Welcome Prof. Romualdo Romero

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Estimating Medicane Extreme Rainfall Risk in the Context of Climate Change

Romero & Emanuel 2017 (DOI: 10.1175/JCLI-D-16-0255.1) employed a statistical-deterministic approach to generate thousands of synthetic tracks of medicanes, examining the current and future risk of these storms and their associated violent winds. These synthetic storms were produced to align with climate simulations from 30 CMIP5 models (later reduced to the top 20 models through comparison with two reanalyses), focusing on historical and RCP8.5 scenarios (1986-2005 and 2081-2100 periods, respectively). The study analyzed present-to-future multimodel mean changes in storm genesis, trajectories and wind risk, emphasizing robust geographical patterns identified through consensus among individual models. Building upon this methodology, we revisit the calculated tracks and enhance the risk analysis by incorporating a rainfall algorithm. This algorithm, drawing from Zhu et al. 2013 (DOI: 10.1002/2013GL058284) and Feldmann et al. 2019 (DOI: 10.1175/JAMC-D-19-0011.1), estimates key contributions to storm-scale vertical velocity and considers the significant influence of the Mediterranean region's complex coastal orography. While the future frequency of medicanes remains uncertain (with our projections indicating no significant change or a slight decrease in total storm frequency on average), the intensification of storms identified in terms of wind (with more moderate and violent medicanes at the expense of weaker storms) is mirrored in the context of rainfall risk. Future scenarios indicate a notable increase in the occurrence of potentially flood-producing accumulations (e.g., storm total rainfalls exceeding 100, 200, or 400 mm), with probabilities more than doubling in many coastal areas and exhibiting high model consensus.

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