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A coupled immersed-boundary land-surface model for resolving atmospheric flows over complex terrain KATHERINE LUNDQUIST, FOTINI CHOW, UC Berkeley, JULIE LUNDQUIST, Lawrence Livermore National Laboratory — Atmospheric boundary layer flows are complicated by the presence of complex terrain which redirects mean flow and alters the structure of turbulence. Surface fluxes of heat and moisture provide additional forcing which induce secondary flows, or can dominate flow dynamics in cases with weak mean winds. Mesoscale models are increasingly used for high resolution simulations of complex terrain, but errors associated with terrain-following coordinates degrade the accuracy of the solution. Use of the immersed boundary method within mesoscale models allows explicit resolution of complex terrain; however, physics parameterizations of surface fluxes complicate treatment of the immersed boundary. We have implemented an immersed boundary method which is coupled to a land-surface model in the Weather Research and Forecasting (WRF) code. Realistic surface forcing is provided by atmospheric physics parameterizations, which are modified to include the effects of the immersed terrain. Validation is provided in the context of three-dimensional valley flow simulations.

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