THUNDERSTORM SURVEILLANCE REPORT FOR THE UNITED KINGDOM

2022

MÉTÉORAGE

TERMINOLOGY

To help you better understand the information in this report, here are the definitions for some of the most frequently used terms.

- **Thunder day:** Each day that lightning was detected in a given area.

- **Lightning density:** The best current representation of thunderstorm activity is lightning density, which is the number of cloud-to-ground (CG) lightning flashes per km^2 per year.

- **Lightning flash:** All current discharges and electrical impulses from a lightning event. A lightning flash can occur within the same cloud (IC), between a cloud and the ground (CG) or between two clouds (CC).A lightning flash can be composed of one stroke or many strokes, which are current discharges and electrical impulses.

- **Cloud-to-ground (CG) lightning flash:** Discharge of current of a certain intensity circulating between the cloud and the ground. Abbreviated to CG (Cloud-to-Ground).

To be able to compare this data with the data collected, Météorage counts the main current pulse circulating between the cloud and the ground, defined in this report by the term "Lightning cloud-to-ground (CG) lightning flash".

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ABOUT THE LIGHTNING REPORT

The lightning report is based on data provided by **Météorage**'s lightning detection network in Europe.

Our expertise draws on more than ten years of analysis, observation and data collected in Europe, and more broadly worldwide. We have over 35 years' expertise in France.

The performance of our network has been validated scientifically and delivers the best possible results with:

- >98% lightning flash detection,
- a median detection accuracy of 100 meters,
- >95% distinction made between cloud-to-ground (CG) lightning flashes and intra-cloud lightning flashes.

The Météorage network consists of more than 100 lightning sensors, calculators and a processing system that manages the databases. Our lightning sensors are based on the Vaisala technology, currently considered one of the best in the world. Our network achieves levels of performance validated by numerous scientific studies and publications.

This 2022 report is based on the most comprehensive source of information in the United Kingdom. The data, densities, rankings and thunder days in this report are dated from 1 January 2022 to 31 December 2022.
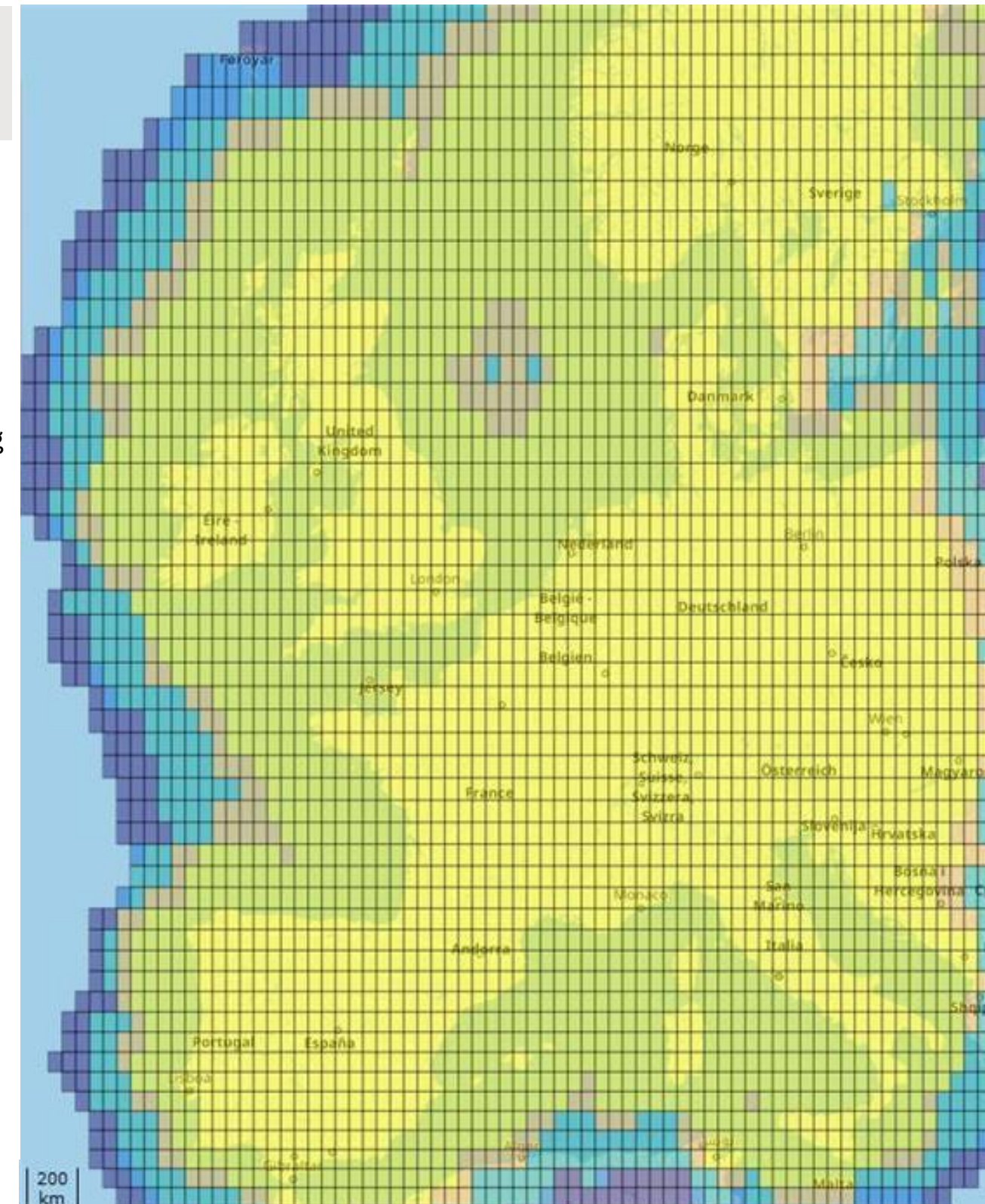
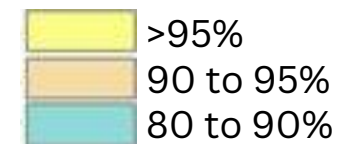The information we provide concerns cloud-to-ground (CG) lightning flashes and lightning density.

