nowcast

high-precision lightning detection.

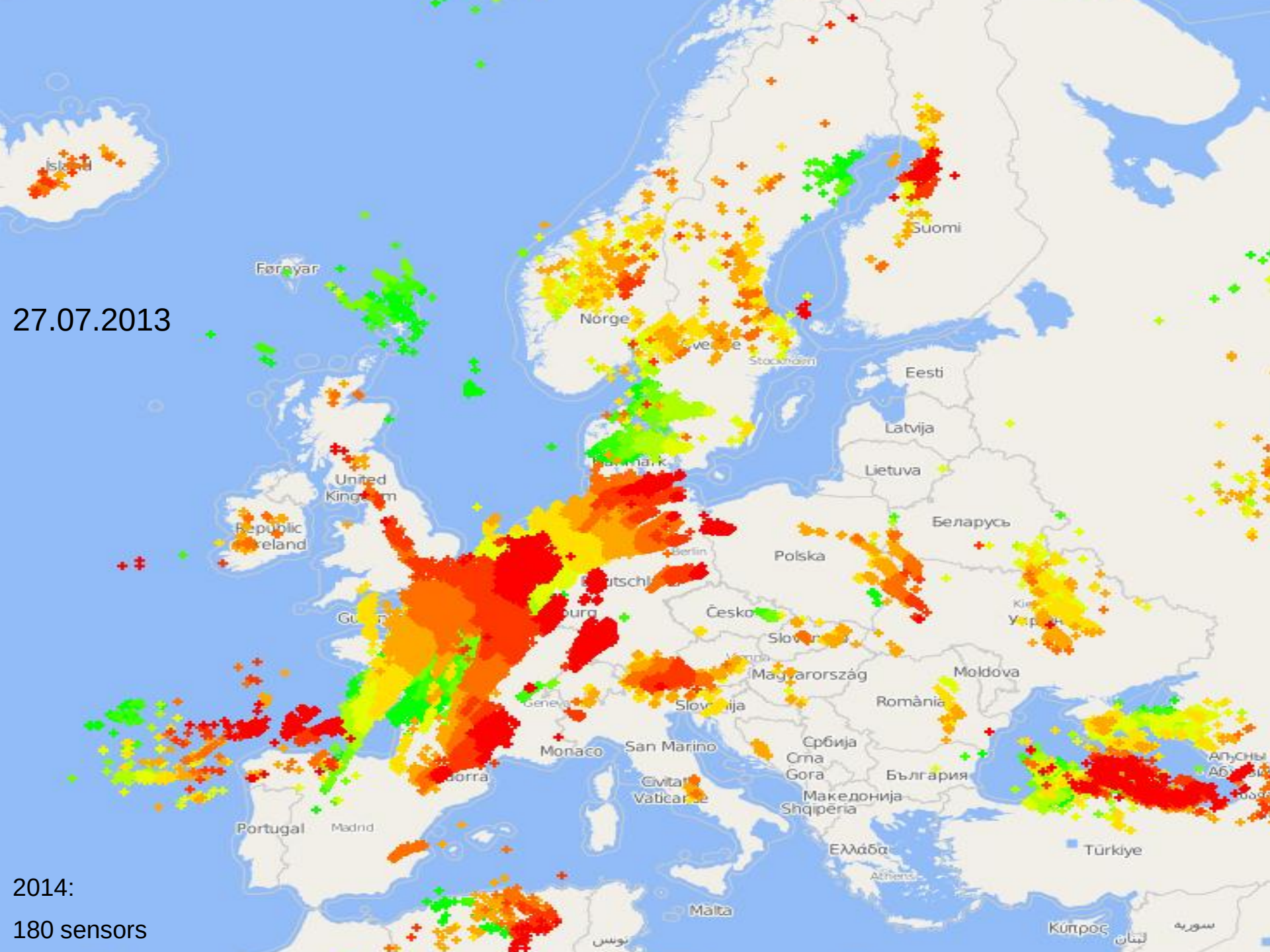
10 Years LINET

Network Features, Data and Products

Joint MTG LI Mission Advisory Group & GOES-R GLM Science Team Workshop

27-29 May, 2015
Centro Alti Studi per la Difesa (CASD)
Rome, Italy

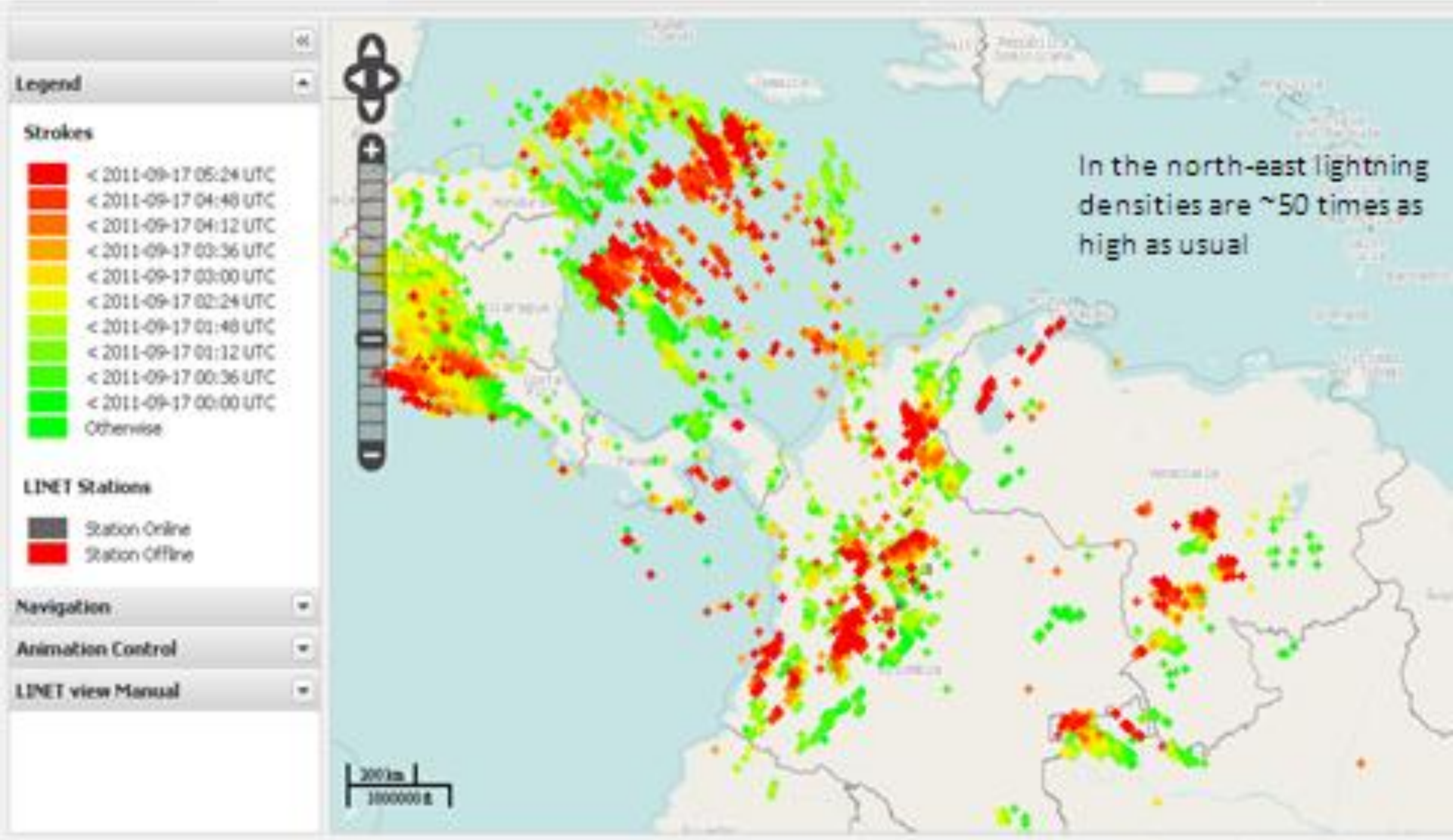
www.nowcast.de


27.07.2013
Føroyar
Norge
Suomi
Eesti
Latvija
Lietuva
Беларусь
United
Polska
Česko
Magyarország
Moldova
România
Monaco
San Marino
Srbija
Црна
Gora
България
Македонија
Shqipëria
Portugal
Madrid
Ελλάδα
Türkiye
Malta
Κύπρος
2014:
180 sensors

nowcast network in Colombia

nowcast

high-precision lightning detection



