MÉTÉORAGE

LIGHTNING INFORMATION AND SOLUTIONS

PRESS PACK

CONTACT US

Météorage
+ 33 5 24 98 71 75
communication@meteorage.com

SOMMAIRE

EDITORIAL

Lightning: essential to life, yet hazardous

In May 2018, the French gazed in awe at images of a lightning-struck Eiffel Tower which were circulated widely on the Internet. Impressive though the pictures were, not a day goes by on Earth without lightning. In fact, in 2018 France experienced the most lightning-struck month of May since a lightning detection network was created 30 years ago.

Lightning helps maintain our planet's electric field and is essential to life, but it can also be a source of danger. Thunderstorms can cause damage to industrial or public sites such as fires, short circuits and other disturbances to electricity, telecommunications and transport networks.

Until the late 1980s, there was no means of detecting lightning and accurately measuring the electrical activity of clouds – and yet looking at where lightning strikes occur is what makes it possible to optimise risk management and the response to major challenges in terms of human, environmental, material and economic security.

Météorage was set up to meet these challenges in France in 1987.
We use a network of sensors that rely on cutting-edge technology, and we are the only source of data on lightning for our main shareholder Météo-France, but also for many economic actors internationally. As a result, we are the global leader in this market

Dominique Lapeyre de Chavardès,
President of Météorage

Météorage : the specialist in lightning detection

Over the last 30 years, Météorage has established a strong reputation in the lightning risk prevention market, supporting customers in France, in Europe and internationally. For this purpose, the company has developed advanced services to meet the requirements of a wide range of customers, including manufacturers, nuclear power plants, insurers and public venues.

The French company that has become a **global leader**

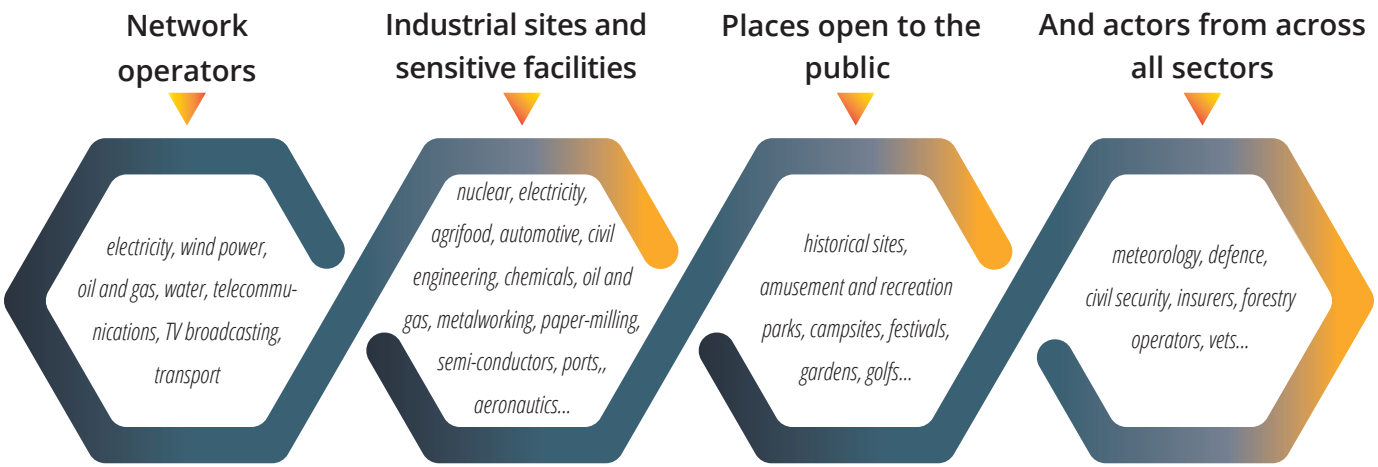
The Météorage story begins in **1987,** when the company was founded.
In a **pioneering** move, it rolled out the first lightning detection network, whose sensors covered the entire French territory.
This network, which was regularly upgraded with the latest technological developments, gradually extended to **Europe**, including Switzerland, United Kingdom, Ireland, Benelux, Spain, Portugal, Andorra, Italy, Austria, Germany and Scandinavia.

In 2001, **Météo-France** acquired a 65% controlling stake in Météorage alongside G.A.I., an American manufacturer of lightning detection sensors. In 2002, the latter was acquired by the Finnish group **Vaisala**, the largest meteorological equipment maker in the world. Vaisala thus became a 35% shareholder in Météorage and gave it access to an **international lightning detection network,** called GLD360.