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Thunderstorm detection network performance map

Météorage Copyright

Detection (cloud-to-ground lightning flashes)

- >95%
- 90 to 95%
- 80 to 90%

ABOUT

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Created in 1987, Météorage, a subsidiary of Météo France (65% stake) and Vaisala (35% stake), is an innovative French company and member of French Tech, which operates the benchmark lightning detection network in Europe.

Météorage's mission is therefore to deliver information services, lightning risk prevention and decision-making services tailored to the issues faced by its users and applied to numerous sectors (industry, transportation, networks, leisure, tourism, meteorological services, aviation, defense, wind turbines, etc.). Outside Europe, Météorage provides the same services using the GLD network.

On the strength of its experience in network design and operation, and in generating decision-making services, Météorage also offers turnkey thunderstorm risk prevention system solutions for national meteorological services and large institutional users.

Its expertise enables it to respond to the major (human, environmental, material and economic) security issues of its customers and partners.
Météorage is **ISO 9001 certified** and **Qualifoudre** approved. In 2019, it was awarded the **OR'NORMES** Trophy by AFNOR in the category "Protecting people and/or the environment".

It is committed to CSR and its policy has been awarded the "Confirmed" level by AFNOR Certification—internationally recognized under the Responsibility Europe label. This represents an important recognition of the ethics and actions implemented daily by Météorage. Corporate social responsibility has been an integral part of its culture and organization for more than 35 years.

The driving purpose of Météorage, that of saving lives and protecting property by mitigating the risks generated by lightning, is part of its mission as a company serving the community with an ethical approach adopted by each of its employees, who are committed ambassadors.

*source: Cooper, M. A. & Holle, R. L. Reducing Lightning Injuries Worldwide. Springer Natural Hazards (2019)

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Why does Météorage detect and study thunderstorms and lightning?

To know its enemies better!

Each year, storm phenomena and lightning are at the origin of millions of cases of electrical damage and more than 20,000 deaths on Earth.*

Météorage can use its knowledge to provide its customers and partners with expertise and solutions to prevent the risks affecting people and infrastructure, through alarm services, real-time monitoring of storm phenomena, post-thunderstorm studies, etc.

