



Supplement of

A global analysis of diurnal variability in dust and dust mixture using CATS observations

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Figure S1 CATS images of the dust plume transporting from North Africa across the Atlantic Ocean on June 17, 2015.



Figure S2 Number of non-zero DAOD retrievals per year during 2015-2017 from CATS in each 3-hour local time window: (a) 00-03, (b) 03-06, (c) 06-09, (d) 09-12, (e) 12-15, (f) 15-18, (g) 18-21, (g) 21-24.



Figure S3 Seasonal average, daytime pDAOD (dust) over the Southern Hemisphere from CATS (noon-15:00 local time) at 1064 nm and CALIOP (12 30 local time) at 532 nm. Within equator – 52°S, gray filling indicates sample size smalle



Figure S4 Seasonal average, daytime DAOD (dust and dust mixture) over the Southern Hemisphere from CATS (noon-15:00 local time) at 1064 nm and CALIOP (13:30 local time) at 532 nm. Within equator – 52°S, gray filling indicates sample size smaller than 20.



Figure S5 Seasonal average, nightime pDAOD (dust) over the S. $\mu\nu$ ern Hemisphere from CATS (0:00-03:00 local time) at 1064 nm and CALIOP (01:30 local time) at 532 nm. Within equator – 52°S, gray filling indicates sample size smaller than 20.



Figure S6 Seasonal average, nighttime DAOD (dust and dust mixture) over the Southern Hemisphere from CATS (0:00-03:00 local time) at 1064 nm and CALIOP (01:30 local time) at 532 nm. Within equator – 52°S, gray filling indicates sample size smaller than 20.



Figure S7 Average dust extinction (km⁻¹) profiles over the Bodélé Depression during 2015-2017 from (a) CATS and (b) CALIOP during the daytime (red) and nighttime (blue) periods.