Based in Pau and with a workforce of 22 employees, Météorage is today the **global leader** in its market.

It provides **lightning risk management** services to its customers in Europe and around the world, as well as **consulting, engineering and support** services relating to the creation of lightning detection systems.

Who are Météorage's **services** aimed at?

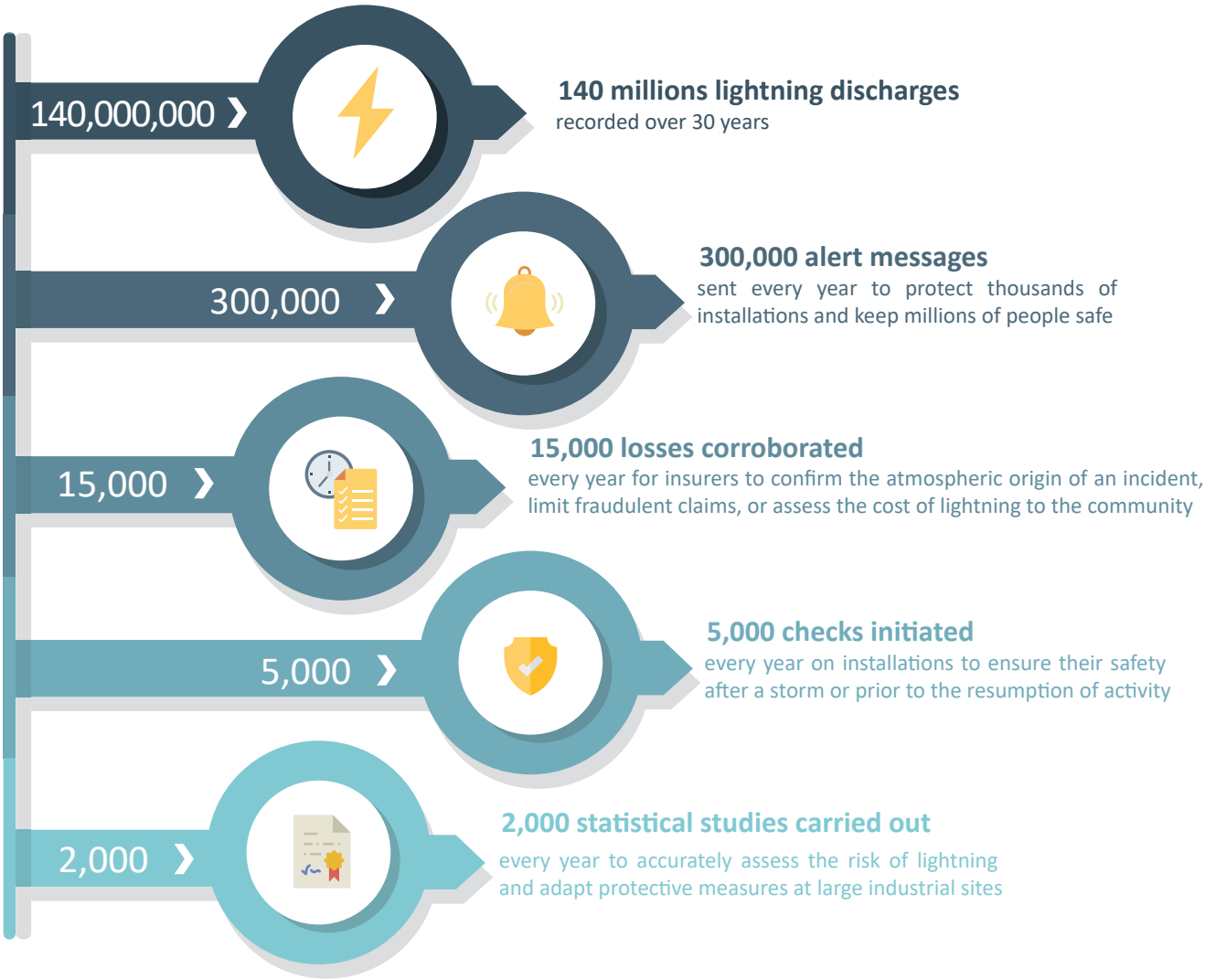


The Météorage network: at the cutting edge of **technology**

Until 1987, measuring thunderstorm electrical activity was confined to counting the number of days on which thunder was observed. With its **network of sensors** continuously scanning the electromagnetic field and providing dense and homogeneous coverage, Météorage has developed powerful tools to detect, locate and analyse each flash in real time. In Europe, the company has more than **100 sensors**, powerful computers and a data processing system, which allow it to offer a range of services to its customers. The network operates all year round, **24/7**, and has an average detection rate of over **98%** with a locational accuracy of **100 m**.