Characteristic Technical LINET Features
LMS – LINET Management System

Web – Based Monitoring and Control

For all LINET systems LMS allows remote access to all sensors

Status of sensor functions
Automatic error-reporting
Log-files
Data transmission

Stored from the beginning of sensor operation

Characteristic Technical LINET Features – since 2004

High sensor sensitivity

magnetic flux, no pulse integration, low intrinsic noise

High signal detection efficiency

low threshold, depending on external noise level

detection of all pulses above threshold in the VLF/LF regime

3D detection

reporting of cloud pulses and emission altitude

allows IC-identification up to some 120 km from the flash

discrimination independent of pulse amplitude, polarity, type of pulse shape

High location accuracy with little scatter

use of 5 or more TOA sensor-reports, retaining high DE with >~250 km baselines

(no use of direction finding, no locating with 2 or 3 sensors !)

Network management software, web-based

Identification of In-Cloud Strokes (IC)

IC signals travel longer (T_P) than CG signals (T_H) to reach the sensor (S)

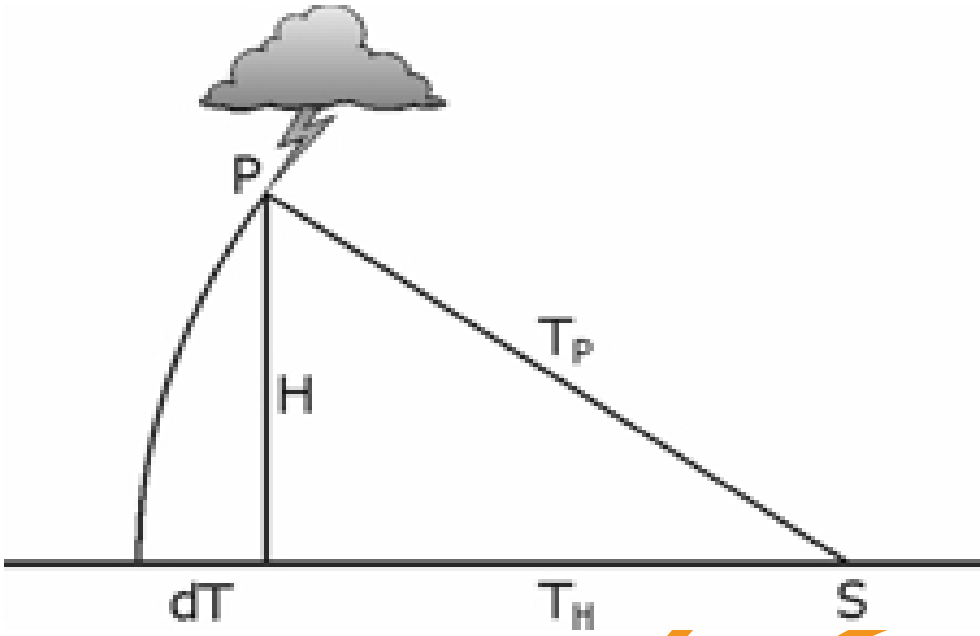
The time difference dT allows discrimination between CG and IC, independent of pulse amplitude, polarity, and waveform.

