

Vaisala's new Airport Lightning Information System (ALIS): Using Vaisala's GLD360™ to improve cloud-to-ground lightning warnings, present weather reporting, and low level windshear situational awareness at airports anywhere in the world

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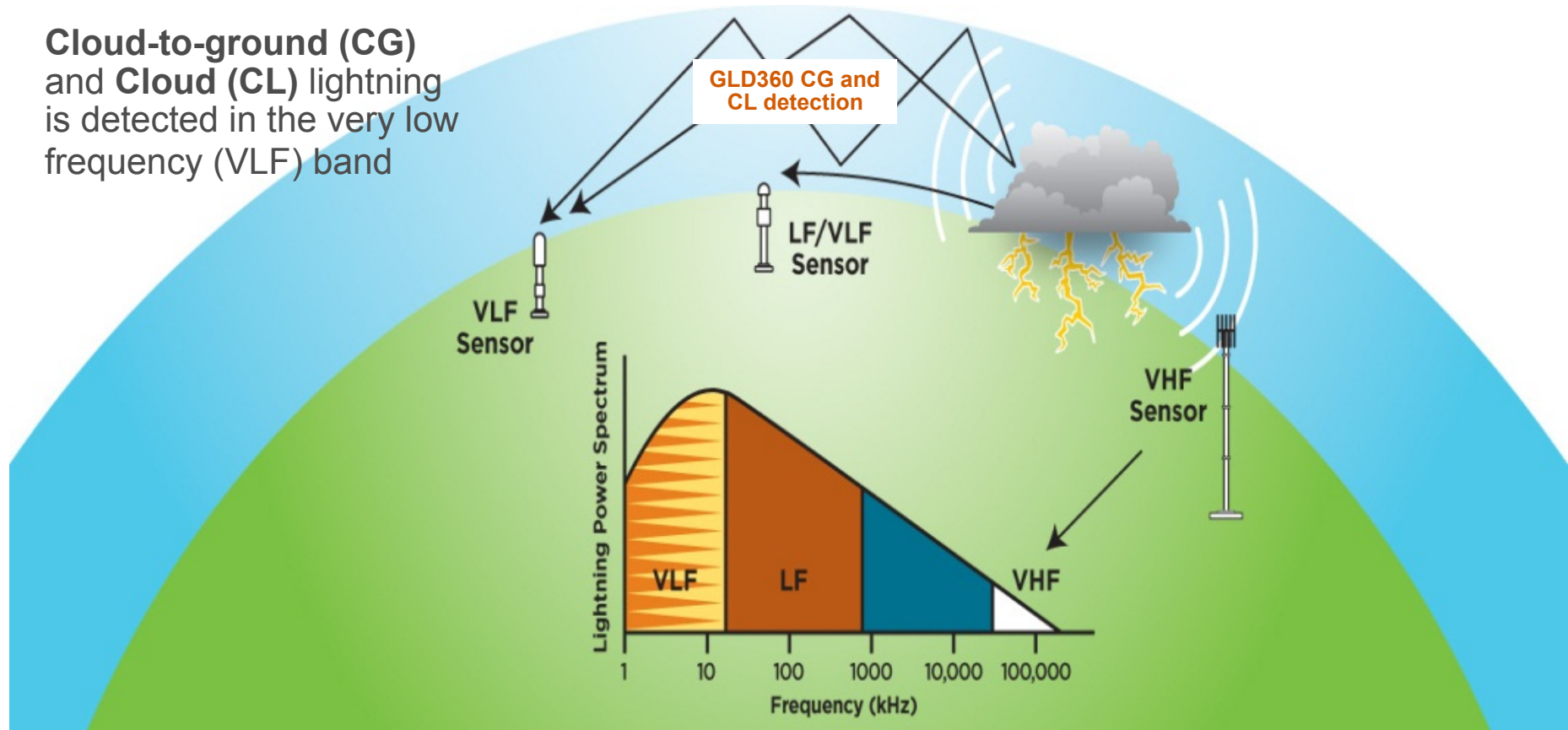
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- **Brief GLD360 and ALIS introduction**
- Low level windshear
- Present weather reporting
- Cloud-to-ground lightning warnings