Moreover, Vaisala's **GLD360** global long-distance network is considered the best in the world, enabling Météorage to detect more than **80%** of lightning strikes to within **1,5 km average location accuracy**.

Some **key figures** for France...



Innovation at the heart of Météorage

Every year Météorage's services evolve, thanks to input from customers and ongoing monitoring of new technological solutions. The company also devotes a substantial budget to **research and development** (10% of its income) and to **investment** (15%). Moreover, in the space of 15 years it has doubled its workforce and tripled its turnover to 3.2 million euros in 2017.

Already well established in Western Europe, Météorage aims to increase the number of countries covered by its network and **strengthen its presence worldwide**. The company also exports its expertise to Asia, Africa, Oceania and elsewhere. Finally, it is currently positioning itself in a number of promising markets, such as **insurance, construction and civil engineering.**

At the same time, Météorage is extensively involved in work to **raise awareness of the risk of lightning.** It contributes actively to **standardisation work**, particularly within the international committees of the electrical and electronic sectors. Its experts also participate regularly in conferences all over the world, as well as in **research studies** carried out in collaboration with major laboratories

Acknowledged expertise

Qualifoudre accreditation
ISO 9001-2015 certification
Involvement in standardisation bodies
Standardisation work

Research, publications and conferences in collaboration with the CNRS (French National Centre for Scientific Research), CNES (French National Centre for Space Studies), ONERA (French Aerospace Lab), ICLP (International Conference on Lightning Protection), ILDC (International Lightning Detection Conference), CIGRÉ (International Council on Large Electric Systems), etc

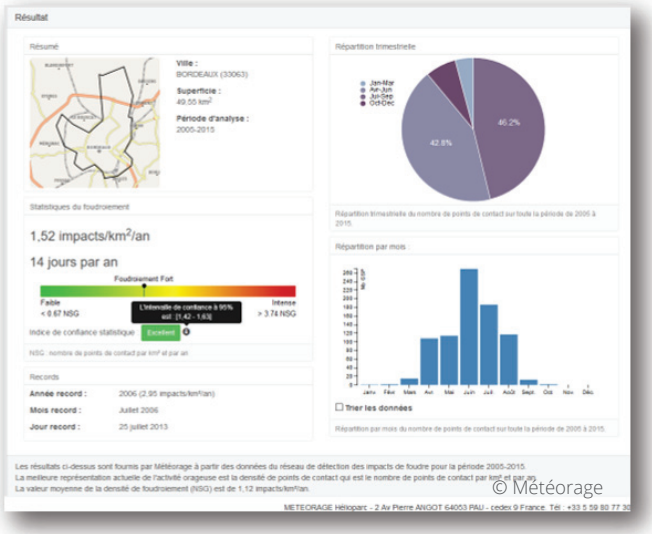
A member of EUCLID (European Cooperation for Lightning Detection), Prométéo, HMEI (Hydro-Meteorological Equipment Industry Association), Wind Europe, Syndicat des Loisirs Actifs, the French National Meteorological Service, The Syndicat National des Espaces de Loisirs d'Attractions et Culturels, the Association Protection Foudre, the SEE (Société de l'Électricité et de l'Électronique), the Union Technique de l'Électricité, etc.

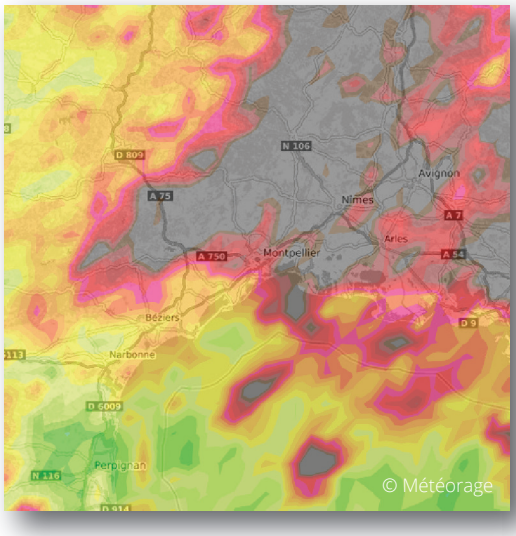
Evaluate the lightning risk

For 30 years, Météorage has been collecting data on lightning strikes, giving it unique climatological expertise. These statistics, which are unmatched in their reliability and precision, help determine the potential risk of lightning discharge at a given site or in a given geographical area.