IC detection serves many purposes:

Recognition of Severe Weather,

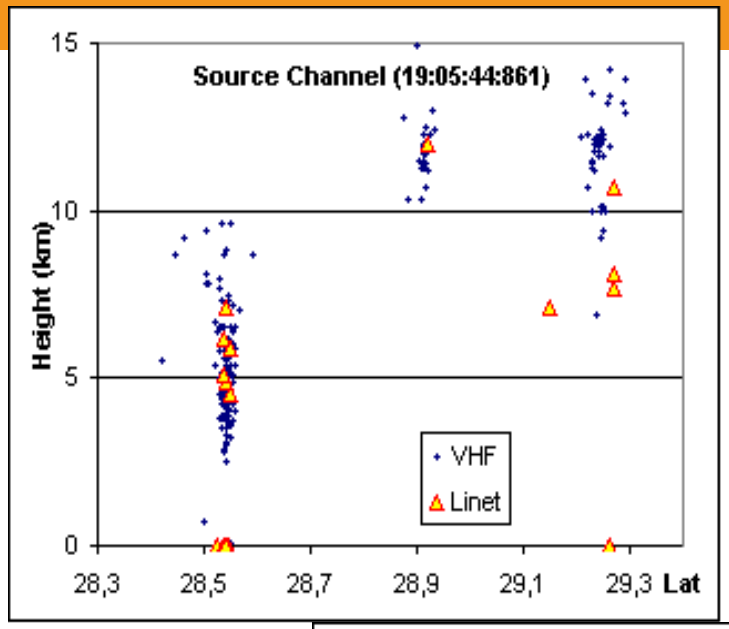
hail, strong wind, heavy precipitation

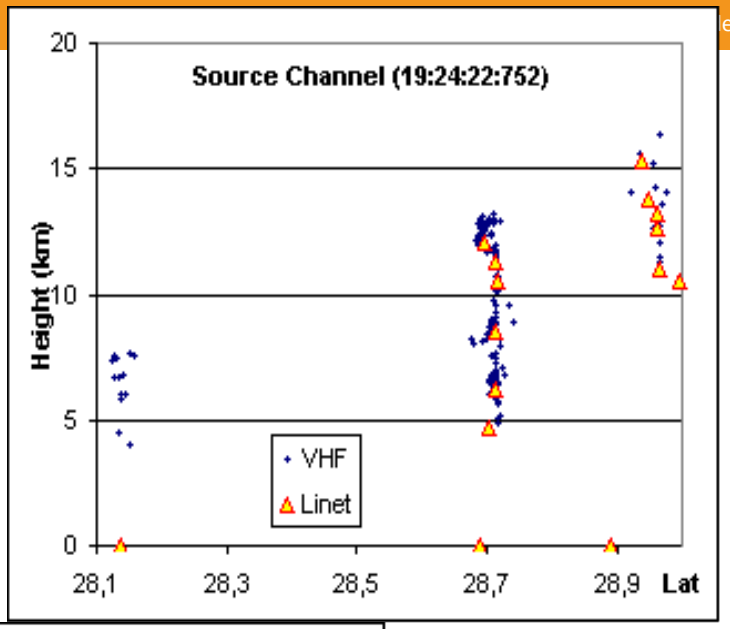
