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A scheme for calculating soil moisture content by using routine weather data

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Abstract. Soil moisture content is one of the most important parameters as input conditions in forecasting model systems of dust storm, but it can not be directly obtained from daily routine weather report. In this paper, a scheme is developed to calculate the surface soil moisture content in China by using both precipitation and evaporation. Precipitation is directly from routine weather report, while evaporation is indirectly calculated by using meteorological elements which are also from routine weather report. According to the formula by Penman, evaporation can be considered as a linear composition of dynamic evaporation and thermodynamic evaporation caused by radiation. First, an equation for calculating daily global radiation within China is given by using regression analysis and the data of global radiation and cloud cover from 116 meteorological stations in China. Then, an equation for calculating evaporation within China is given by using regression analysis and the data of cloud cover, air temperature, precipitation, relative humidity, and wind velocity from 701 meteorological stations. Finally, a scheme for calculating soil moisture content within China is established by using regression analysis and the soil moisture content, precipitation, and evaporation at 79 agro-meteorological stations. Validation results show that the forecasting accuracy of the Chinese dust numerical model can be improved by using this scheme.

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