Why **evaluate** the lightning risk ?

Lightning can have serious consequences for certain facilities and in certain regions, adversely affecting their security, personal safety and the quality of the environment. Many countries have introduced regulatory requirements; this is the case in France, for instance, for facilities listed under environmental protection regulations. Measuring a site's lightning risk makes it possible not just to determine the **potential lightning density**, but to prioritise its protection systems.





The Météorage Solution: **lightning statistics**

Drawing on data gathered since 1987, Météorage is able to compile **lightning statistics** for a municipality or site, presented in the form of maps, bar graphs and charts. These lead to a better understanding of the density of lightning strikes, the number of stormy days per year, the statistical confidence interval, the records for a given area, and the seasonal or monthly distribution of the places where lightning strikes.

Additionally, Météorage provides free lightning statistics per French region or department via the **interactive map** published on its website. More complex, multi-site or geolocalised studies can also be performed.

The example of a design firm : **SEFTIM**

*'**SEFTIM** specialises in lightning protection studies, particularly on sensitive sites (nuclear, aviation, data centres, explosives, oil & gas etc.) for which our expertise is recognised internationally.*

Lightning data from Météorage are an integral part of the lightning risk analysis of a site and are particularly useful to us for complex studies. As well as looking at the local lightning density, as is the case in conventional lightning studies, we also analyse the current distribution of the electrical discharges in order to determine whether the site is more severely struck than would be expected or to take account of the seasonality of thunderstorms.

Thirty years ago, the only data concerned the number of days on which a human observer could hear thunder. Today, thanks to Météorage, it is possible to learn in detail about how lightning affects a site, and to know more about the spatial representation and the violence of the phenomenon. We regard this as vital to our ability to protect a site from lightning. Such an analysis is also essential when investigating the cause of incidents.'

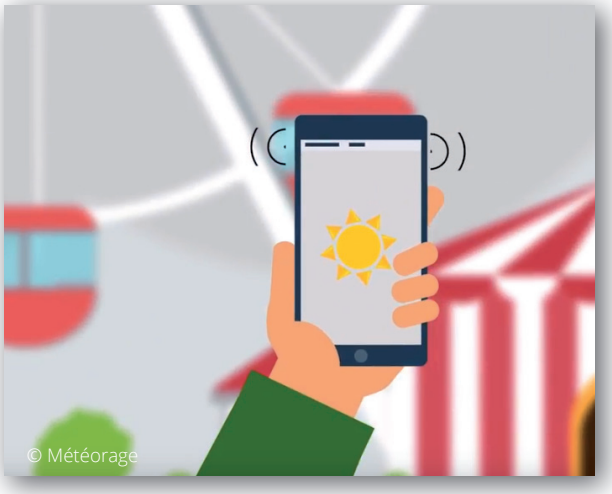
Alain Rousseau, *Chairman of SEFTIM and of the European Lightning Protection Standard Committee*

Lightning warnings

Météorage is able to detect storms in real time, anticipate their arrival and warn customers up to an hour before a potential lightning strike. They can then use this information to put in place procedures for protecting both people and property.

Why warn about lightning?

Lightning can pose a threat to both facilities and people – the personnel of a company, its partners, its subcontractors, its customers and so on. Being alerted when a storm is imminent thus makes it possible to **limit harm to humans and material damage**. In addition, a company can in this way keep its site operational during storms, avoiding interruption of its activities. This is why Météorage offers **lightning prevention services**: to allow its customers to anticipate threats and take protective measures.



The Météorage solution: lightning alerts

Through lightning alerts, Météorage informs its customers in **real time** of the arrival and then the departure of a storm. The beginning and the end of an alert are communicated in line with standard practice or the user's planning.

This service is available by email, text, telephone or fax and does not require any special installation or maintenance services. Proven in its effectiveness, it offers two options: a visual display that tracks the development and extent of a storm, and an automatic system to trigger sirens or generators, for example.