Lightning power spectrum and Vaisala detection technology

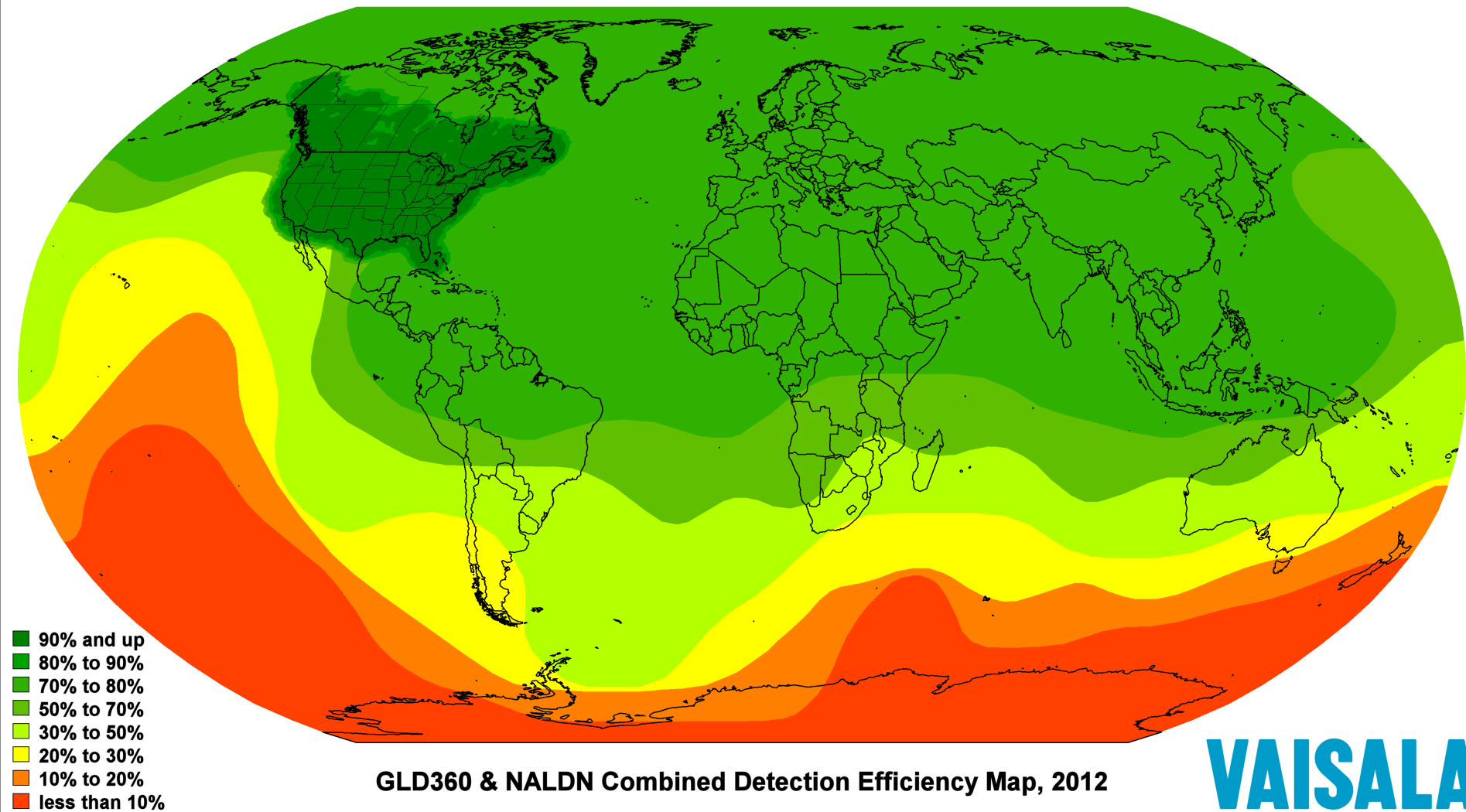
Cloud-to-ground (CG)
and **Cloud (CL)** lightning
is detected in the very low
frequency (VLF) band



