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Climate downscaling for the eastern Mediterranean region using the MM5 mesoscale model

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Estimating the fine-scale climate of a region can be useful for defining air-pollution source-receptor relationships, for siting wind-power generation facilities, and for long-range planning of weather-sensitive events. The Penn State/NCAR community mesoscale model, MM5, has been adapted so that it can provide such high-resolution depictions of regional climate. The geographic focus area of the case to be reported on here is the eastern Mediterranean and the adjacent countries of the Middle East, where the Mediterranean Sea represents a large void in terms of conventional data. Our objective is to use satellite estimates of rainfall to confirm that the model is reasonably replicating the small-scale aspects of the precipitation climate. We choose precipitation for verification in this test because it is sensitive to many other variables, and is an excellent single indicator that most other physical variables are being simulated correctly.

For this test, the model has been run for six Januaries (2001-2006) using NCAR-NCEP Reanalysis Project archived global analyses for lateral-boundary conditions. Surface and upper-air observations are assimilated on the model grids to provide the best possible model climatology of the region. Based on the model, significant precipitation maxima are seen along the coastlines of the Levant, Turkey, and Greece. There is also considerable precipitation over the Mediterranean to the south of Greece. The precipitation gradient is very large along the North African coastline. The gradient is somewhat less along the Levant and Turkey coasts, but it is still large. Estimates from the Tropical Rainfall Measurements Mission satellite are consistent with the model estimates, showing the greatest amounts along the coasts of the Levant, Turkey and Greece, with large coastal gradients. But, there is less precipitation estimated by the

model over the central and southern Mediterranean Sea.