Accuracy of Spatial Precipitation Estimates for Hydrologic Modelling

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Abstract. Accurate estimation of the spatial and temporal distribution of rainfall is a crucial input parameter for hydrologic model calibration and validation. The number of rain gauges used to monitor rainfall is generally inadequate to resolve the spatial and temporal distributions of rainfall over a watershed. Typically, spatial rainfall distributions have been estimated by developing a spatial pattern based on rain gauge observations using Thiessen polygons, inverse distance weighting or geostatistical techniques. The spatial distributions inferred from these techniques do not accurately represent the actual precipitation pattern.
Techniques have been developed to calibrate NEXRAD radar data with rain gauge data to improve the accuracy of radar rainfall estimates, and produce high spatial and temporal resolution rainfall information for use in hydrologic model calibration and validation. The Storm Precipitation Analysis System (SPAS) precipitation-radar algorithms were used along with National Weather Service (NWS) default NEXRAD coefficients and inverse-distance weighting (IDW) for estimating the spatial and temporal rainfall distribution over the Alsea watershed in northwestern Oregon. The three precipitation estimates, SPAS, NWS, and IDW, were used as input into a hydrologic model to quantify the accuracy of these precipitation estimates as compared to the hydrologic model output. Depth-area-duration (DAD) analysis was performed to determine the maximum amounts of precipitation within various durations over areas of various sizes.