



## **Evaluation of sub daily satellite rainfall estimates through hydrological and flash flood modelling in the Middle Zambezi Basin**

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### **Abstract**

We evaluated performance of CMORPH and TRMM satellite rainfall estimates at high temporal resolution (30m, 1hr, 3hr and daily) through hydrologic modelling in the Lower Middle Zambezi Basin from 2010-2016. The performance was evaluated through statistical analysis which measures systematic differences between satellite rainfall estimates and rain gauge observation such as relative bias, accumulated error (RMSE) which determines the correctness of satellite rainfall as compared to rain gauge observations and measures of association such as Correlation Coefficient (CC) which shows the agreement between satellite rainfall and rain gauge observation. Bias correction technique greatly improved the RMSE and CC by 60 %. The satellite rainfall estimates were corrected by a multiplicative bias correction technique. The performance of bias corrected sub daily satellite rainfall estimates was done through hydrological modeling using the HEC-HMS model and the HEC-RAS flash flood modelling. Therefore, it can be concluded that bias corrected satellite yield results close to gauge observations. The 30 minutes and 1 hour time step effectively captures flash floods. For sub- daily records of rainfall, satellite products are most effective in capturing hydrological processes such as flash floods because of improved spatial and temporal resolution. The high spatial and temporal resolution helped to capture the localized processes of floods.

**Keywords:** bias correction techniques, HEC-HMS, HEC-RAS, flash flood modelling, satellite rainfall