UNIVERSITÀ DEGLI STUDI DI PADOVA

PTSTORM - Extreme Precipitation Response to Temperature Variations: The Role of Storm Types and Global Circulation Patterns

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Extreme precipitation-related disasters are causing serious concern to our society. Especially over the last few years, their intensity and frequency have become substantial throughout the globe, a trend that is projected to continue in the coming decades. While existing studies indicate that extreme precipitation increases with temperature—a phenomenon known as scaling—the exact rates of this increase are not spatially homogeneous, and global distribution remains highly debated. Furthermore, current literature has only considered temperature, with no studies examining how different storm types and global circulation patterns could affect this scaling rate, especially at the global level. Since extreme precipitation results from complex phenomena and depends on multiple factors, accurately forecasting and predicting these events is extremely challenging. This, in turn, hampers early warming, efficient mitigation, and strategic planning for such future events. Addressing these research gaps, the PTSTORM project introduces a novel approach to estimating how storm types and global circulation patterns can modulate the scaling of extremes. The project is interdisciplinary in nature and incorporates a range of datasets from satellites, reanalysis, and observations. The project will have significant societal impacts as it will play a pivotal role in providing a broader understanding of the physical mechanism behind the extremes and, consequently, preparing mitigation plans accordingly. Furthermore, it is in line with the EU strategy for the sustainable development goal 13 'Climate action' and thus contributes to the enhancement of EU scientific excellence. Moreover, the project will enhance the researcher's career growth, expand his knowledge and expertise in the field of atmospheric science, and enhance his collaboration.

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