Météorage is also actively involved in raising public and media awareness of the risks and consequences of lightning and thunderstorms.

LIGHTNING ANALYSIS 2022

The year 2022 was marked by two significant lightning records, registered by Météorage:

- **September 2022 was the most lightning-struck month of 2022, and the 2nd most lightning-struck month of September observed in the United Kingdom since 1989.**

- **October 2022 was the most lightning-struck month of October seen in the United Kingdom since 1989, when our records began.**

In the United Kingdom, 157 thunder days were recorded in 2022, compared to 134 in 2021.

According to the expert...

"In the United Kingdom, early spring 2022 saw few lightning strikes. Electrical activity intensified in May with more than 2,000 cloud-to-ground (CG) lightning flashes detected.

The most lightning-struck month of the year was September, with over 4,500 cloud-to-ground (CG) lightning flashes, followed by the months of August and October.

In the United Kingdom, there were more thunderstorms in the autumn than in the summer, which is rare! The month of October 2022 was in fact the most lightning-struck month of October since 1989 in the United Kingdom.

In terms of the number of lightning strikes, 2022 was a standard year of a usual nature.

The atmospheric configuration contributed to the very frequent thunderstorms seen in May, August, September and October. Lots of cold-air pools (areas of low-pressure on the ground combined with a pocket of cold air at altitude) formed on the near Atlantic, and the difference in air mass caused numerous bursts of thunderstorms to move over the country.

The heat that accumulated in the low layers also amplified the temperature difference in the atmospheric column, increasing the likelihood of severe thunderstorms over our country. The positive thermal anomaly of the sea also encouraged the development and maintenance of convection during thunderstorms.

November 2022 was stormy too, due in part to atmospheric dynamics still relatively conducive to the formation of thunderstorms over the United Kingdom, with still relatively warm waters."

Joris Royet, Météorage Meteorology Project Manager

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SIGNIFICANT EVENTS 2022

September 2022

SEPTEMBER 2022: MOST LIGHTNING-STRUCK MONTH OF THE YEAR
With nearly 4,555 cloud-to-ground (CG) lightning flashes and 13 thunder days, September 2022 was the most lightning-struck month of 2022, and the 2nd most lightning-struck month of September observed in the United Kingdom since 1989.

OCTOBER 2022: MOST LIGHTNING-STRUCK MONTH OF OCTOBER SINCE 1989
With 2,201 cloud-to-ground (CG) lightning flashes and 19 thunder days, October 2022 was the most lightning-struck month of October seen in the United Kingdom since 1989, when our records began.

October 2022

SEPTEMBER 5 2022

SEPTEMBER 5, 2022
The most lightning-struck day in the UK, with 1,678 cloud-to-ground (CG) lightning flashes detected.
Followed closely by October 23, 2022, the 2nd most lightning-struck day of 2022 with 1,443 cloud-to-ground lightning (CG) flashes.

ENGLAND: MOST LIGHTNING-STRUCK COUNTRY
The United Kingdom's most lightning-struck country in 2022, with 12,627 cloud-to-ground lightning (CG) flashes and 112 thunder days. The highest electrical activity was recorded there on September 5, 2022.

JERSEY (ENGLAND): THE MOST LIGHTNING-STRUCK REGION
The United Kingdom's most lightning-struck region in 2022, with a lightning density* of 0.3133. The highest electrical activity was recorded there on September 7, 2022.

*Lightning density: number of cloud-to-ground (CG) lightning flashes per km² per year.

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OCTOBER 2022: Supercells on October 23, 2022 in the south of England

Close-up on the electrical activity of a thunderstorm

A storm phenomenon is characterized by its electrical activity.

Other violent phenomena associated with storm phenomena (heavy rainfall, hail, wind gusts and tornadoes) are usually preceded by electrical activity.

