

## **Abstract**

The impact of topography on heavy rainfall during two rain seasons was investigated in order to explain their mechanisms on rainfall distribution over Rwanda. Weather Research and Forecasting (WRF-ARW) model was used to study two historical cases of heavy rainfall which took place over Rwanda during two rain seasons, March to May (MAM) and September to December (SOND), from April 7 to 9, 2012 (for MAM) and from October 29 to 31, 2012 (during SOND). The control experiment was done with actual topography, whereas sensitivity experiment was carried out with topography reduced by half. Results show that rainfall distribution over Rwanda significantly changes when topography is reduced. The reduction in topography leads to a decrease in rainfall amounts in both MAM and SOND seasons, with varying magnitudes. This reveals the importance of orography in determining rainfall amounts and distribution over the region. The accumulated rainfall amount from WRF underestimate or overestimate rain gauge stations data by region and by season, but there is good agreement especially in altitude below 1490 m and above 1554 m during April and October respectively. The results may motivate modelling carters to further improve parameterization schemes in the mountainous regions.