Life cycle of storm cells

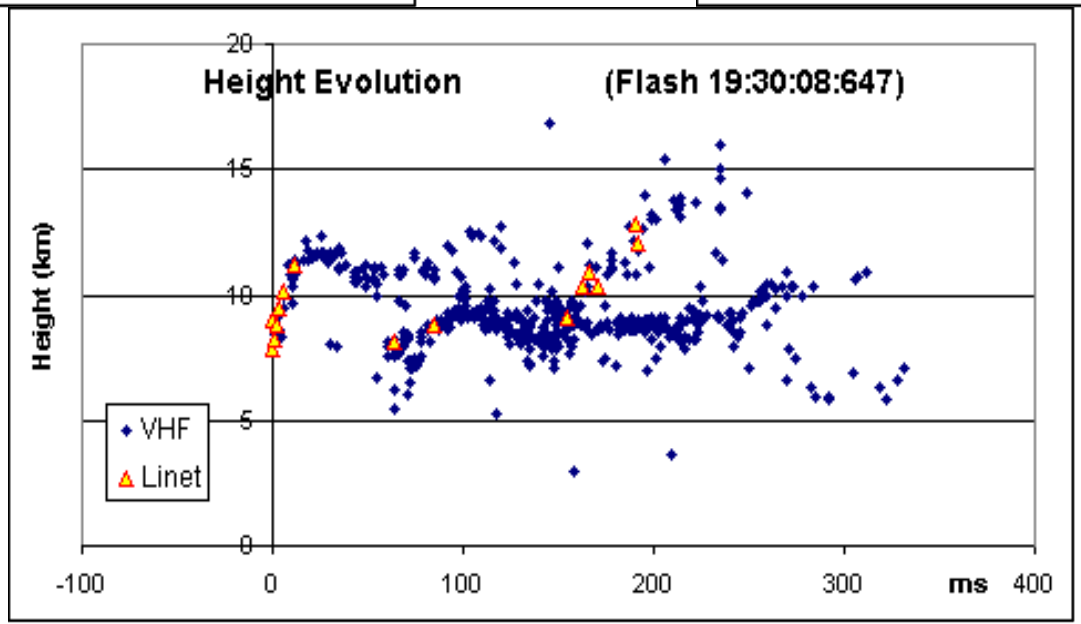


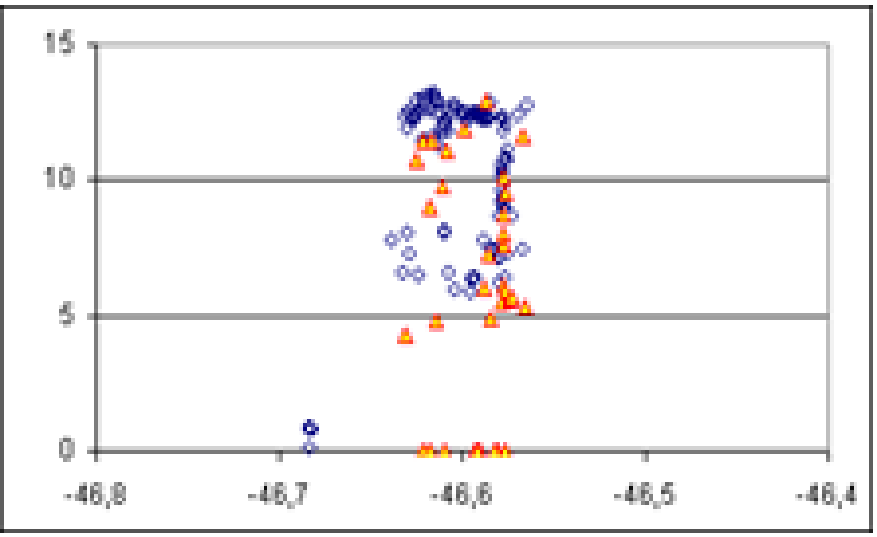
LADAR-II und LINET -- VHF und VLF/LF

etection.



