5B.2   A coupled surface nudging scheme for use in retrospective weather and climate simulations for environmental applications.

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A surface analysis nudging scheme coupling atmospheric and land surface thermodynamic parameters has been implemented into WRF v3.8 (latest version) for use with retrospective weather and climate simulations, as well as for applications in air quality, hydrology, and ecosystem modeling. This scheme is known as the flux-adjusting surface data assimilation system (FASDAS) developed by Alapaty et al. (2008). This scheme provides continuous adjustments for soil moisture and temperature (via indirect nudging) and for surface air temperature and water vapor mixing ratio (via direct nudging). The simultaneous application of indirect and direct nudging maintains greater consistency between the soil temperature–moisture and the atmospheric surface layer mass-field variables.

Using WRF v3.8 the FASDAS has been tested and evaluated for retrospective weather simulations and also for regional climate summer predictions (JJA) with the YSU PBL scheme and Noah land surface schemes. Results indicate that the FASDAS consistently improved the accuracy of the model simulations at weather prediction scales for different horizontal grid resolutions, as well as for high resolution regional climate predictions.   This capability has been released in WRF Version 3.8 as option grid_sfdda = 2.