

THUNDERSTORM SURVEILLANCE REPORT BELGIUM

2023



METEORAGE



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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, METEORAGE 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”.



ABOUT THE LIGHTNING REPORT

The lightning report is based on data provided by [METEORAGE](#)'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 Ireland.

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 METEORAGE 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](#).

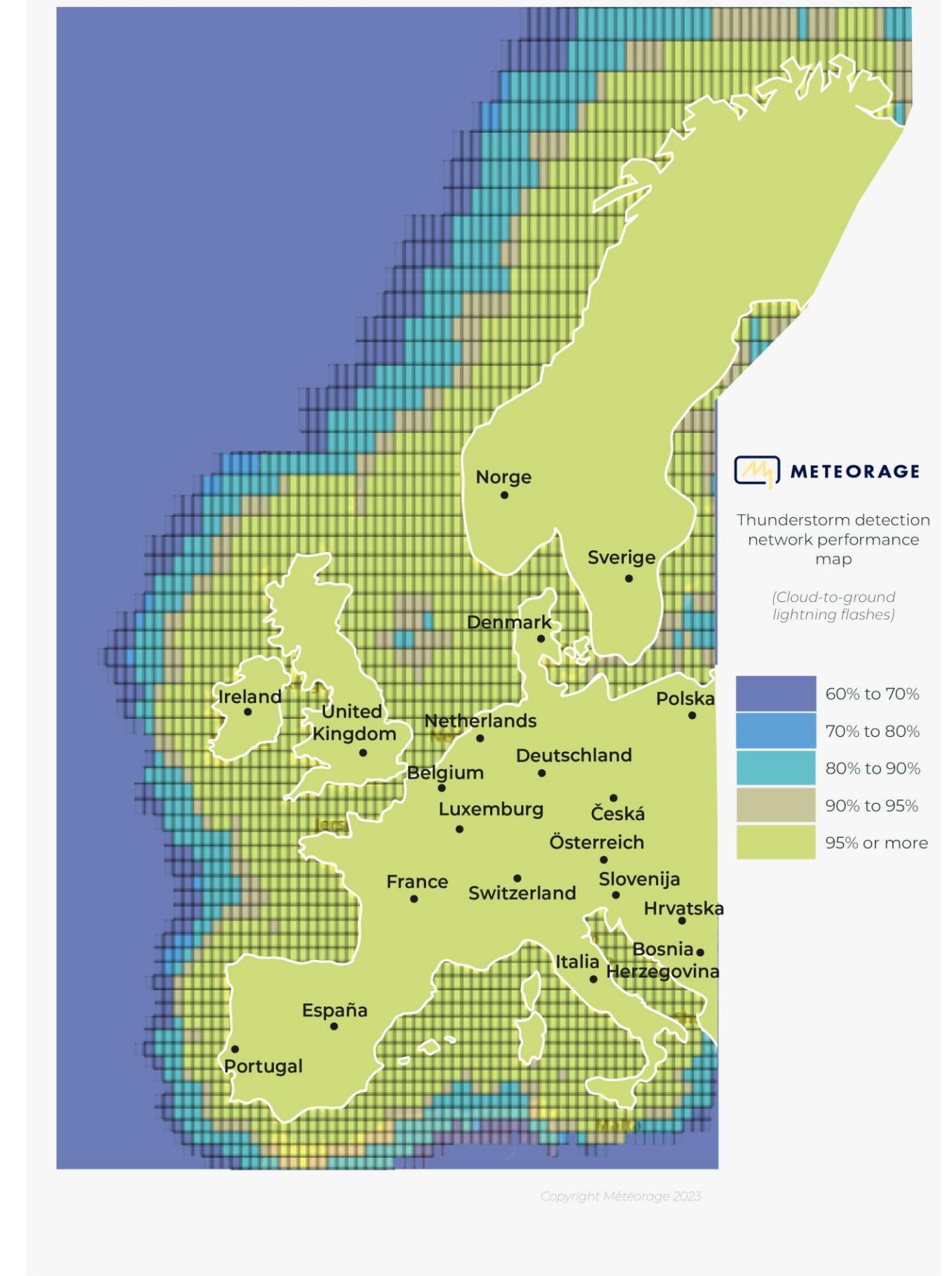
This 2023 report is based on the most comprehensive source of information in Belgium.

The data, densities, rankings and thunder days in this report are dated from 1 January 2023 to 31 December 2023.

The information we provide concerns cloud-to-ground (CG) lightning flashes and lightning density.

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ABOUT



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Created in 1987, [METEORAGE](#), 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.

METEORAGE'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, METEORAGE 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, METEORAGE 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.

METEORAGE 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 RSE** 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 METEORAGE. Corporate social responsibility has been an integral part of its culture and organization for more than 35 years.

The driving purpose of METEORAGE, 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).