Lightning activity (cloud-to-ground (CG) lightning flashes) in the south of England (terrestrial and maritime) October 23, 2022
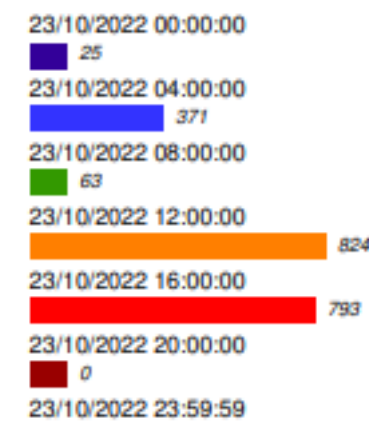
Some 1,500 cloud-to-ground (CG) lightning flashes struck the English land on this day, with heavy rain and strong gusts of wind.

These supercells first struck France, before then moving north and reaching England at the end of the day.
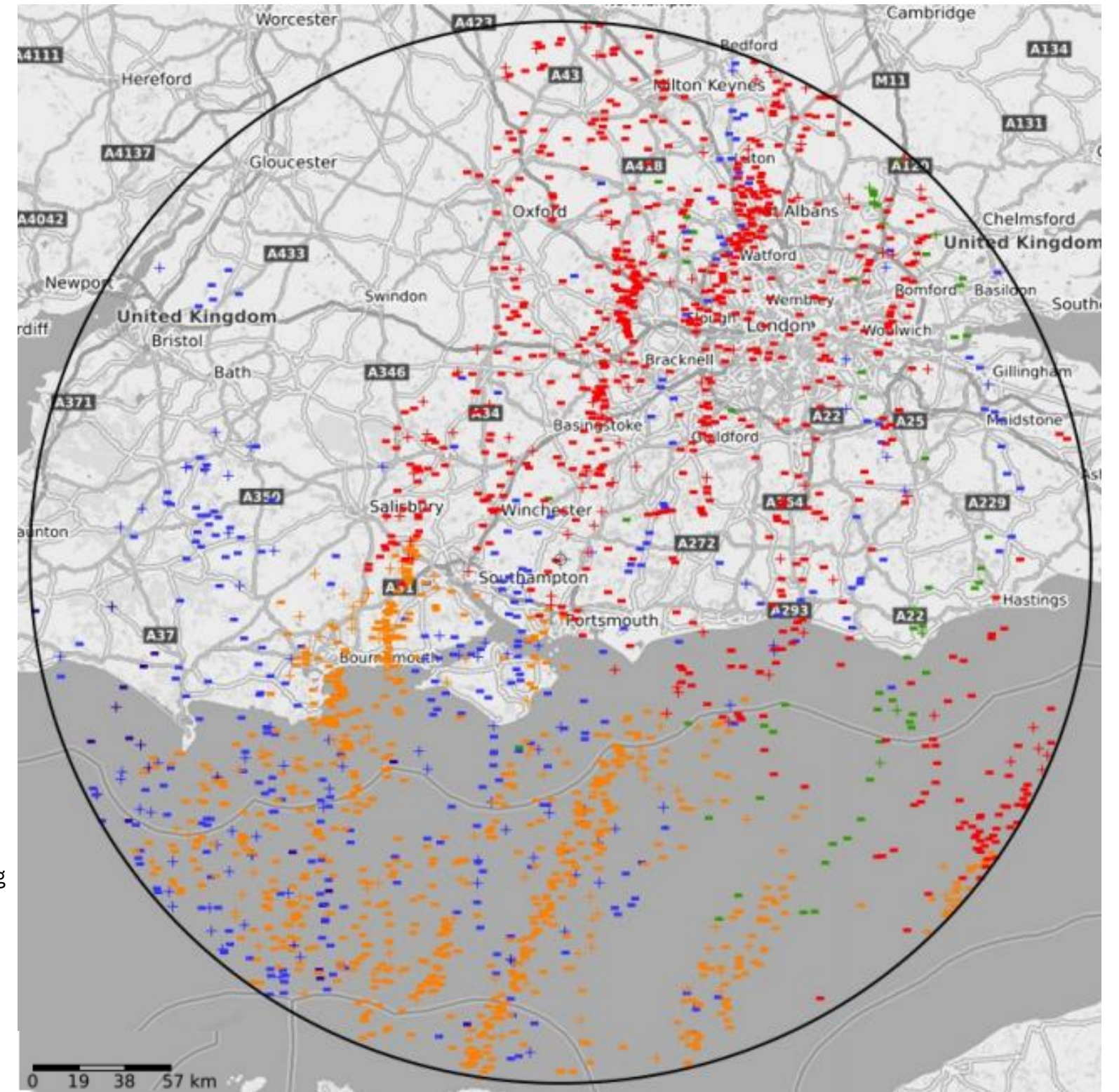
The still-warm water helped to maintain convection when the thunderstorm passed over the Channel.