Example: the **FNHPA** (National Federation of Camping Tourism)

FNHPA
FEDERATION NATIONALE DE L'HOTELLERIE DE PLEIN AIR

*'The **FNHPA** brings together campsite operators, whether private, municipal or associative, independent or part of a group, representing 4,000 sites in France today. This is the leading mode of tourist accommodation in our country, with 124 million overnight stays in 2017 alone.*

People's safety is a top priority for us, hence the importance of being warned about lightning via Météorage's alerts, which we have been using for many years. This ensures that campsite operators know in advance when a storm episode will begin and end. As a result, they can make decisions with greater autonomy and effectiveness to confine their customers to shelter or evacuate them where necessary, and their customers find this reassuring. This is particularly true as the information from Météorage is very reliable. Only proven risks are communicated, and the information is also perfectly localised: it really does concern the campsite's local area, and not the other end of the town. There are significantly fewer accidents due to lightning now than there were fifteen years ago.'

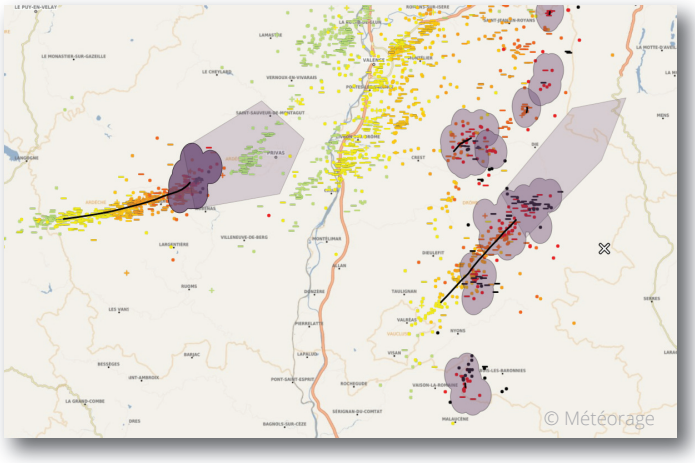
Nicolas Dayot, *chairman of the National Federation of Camping Tourism*

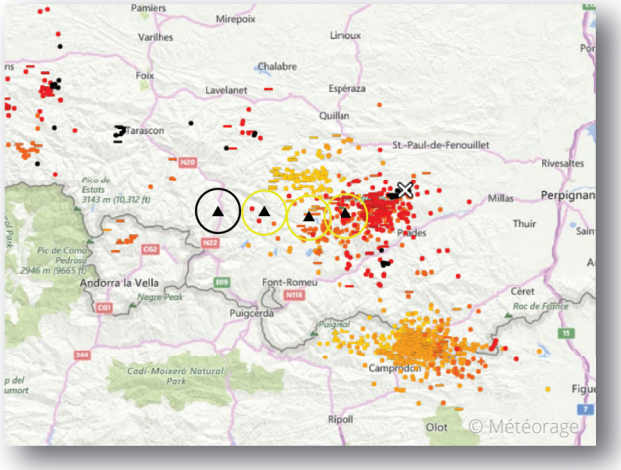
Monitoring storms in real time

Météorage can use its sophisticated and extensive sensor network to measure the magnitude and the intensity of a storm. Such data is particularly useful for anyone wishing to adapt their safety measures in order to protect against lightning strikes in a great variety of contexts.

Why monitor thunderstorms in real time?

During a single storm episode, it is possible to observe variations in lightning activity, in terms of both **magnitude** and **intensity**. Tracking the impacts of lightning in real time therefore helps customers to **understand the storm's severity** more accurately, anticipate the threat and take any measures deemed necessary. With this in mind, Météorage offers services designed to track the progress of a storm across a given area and even predict its movement over the next hour.





The Météorage solution: real-time visualisation services

Météorage has designed several **real-time** visualisation services in which each flash is displayed on the screen within 10 seconds of its occurrence. Users can therefore view storm activity in their area of interest, but also create alerts and manage the distribution of related messages.

They can also see from the display of storm cells, their predicted path and their severity index whether high winds, intense rainfall, hail and other phenomena can be expected.

Example:
The Royal Netherlands Meteorological Institute (KNMI)

Koninklijk Nederlands Meteorologisch Instituut
Ministerie van Infrastructuur en Waterstaat

*' **KNMI** is the national meteorological service of the Netherlands, which has existed since 1854. As a governmental agency of the Ministry of Infrastructure and Water Management, our main activities are weather forecasting and monitoring of meteorological, climatic and seismic conditions and air quality.*

We have used the lightning data provided by Météorage for almost five years. This data is permanently displayed in our forecasting room to allow our meteorologists to track extreme weather events currently occurring and to refine their weather forecasts or warning levels.
We adapt our safety briefings, warn partners , who are particularly weather-sensitive such as air traffic controllers, produce automatic reports, such as METAR, and inform the general public.*
From the individual to the helicopter flying over the oil rigs of the North Sea, we try to disseminate this information in keeping with our role.'