Why does METEORAGE 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.*

METEORAGE 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.

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

WEATHER- CLIMATE- ELECTRICAL ACTIVITY ANALYSIS

2023



According to the expert

“Electrical activity in Belgium was relatively low throughout the year, with the exception of a slight increase in instability in August and September.

Moreover, a meteorologically stable autumn resulted in very limited electrical activity in the region. As is often the case during winter, active mackerel skies, fueled mainly by warm water, had little impact on Belgium, resulting in almost no electrical activity in winter.”

Joris Royet, METEORAGE Meteorology Project Manager

SIGNIFICANT EVENTS BELGIUM 2023



AUGUST
2023

WALLONIA

AUGUST 2023 : THE MOST LIGHTNING STRUCK MONTH IN 2023

With almost 4,218 cloud-to-ground lightning flashes and 16 days of thunderstorms, August 2023 was the month with the most lightning strikes in 2023, well ahead of September 2023 with 2,526 cloud-to-ground lightning flashes.

25 AUGUST 2023

The most lightning-filled day of 2023, with 1,847 cloud-to-ground flashes detected.

25 AUGUST
2023

WALLONIA : THE MOST LIGHTNING STRUCK REGION IN 2023

The region with the most lightning strikes in Belgium in 2023, with 8,249 cloud-to-ground lightning flashes detected, of which about a third (2,959) were concentrated in August, a lightning density* of 0.4883 and the highest electrical activity on 12 September 2023 with 1,651 cloud-to-ground lightning flashes.

LIBRAMONT-CHEVIGNY : THE MOST LIGHTNING STRUCK MUNICIPALITY IN 2023

The municipality with the most lightning strikes in Belgium in 2023, with the highest level of electrical activity on 12 September, concentrating over 24 hours more than 56% of the year's cloud-to-ground lightning, i.e. 153 cloud-to-ground lightning flashes out of a total of 271 detected over the whole year, and a lightning density* of 1.5160.

LIBRAMONT-
CHEVIGNY

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

SIGNIFICANT STORM PHENOMENA 2023

Focus on electrical activity of a thunderstorm

Electrical activity characterises thunderstorms.

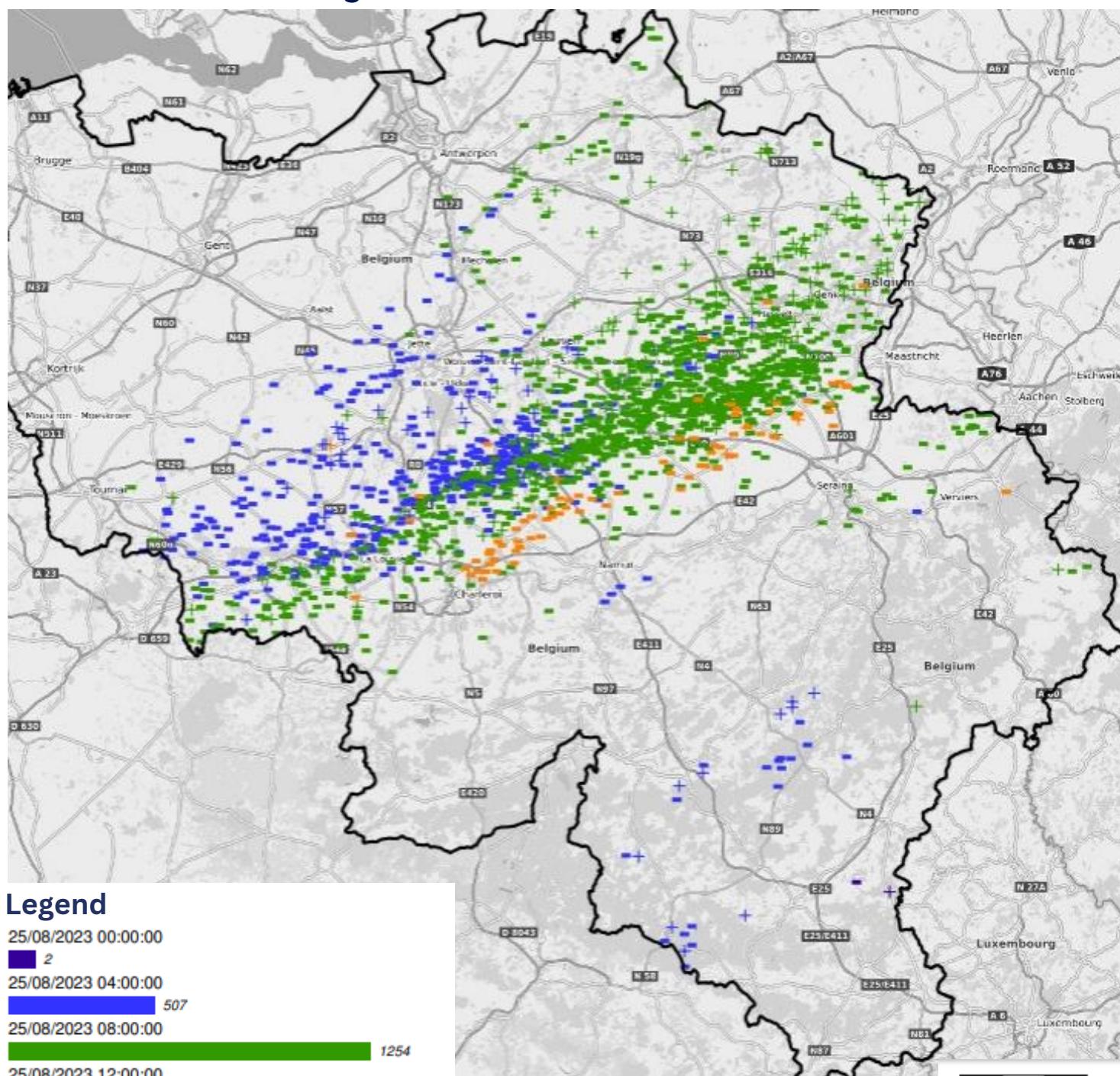
The other violent phenomena associated with thunderstorms (intense precipitation, hail, wind gusts and tornadoes) are generally preceded by electrical activity..

