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Modeling seasonal and interannual changes in mineral dust concentrations using a dynamic global vegetation model

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In situ observations of atmospheric dust concentrations shows the existence of seasonal and inter annual variability. We investigate whether the observed variability is due to changes in vegetation cover by performing two experiments with a dust cycle model. The dust cycle model uses the LPJ-SPITFIRE dynamic global vegetation model (*Thonicke in prep.)* to predict the evolution of vegetation growth as it varies with climate and atmospheric CO_2levels. LPJ-SPITFIRE is a modified version of the Lund-Potsdam-Jena dynamic global vegetation model (*Sitch et al., 2003)* which includes a fire disturbance component. The dust emission flux is calculated by simulating the processes of sandblasting and saltation. Soil texture information determines the particle size distribution of the dust flux [*Tegen et al., 2002*]. Dust particles are transported as independent tracers using the chemical transport model TOMCAT (*Chipperfield and Simon, 1996)*. Particles are removed from the atmosphere by gravitational settling and turbulent mixing at the surface and by convective and large scale precipitation. Two experiments are run for the years 1980-2002 using ERA-40 climate, one in which the vegetation cover is fixed and the other in which it is allowed to vary on seasonal and inter-annual timescales. The modelled dust concentrations are compared to observations from the University of Miami aerosol network to evaluate the role of vegetation dynamics on the global dust cycle.