EARTH NETWORKS®





INDIA LIGHTNING REPORT



ABOUT THIS REPORT

This 2019 India Lightning Report was prepared by Earth Networks using the Earth Networks Global Lightning Network (ENGLN). The following report includes in-cloud, cloud-to-ground, and total lightning data from India and the surrounding water bodies during 2019. Counts, rankings, and Dangerous Thunderstorm Alerts (DTAs) in this report are from January 1, 2019 to December 31, 2019.

THE EARTH NETWORKS GLOBAL LIGHTNING NETWORK (ENGLN)

The lightning data in this report is derived from the Earth Networks Global Lightning Network (ENGLN), which monitors the combination of in-cloud and cloud-to-ground lightning strikes over 100 countries. With over 1,800 sensors, the ENGLN is the most extensive and technologically advanced total lightning network in the world. ENGLN has been specifically deployed to detect real-time lightning and provide advanced warning for severe weather events that could threaten public safety and operational efficiency.

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TOTAL LIGHTNING STRIKES

TOTAL LIGHTNING

is the combination of cloud-to-ground (CG) and in-cloud (IC) lightning strikes



Cloud-to-ground lightning:

Lightning that happens between opposite charges in a cloud and on the ground

In-cloud lightning:

Lightning that occurs between opposite charges within a thunderstorm cloud



TOTAL LIGHTNING TYPE PERCENTAGES



62.6%



LIGHTNING COUNT STATE RANKINGS

These are the India states with the highest lightning counts during 2019.



State Name	Cloud-to-Ground Count	In-Cloud Count	Total Count
Odisha	16,21,408	24,63,412	40,84,820
'est Bengal	10,32,512	19,66,679	29,99,191
lhya Pradesh	12,20,139	14,88,344	27,08,483
harkhand	8,54,401	15,75,011	24,29,412
Karnataka	5,62,795	15,69,092	21,31,887

India's most active state for total lightning flashes in 2019 was Odisha. Odisha experienced 10,85,629 more total lightning strikes than second place West Bengal. Even though Odisha is 1,55,707 km², the state saw more flashes than larger states like Madhya Pradesh (2,08,250 km²) and Karnataka (1,91,791 km²)

LIGHTNING FLASH DENSITY MAP



EARTH NETWORKS 2019 India Lightning Report

As you can see from the map, the ENGLN detected high flash densities along East India.

Flash density is a great way to compare states of different areas fairly when it comes to lightning activity.

The two states with the highest flash densities were West Bengal and Jharkhand, followed by Meghalaya and Odisha.

LIGHTNING COUNT MONTHLY RANKINGS

Which months saw the most lightning strikes from January through December in India?

TOTAL LIGHTNING FLASH COUNT

Total Flashes

In-Cloud

Cloud-to-Ground



The month with the most lightning flashes throughout India was June, followed by September. This makes sense as Monsoon Season typically starts in May or June and then ends in September. The Southwest monsoon rains in 2019 were the heaviest India had witnessed in 25 years. Between June and September 2019, rainfall was 110% of its long-period average of 880 mm. June and September not only saw the most lightning, but the most rainfall as well.

DANGEROUS THUNDERSTORM ALERTS

The ENGLN generated 18,026 Dangerous Thunderstorm Alerts (DTAs) in India during 2019. These are the Indian states where we issued the most DTAs.

STATES



Dangerous Thunderstorm Alerts are extremely advanced severe weather warnings exclusive to Earth Networks. These patented alerts notify users severe weather is approaching up to 45 minutes before storms arrive.

DANGEROUS THUNDERSTORM ALERTS BY MONTH

Which months saw the most severe thunderstorms in 2019?



April, May, and June are the three months that had over 5,000 DTAs as monsoon season was ramping up.

January and December saw the least amount of severe thunderstorms, with only 10 DTAs combined.

DANGEROUS THUNDERSTORM ALERTS DENSITY MAP



This map of Dangerous Thunderstorm Alert Density shows the states that had the most DTAs per km2.

West Bengal had the highest DTA density followed by Meghalaya and Jharkhand.

LIGHTNING IN INDIA

Severe weather is a huge problem in India and lightning is the number one killer. Lightning kills over 2,000 people in India annually. That's more than floods and cyclones.

Image: Description of the section o

WHAT WE'RE DOING TO HELP

Earth Networks contributes to national, state and municipal efforts to minimize lightning deaths, injuries, and damage throughout India by deploying and operating national total lightning detection networks and supporting stakeholders with much needed data and analytics.

Earth Networks patented lightning sensors are located in most states in India. We work together with governments in states like Andhra Pradesh, Assam, Bihar, Karnataka, Odisha, NESAC (NE India), and West Bengal.

