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# On the use of Geostationary Lightning Mapper data as proxy for heavy precipitation

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In view of the likely increase of thunderstorm and extreme precipitation events under climate change scenarios, alternatives to improve the estimates of rainfall and the understanding of the runoff response to extreme events are relevant, especially in areas with low or absent radar or raingauge coverage. Efforts in this direction have resulted, for example, on the Global Precipitation Measurement (GPM) products, which offer potentially useful estimates of precipitation over relatively fine spatial and temporal scales. With the launch of GOES 16 satellite, with its new Geostationary Lightning Mapper (GLM) instrument and improved visible and infrared imagery (with the Advanced Baseline Imager - ABI), new possibilities emerge in the analysis of (severe) convective precipitation and its impact on runoff. In this work, we analyze the relationship between lightning activity and rainfall, with the aim to estimate how total lightning data can be used as proxy of (heavy) precipitation estimates. GLM data is evaluated against weather radar in three different ways: (1) based on a Gaussian Kernel method; (2) using a simple dot-count approach, and (3) using the operational GLM gridded product, built on the ABI fixed grid (2 x 2 km). Two sample strategies are evaluated: a pixel-based comparison and a comparison method that extracts statistics inside polygons (using watersheds). For all cases, both group and flash data from GLM are used. The study area focuses on the southeastern and central-west regions of Brazil, where developments towards enhanced flood nowcasting and warning systems capabilities have been carried out in order to anticipate flash floods and prevent flood damages in the future.