**TECHNICAL NOTE**
September 2019

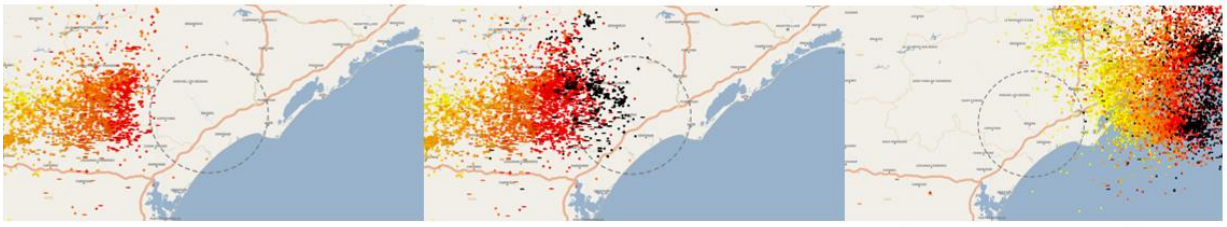
# *Operating principle of our Thunderstorm warning systems*

METEORAGE operates a lightning detection network which allows to continuously monitor the formation and movement of thunderstorms in Western Europe.

Thanks to this real time observation, it is possible to alert a site of the imminent arrival of the thunderstorm in order to prevent the lightning risk for people and assets.

The operating principle consists in creating a monitoring area around the site and alerting it as soon as some lightning flashes are detected in this perimeter. Afterwards, the site is informed once the activity has stopped inside the area.

Example : illustration of a storm approaching a site in Montpellier



- A thunderstorm started around Carcassonne before 8 PM and moves towards Béziers
- Reaching the monitoring area at **22:12**, an alarm-start is sent

- The site is struck at **22h51** but had enough lead time (39') to apply its safety procedures

- **00h33** : an alarm-end is sent'
- The site can start again its activity

This technique does not generate false alarms because the alert is systematically sent during the **actual presence of a thunderstorm**, unlike deductive methods based on the electrostatic field measurement or on weather forecasts.

Our standard setting[1] is defined by a monitoring area of 20km radius, which ensures an excellent efficiency while limiting the number of alerts to a minimum.

This configuration is based on several published[2] studies, in particular an evaluation based on the analysis of 200 accidents during the last 10 years in Europe. This last study shows that, even in these extreme situations, our warning system would have sent a message at least 15 minutes before the accident in more than 90% of the cases.

These studies show a level of performance beyond the recommendations of IEC 62793 standard with a failure to warn ratio[3] below 5%. Edition 2 of this standard[4] recommends not to exceed:

- 10% FTWR during activity on cranes or in sporting practices such as Golf.

- 5% in case of proximity of flammable or hazardous substance such as hydrocarbon storage.



[1] This configuration is particularly suitable when a specific study on site to optimize the performances of the warning system is not done.

[2] - Schmitt, S., (2014), "Thunderstorm warning systems : why lightning detection networks should be considered as one of the most relevant solution in Western Europe ?", paper presented in International Lightning Detection Conference (ILDC), San Diego, USA .
- Schmitt, S., (2017), "Thunderstorm warning systems applied to the wind energy domain : evaluation of a TWS based on lightning locating system", poster presented in WindEurope, Amsterdam, The Netherlands.
- Schmitt, S., Kreitz, M. (2019), Learning lessons from deaths and injuries due to lightning in Western Europe, paper presented in European Conference on Severe Storm (ECCS), Krakow, Poland.

[3] We considered as a failure to warn, all the cases where thunderstorms formed suddenly and unpredictably

[4] International standard on « Thunderstorm warning systems", whose edition 2 is expected in 2020.