** METAR : meteorological terminal aviation routine weather report*

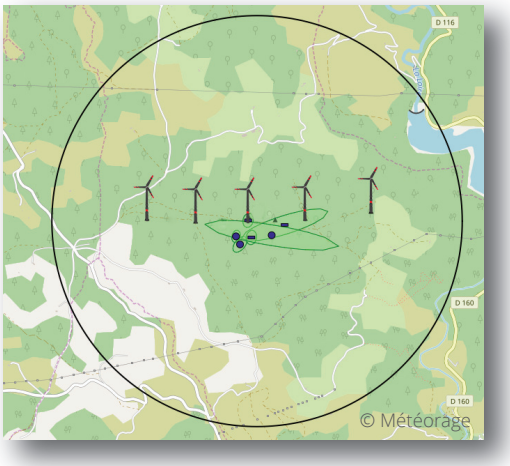
Hans Beekhuis, *Senior Consultant at the KNMI's observation service R&D centre*

Checking facilities and investigating incidents

Météorage provides services to establish correlations between lightning strikes and incidents. It can check a storm-hit site and see if any damage has been caused by lightning. For this purpose, Météorage has created adapted services in order to target its checks and, if necessary, determine if lightning was indeed responsible for any damage.

Why **check** facilities and investigate the origin of an incident?

To make site checks and protective measures after a storm easier, it is extremely useful to know **how many lightning strikes there have been**, their **location** and their **date**. Météorage offers its customers just this. This also ensures compliance with the 2010 decree on accident risk prevention, which provides for the setting up of a system to record this information. In the event of a claim, the fact that lightning is the cause can also be demonstrated to the **insurers** by obtaining an official document attesting to the presence of lightning strikes on a given site and in a given period.



The Météorage solution: the lightning **remote-counter** and the **web survey**

After a storm episode, Météorage can use its remote counter to provide a detailed report, containing a **map** and the **features** of each lightning strike. On-site checks can then be optimised, and preventive or corrective maintenance operations carried out on the customer's facilities.

Météorage's **web survey** also provides detailed information about the presence of lightning strikes at a given location (postal address, GPS coordinates, electricity, rail or telecom networks, etc.). These surveys are available on a one-off basis on request, but also by subscription or as a bundled purchase to meet recurring needs

Example: a **Total** fuel depot

'I manage the fuel depot in Feluy, Belgium, which is supplied by the Antwerp refinery via a pipeline. It has a storage capacity of 756,000 cubic metres, and operates 24/7, receiving around 500 truck drivers a day who call in to refuel. We have been working with Météorage for five years now to manage the storm risk.

When storm activity is detected within a radius of 10 km, we are warned to stop our activities and get people on our site safely into buildings that offer protection against lightning. Once the episode is over, we are also informed and can resume our activity. On the Internet, I can also follow the thunderstorm's progress with precision and see how many strikes have hit the depot, in order to take the necessary measures, including checking our lightning protection systems. This happens fairly regularly. On 27 May 2018, for example, we recorded 110 lightning strikes between 6 and 7.40 pm. Thanks to Météorage, we were able to protect people on site and warn our customers of the risk. This also enables us to comply with the regulations, which require the detection of lightning and the counting of strikes. Météorage makes it easy for us by helping us make the right choices.'

Olivier Fasilleau, *manager of the Total fuel depot in Feluy, Belgium*

Parc du Puy du Fou is thunderstruck by Météorage's wonderful service!

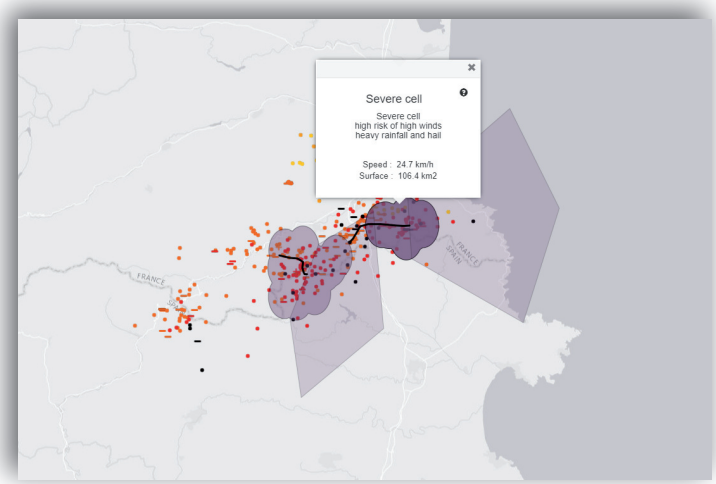
Created in 1977, Puy du Fou invites the public on a total immersion tour through the history of France. With its superb shows, recreated historical villages and incredible technical wizardry, it is recognised as one of the most remarkable tourist attractions in the world. It is therefore out of the question to ignore the risks associated with lightning, which could pose a threat to visitors, employees, shows and technical installations. To protect itself, the park has been using the Météorage service since 2005.

