The São Sebastião Extreme Precipitation Event: A Radar and Regional Climate Model Analysis

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With the advance of climate change, extreme events have become increasingly frequent and intense, directly impacting societies and ecosystems [1,2,3]. The year 2023 was marked by record global temperatures and significant anomalies on the Earth's surface, with evident repercussions in Brazil [4]. These extremes, associated with global warming, increase the risks to water security, agricultural production, and the resilience of populations, revealing structural and social vulnerabilities in the face of a rapidly changing climate scenario.
In this context, the February 2023 disaster in São Sebastião (São Paulo, Brazil), when historic rainfall in a short period of time triggered catastrophic landslides, illustrates the direct impacts of this new reality. This devastating climatic event hit the region with an unprecedented rainfall of 683 mm in less than 15 hours. This extreme precipitation caused landslides that resulted in the deaths of 65 people and caused extensive material damage. The tragedy was exacerbated by the high population density in precarious settlements located in risk areas prone to landslides on the slopes of the Serra do Mar mountain range. Despite the issuance of warnings, failures in communication and community preparedness highlighted the inadequacy of current response systems [4, 5].
This study investigates the ability of the WRF and RegCM5 regional models [6] to simulate this intense precipitation event. To this end, the study used observational data from the CEMADEN rain gauge network and the FCTH S-band weather radar. Preliminary results indicate that the precipitation event occurred near the coast, but the models still need to be better calibrated. Other parameters will be investigated to improve the forecast.

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