



Australian Government
Bureau of Meteorology

Gridded Average Lightning Flash Density Metadata

Dataset	
Title	Annual lightning data (base climatological data sets): Annual lightning ground flash density & annual lightning total flash density.
Custodian	
Custodian	Bureau of Meteorology
Jurisdiction	Australia
Description	
Abstract	Mean annual number of lightning flashes per square km. The grids show the number of lightning flashes per square km per year across Australia in the form of two-dimensional array data. The mean data are based on the eight year period 1995-2002. See LINEAGE below for more information.
Search Word(s)	Gridded, analyses, climatology, lightning, meteorology
Geographic Extent Names(s)	Australia
General Category	Gridded climatological data
General Custodian Jurisdiction	Australian Government Australia
Geographic Extent Polygon	Not applicable
Geographic Bounding Box	See below
North Bounding Latitude	-8.500
South Bounding Latitude	-44.00
East Bounding Longitude	160.00
West Bounding Longitude	107.500
Data Currency	
Beginning Date	1995
Ending Date	2002
Dataset Status	
Progress	Completed
Maintenance and Update frequency	Ongoing
Access	
Stored Data Format	Arc/Info grids – all Australia

Available Format	ASCII row major, Arc/Info grid Interchange (.e00), Shapefiles.
Access Constraint	Please note that the copyright for any data supplied by the Bureau of Meteorology is held in the Commonwealth of Australia and the purchaser shall give acknowledgement of the source in reference to the data. Apart from dealings under the Copyright Act 1968, the purchaser shall not reproduce (electronically or otherwise), modify or supply (by sale or otherwise) these data without written permission from the supplier. Please contact us (see details below) for more information.
Data Quality	
Lineage	<p>The lightning total flash density grid and lightning ground flash density grid are based on data from the Optical Transient Detector (OTD) and Lightning Imaging Sensor (LIS) for the Australian region (10°S – 45°S, 105°E – 165°E). It is important to note that the analysis is based on eight years of combined OTD and LIS data.</p> <p>The grid point resolution of the data is 0.5° (approximately 50 km).</p> <p>The data are acquired from polar orbiting satellites and consequently undersampling may influence the estimates of lightning activity in some areas (Kuleshov et al. 2006). The satellite data were calibrated against the data derived from observations obtained by ground-based lightning flash counters and then adjusted applying an empirical polynomial in a form</p> $R_{LNP}(\lambda) = A - B \lambda^2 + C \lambda^N,$ <p>with λ in magnitude of degrees, $A = 1.2339$, $B = 2.8108E-3$, $C = 1.3661E-5$, and $N = 3.5$.</p> <p>The adjusted N_{tSAT} values obtained by multiplying each N_{tSAT} value by $R_{LNP}(\lambda)$ were used to produce the total flash density map for Australia (Kuleshov et al 2006).</p> <p>Applying the assumption that the value of cloud flash-to-ground flash ratio, Z, over the range of latitude for the Australian continent is uniform ($Z = 2$), the N_g values were derived from the average annual total flash density values, N_t, by using the equation</p> $N_g = N_t / (1 + Z).$ <p>OTD and LIS estimates of lightning ground flash density (N_g) were compared with, and evaluated against, estimates of N_g derived from a thunder day analysis as well as from direct measurements obtained by ground-based lightning flash counters (Kuleshov et al 2006).</p> <p>N_g is conventionally estimated from T_d using an equation of the form $N_g = a T_d^b$, in which a and b are empirically derived constants that are influenced by the meteorological conditions at a given location. In this study, Kuleshov and Jayaratne's formula with derived values of a = 0.012 and b = 1.4 was used (Kuleshov and Jayaratne 2004).</p> <p>References: Kuleshov, Y. and Jayaratne, E. R. 2004. Estimates of lightning ground flash density in Australia and its relationship to thunder-days. <i>Aust. Met. Mag.</i> 53, 189-196. Kuleshov, Y., Mackerras, D., and Darveniza, M. 2006. Spatial distribution and frequency of lightning activity and lightning flash density maps for Australia. <i>J.Geophys.Res.</i>, Vol. 111, D19105, doi:10.1029/2005JD006982</p>

Positional Accuracy	The OTD and LIS data on which the analysis was based have an associated accuracy of the order of 0.1° (approximately 10 km) or better.
Attribute Accuracy	n/a
Logical Consistency	Not applicable
Completeness	No missing data
Contact Information	
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Additional Metadata	Additional information available on request (see contact above).