DELINEATION OF CLIMATE REGIONS IN THE NORTHEASTERN UNITED STATES

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Climate is a primary criterion for the development, description and validation of subregional levels of the National Hierarchical Framework of Ecological Units. However, climate information is not currently available in the form or level of detail required for integration with other biophysical factors at the section or subsection levels. In this study, historical climate data from 640 observing sites in the northeastern United States and Canada are used to delineate climatic zones with sufficient detail to be incorporated into subsection levels of the National Hierarchical Framework of Ecological Units.

For each site a total of 110 climatological variables representing such parameters as monthly average temperature, temperature extremes, frost occurrence, precipitation, and potential evapotranspiration were quality controlled and adjusted to a standard observation hour. In addition, missing temperature observations were estimated to yield a serially complete temperature data set. All variables are representative of the 1961-1990 climatological normals period. Using principal component analysis, the intercorrelation of these variables is eliminated and thus the size of the original data set can be reduced. Eight components, explaining 94 percent of the variability in the original 110 variables, are retained for subsequent analysis..

Based on the retained components, Ward's method of cluster analysis is used to define 54 climate zones within the region. These zones are used as initial seeds for nonhierachical K-means clustering. This second clustering eliminates several of the shortfalls associated with hierarchical clustering and allows the grouping of stations based on a variable number of initial components.

Once this grouping of stations was established, discriminant functions were calculated to express the station grouping in terms of variables derived from latitude, longitude and elevation. Cross validation showed that more than 60 percent of the stations were correctly classified based on the discriminant functions. Since the spatial resolution of the 640 climatological stations is relatively low, a 5 minute grided elevation data set was used in conjunction with the discriminant functions to produce the final climate delineations.

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