

Development of temperature and relative humidity profiles from the Wasatch Front Ozone NAA for mobile source emissions modeling in MOVES

Mobile emissions modeling requires diurnal temperature and relative humidity (RH) profiles that are representative of the region of interest. Because the Wasatch Front experiences ozone exceedances sporadically throughout the summer months, a single profile is not representative of an ozone event, and many months of meteorological data must be analyzed. For future SIP demonstrations, the months of May, June, July, and August (MJJ) of 2017 will be used. All of the meteorological data used in this analysis was acquired from the MesoWest data archives. Mesowest (mesowest.utah.edu) is a database of current and archived meteorological data from weather stations in the United States maintained by the University of Utah. The approach for developing temperature and RH profiles are described below.

To complete this analysis, the largest population center in each county was identified. Then, data from the nearest weather station was acquired from the MesoWest data Archives. The majority of the 29 counties had representative weather stations with data completeness >95% for MJJ of 2017. For counties that had incomplete or unreliable meteorological data, nearby stations of similar latitude and altitude were used to generate temperature and RH profiles. Table 1 indicates which counties are represented with meteorological data from stations > 50 km from the largest population center.

The meteorological data were then averaged to hourly time frequency to account for stations that reported data more frequently. Hourly data were grouped by month and averaged, creating an averaged diurnal profile for the entire month. Figures 1 and 2 show these profiles for July. Salt Lake City (lavender), Saint George (green), and Park City (plum) have heavier line widths for reference.

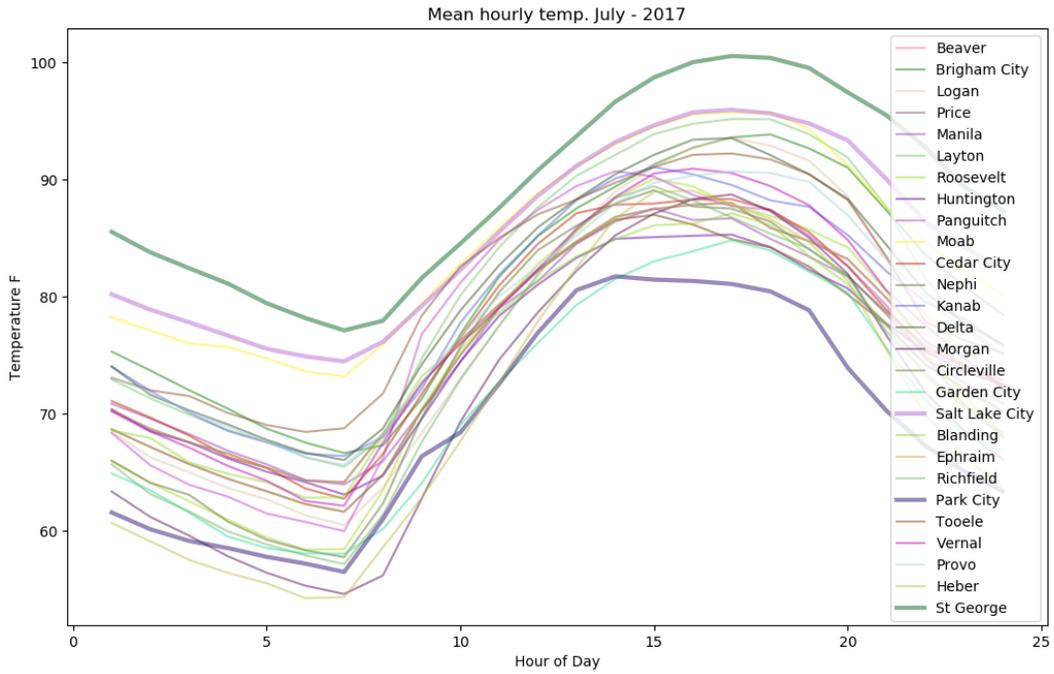


Figure 1: Temperature profile of an average day in July, 2017 for meteorological stations at each County's largest population center (or representative station as described in Table 1.)

