Data Magic: Converting Automated Hourly Data into Reliable Climate Information

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The Northwest Avalanche Center (NWAC) began building a network of automated weather stations shortly after they began forecasting in 1976. Since then the network has grown to be one of the most valuable sources of mountain weather data in the northwestern United States. Instrumentation at each site has been tested and modified to withstand the harsh winter environment. The data are used to help determine snow layering and avalanche potential, the depth and extent of freezing rain that impairs driving conditions, and overall mountain weather conditions in the Olympic and Cascade mountains of Washington and northern Oregon. The location of sensors has proved invaluable for observing and defining unique phenomenon associated with easterly pass flows, arctic inversions, and topographically forced convergence. Until now, however, the NWAC data have been available only for daily, operational use by forecasters. We have undertaken the task of reformatting the NWAC data and adding quality control flags to each variable to make them more readily available for a broad range of weather model verification and climatological purposes. Because this is the first network of automated, hourly, mountain weather data to attempt a quality control analysis, we have solicited assistance from the Western Regional Climate Center and the USDA Climate Data Access Facility. It is anticipated that the experience obtained from examination of NWAC data can be applied in developing guidelines for quality control of other networks, such as the USDA-USDI/BLM RAWS. During the retrospective analysis of data quality, problems and issues were identified that could be traced both to the original establishment ofthe network and its sensors and to the way the network was maintained. In this way the uncertainty of each value was assessed and appropriate quality assurance measures were assigned using a system of three flags, 1) data quality, 2) data problem (if any), and 3) adjustment method (if any). Although the original data values always were preserved, adjusted values were suggested as substitutes whenever a value could be identified as "suspect" with reasonable confidence. The NWAC data are organized in a way that the file can be read by typical Fortran or C programs or imported into a spreadsheet.