Legend

23/10/2022 00:00:00	(dark blue)	25
23/10/2022 04:00:00	(blue)	371
23/10/2022 08:00:00	(green)	63
23/10/2022 12:00:00	(orange)	824
23/10/2022 16:00:00	(red)	793
23/10/2022 20:00:00	(dark red)	0
23/10/2022 23:59:59		

Number of cloud-to-ground (CG) lightning flashes detected
Per 4-hour period

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157 thunder days in 2022

Ranking by lightning density of cloud-to-ground (CG) lightning flashes per km²/year

1	England	0.0966
2	Wales	0.0612
3	Northern Ireland	0.0251
4	Scotland	0.0247

Ranking by number of cloud-to-ground (CG) lightning flashes.

1	England	12,627
2	Scotland	1,963
3	Northern Ireland	1,281
4	Wales	356
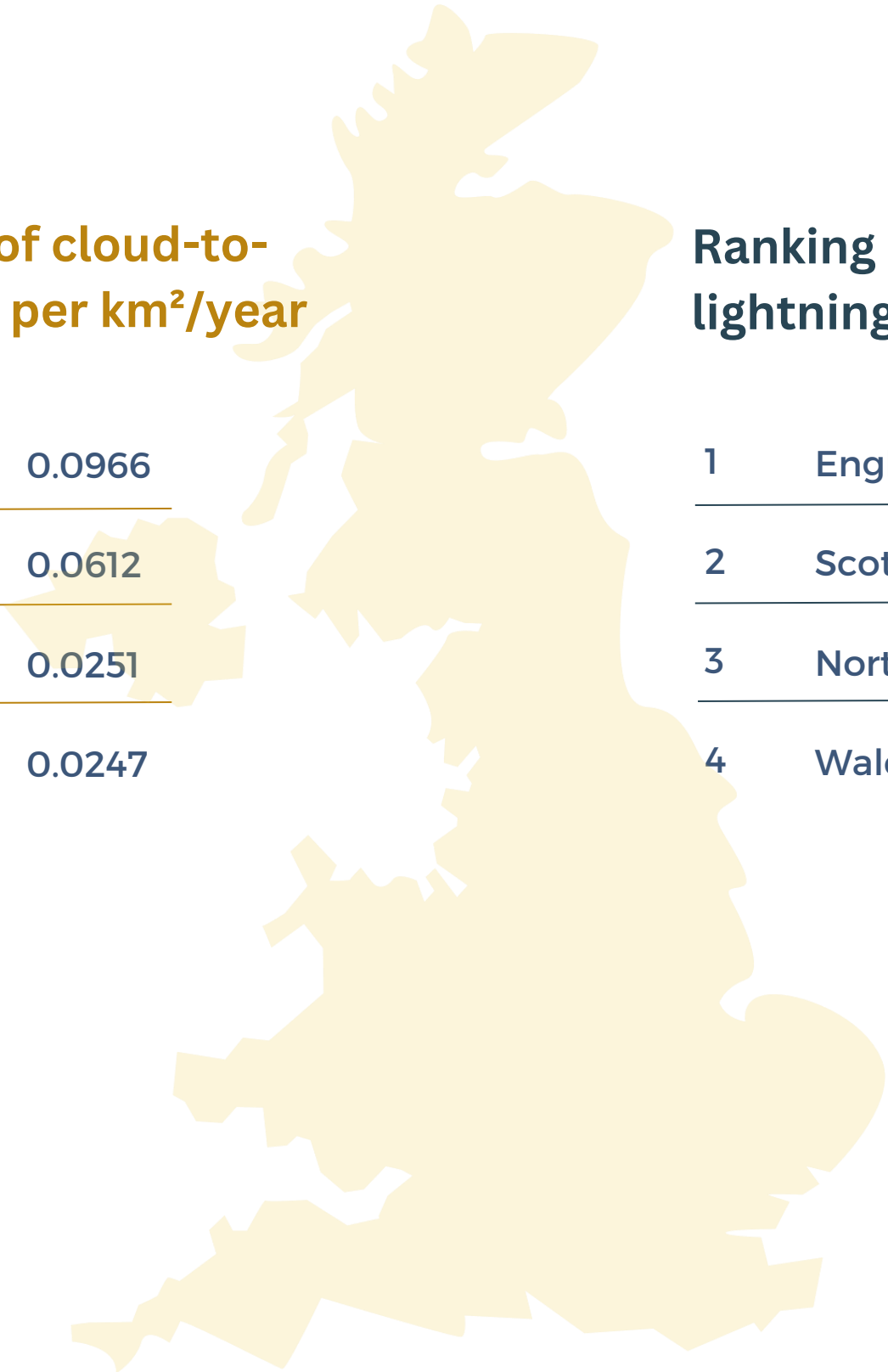
LIGHTNING IN ENGLAND: TOP 10 COUNTIES & REGIONS IN 2022