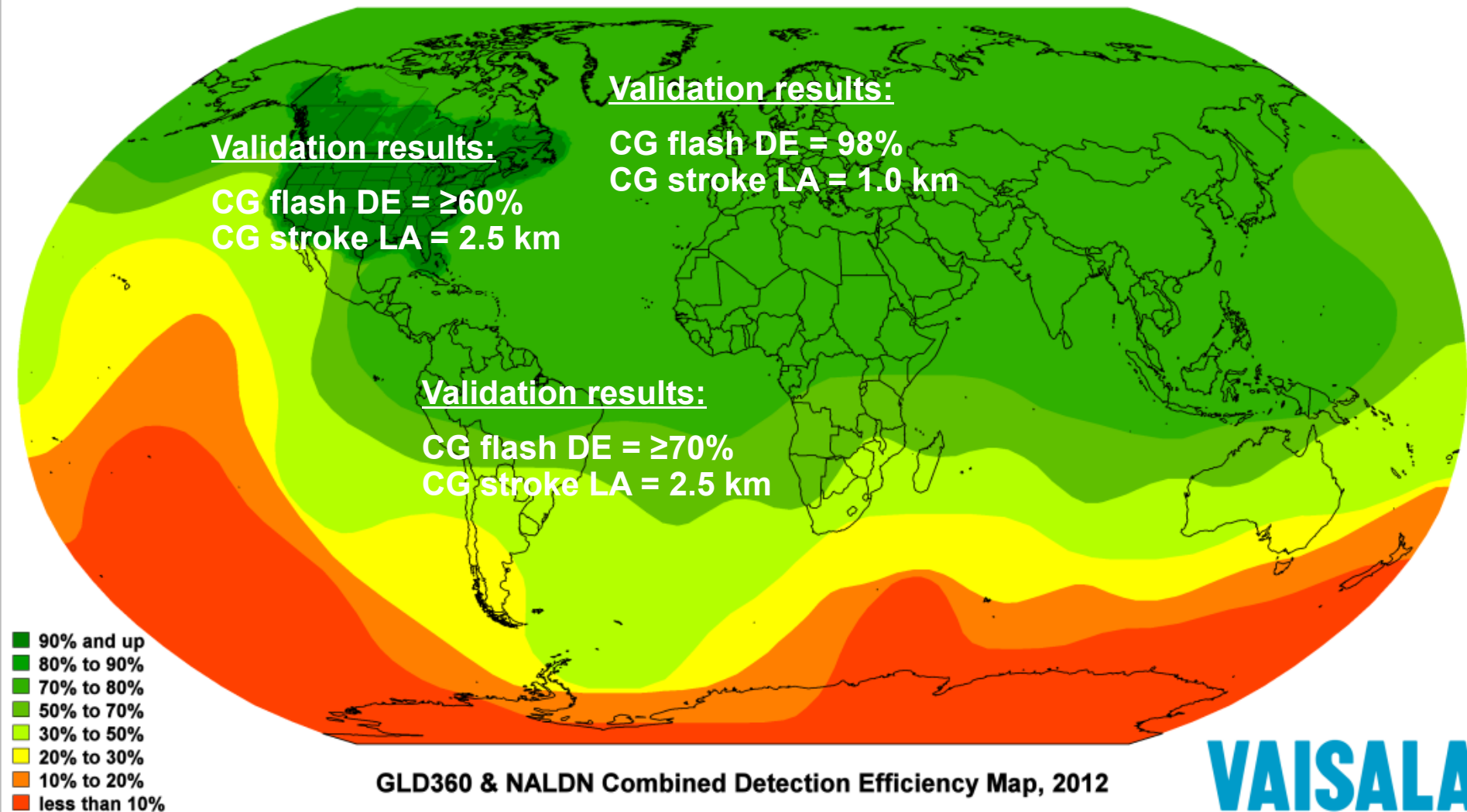
GLD360 lightning geo-location



GLD360 global performance map

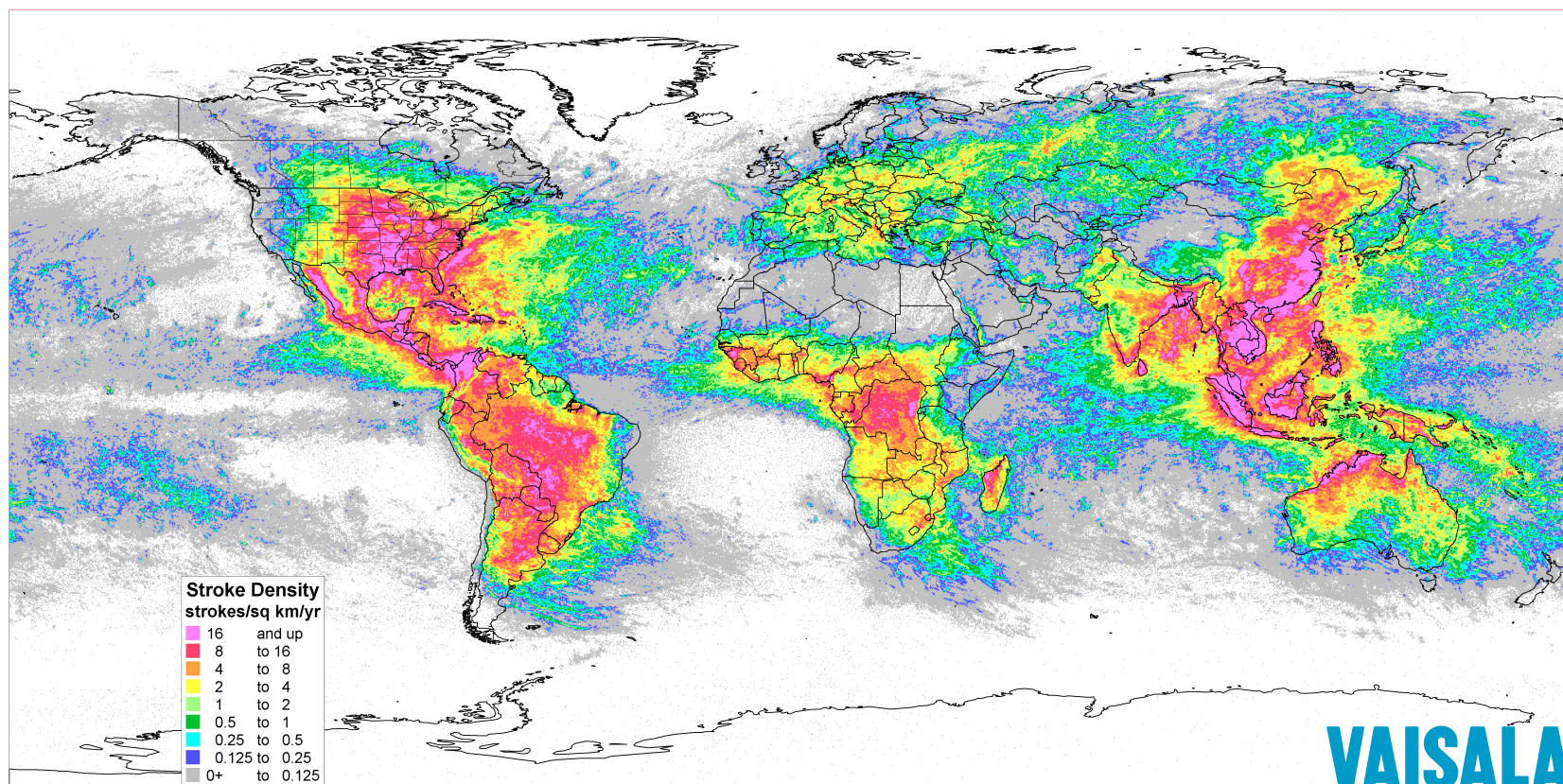


GLD360 global performance map



GLD360 annual global lightning density map

July 2011 through June 2012



Stroke Density Map - 20 km grid

1 Year (July 2011 - June 2012)

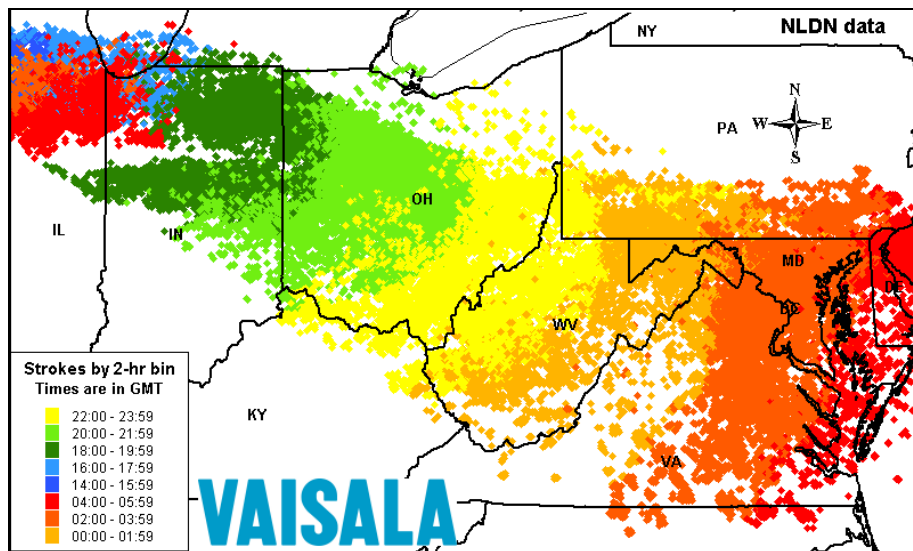
