

[Related articles](#)[Volume 4, issue 1](#) | [Copyright](#) ▾

16 Feb 2011

A new dust cycle model with dynamic vegetation: LPJ-dust version 1.0

S. Shannon and D. J. Lunt ▾

Received: 07 Apr 2010 – Discussion started: 23 Apr 2010 – Revised: 20 Dec 2010 – Accepted: 20 Jan 2011 –

Published: 16 Feb 2011

Abstract. This paper presents a new offline dust cycle model which uses the Lund-Potsdam-Jena dynamic global vegetation model (Sitch et al., 2003) to calculate time varying dust sources. Surface emissions are calculated by simulating the processes of saltation and sandblasting using an existing model (Tegen et al., 2002). Dust particles are transported using the TOMCAT chemical transport model (Chipperfield, 2006). Dust particles are removed from the atmosphere by dry deposition and sub-cloud scavenging. The model is designed so that it can be driven using reanalysis data or GCM derived fields.

To improve the performance of the model, threshold values for vegetation cover, soil moisture, snow depth and threshold friction velocity, used to determine surface emissions are tuned. The effectiveness of three sub-cloud scavenging schemes are also tested. An ensemble of tuning experiments are evaluated against dust deposition and surface concentration measurements. Surface emissions which produce the best agreement with observations range from 1600 to 2400 Mtyr⁻¹.

Download & links

- [Article \(PDF, 1600 KB\)](#)

How to cite: Shannon, S. and Lunt, D. J.: A new dust cycle model with dynamic vegetation: LPJ-dust version 1.0, *Geosci. Model Dev.*, 4, 85-105, <https://doi.org/10.5194/gmd-4-85-2011>, 2011.