Stochastic space-time rainfall models

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Realistic rain fields that represent storms with a known recurrence interval are required as input to hydrological models for design calculations in areas where there are no hydrological records. The hydrological response to a certain volume of rainfall is dependent on the antecedent conditions and the distribution of the rainfall in space and time during the storm. One way to deal with this dependence is to construct a continuous space-time model to generate rainfall over a period of several decades and then to calculate the recurrence interval using the synthetic stream flows. A simpler alternative is to force the hydrological model with a number of stochastic design storms, each with a fixed recurrence interval, and to evaluate the variability in the hydrological response. The talk will start with a discussion on what constitutes a "realistic" field. Thereafter a study of extreme rainfall events in Melbourne, Australia will be used to provide examples of issues that arise in space-time modelling including the dependence of the space-time statistics on the meteorological situation, modelling the advection of the stochastic field, and orographic enhancement.