Understanding the lightning risk with precision

Damien Botton, deputy general manager and technical director of Puy du Fou since 2002, is responsible on a day-to-day basis, with his team of 80 technicians and specialists, for the technical management of the Grand Parc and Cinéscénie (supervising the IT systems, maintaining the buildings, monitoring structures and machinery used in the shows), and for the operational side of the shows. Since 2005, he has worked with Météorage, whose services **optimise the safety of people and property** on this very busy site.

> *'There's no denying the fact that thunderstorms are becoming more common, and a site like ours which is frequented by the general public has to take this into account,' he says. 'We've been equipped with lightning conductors for 30 years – we have about thirty today – and this has shown us the scale of the phenomena associated with lightning. In this context, the Météorage tool with which we have been provided gives us a better understanding of lightning risks in advance of storm episodes, so we can anticipate what action needs to be taken.'*

When asked why he chose Météorage, Damien Botton replies without hesitation: '*There are free services available on the Internet that we could use, but Météorage has developed some highly sophisticated services. These give us a real-time view of the storm cell and its geographical direction, and we can see the frequency and intensity of the strikes. With this very precise information, we are able to make the right choices.*'



Some figures on PUY DU FOU.

2.26 million visitors in 2017
including 65% repeat visitors and 14% from other countries

107,6 million euros turnover in 2017
and 277 million euros in economic benefits for the region

25 million euros of investment in 2017
and 500 million euros since the park's creation

Protecting visitors in all circumstances

Visitors to Puy du Fou are immersed in a magical world, but it's important to be vigilant about the threat of storms. When Météorage sends a lightning alert to the park, its operational managers are therefore ready to broadcast **pre-programmed safety messages** throughout the park, for each show, and to take the necessary measures, depending on the weather event. This may include announcing adverse weather conditions or a technical incident caused by lightning; and sometimes it is necessary to interrupt a show or even evacuate the stands.

> *'On 3 June 2018, we had to break off a performance because of intense rainfall and a thunderstorm,' recounts Damien Botton. 'Each show is unique and everything happens live. It's therefore vital to keep the public safe – several thousand visitors – but also our teams. We have to avoid causing panic, yet be ready to react at any moment. This means having the necessary technical means at our disposal, and Météorage provides us with these solutions.'*

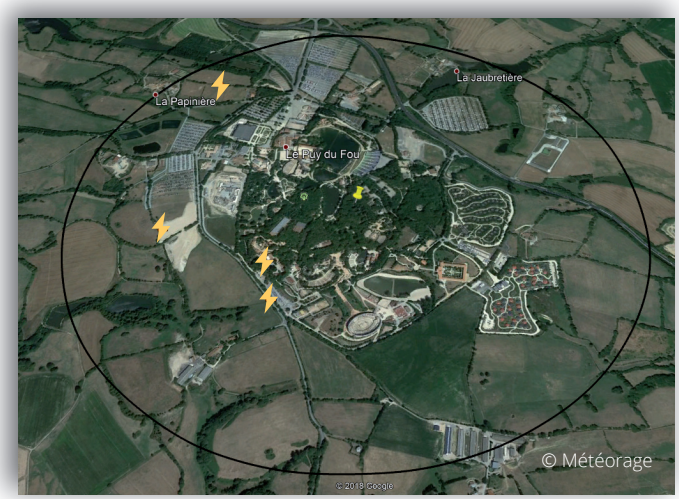
Securing the park facilities

With Météorage, Puy du Fou has defined a **perimeter of 30 km** around the park. As soon as lightning affects this area, the site's safety post receives a **lightning alert**, which it transmits internally to various recipients who are responsible for ensuring the safety of the facilities (show or restaurant managers, technicians, gardeners, etc.).