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GLD360 data

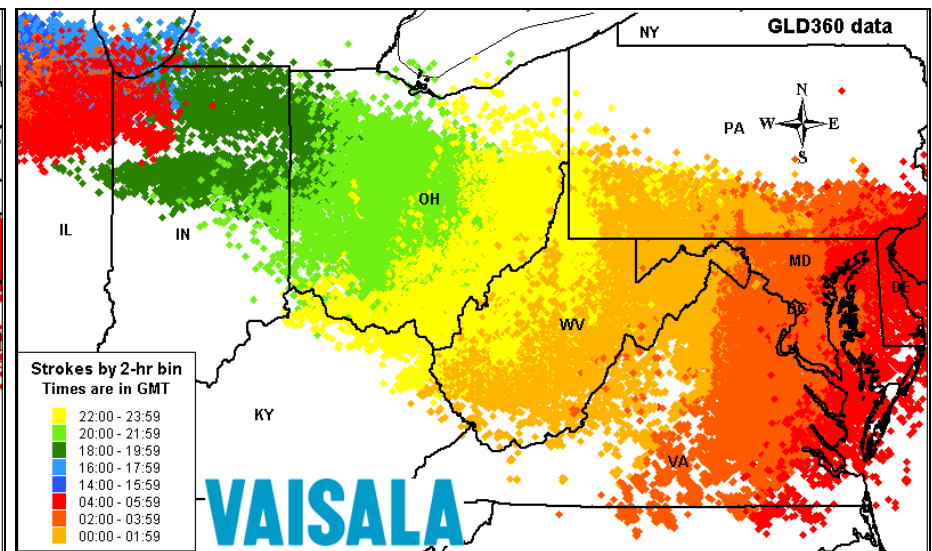
Identifying and tracking a large thunderstorm complex producing significant straight-line wind damage

29-30 June 2012

Vaisala NLDN



Vaisala GLD360



Vaisala ALIS

Login screen

VAISALA / GLD360

User name

Password

Login

Welcome to GLD360. Please log in using your user name and password.

