

Global Lightning Dataset maps lightning flashes anywhere in the world

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The study of lightning is steadily gaining importance - backed up by the fact that scientists are discovering links between global warming and lightning frequency. Vaisala's GLD360 detects lightning and convective activity globally - over both land and sea.

The study of lightning strikes has assumed significant proportions across industry fields including aviation, marine, forestry, and electrical utilities. And with good reason: when you consider that a staggering 16 million lightning storms occur world-wide every year and that lightning kills more people than tornadoes, hurricanes, floods, or any other kind of extreme weather, you can imagine the consequences of not paying attention to one of nature's most hazardous phenomena.

Patching the gaps - uniform coverage on a global scale

For the past 20 years, Vaisala's National Lightning Detection Network (NLDN) in the United States has been one of the most sophisticated and high precision lightning detec-

tion systems. Comprised of over 100 remote, ground-based sensing stations located across the country, the system detects the electromagnetic signals given off when lightning strikes the earth's surface. Information on location, time, polarity and amplitude of each strike is processed and then communicated to users.

Short range networks and satellites can also be used to detect lightning activity, but they come with their own set of limitations in terms of coverage, for example. Satellite techniques and short range networks are not currently able to provide a high level of detection uniformly across the globe. There has also been a clear shortage of real-time weather observations over oceanic regions.

To fill the gaps in long-range severe weather detection, Vaisala decided on the development of a global lightning detection dataset.

The goal was to create a service that provides uniform, real-time lightning information for early detection and accurate tracking of rapidly evolving severe weather situations across the globe.

Spot-on detection efficiency and location accuracy

The Global Lightning Dataset GLD360 brings many firsts to the study of lightning – apart from full global coverage, it is the only long range network capable of measuring the maximum or peak current for each individual lightning strike.

Peak currents refer to the exchange of energy each lightning generates between the cloud and ground. Understanding this energy exchange, which manifests itself in the form of electrical current is



Global Lightning Dataset GLD360 detects over two thirds of lightning flashes worldwide, with a location accuracy of 5-10 kilometers.

imperative to get a grasp of the variations in lightning activity.

Initial performance results have shown GLD360 to detect over two thirds of all cloud to ground (CG) lightning strikes and its mean location accuracy is nearly five kilometers. It outperforms other long range systems by a factor of five for detection efficiency and a factor of two for location accuracy of lightning strikes. Together with precision lightning networks, the GLD360 provides a full scale vision over the globe.

A new realm of use for lightning information

Providing quantitative data, the Global Lightning Dataset GLD360

will open up a new realm in terms of Vaisala's customers' global lightning and convective activity information needs. Vaisala owns and operates the network, and the data is streamed to the customer. When lightning is detected, the data can be delivered in less than two minutes.

The data can be easily assimilated into weather models to improve short-to-medium term weather forecasts, open up a wider range of thunderstorm identification, and improve the prediction of high and rough seas. In the field of hydrology or precipitation estimation (i.e. how much rain is expected), the GLD360 will provide information for the development of advanced flood warning systems.

GLD360 data can also be used as a substitute to weather radar information in areas with limited or non-existent radar coverage, as radar reflectivity can be simulated by processing lightning data through advanced algorithms. With many parts of the world still without access to weather radar information, this could be a very useful technique for identification and interpretation of convective storm cells and prediction of thunderstorms.

Further information:

www.vaisala.com/weather/products/gld360.html

Lightning facts

Lightning occurs when electrical charges separate inside storm clouds, with the negative charges tending to accumulate in the middle and the positive charges in the upper or lower altitudes; the bright light we see is caused by the electrical energy released when these opposite charges connect and neutralize each other.

- A lightning channel is quite narrow, about twice the thickness of a pencil.
- On average, lightning strikes the earth 50-100 times every second.
- Roughly 2,000 thunderstorms are in progress over the earth's surface at any given time.