112 thunder days in 2022

Ranking by lightning density of cloud-to-ground (CG) lightning flashes per km²/year

1	JERSEY	0.3133
2	GUERNSEY	0.2737
3	EAST SUSSEX	0.2622
4	WEST SUSSEX	0.2168
5	SUFFOLK	0.1979
6	KENT	0.1957
7	ISLE OF WIGHT	0.1950
8	SURREY	0.1803
9	LONDON	0.1769
10	CORNWALL	0.1745

Ranking by number of cloud-to-ground (CG) lightning flashes

|		
1	SUFFOLK	763
2	KENT	760
3	NORFOLK	726
4	LINCOLNSHIRE	670
5	DEVON	668
6	CORNWALL	648
7	HIGHLANDS	642
8	ESSEX	620
9	HAMPSHIRE	596
10	EAST SUSSEX	474

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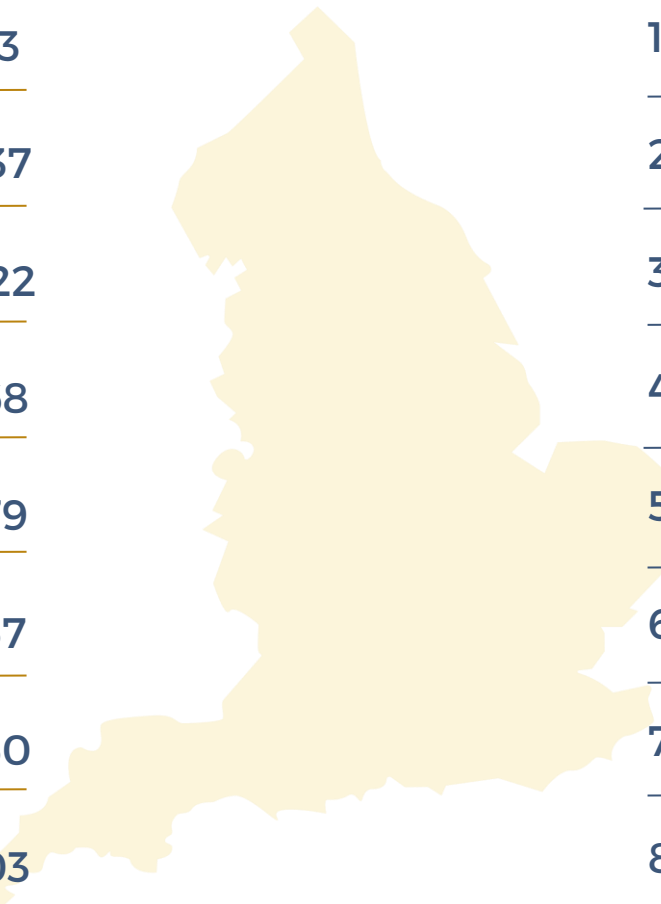
LIGHTNING IN NORTHERN IRELAND: RANKING OF COUNTIES IN 2022

