ARR2016 temporal patterns for urban drainage and flood-modelling. Do we need to run them all?

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Biography:
Glenn is an expert in stormwater engineering and flood modelling. He has over 10 years experience practicing hydrology and hydraulics. He is currently employed as a principal engineer and associate at Engeny Water Management. The key focus of Glenn's career has been on working with Local Governments undertaking flood studies, designing and auditing WSUD assets and designing traditional drainage assets. He has also appeared as an expert witness at numerous VCAT hearings and is enjoying the challenges of implementing Australian Rainfall and Runoff 2016 methodologies on projects.

One of the key changes to estimating rainfall which was introduced with Australian Rainfall and Runoff (ARR) 2016 was the requirement to consider multiple temporal patterns in hydrological design storm estimates. Design storm flow estimation using the ten ARR2016 storm temporal patterns for each storm duration can be undertaken by using either the ensemble or Monte Carlo simulation methods. Flow estimation using these methods is relatively straightforward when estimating a flow at a single location, for example along a waterway. However it becomes significantly more complicated for a catchment wide analysis where results are required at all locations within the catchment, such as may be required for an urban drainage flood investigation. Simulating all ten temporal patterns for each duration with a hydraulic model using the ensemble approach results in ten times the run time compared to the single temporal pattern ARR1987 approach. Given the already significant runtimes of large hydraulic models it is worth considering what benefit or improvement in accuracy and understanding of uncertainty is gained from this significant increase in hydraulic model runtime. It is also worth considering if analysing ten temporal patterns is the best use of the additional effort or if sensitivity of other hydrologic parameters, such as losses should be considered for as it could have a larger impact on the final results than temporal patterns.
This presentation will present results from multiple flood models across Melbourne where the full ensemble of temporal patterns has been run through hydraulic models. The key questions answered will be:

- What is the variation in results between the different temporal patterns within an individual duration within an event?
- Is the variation associated with temporal patterns consistent throughout the catchment or does it vary?
- Can we predict what the critical temporal pattern will be just by looking at the hyetograph?
- What impact do storages (retarding basins and information ponding) have on results?
- Where should our modelling effort be directed to get the best result with limited time and money?