**Results from Prior Research**

1. *Multi-sensor Improved Sea Surface Temperatures (MISST2): 2013-2017 [PI E. Crosman; Co-PI J. Horel]*

This project, which ends in December 2017, is being supported by the NASA Integrated Ocean Observing System (IOOS) program. The goal of this study was to provide recommendations for improving lake temperatures for input into numerical weather prediction models, and to review the error sources and uncertainties associated with lake temperature retrievals, as well as the various split-window and other algorithms that have been developed for satellite-derived lake temperature over the past few decades. As part of this study, an evaluation of the NASA Multi-scale Ultra-high Resolution (MUR) analysis of lake surface temperature for several lakes was conducted, with results recently published in Crosman et al. (2017a). Statistical and other quality-control algorithms specifically designed for improving lake temperature retrievals from satellite have been developed at the onset of this study and were presented by Grim et al. (2013). An extensive review paper on lake temperature (Crosman et al. 2017b) is in preparation for submission.

1. *NMP Data Hub*. *2017-2018 [PI E. Crosman]*

As part of this program, the University of Utah provides a wide range of weather data under the National Mesonet Program for use by the National Weather Service, public, and private sectors, and for input into the National Centers for Environmental Prediction Meteorological Assimilation Data Ingest System (MADIS) for initializing a suite of numerical weather models. As part of this project, a network of weather stations are maintained in northern Utah as part of this project, including 14 surface stations measuring wind, temperature, humidity, solar radiation, atmospheric pressure, precipitation. Several wind sodars and backscatter ceilometers for profiling the boundary-layer are also operated on a routine basis as part of this project. The data for this project are all available via a state-of-the art API: <https://synopticlabs.org/api/>.

This includes a number of *in situ* buoy measurements of lake temperature that will be utilized in the proposed study.

1. *Improve Air Quality Modeling for the Wasatch Front & Cache Valley Winter Air Pollution Episodes: 2015-2016* [*PI E. Crosman*]

The Utah DAQ supported a modeling study to develop appropriate modeling strategies to simulate the meteorological conditions associated with poor winter air quality episodes in Utah basins. This work builds on the prior modeling work for similar conditions in the Uintah Basin (Neemann et al. 2014) as well as other wintertime modeling studies for the Salt Lake region (Lareau and Horel 2015a,b). The simulated meteorological conditions are sensitive to the specification of the land and lake surface state, e.g., areal extent and temperature of the Great Salt Lake and surrounding snow cover. This results of this research was published in Foster et al. (2017).

1. *2015 Great Salt Lake Summer Ozone Study: 2014-2016 [PI J. Horel; Co-PI E. Crosman]*

The Utah Division of Air Quality (DAQ) supported a field study in 2015 to improve understanding of the temporal and spatial distribution of ozone in the vicinity of the metropolitan regions of northern Utah (Horel et al. 2016). During the 2015 summer months, DAQ staff and researchers from the University of Utah, Utah State University, and Weber State University deployed ozone sensors near the Great Salt Lake at fixed sites as well as on a UTA TRAX light rail car, vehicles, UAV’s, and tethered balloons. An ozone sensor onboard the KSL traffic helicopter (Crosman et al. 2017) provided critical information on ozone concentration aloft, particularly along major traffic corridors during the late afternoon when ozone levels reach their peak. The temperature of the Great Salt Lake derived from satellite (Blaylock et al. 2017) was found to be a contributing factor in the ozone pollution levels associated with the lake breeze front. The data from this project are publically accessible at the following websites:

<http://meso2.chpc.utah.edu/aq/cgi-bin/mobile_data.cgi>

and mesowest.utah.edu