Identification and Understanding of Wasatch Front Canyons Air Outflow

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This project investigates the existence, processes and effects of valley exit jets in the Salt Lake valley of Utah. The presence of strong nighttime valley outflows at the exits of tributary canyons has been documented in such disparate regions as Inyo Valley, Arizona; North Fork of the Gunnison River at Paonia, CO; and Spanish Fork Canyon, UT. Due to the existence of similar topography and weather conditions in Utah, the potential for similar jets exists along the Wasatch Front. Understanding the jets will assist in the mitigation of air pollution, the assessment of wind energy potential and development of fire control strategies.

The preliminary work in progress includes observing the atmospheric flows at the mouths of several Salt Lake valley canyons and analyzing the data. Initial observations were made by tracking a helium filled pilot balloon with a single theodolite to nearly 20,000 feet above the surface. The elevation and azimuth angles for balloon sightings at 30 second intervals will create a vertical profile of horizontal winds above the canyon exits. The occurrence of exit jets will be determined by analyzing these profiles, along with temperature and wind structure in the main Salt Lake valley.

Once exit jets have been identified, their processes and effects on the Salt Lake valley will be examined from perspectives of energy and air quality. The strength of the exit jets will help determine where wind energy potential exists for the valley. The effect on the polluted valley air by the documented clean air of the jets will also be investigated.

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