# Conditioning simulated radar rainfields onto gauges to preserve anistropy and relative wetness towards uncertainty estimates in hydrological applications

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Given a record of daily rainfall over a network of gauges, this presentation describes a method of linking the Gauge Wetness Ratio (GWR) on a given day to the joint distribution of the parameters of the anisotropic correlogram defining the spatial statistics of simulated radar-rainfall fields. We generate a large number of Gaussian random fields by sampling from the correlogram parameters conditioned on the GWR and then conditionally merge these fields to the gauge observations, transformed into the Gaussian domain. Correlograms of several Gaussianised daily accumulations of recorded radar images are developed using the Fast Fourier Transform to determine their sample power spectra. Empirical correlograms were fitted using a 2D exponential distribution to yield the 3 key parameters of the correlogram; the range, the anisotropy ratio and the direction of the major axis. The radar wetted area ratio (RWAR) drives the parameters of the correlogram, and its link with GWR is modelled by a transition probability matrix. We take each of the generated Gaussian random fields and conditionally merge it with Gaussianised rainfall values at the gauge locations using Ordinary Kriging. The method produces realistic artificial radar images, on a grid chosen to suit the data, which match the gauge observations at their locations. Ensemble simulations of 1000 samples were used to derive the median and the inter-quartile range of the fields; these were found to narrow near the control gauge locations, as expected, emphasising the value of high density gauge networks. Ongoing research is looking towards integration of the presented methodology with a stochastic daily rainfall generator for useful spatial rainfall simulation over catchments with gauged records.