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- Special Issues
- Library Search
- Title and Author Search

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Production

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Mixed rectangular pulses models of rainfall

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Abstract. A stochastic rainfall model, obtained as the superposition of independent Neyman-Scott Rectangular Pulses (NSRP), is proposed to provide a flexible parameterisation and general procedure for modelling rainfall. The methodology is illustrated using hourly data from Auckland, New Zealand, where the model is fitted to data collected for each calendar month over the period: 1966–1998. For data taken over the months April to August, two independent superposed NSRP processes are fitted, which may correspond to the existence of mixtures of convective and stratiform storm types for these months. The special case of the superposition of an independent NSRP process and a Poisson rectangular pulses process fits the data for January to March, whilst the original NSRP model (i.e. without superposition) fits the data for September to November. A simulation study verifies that the model performs well with respect to the distribution of annual totals, the proportion of dry periods, and extreme values.

Keywords: stochastic processes; point processes; rainfall time series; Poisson cluster models

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