



Evaluation of Satellite-based and Re-analysis Precipitation Products over Canada

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Flood risk is influenced by a complex interplay between many climatic and non-climatic factors. Among these, heavy precipitation events stand out as one of the primary drivers of flooding. Therefore, the availability and accuracy of precipitation datasets are essential for reliable assessment of flood risk. This study undertakes a comparative analysis of several precipitation products for selected historical large flood events across Canada. The products under investigation include the satellite-based GPM IMERG product, the ERA5-Land reanalysis product, and the Daymet product, which is used as a reference. Since snowfall is frequent and snowmelt is a main driver of flood events in many parts of Canada, our analysis is extended to compare the precipitation products considering surface conditions; i.e. surfaces with and without snow and ice. The evaluation employs a combination of categorical and statistical metrics to assess the accuracy and reliability of the precipitation products. Categorical metrics include the probability of detection, false alarm ratio, and Heidke skill score. Statistical measures such as the correlation coefficient and volume bias are also analysed. These metrics are analysed as functions of precipitation rate, precipitation phase, and surface type. The outcomes of this analysis are anticipated to offer valuable insights for flood modelling studies focused on Canada. Furthermore, the results are expected to provide constructive feedback to algorithm developers, supporting the enhancement of precipitation products, particularly in regions dominated by snow.