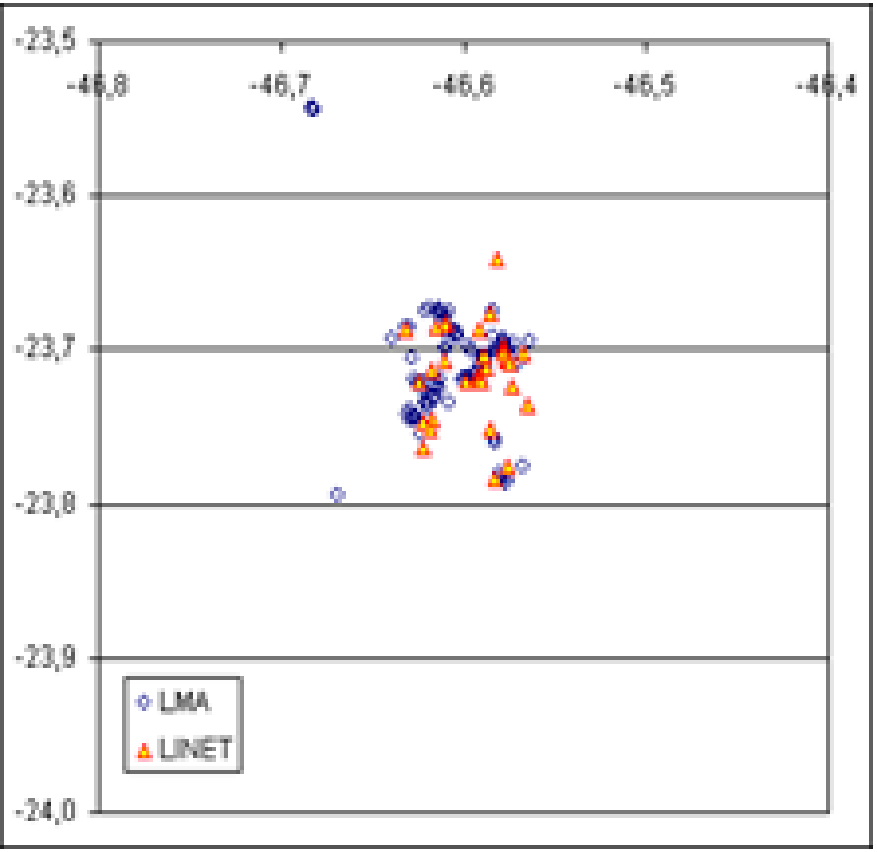


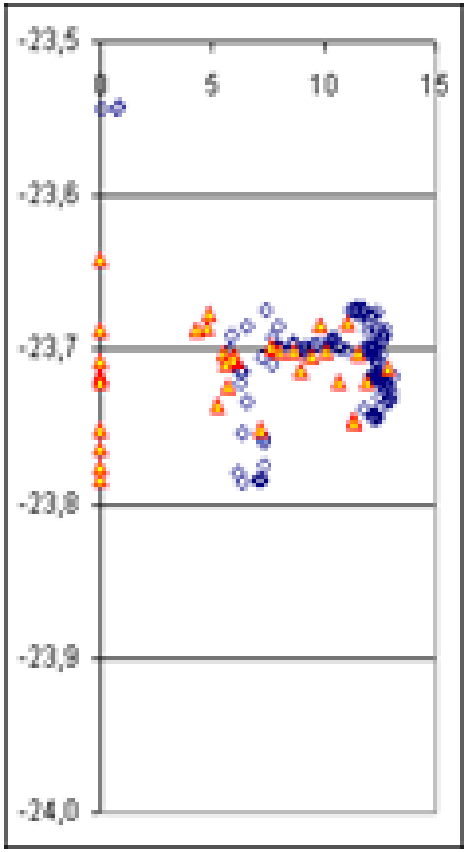




CHUVA Campaign 2012

comparison of 3D lightning data





