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Lightning Activity and its Temporal Progression Using GOES/GLM sensor During the Catastrophic May 2024 Floods of Rio Grande do Sul

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The May 2024 flood event was the most significant in the history of Rio Grande do Sul and among the largest recorded in Brazil, resulting in 182 fatalities, 29 missing persons, and affecting over 2 million individuals. Considered a major global climatic event of recent times, this tragedy mobilized the entire nation of Brazil, significantly influenced news broadcasting schedules, and remained a prominent topic on social media platforms for an extended period. Extreme weather events, such as floods and severe storms, underscore the importance of studying atmospheric phenomena, including lightning. Understanding the dynamics of lightning is crucial for forecasting and mitigating the impacts of these natural events, thereby contributing to public safety and the development of effective prevention strategies. The results indicated a direct association between lightning density and 87% of the precipitation events, and a "lightning jump" was observed minutes prior to the occurrence of the most significant precipitation intensities. The convection was sustained by a persistent low-level moisture flow from the Atlantic Ocean, which was anomalously warm. Consequently, the convection was not as deep as that generated by the South American low-level jet, but it persisted for many days. The lightning activity was also persistent and highly correlated with the rainfall.