37 thunder days in 2022

Ranking by lightning density of cloud-to-ground (CG) lightning flashes per km²/year

1	COUNTY FERMANAGH	0.0537
2	COUNTY TYRONE	0.0301
3	COUNTY LONDONDERRY	0.0294
4	COUNTY ARMAGH	0.0203
5	COUNTY ANTRIM	0.0161
6	COUNTY DOWN	0.0090
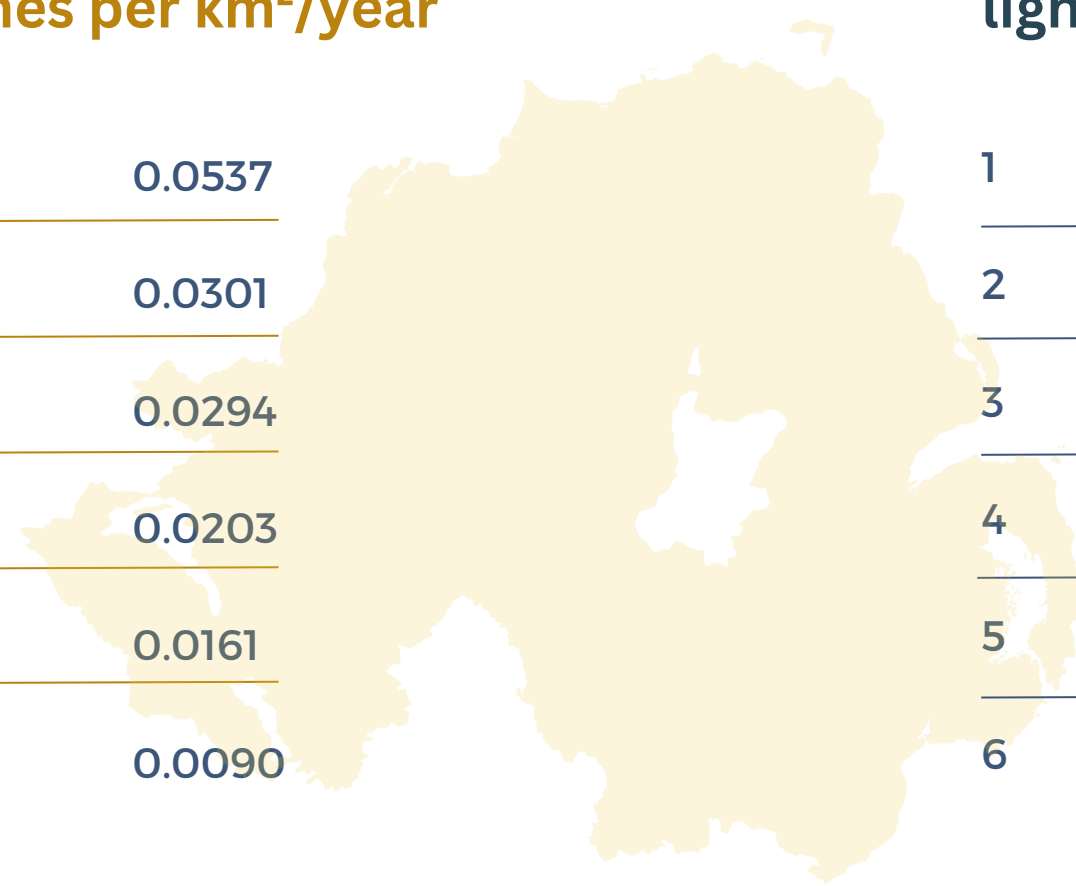
Ranking by number of cloud-to-ground (CG) lightning flashes

1	COUNTY FERMANAGH	99
2	COUNTY TYRONE	99
3	COUNTY LONDONDERRY	66
4	COUNTY ANTRIM	50
5	COUNTY ARMAGH	27
6	COUNTY DOWN	24

LIGHTNING IN SCOTLAND: TOP 10 IN 2022

107 thunder days in 2022

Ranking by lightning density of cloud-to-ground (CG) lightning flashes per km²/year

