Ocean NGD: Status and Future Directions

Luke Van Roekel, Steven Brus, Phillip Wolfram

Recently the mini-NGD for coastal waves was incorporated into a larger effort directed at improving physics in the MPAS-Ocean model and developing a plan to transition the ocean and sea ice models to exascale. In this talk we discuss the development of a global unstructured mesh capability for the wave model within E3SM. Validation results show that use of 2 degree resolution for depths below 4000m and ½ degree nearer to the coast reproduces global ½ degree results at a fraction of the cost. This balance of accuracy and efficiency opens the possibility of representing both global and coastal coupled ocean-wave processes in E3SM. In the second part of the talk we will discuss the importance of unresolved processes (mesoscale, submesoscale, and small scale turbulence) and planned improvements to these physics for v3 of E3SM under the new Ocean NGD. We will end with a discussion of the path toward an exascale ready ocean. This work will involve revisiting the transport algorithms, data-structures, programming model, and GPU utilization of the current MPAS-Ocean code.