

# Application of satellite-derived rainfall estimates to extend water resource simulation modelling in South Africa

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## Abstract

Spatially interpolated rainfall estimates from rain-gauges are widely used as input to hydrological models, but deriving accurate estimates at appropriate space and time scales remain a major problem. In South Africa there has been a gradual decrease in the number of active rain-gauges over time. Satellite-based estimates of spatial rainfall are becoming more readily available and offer a viable substitute. The paper presents the potential of using Climate Prediction Center African daily precipitation climatology (CPCAPC) satellite-based datasets (2001-2006) to drive a Pitman hydrological model which has been calibrated using gauge-based rainfall data (1920-1990). However, if two sources of rainfall data are to be used together, it is necessary to ensure that they are compatible in terms of their statistical properties. A non-linear frequency of exceedance transformation technique was used to correct the satellite data to be more consistent with historical spatial rainfall estimates. The technique generated simulation results for the 2001 to 2006 period that were greatly improved compared to the direct use of the untransformed satellite data. While there remain some further questions about the use of satellite-derived rainfall data in different parts of the country, they do seem to have the potential to contribute to extending water resource modelling into the future.

**Keywords:** satellite-based rainfall, hydrological model, water resources, South Africa