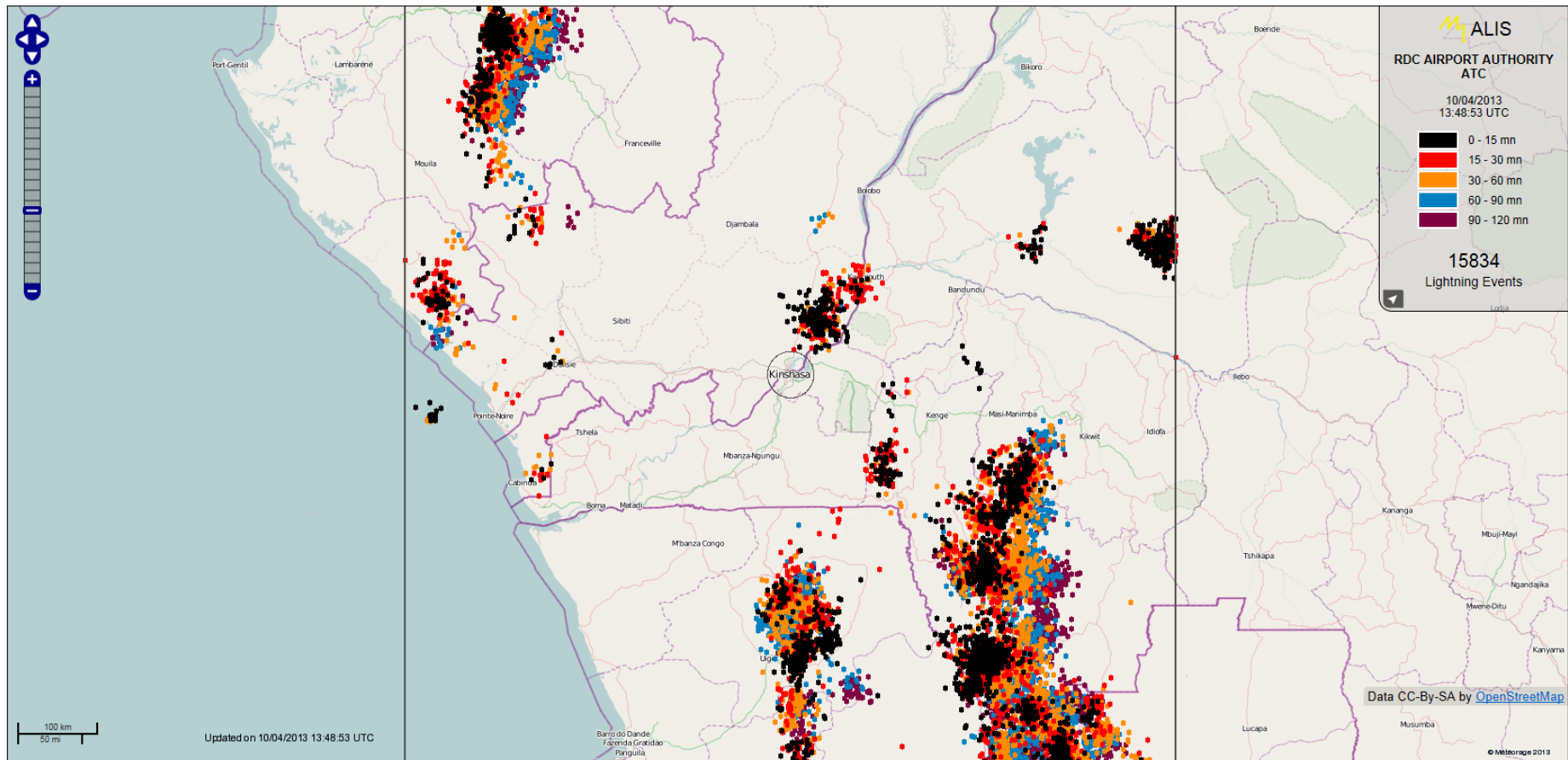
Technical Support via Telephone (UK): +44 (0)121-683-126

Technical Support via Email (UK): helpdesk@vaisala.com

Vaisala ALIS web-based display example

Lightning color-coded by time (wide area view)

VAISALA / GLD360



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Gust front shelf cloud and debris from strong winds field



Gust front outflow from a line of thunderstorms

National Academy of Sciences study performed for the FAA in 1983

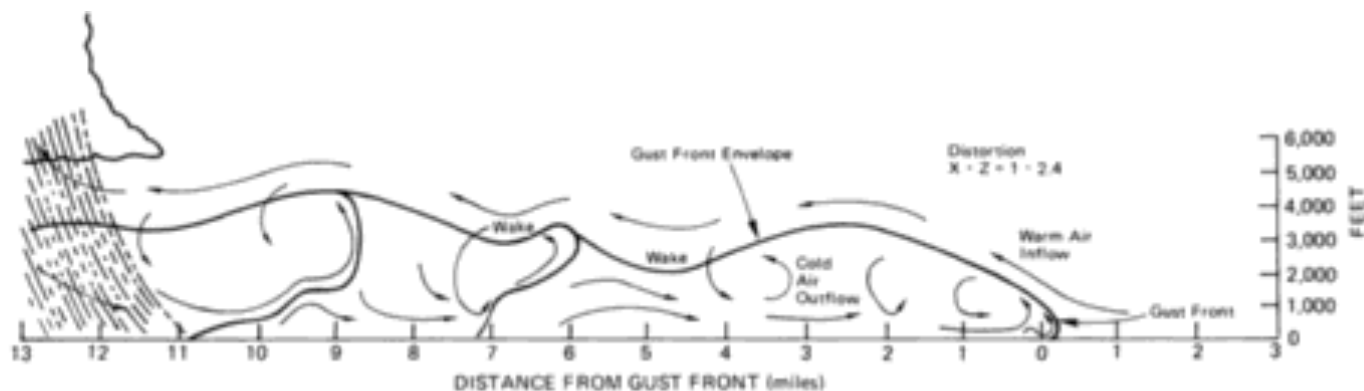


FIGURE 6 Squall Line Thunderstorm Outflow (schematic). (Source: Goff, 1980).

Low level windshear watch

- ALIS issues a low level windshear watch whenever lightning is detected within 30 km of the airport

"Lightning has been detected within 30 km of the airport. A low level windshear watch has been issued for the airport due to the possibility of thunderstorm-induced straight-line winds (gust fronts and outflows) moving through the airport."