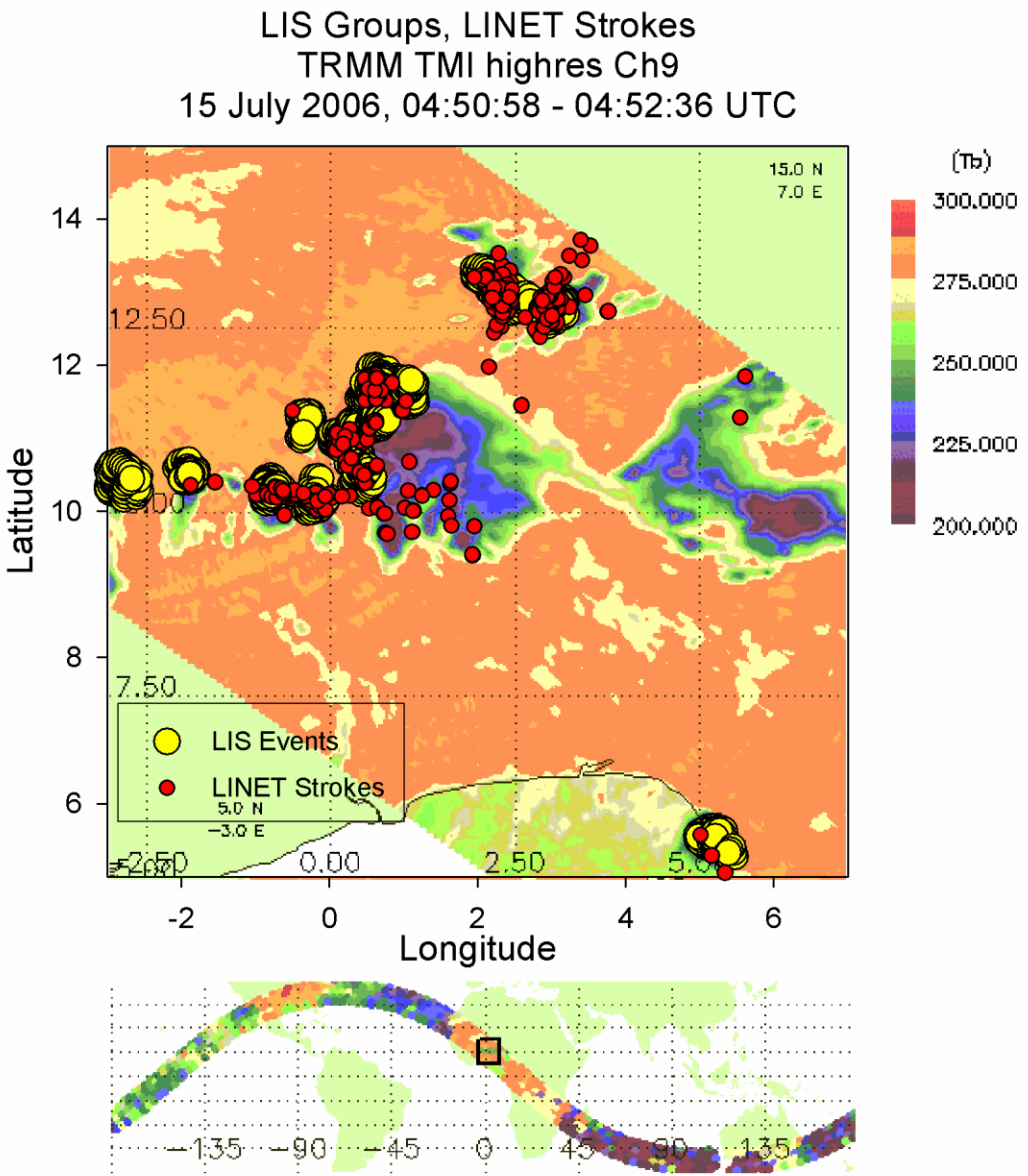
Flash 19 Jan 2012
00:23:05 UTC

VLF/LF: LINET (triangles)

VHF: LMA (squares)

