Changes in the intensity and frequency of extreme rainfall events will be one of the major impacts of climate change on hydrological systems. The main challenges for assessing these changes at the local scale are the inability of climate models to adequately reproduce the variability in climate variables and the large uncertainty associated with changes in extreme events projected by climate models. Thus, the use of suitable downscaling methods and multiple climate model projections is needed in order to obtain reliable impact assessment of the changes in extreme events at the local scale.

Weather generators (WGs) have been widely used in hydrology and, in recent years, also been used in climate change impact studies as statistical downscaling tools. The Neyman Scott Rectangular Pulses (NSRP) is probably one of the most comprehensive WGs that can be tuned to put emphasis on extreme events. This study analyses the ability of the NSRP for reproducing extreme events and its use as statistical downscaling tool for both spatial and temporal downscaling of climate model projections. The validation of the NSRP model using observed rainfall data is carried out for a location in Denmark and a total of 19 Regional Climate Models driven by different General Circulation Models from the ENSEMBLES project are used in the downscaling process.