A new Dynamic Dust-emission rate (DDR) scheme base on Satellite remote sensing data for air quality model

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Dust produced by wind erosion is a major source of atmospheric dust pollutions which have impacts on air quality, weather and climate. It is difficult to calculate dust concentration in the atmosphere with certainty unless the dust-emission rate can be estimated with accuracy. Hence, due to the unreliable estimation of dust-emission rate flux from ground surface, the dust forecast accuracy in air quality models is low. The main reason is that the parameter that describes the dust-emission rate in the regional air quality model is constant and cannot reflect the reality of surface dust-emission changes. A new scheme which uses the vegetation information from satellite remote sensing data and meteorological condition provided by meteorological forecast model is developed to estimate the actual dust-emission rete from the ground surface. The results shows that the new scheme can improve dust simulation and forecast performance significantly and reduce the root mean square error by 25%~68%.

The DDR scheme can be coupled with any current air quality model (e.g. WRF-Chem, CMAQ, CAMx) and produce more accurate dust forecast.