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## Recent increase in aerosol loading over the Australian arid zone

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**Abstract.** Collocated sun photometer and nephelometer measurements at Tinga Tingana in the Australian Outback over the decade 1997–2007 show a significant increase in aerosol loading following the onset of severe drought conditions in 2002. This increase is confined to the season of dust activity, particularly September to March. In contrast, background aerosol levels during May, June and July remained stable. The enhanced aerosol loadings during the latter 5 years of the study period can be understood as a combination of dune destabilisation through loss of ephemeral vegetation and surface crust, and the changing supply of fluvial sediments to ephemeral lakes and floodplains within the Lake Eyre Basin. Major dust outbreaks are generally highly localised, although significant dust activity was observed at Tinga Tingana on 50% of days when a major event occurred elsewhere in the Lake Eyre Basin, suggesting frequent basin-wide dust mobilisation. Combined analysis of aerosol optical depth and scattering coefficient shows weak correlation between the surface and column aerosol ( $R^2=0.24$ ). The aerosol scale height is broadly distributed with a mode typically between 2–3 km, with clearly defined seasonal variation. Climatological analysis reveals bimodal structure in the annual cycle of aerosol optical depth, with a summer peak related to maximal dust activity, and a spring peak related to lofted fine-mode aerosol. There is evidence for an increase in near-surface aerosol during the period 2003–2007 relative to 1997–2002, consistent with an increase in dust activity. This accords with an independent finding of increasing aerosol loading over the Australian region as a whole, suggesting that rising dust activity over the Lake Eyre Basin may be a significant contributor to changes in the aerosol budget of the continent.

[Final Revised Paper](#) (PDF, 988 KB) [Discussion Paper](#) (ACPD)

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