

8.6 A comparison of mesh refinement in the global MPAS-A and WRF models using an idealized normal-mode baroclinic wave simulation

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Idealized normal-mode baroclinic wave simulations are conducted to examine the impact of continuous mesh refinement compared with stepwise changes in resolution using nested grids. The nested grid results are produced using the WRF (ARW) model and the continuous 9 refinement results are produced using the atmospheric component of the Model for Prediction Across Scales (MPAS-A).

It is well-known that significant flow distortions can occur in the vicinity of the lateral boundaries in nested domain simulations, and variants of both one-way and two-way nesting techniques are examined.

Significant reflection and distortion of waves are evident in results using one way nesting, with the error increasing with decreasing boundary-update frequency. Variable-resolution mesh MPAS-A simulations, using different transition zones between high- and low-resolution regions, are compared with the results from the ARW simulations.