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Secondary Ice Processes during a Medicane Evolution

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The Mediterranean basin is characterized by cyclonic activity that can often lead to adverse weather conditions. Lately, there is an increasing interest to specific types of cyclones, such as medicanes, due to their dynamic characteristics. However, these events can also lead to extreme precipitation, often resulting in flooding and causing severe damage, with potential human casualties. While there is continuous effort to understand the dynamic evolution of these systems, little is known about the underlying microphysical processes. Secondary Ice Production (SIP) processes are ice multiplication mechanisms that have been frequently linked to the onset of heavy precipitation and the generation of high concentrations of precipitation particles. In this study we investigate the impact of four SIP mechanisms (rime-splintering, collisional break-up, drop-shattering, sublimation break-up) on the evolution of medicane Qendresa using the Weather and Research Forecasting (WRF) model. Qendresa occurred in 2014 mainly in the vicinity of Italy and Malta, causing three fatalities and at least \$250 million in damages in Italy.