Contributor:
Joris Royet
Meteorology Project Manager
METEORAGE

VIOLENT LINE OF THUNDERSTORMS ON THE NIGHT OF 25 AUGUST 2023

Lightning activity (CG cloud-to-ground lightning) over Belgium

August 25, 2023 until 12.00 am



In the middle of a summer with relatively few lightning strikes, the day of August 25, 2023 was marked by the passage of a particularly active thunderstorm line, the first of the year.

What is original about this thunderstorm line is its time of formation, occurring between 4:00 a.m. and 6 a.m. local time. In general, instability is minimal in the early hours of the morning, with stable atmospheric layers that inhibit convection.

However, during the night of 24 to 25 August, instability was significant, reaching a CAPE value of up to 2000 to 2500 J/kg (Convective Available Potential Energy, a measurement of latent instability in the atmosphere) near the Franco-Belgian border.

In addition, altitude forcing combined with ground forcing by wind convergence favored convection between the Hauts-de-France and the Grand Est. Once mature, the storm cell reached Belgium, causing heavy rainfall, hail and violent wind gusts, especially in eastern Walloon Brabant.

The resulting electrical activity was truly remarkable for the early hours of the morning, with the MÉTÉORAGE network recording more than 1,840 CG flashes during this episode, representing almost half of the electrical activity of August in Belgium.

LIGHTNING ACTIVITY IN BELGIUM'S REGIONS IN 2023

	Cloud-to-ground lightning flash density (CG) per km² per year	Number of flashes cloud-to-ground (CG)
BRUSSELS REGION	0,2654	43
FLANDERS REGION	0,2436	3 312
WALLONIA REGION	0,4883	8 249



TOP 10 MOST LIGHTNING-STRUCK PROVINCES IN 2023

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

1	LUXEMBURG	0,7417
2	WALLOON BRABANT	0,6340
3	LIÈGE	0,4169
4	NAMUR	0,3874
5	LIMBURG	0,3532
6	HAINAUT	0,3196
7	WEST FLANDERS	0,2996
8	VLAAMS BRABANT	0,2848
9	BRUSSEL	0,2654
10	ANTWERPEN	0,1660

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

1	LUXEMBURG	3 306
2	LIÈGE	1607
3	NAMUR	1423
4	HAINAUT	1218
5	WEST FLANDERS	951
6	LIMBURG	857
7	WALLOON BRABANT	695
8	VLAAMS BRABANT	603
9	ANTWERPEN	477
10	OOST-VLAANDEREN	424

TOP 10 MOST LIGHTNING-STRUCK MUNICIPALITIES IN 2023

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

1	LIBRAMONT-CHEVIGNY	1,5160
2	THIMISTER-CLERMONTGNY	1,4699
3	PLOMBIÈRES	1,4670
4	OTTIGNIES-LOUVAIN-LA-NEUVE	1,3502
5	BASTOGNE	1,3426
6	MONT-SAINT-Guibert	1,3346
7	MESEN	1,1330
8	BERTRIX	1,1006
9	COMINES-WARNETON	1,0842
10	GOUVY	1,0708

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

1	LIBRAMONT-CHEVIGNY	271
2	BASTOGNE	232
3	GOUVY	177
4	HOUFFALIZE	155
5	BERTRIX	152
6	BOUILLON	142
7	VAUX-SUR-SÛRE	133
8	FLORENVILLE	125
9	COUVIN	123
10	NEUFCHÂTEAU	122



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