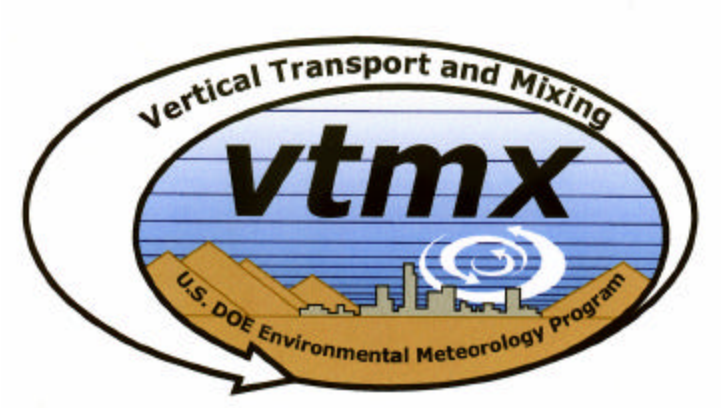

Meteorological Study of Atmospheric Vertical Transport and Mixing

Field Measurement Program

A meteorological field measurement program will take place in the Salt Lake Valley during October 2000. Scientists from government laboratories, universities, and private industry will be carrying out studies of the processes contributing to the vertical transport and mixing of momentum, heat, and water vapor in the lowest few thousand feet of the atmosphere. Such processes affect how wind speed, temperature, and moisture vary with height and how atmospheric pollutants may be distributed over an area. Our current ability to describe or model many of the phenomena relevant to vertical transport and mixing is limited when conditions of light winds and weak atmospheric turbulence are present - conditions that frequently occur at night or during stagnant weather periods during the winter. In this program scientists will concentrate on examining such periods in an effort to increase the fundamental understanding of these phenomena, which may eventually lead to improved air quality and weather forecasting models.

Participants

The program is sponsored by the U.S. Department of Energy as part of their Environmental Meteorology Program in the Environmental Sciences Division, Office of Biological and Environmental Research of the Office of Science. Participants include researchers from the following institutions:

Department of Energy -
- Argonne National Laboratory
- Brookhaven National Laboratory
- Los Alamos National Laboratory
- Pacific Northwest National Laboratory

National and Oceanic Administration -
- Environmental Technology Laboratory
- Atmospheric Turbulence and Diffusion Division

University of Utah
University of Massachusetts
Oregon State University
Stanford University
Arizona State University
Desert Research Institute
Colorado Research Associates
National Center for Atmospheric Research

Locale

The Salt Lake Valley was chosen as a study site for a number of reasons. The surrounding mountains often contribute to the development of cold pools, i.e., conditions in which colder air is trapped in the valley while warmer air is found at higher elevations. Vertical transport and mixing processes in these conditions can be particularly difficult to describe. Flows over the mountains and out of the canyons and winds generated by the temperature contrasts between the Great Salt Lake and the valley floor may generate wind shear and atmospheric waves; these, in turn, can modify the vertical structure of the atmosphere's properties. The terrain also imposes some limitations on the possible wind patterns in the area, an effect that is useful in identifying suitable sites for possible instrument deployment. Finally, members of the University of Utah's meteorology department provide a valuable resource for assistance in planning and designing the experiment and in analyzing the data to be collected.

Measurements and Analysis

Researchers hope to deploy a variety of instruments to probe the atmosphere's behavior during the measurement program, including Doppler radars, sodars, lidars, instrumented balloons, sonic anemometers, atmospheric tracers, and an instrumented aircraft. Many measurements will be made continuously throughout the experimental period. Up to 10 intensive operating periods (IOPs) will also be identified during which additional instruments will be deployed or operated. Scientists will use the data collected to determine the mean and fluctuating wind, temperature, and moisture patterns over the Salt Lake Valley, to test the ability of computer models to describe these patterns, and to identify necessary improvements in cases where the models' performance is unsatisfactory.

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