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Application of the OI land surface assimilation method in GRAPES_Meso model

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The initialization of soil water content and temperature is known to significantly influence numerical weather forecasts. The OI scheme proposed by Mahfouf in 1991 takes into account observation and forecast errors statistics in an objective way. Douville in 2000 improved the OI scheme introducing the effects of reduced radiation by empirical functions which are used to reduce the optimum coefficients when the coupling between the soil and the lower boundary layer is weak. This method relates forecast errors of screen-level temperature and relative humidity of static corrections of soil water content and temperature by an optimal interpolation. The coefficients, which completely define the assimilation procedure, include a lot of information about the physics of the soil-atmosphere interface on the diurnal cycle. The OI land surface assimilation method is used in European Centre for Medium-Range Weather Forecasts , in Météo-France and so on. In China Meteorological Administration (CMA), the Global/Regional Assimilation and Prediction System is an important operational numerical weather prediction system.This model is based on a software in accordance with strict requirements of software engineering adopting a structure of standardized and module.Nowadays, GRAPES model has been expanded to applications in various fields, such as GRAPES_Meso for mesoscale weather prediction, GRAPES_GFS for global weather prediction, and so on. The land surface assimilation method is not used in GRAPES model, so the author tried to couple the OI land surface assimilation method with GRAPES_Meso. The corrections are computed in every 6-h from the 2-m increments of air temperature and relative humidity. The experiment results show that the accuracy of the simulated 2-m temperature is improved by the use of the OI method, and there is no obvious change in precipitation simulation results.