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Enabling high-resolution simulations of atmospheric flow over complex terrain in the WRF model KATHERINE LUNDQUIST, JEFF MIROCHA, Lawrence Livermore National Laboratory, DAVID WIERSEMA, JINGYI BAO, University of California, Berkeley, MEGAN DANIELS, Lawrence Livermore National Laboratory, FOTINI CHOW, University of California, Berkeley — As model grid resolution increases, atmospheric models are able to represent fine scale terrain, which can result in steep terrain slopes. The standard terrain-following coordinates used by models such as WRF (Weather and Research Forecasting) are unable to handle very steep terrain because of the grid distortion and related numerical errors. This has prompted the development of an alternative gridding technique in the WRF model, known as the immersed boundary method (IBM), which eliminates terrain-following grids and the associated errors (Lundquist et al. 2010,2012). This implementation, WRF-IBM, has been validated for idealized cases and real urban cases with excellent results; however, to date WRF-IBM has been applied with idealized lateral boundary conditions, and uses a no-slip boundary condition. In this work, we detail a multi-year effort to develop WRF-IBM for real, multi-scale simulations, including full atmospheric physics. Results from three aspects of this project are presented: initializing IBM domains using real meteorological and surface data, developing a nest interface between domains using terrain-following and IBM coordinates, and modifying the IBM boundary condition to include a wall model.

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