

8.6 Why resolution matters when using WRF to drive hydrology and hydrodynamic models.

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The Jefferson Project at Lake George, NY is a collaborative effort between IBM Research, Rensselaer Polytechnic Institute and The FUND for Lake George. A core component of the project is to develop a one-way, coupled atmosphere-hydrology-lake circulation modeling system capable of robust, very high resolution operational forecasts. For over 18 months, we have used WRF-ARW to generate daily weather forecasts with a maximum horizontal resolution of 0.33 km. This presentation will provide (i) a brief overview of the operational infrastructure used for these forecasts, including model coupling, integration of observations from our intelligent sensor network, visualization and data dissemination; and (ii) results from a one-month case study examining the impact of WRF resolution on the simulated hydrodynamics of Lake George. With respect to (ii), we find critical differences emerge in the simulated lake vertical mixing, surface heat flux and temperature stratification when the hydrodynamic model is driven by WRF at different horizontal resolutions. A comparison to lake-wide observations reveals more accurate simulations of the lake hydrodynamics when driven by WRF at the highest resolution (0.33 km), primarily because the highly-localized wind field over the narrow lake is much better represented.