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Thunderstorm reporting

- ICAO Annex 3 titled states that ***“the following present weather phenomena shall be identified, as a minimum: precipitation and freezing precipitation, ..., thunderstorms (including thunderstorms in the vicinity).”***
 - Thunderstorms (at the airport) are defined as being within 5 nm (9 km) of an airport
 - Thunderstorms in the vicinity of the airport are defined as being between 5 and 10 nm (9 and 19 km) of an airport

Example of thunderstorm at the airport

VAISALA / GLD360

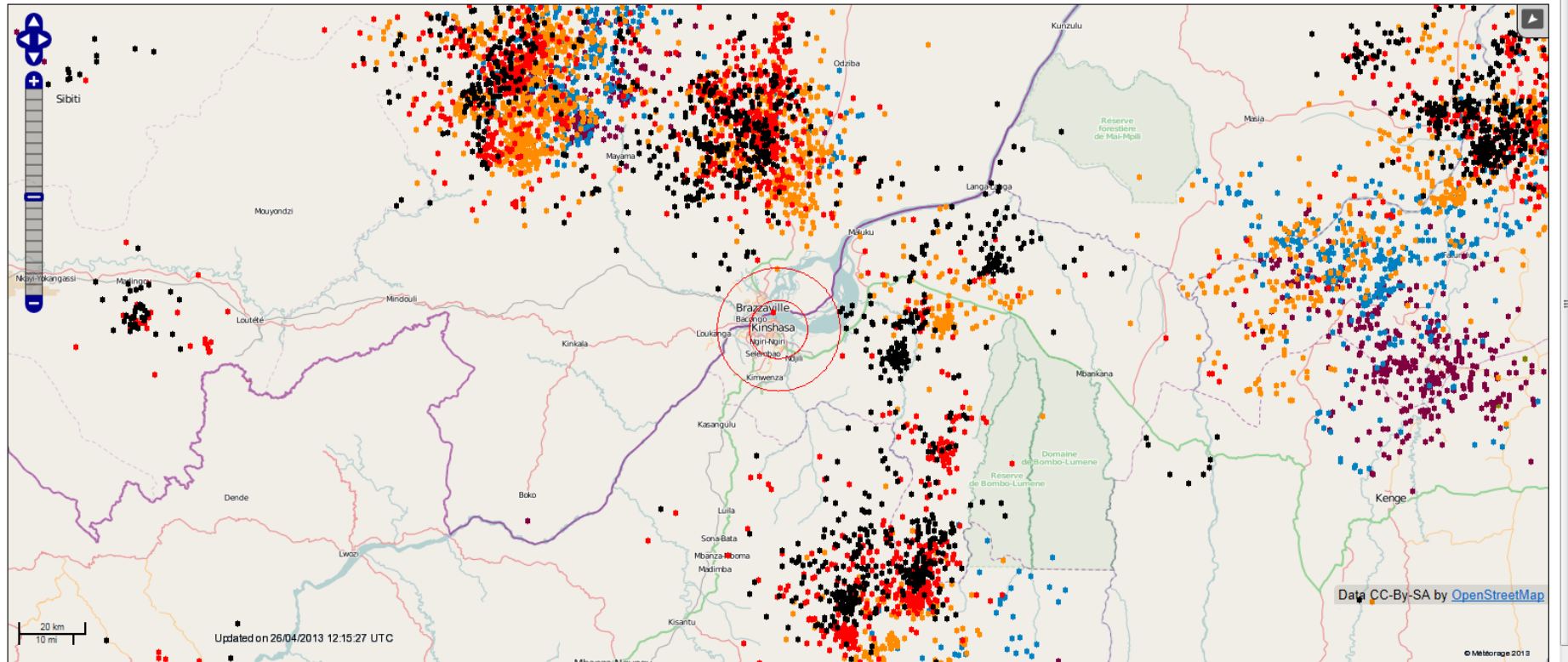
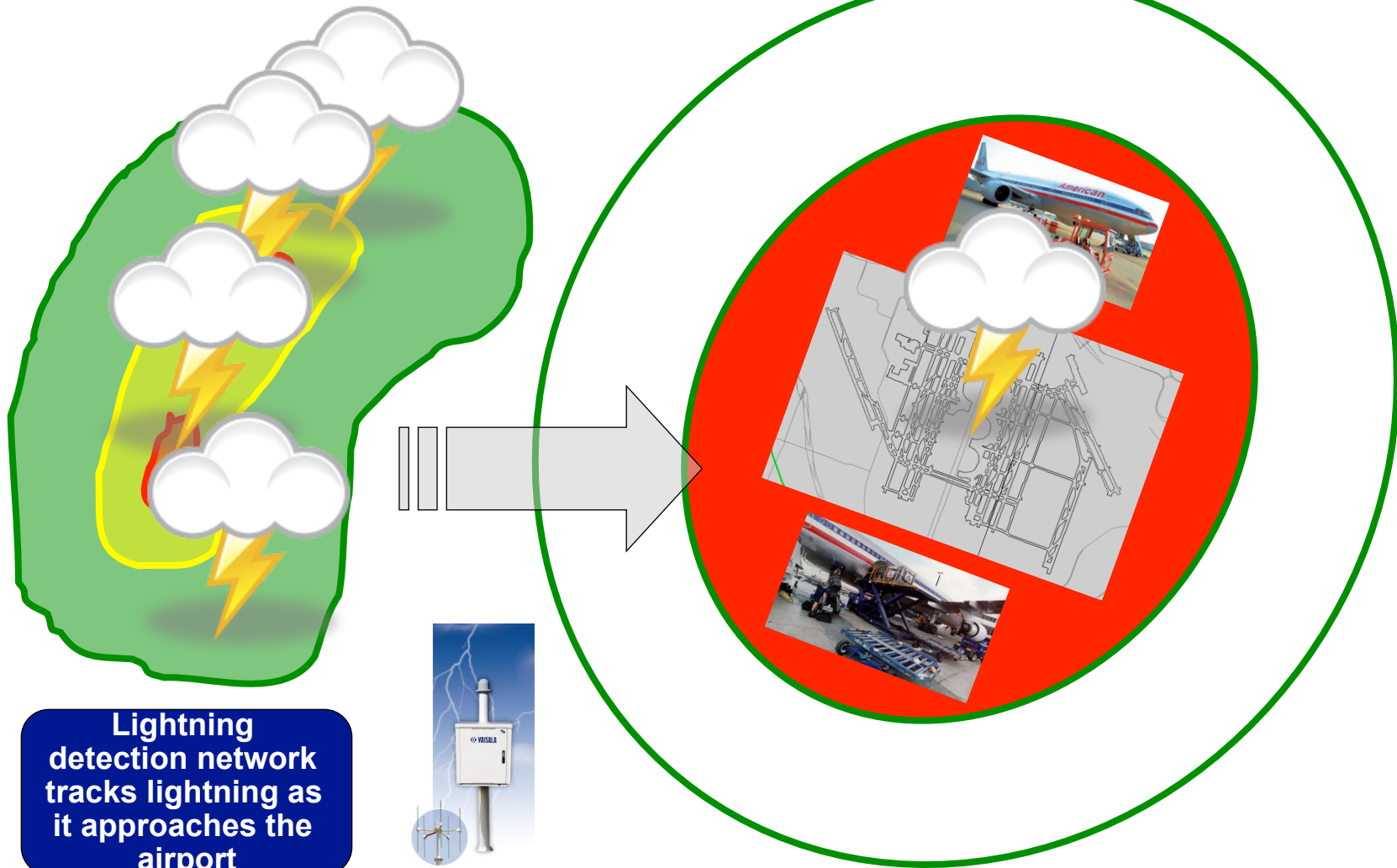


