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Variability of urban flood response to radar rainfall inputs

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Urban flooding is a significant problem. In 2016, the economic loss due to flood damage approached US$1 trillion. Accurate estimates of urban flood inundation are needed for planning and mitigation. The urban environment is highly complex and sensitive to rainfall. Current practice typically makes the assumption of uniform rainfall over a catchment of interest using a single design storm. This assumption can result in significant error and uncertainty in inundation estimates. In this study, the flood response is analysed for the City of Port Phillip in Victoria, using the SWIFT 2D hydraulic model. The study explores the resampling of radar images to form an ensemble of design events by rotation, translation and rescaling of storm event images. The complexities of urban flood response are highlighted by contrasting the flood response from spatially distributed and uniform rainfall inputs. The benefits of using an ensemble over a single design storm estimate include better accounting for variability in characteristics such as the advection direction, peak intensity, timing and volume.