

Dew Point Temperature Estimation across Large Elevation Gradients

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Abstract. This presentation reviews several methods from the literature that have been developed to estimate dew point temperature data and compares their performances in mountainous regions. Dew point temperature is a commonly used measure of humidity in hydrologic modeling and studies of irrigation water requirements. Unfortunately, humidity data are collected at far fewer weather stations than precipitation and air temperature. Stations that do report dew points are often located in cities or airports, leaving the higher elevations in mountainous watershed underrepresented.

Existing estimation methods generally fall into two classes: Those that estimate dew points at one location using dew point measurements from another, and those that estimate dew points based on other variables, such as air temperature and precipitation. The first class typically employs a mean elevation lapse rate. Standard lapse rates have been demonstrated to be accurate for most weather stations. However, it may be shown that these lapse rates are often too large in regions with substantial topographic relief and consequent orographic enhancement of precipitation. The actual dew point lapse rates are smaller due to the increasing wetness of the climate at higher elevations. These findings suggest that it may be possible to derive adjustments to the standard dew point temperature lapse rates that account for these climatic differences.

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