



Diagnosing resolution sensitivity over the Maritime Continent in the MetUM

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The Maritime Continent, with over 25,000 islands ranging from hundreds to 780,000 square kilometers, is a key challenge for cumulus-convection and coastal parameterizations in climate resolution GCMs. We studied the resolution sensitivity of precipitation over the Maritime Continent in the MetUM AGCM at horizontal resolutions ranging from approximately 200 to 40 km. We found robust increases in summer precipitation over the Maritime Continent Islands and decreases in summer precipitation over the northern Maritime Continent seas, similar to the resolution sensitivity seen in other studies. These precipitation changes near the Maritime Continent can be large, exceeding 5 mm/day, and are the largest changes in tropical precipitation as resolution is increased.

To explore the source of these changes, we present novel experiments to diagnose the role of increased resolution of different components of the AGCM, such as the orography, coastlines and atmospheric dynamics, in the Maritime Continent domain. Our results suggest that total orographic precipitation in the Maritime Continent domain is resolution dependent at these scales. While increased precipitation associated with the higher resolution of the mean orography is compensated for by decreasing precipitation associated with changes in the subgrid orography and its effect on parameterized drag, the total orographic precipitation is not equal across resolutions. Experiments are in progress to determine the impact of better resolving other boundary conditions, such as coastlines.