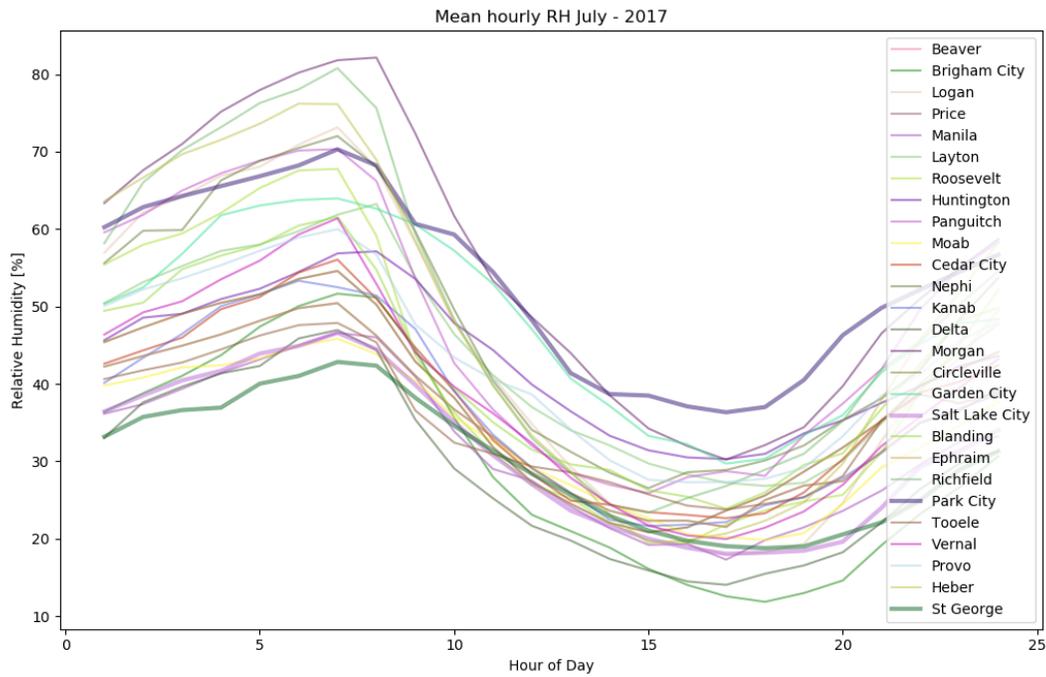


Figure 2: Relative humidity profile of an average day in July, 2017 for meteorological stations at each County's largest population center (or representative station as described in Table 1.)

MOVES zoneID	County	Largest City	City Elevation	Elevation of Station	Location of Station
90010	Beaver	Beaver	5860		
490030	Box Elder	Brigham City	4301		
490050	Cache	Logan	4446		
490070	Carbon	Price	5813		
490090	Daggett	Manila	6374	6731	Near Dinosaur NM, Moffat County, CO
490110	Davis	Layton	4789	4245	
490130	Duchesne	Roosevelt	5171		
490150	Emery	Huntington	5843	5843	Castle Dale, Emery County
490170	Garfield	Panguitch	6759	6200	I-15 at Wildcat Ridge, Beaver County
490190	Grand	Moab	4026		
490210	Iron	Cedar City	5581		
490230	Juab	Nephi	5002		
490250	Kane	Kanab	4970		
490270	Millard	Delta	4755		
490290	Morgan	Morgan	5069		
490310	Piute	Circleville	6066	5941	1-15 at Beaver, Beaver County
490330	Rich	Garden City	5929		
490350	Salt Lake	Salt Lake City	4226		
490370	San Juan	Blanding	6001		
490390	Sanpete	Ephraim	5500	5831	Price Regional Airport, Price County
490410	Sevier	Richfield	5299	5224	Venice, Sevier County
490430	Summit	Park City	7000		
490450	Tooele	Tooele	4291		
490470	Uintah	Vernal	5262		
490490	Utah	Provo	4498		
490510	Wasatch	Heber	5597		
490530	Washington	St George	2872		
490550	Wayne	Loa	7062	7151	Ghost Rocks, Emery County
490570	Weber	Ogden	4440		

