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THE BEST PRECIPITATION ESTIMATES FOR A HYDROLOGIC MODEL BY COMBINING GAUGE AND RADAR DATA

DIE BESTEN NIEDERSCHLAGSSCHÄTZUNGEN FÜR EIN HYDROLOGISCHES MODELL DURCH EINE KOMBINATION VON STATIONS- UND RADARDATEN

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SUMMARY

Accurate estimation of the spatial and temporal distribution of rainfall is a crucial input into a surface water model, and for model calibration and evaluation. Typically, the number of rain gauges used to monitor rainfall is inadequate to resolve the spatial and temporal distributions over a watershed. When the measurement of rain falling in a watershed is based solely on rain gauges, these gauges are frequently located in convenient locations, which may not represent the entire watershed, and can lead to over- or under-estimation of runoff. Radar-estimated precipitation provides high spatial and temporal resolution yet requires significant quality control and calibration before being useful for hydrologic modeling. Rain gauge data are combined with radar data to calibrate the rainfall rate.

In this study, four spatial precipitation estimates (inverse distance weighting (IDW), IDW-PRISM (Parameter-elevation Regressions on Independent Slopes Model), default radar, and gauge-adjusted radar) were used to generate high spatial and temporal resolution precipitation estimates for input into a hydrologic model to assess streamflow variability from the different precipitation inputs. Each input was used in the US Army Corps of Engineers Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) model to examine precipitation uncertainty on simulated streamflow predictions in the 857 km^2 Alsea watershed. Initial Loss and Clark Transformation parameters were calibrated to observed streamflow from a 48-hour storm event using the gauge-adjusted radar precipitation dataset. The three remaining precipitation estimates were used as forcing datasets in the HEC-HMS model, showing that for this storm event, rainfall estimation gives rise to significant variability in streamflow predictions.

Keywords: precipitation, radar, IDW, uncertainty, model calibration