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Observational and numerical study of northern wind flow through the main gap of Crete Island

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One of the major topographical elements of Crete Island is the major gap which is located between the two highest mountains Lefka Ori (2453 m) and Idi (2456 m). When northerly winds are blowing over the Aegean Sea, the highly complex topography of Crete Island plays an important role in the modification of the flow. This study examines the dynamics of the northerly wind flow through the major gap of Crete mountains on 24-25 August 2007 using observations and high-resolution model simulations. For the observational analysis, data from four meteorological stations located along the gap are used. Moreover, high-resolution (12.5 km) satellite QuikScat data are used in order to study the modification of the general flow around the island.
The event was simulated down to 1 km horizontal resolution using the non-hydrostatic model MM5. The model simulations show that the localized intensification of the flow downstream of the major gap is related to the channeling of the flow through the gap. The strongest winds are observed at the gap exit region, implying that the main cause of the strong winds is the pressure different between the gap entrance and exit. The model results reveal that during the event a relative cooler maritime air approached the island and dammed up the high mountains. The thermal gradient between the gap entrance and the exit, which is evident throughout the event, may have amplified the pressure gradient across the gap.