> *'In alert situations, our teams are of course extra-vigilant,' continues Damien Botton. 'In addition, thanks to the information provided by Météorage, we are able to monitor the storm, and can see if it is isolated, if it is generating lots of strikes, and so on. We can then initiate suitable procedures in advance, such as starting up generators, a process which is now well-established.'*

Detailed reports on lightning strikes also gives Puy de Fou real credibility with insurers. 'If there is damage, which happens regularly, Météorage makes our task a lot easier by giving us lightning strike reports,' adds Damien Botton.

'On 19 July 2017, a storm caused significant damage to one of our transformers, but thanks to these in-depth analyses our insurers reacted the same day!'



© Météorage

Testimonial of a Météorage service distributor

Tesicnor, a Spanish company specialising in occupational risk prevention

'The Météorage service offering complements our own very closely, as we specialise in occupational risk prevention. We do a lot of work for large groups in the wind power, industrial and construction sectors, which are sensitive to natural hazards. We have been distributing Météorage's services in Spain since 2015 and are currently taking our first steps in the Indian market.

Our partnership with Météorage is based on trust, closeness and sharing, and we value it highly. It allows us to develop solutions tailored to specific needs, especially for the assessment of the lightning risk. As a result, our customers are able to implement targeted prevention measures, give their teams and their machinery the best possible protection and optimise their productivity by avoiding unnecessary shutdowns. In addition, the implementation of Météorage solutions is very quick and easy, taking from three days to two weeks depending on the project.'

Anaïs Brocheriou, *commercial management and marketing coordinator at Tesicnor*

MAY 2018

A record for lightning strikes in France*

*Since records began in 1987

173,000 lightning flashes

(cloud-to-ground) & 500,000 intra-cloud discharges

20,000 alerts

& 100,000 messages sent to industrial sites, leisure parks, campsites etc

26 days

of storms observed during the month

TOP 5

27 and 28 may

among the top 5 May days for the most lightning strikes

The 3 cities with the most lightning strikes*:

1. La Favière (Jura)
2. Esserval-Combe (Jura)
3. Grosbois (Doubs)

The 3 regions with the most lightning strikes*:

1. Hauts-de-France
2. Bourgogne-Franche Comté
3. Grand-Est

The 3 départements with the most lightning strikes*:

1. Le Doubs
2. Le Jura
3. La Somme

* : Cloud-to-Ground Flashes

LIGHTNING

Key information and figures

6 to 8 million

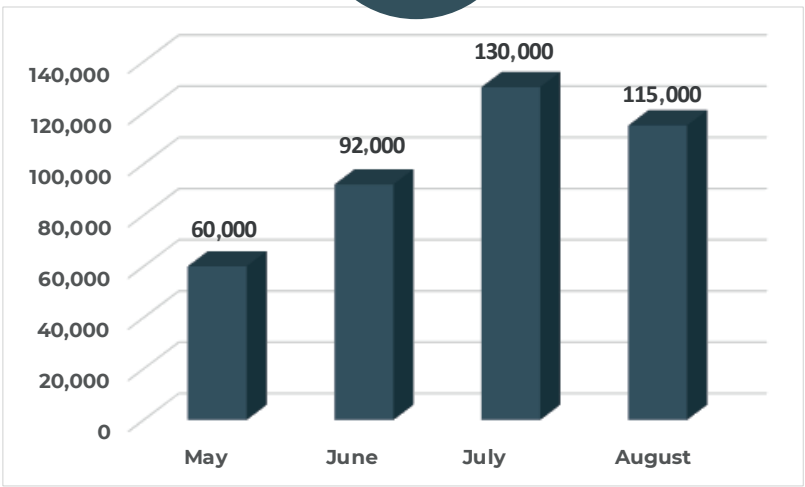
lightning discharges on Earth every day

+250 days

thunderstorms per year in France: 1 lightning flash per km2 per year

200 000 amperes

The intensity that a lightning flash is capable of reaching or even exceeding



Average number of cloud-to-ground flashes in France in last 30 years

A **major risk**, causing **direct damage*** ...

- **15,000** fires per year
- **20,000** animals struck per year
- **10** major industrial accidents per year
- **4 to 7%** of all forest fire outbreaks

... and **indirect damage***

- **>1 million** electrical damage cases
- **>25 000** mobile phone antenna breakdowns
- **>100,000** box put out of action
- **+65%** of power grid short-circuits

*data and key figures collected in France

For more information, go to
www.meteorage.com

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