1	WEST LOTHIAN	0.0817
2	FALKIRK	0.0675
3	FIFE	0.0639
4	CITY OF EDINBURGH	0.0566
5	NORTH LANARKSHIRE	0.0487
6	CLACKMANNANSHIRE	0.0482
7	ANGUS	0.0433
8	SOUTH AYRSHIRE	0.0425
9	SOUTH LANARKSHIRE	0.0406
10	CITY OF DUNDEE	0.0322

Ranking by number of cloud-to-ground (CG) lightning flashes

1	HIGHLANDS	642
2	ARGYLL AND BUTE	208
3	DUMFRIES AND GALLOWAY	141
4	BORDERS	140
5	PERTH AND KINROSS	129
6	ANGUS	95
7	FIFE	87
8	ABERDEENSHIRE	81
9	SOUTH LANARKSHIRE	72
10	SOUTH AYRSHIRE	52

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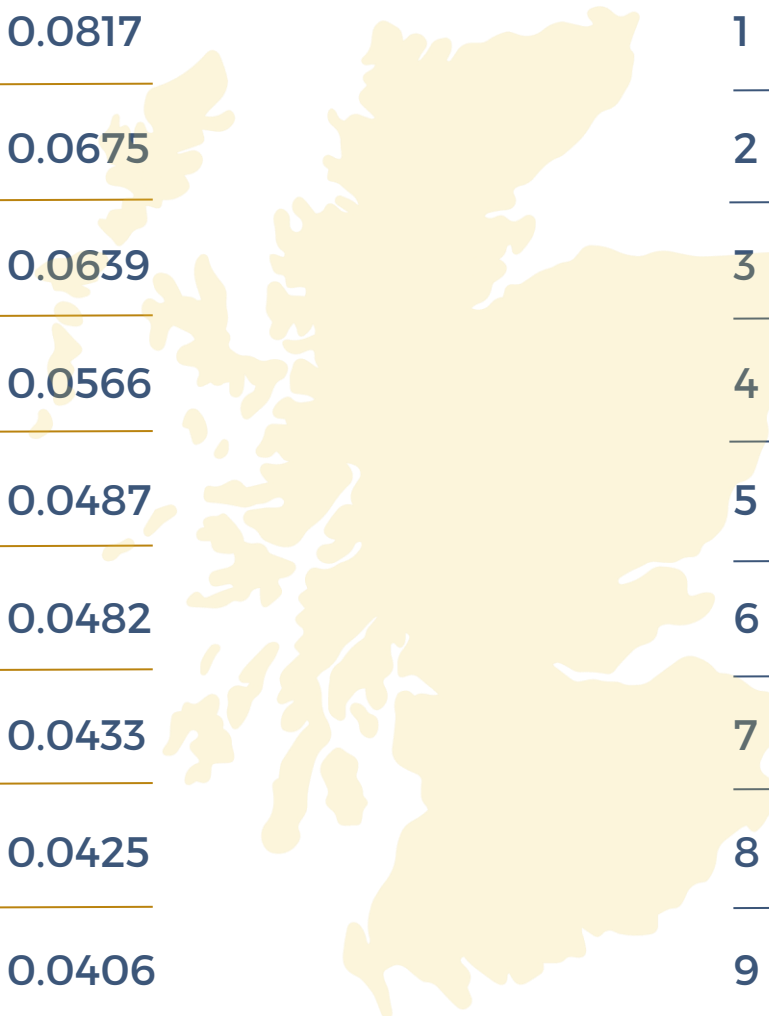
LIGHTNING IN WALES:TOP 5 IN 2022

55 thunder days in 2022

Ranking by lightning density of cloud-to-ground (CG) lightning flashes per km²/year

1	MERTHYR TYDFIL	0.1267
2	CARDIFF	0.1253
3	VALE OF GLAMORGAN	0.1219
4	SWANSEA	0.1195
5	BLAENAU GWENT	0.1105

Ranking by number of cloud-to-ground (CG) lightning flashes

1	POWYS	642
2	GWYNEDD	208
3	CARMARTHENSHIRE	141
4	PEMBROKESHIRE	140
5	CEREDIGION	129