P12 Internal variability and boundary read performance of a high resolution regional climate model (WRF)

Wang, Jiali, Preeti Malakar, Rao Kotamarthi, and Venkat Vishwanath, *Argonne National Laboratory*

The internal variability of regional climate model (RCM) is important for the detection of a climate signal in sensitivity studies. Indeed, when the model internal variability is reduced compared to the real climate variability, the detection and the evaluation of the magnitude of a climate signal are likely to be underestimated. In practice, model domain size, physics, and grid horizontal resolution all affect the internal variability of RCMs. We have been generating high resolution RCM simulations over North America at 12 km. In this study, we investigate internal variability of our simulation with spectral nudging on/off. We also compare internal variabilities between 12 km and 50 km runs over the same domain using the same physics and model setup. The analysis is carried out for 10 ensembles. We ran the model on IBM Blue Gene/Q (Mira) at Argonne National Laboratory — the fifth fastest (computing speed) supercomputer in the world. However, the performance of WRF boundary reads worsens with higher number of processes on Mira. We found that the current algorithm requires many redundant reads to the file system, which is a bottleneck at larger process counts. We show that by employing fewer processes to read from the filesystem, we can improve the boundary read time. We developed a benchmark for reading input boundary data in WRF, which improves the read time for boundary data by a factor of 10 on 16384 cores of Mira.