Andhra Pradesh collaborated with Earth Networks and other experts to establish standard procedures for lightning alerting. These procedures are now part of the recommended best practices published by the National Disaster Management Authority (NDMA). You can read about it on page 33 of <u>their report</u>.

We also work alongside top atmospheric scientists studying thunderstorm dynamics throughout the country.



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THANK YOU

To learn how to implement this technology in India or for press inquiries, please contact Kumar Margasahayam at +91 98453 45934 or by email at <u>kmargasahayam@earthnetworks.com</u>.

For additional insights or permission to use data or graphics from this report, please contact us at: info@earthnetworks.com or call +1 301 250 4000.





LIGHTNING FLASH COUNT APPENDIX

STATE	CLOUD-TO-GROUND	IN-CLOUD	TOTAL COUNT
Andaman and Nicobar	20,168	11,591	31,759
Andhra Pradesh	6,24,931	13,66,492	19,91,423
Arunachal Pradesh	45,240	8,521	53,761
Assam	3,24,269	3,81,084	7,05,353
Bihar	4,93,906	12,23,727	17,17,633
Chandigarh	276	268	544
Chhattisgarh	9,14,031	10,68,707	19,82,738
Dadra and Nagar Haveli	821	520	1,341
Daman and Diu	299	192	491
Goa	10,969	25,421	36,390
Gujarat	3,79,900	2,50,485	6,30,385
Haryana	76,115	91,122	1,67,237
Himachal Pradesh	65,302	32,316	97,618
Jammu and Kashmir	55,420	30,223	85,643
Jharkhand	8,54,401	15,75,011	24,29,412
Karnataka	5,62,795	15,69,092	21,31,887
Kerala	1,93,560	4,91,402	6,84,962
Lakshadweep	46	41	87
Madhya Pradesh	12,20,139	14,88,344	27,08,483
Maharashtra	7,07,769	8,72,903	15,80,672
Manipur	37,497	24,193	61,690
Meghalaya	2,15,663	4,07,715	6,23,378
Mizoram	80,283	72,454	1,52,737
Nagaland	27,452	14,410	41,862
NCT of Delhi	4,476	5,723	10,199
Odisha	16,21,408	24,63,412	40,84,820
Puducherry	1,267	3,126	4,393
Punjab	99,913	1,02,027	2,01,940
Rajasthan	5,89,299	9,77,227	15,66,526
Sikkim	4,647	2,286	6,933
Tamil Nadu	4,48,787	15,94,606	20,43,393
Telangana	4,22,936	6,94,691	11,17,627
Tripura	98,844	1,14,451	2,13,295
Uttar Pradesh	7,40,078	12,07,941	19,48,019
Uttarakhand	72,763	52,082	1,24,845
West Bengal	10,32,512	19,66,679	29,99,191
Totals	1,20,48,182	2,01,90,485	3,22,38,667
*Lightning flash count data from January 1 st . 2019 through Dec	cember 31 st . 2019		

DTA COUNT APPENDIX FOR 2019

STATE	TOTAL COUNT		
Andaman and Nicobar	1		
Andhra Pradesh	1,285		
Arunachal Pradesh	0		
Assam	417		
Bihar	1,347		
Chandigarh	0		
Chhattisgarh	714		
Dadra and Nagar Haveli	2		
Daman and Diu	0		
Goa	34		
Gujarat	149		
Haryana	10		
Himachal Pradesh	2		
Jammu and Kashmir	2		
Jharkhand	2,038		
Karnataka	1,340		
Kerala	483		
Lakshadweep	0		
Madhya Pradesh	553		
Maharashtra	338		
Manipur	21		
Meghalaya	639		
Mizoram	57		
Nagaland	5		
NCT of Delhi	2		
Odisha	2,788		
Puducherry	10		
Punjab	3		
Rajasthan	307		
Sikkim	0		
Tamil Nadu	1,156		
Telangana	419		
Tripura	191		
Uttar Pradesh	503		
Uttarakhand	11		
West Bengal	3,199		
*Dangerous Thunderstorm Alert data from January 1 st , 2019 through December 31 st , 2019			

PRESS COVERAGE APPENDIX

- https://timesofindia.indiatimes.com/india/odisha-registers-31-decline-in-number-of-lightning-deaths/articleshow/70214221.cms
- https://weather.com/en-IN/india/news/news/2019-08-19-bihar-set-up-lightning-alert-system-save-lives
- https://www.ommcomnews.com/odisha-news/odisha-trying-to-send-sms-for-lightning-warning-alert-system-in-osdma-on-offing-
- https://scroll.in/article/915759/lightning-kills-more-people-in-india-than-other-extreme-weather-events-finds-study
- https://ndma.gov.in/images/guidelines/Guidelines-on-TSL-HSW.pdf
- https://www.newindianexpress.com/nation/2019/aug/17/bihar-to-set-up-lightning-alert-system-to-save-lives-2020304.htm