to improve the prediction of aviation hazards, downslope windstorms, and aerosol transport and dispersion in complex terrain. We chose the Sierra Nevada and Owens Valley because of its extreme terrain and as a place where mountain waves (Sierra Waves) and rotors are well know to achieve great amplitude and strength. T-REX participants include investigators from a large number of US universities and agencies, the National Center for Atmospheric Research, and several European universities and research institutes. The major funding for T-REX is being provided by the National Science Foundation, with a number of other US and European agencies contributing to the T-REX observational and research effort funding, including the Natural Environmental Research Council (UK), Office of Naval Research (USA), Federal Aviation Administration (USA), the Austrian Ministry of Science (AUT), and the Swiss Science Foundation (CHE).

Previous Work

The initial, exploratory phase of this effort has been a three-year project funded by the National Science Foundation and conducted in collaboration between the Desert Research Institute, University of Washington, Naval Research Laboratory, and the National Center for Atmospheric Research. The Sierra Rotors (SR), a two-month field campaign of this project, took place in March and April 2004. The core of the SR instrumentation was the DRI long-term network of 16 automatic weather stations (AWS) with telemetry, located in the central part of Owens Valley near Independence. These stations, with sensors on 10-m towers, have been providing data continuously in near real-time since February 2004, with the data lookup available online at http://www.wrcc.dri.edu/trex. One station of this network is located on the Forest Service land, and the permit for it has been previously secured from your agency. During the two months (March-April 04) of the SR field campaign, two Integrated Sounding Systems (ISS) were deployed to the study area in Owens Valley by the investigators from the National Center of Atmospheric Research. One of their instruments was placed near the south end of the DRI network, on the Los Angeles Water and Power Department (LAWPD) land, and the other at Independence Airport. The permits for that short-term installation were successfully secured from the LAWPD and the County of Inyo prior to the beginning of the SR field campaign.

Since the completion of SR and in preparation for T-REX, the University of Leeds atmospheric science group has pursued installation of additional 12 AWS in Owens Valley, extending the spatial coverage provided by the DRI network. The process for obtaining permits for installing six of these stations on the Forest Service land has been initiated last fall.

New Permit Requests

The overview of the full T-REX 2006 ground-based instrumentation suite is shown in the attached Figure. This suite includes the above two AWS networks and a number of additional instruments and sensors. A portion of these additional instruments and sensors are planned to be located on the Forest Service land. While a number of instrument sites in this figure are marked at their final desired locations, determined during our two recent site surveys, the remainder is still awaiting future surveys. Enclosed with this letter are individual permit requests for those instruments or set of sensors for which we know the final locations at this time, the majority of which will need to be installed several months ahead of the T-REX field campaign. Permit requests for the remaining instruments, referring to this communication, will be submitted sometime this fall after their final locations have been selected.

The installation schedule for the majority of the T-REX ground-based instrumentation suite will be mid-February, except for (1) tall (32-m) flux towers, (2) temperature data loggers (HOBOs), and (3) soil moisture sensors, which will all need to be installed several months ahead of the field campaign. The specific installation dates are provided in the individual permit requests. All short-term installations will be removed shortly after the end of the T-REX field campaign in early May 2006.

If archeological surveys are needed for the instrument sites, Dr. David Rhode, a DRI archeologist who has done previous surveys for the Sierra Rotors installations, has agreed to work with us again in T-REX. We are expecting to hear from you whether and for what sites archeological surveys will be needed.

At this time, we are also applying for permits with the Bureau of Land Management and the LAWPD for the rest of the T-REX instrumentation suite that is planned to be located on their land, and the County of Inyo for building permits for our towers on the LAPWD land.

If you need any additional information or have general questions about T-REX, please, do not hesitate to contact me. For questions regarding the T-REX ground-based instrumentation deployment and our permit applications, please, contact Dr. Richard Dirks at the National Center for Atmospheric Research.

We are looking forward to hearing from you soon.

Sincerely,

Vanda Grubišić
Associate Research Professor
Chair, T-REX Scientific Steering Committee

T-REX Contacts:

General T-REX inquiries
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Attachment: T-REX ground-based instrumentation suite