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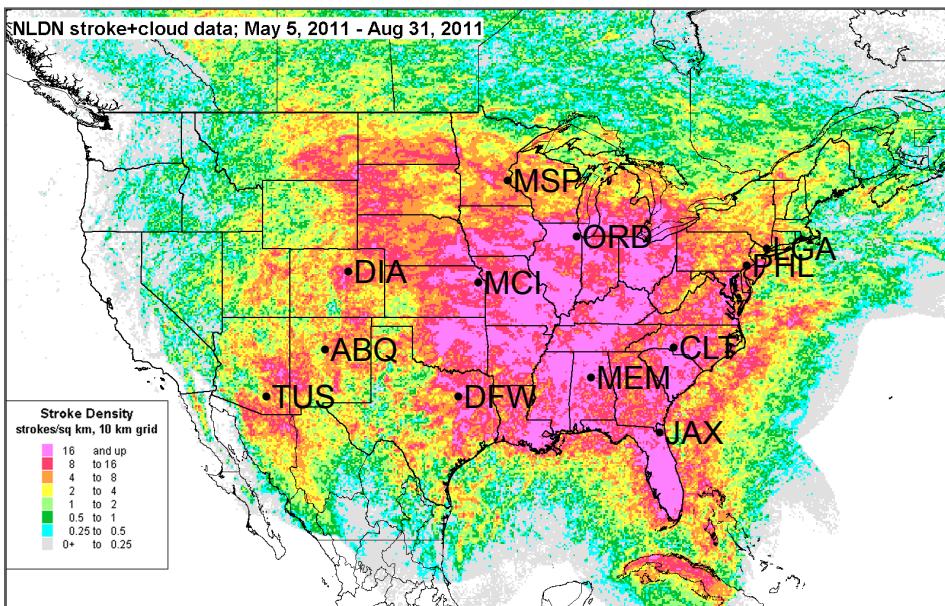
- Brief GLD360 and ALIS introduction
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- **Cloud-to-ground lightning warnings**



