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Wet-Bulb Temperatures and Wet-Bulb Depressions



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1 Purpose and Scope

1.1 These data allow estimation of weather parameters for locations in the continental United States and southern Canada. The accompanying sets of maps show mean wet-bulb temperatures, mean wet-bulb depressions, and their standard deviations, in °C and in °F.

2 Wet-bulb Temperatures and Wet-bulb Depressions

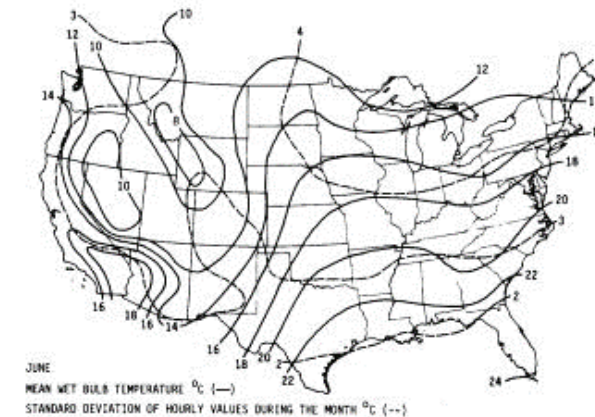
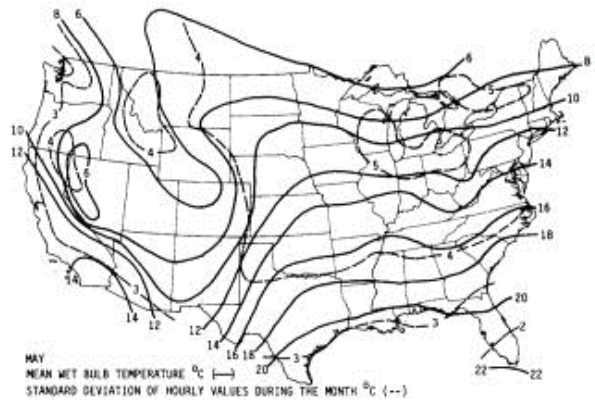
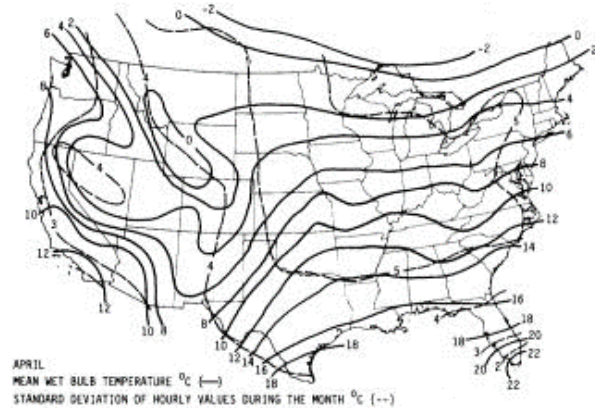
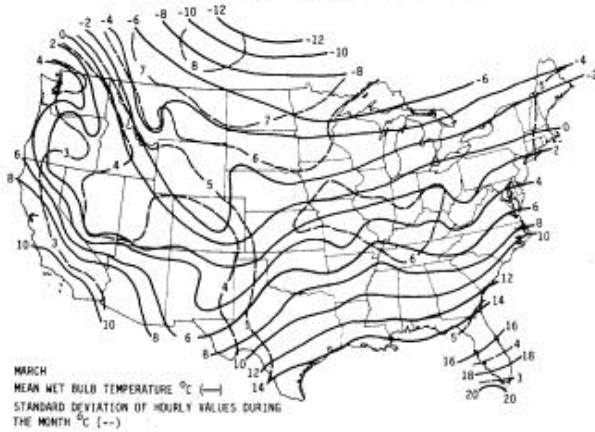
2.1 Graphical data. Celsius and Fahrenheit maps are based upon different weather records. Celsius maps are based upon weather records from 127 U.S. and 13 Canadian sites. United States records averaged 21 yr while Canadian records averaged 12 yr. Fahrenheit maps are based upon weather records averaging 10 yr from 82 U.S. sites.

2.2 Use of standard deviation values. Standard deviation isolines are shown on both the Fahrenheit and Celsius maps. However, the Fahrenheit isolines have a different meaning from the Celsius isolines.

2.2.1 Standard deviation lines on the Fahrenheit maps estimate standard deviations of monthly mean values about the average of monthly means for the years of record. These values can be used to estimate year-to-year variations in monthly mean values. For example, for October in Central Iowa, the mean wet-bulb temperature is 47°F with a standard deviation of 4°F. Assuming variations are normally distributed, about 68% of the years the mean wet-bulb temperature for the month will be within one standard deviation of 47°F (between 43 and 51°F). About 95% of the years, the mean monthly wet-bulb temperature for the month will be within two standard deviations of 47°F (between 39 and 55°F). Estimation of year-to-year variation in mean monthly temperature is of interest in an application like natural-air grain drying which requires several weeks to complete and which is not influenced very much by daily temperature fluctuations.

2.2.2 Standard deviation isolines on the Celsius maps estimate standard deviations of hourly readings about the monthly mean. These standard deviation values are two to four times as large as the Fahrenheit standard deviations and can be used to estimate short-term (hourly) temperature variations. For example, for October in Central Iowa, the mean wet-bulb temperature is 8°C with a standard deviation of 5.5°C. Assuming variations are normally distributed, about 68% of the hourly temperature readings during October will be within one standard deviation of 8°C (between 2.5 and 13.5°C). About 95% of the hourly temperature readings will be within 2 standard deviations of 8°C (between -3 and 19°C). Estimation of the range of hourly temperatures during the month is of value in applications like environmental control of buildings where the systems are responsive to short-term temperature fluctuations.

WET-BULB TEMPERATURES °C



WET-BULB DEPRESSIONS °C