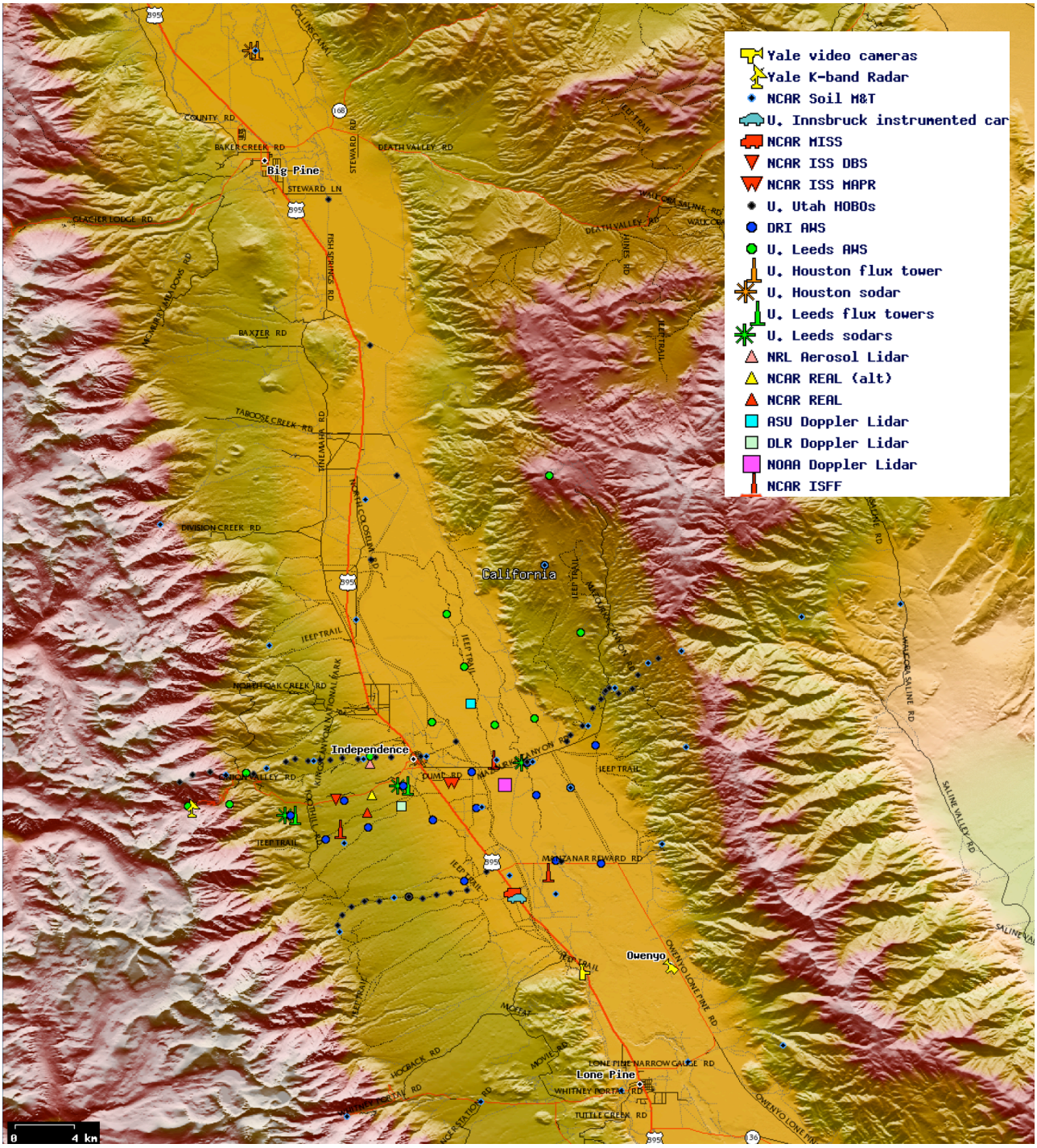

Figure 1: Planned T-REX ground-based instrumentation suite in Owens Valley, CA. The main cluster is located south of Independence.

List of T-REX ground-based instruments. Names and institutional affiliation of instrumentation principal investigators are provided in the parentheses.

1) DRI Automatic Weather Station (AWS) Network (Vanda Grubišić, Desert Research Institute) – permitted, already in place
2) Leeds AWS Network (Stephen Mobbs, University of Leeds, UK) – permitted, to be built in fall 2005
3) HOBO Temperature Data Loggers (~50 HOBOs) (David Whiteman, University of Utah)
4) Soil Moisture and Temperature Probes (~30 probes) (Greg Poulos & Tina Chow, National Center for Atmospheric Research & UC Berkeley)
5) NCAR Integrated Surface Flux Facility (ISFF; 3 32-m tall instrumented towers) (Steven Oncley, National Center for Atmospheric Research Earth Observing Laboratory (NCAR/EOL))
6) Leeds Flux Towers (2 15-m tall instrumented towers) (Stephen Mobbs, University of Leeds)
7) Houston Flux Tower (1 10-m tall instrumented tower) (Sharon Zhong, University of Houston)
8) Tethered Lifting System (TLS; instrumented kites and aerodynamic blimps) (Ben Balsely & Rod Frehlich, University of Colorado); *not shown in the figure*
9) Instrumented Car (Georg Mayr, University of Innsbruck, *Austria*)
10) Time-Lapse Video Camera System (Ronald Smith, Yale University)
11) NOAA Doppler Lidar (Robert Banta, National Oceanic and Atmospheric Administration Environmental Technology Laboratory (NOAA/ETL))
12) DLR Doppler Lidar (Martin Weissmann, Deutschen Zentrum für Luft- und Raumfahrt (DLR), Germany)
13) ASU Doppler Lidar (Ronald Calhoun, Arizona State University)
14) NCAR Aerosol Lidar (REAL) (Stephan De Wekker & Shane Mayor, NCAR/EOL)
15) NRL Aerosol Lidar (William Hooper, Naval Research Laboratory)
16) NCAR Integrated Sounding System (3 ISSs) (Steven Cohn & William Brown, NCAR/EOL)
17) Leeds sodars (3 sodars) (Stephen Mobbs, University of Leeds)
18) Houston sodar (1 sodar) (Sharon Zhong, University of Houston)
19) K-band radar (Ronald Smith, Yale University)