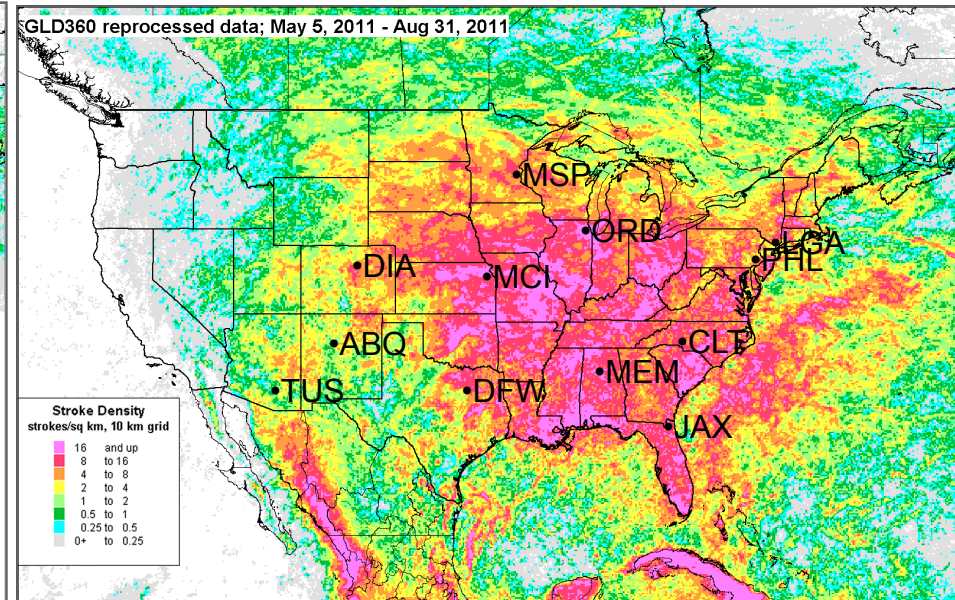
Cloud-to-ground lightning warning methodology



Airport lightning warning study comparing Vaisala NLDN precision network with GLD360



NLDN



GLD360

Probability of detection (POD2)

12 airports' lightning compared with thunderstorms

Lightning at 12 U.S. airports

NLDN

GLD360

Severe thunderstorm warnings¹

Non-organized

Pulse

Linear

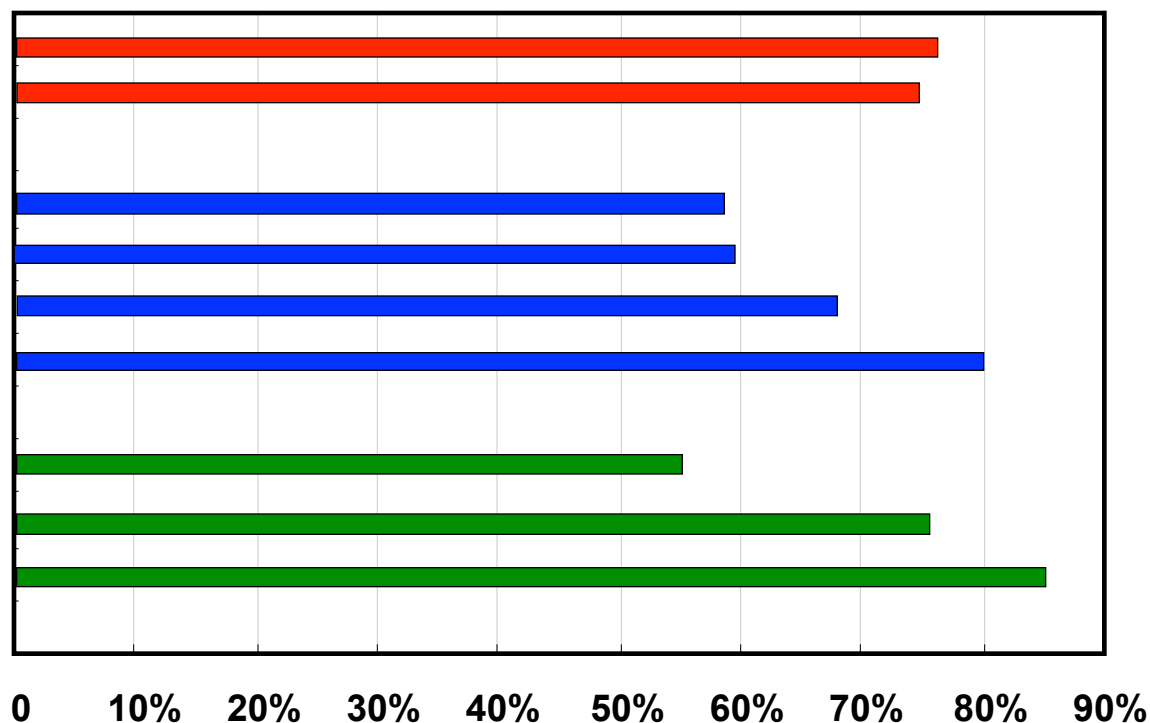
Supercell

Tornado warnings²

No SPC watch

SPC severe thunderstorm watch

SPC tornado watch



¹National Weather Service (NWS) forecaster-enhanced warnings for three 2007 tornado outbreaks, Guillot et al.

²National Weather Service (NWS) forecaster-enhanced warnings for 2003-2007 severe thunderstorms, Keene et al.

Summary of ALIS features

- GLD360 data subscription with an area defined by a 500 km radius from the airport
- Web-based lightning display with lightning events color-coded by time to assist with thunderstorm tracking
- Alarm radii at 5 nm (9 km) and 10 nm (19 km) to assist weather observers with "TS" and "VCTS" present weather reporting
- Alarm radii at 30 km used to issue low windshear watches for Air Traffic Controllers
- Customer-configurable alarm radius distance to issue cloud-to-ground lightning warnings to protect outdoor airport workers