LINET detects cloud lightning and maps discharge channels

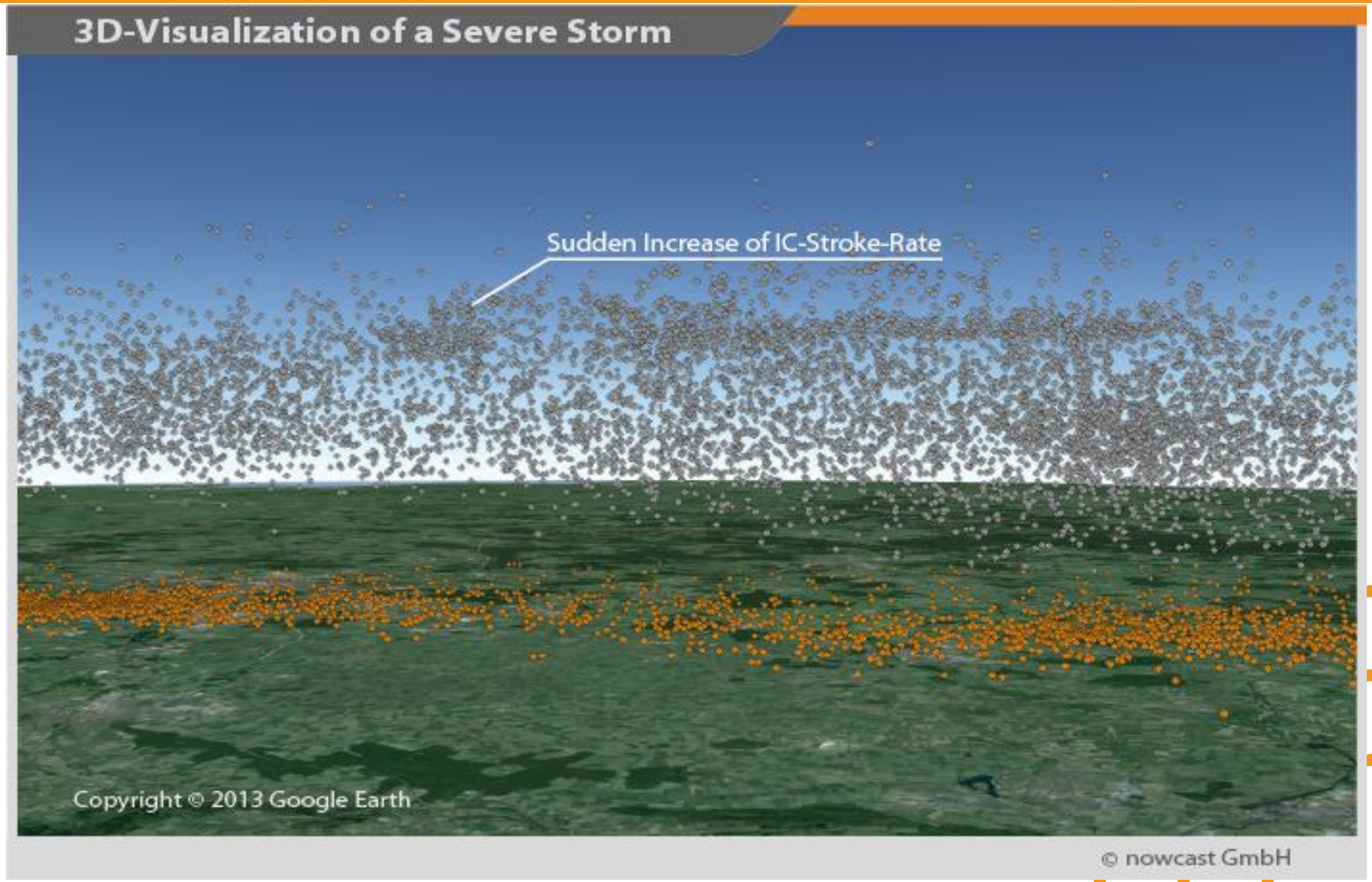
Eumetsat Project: LIS – LINET Comparison



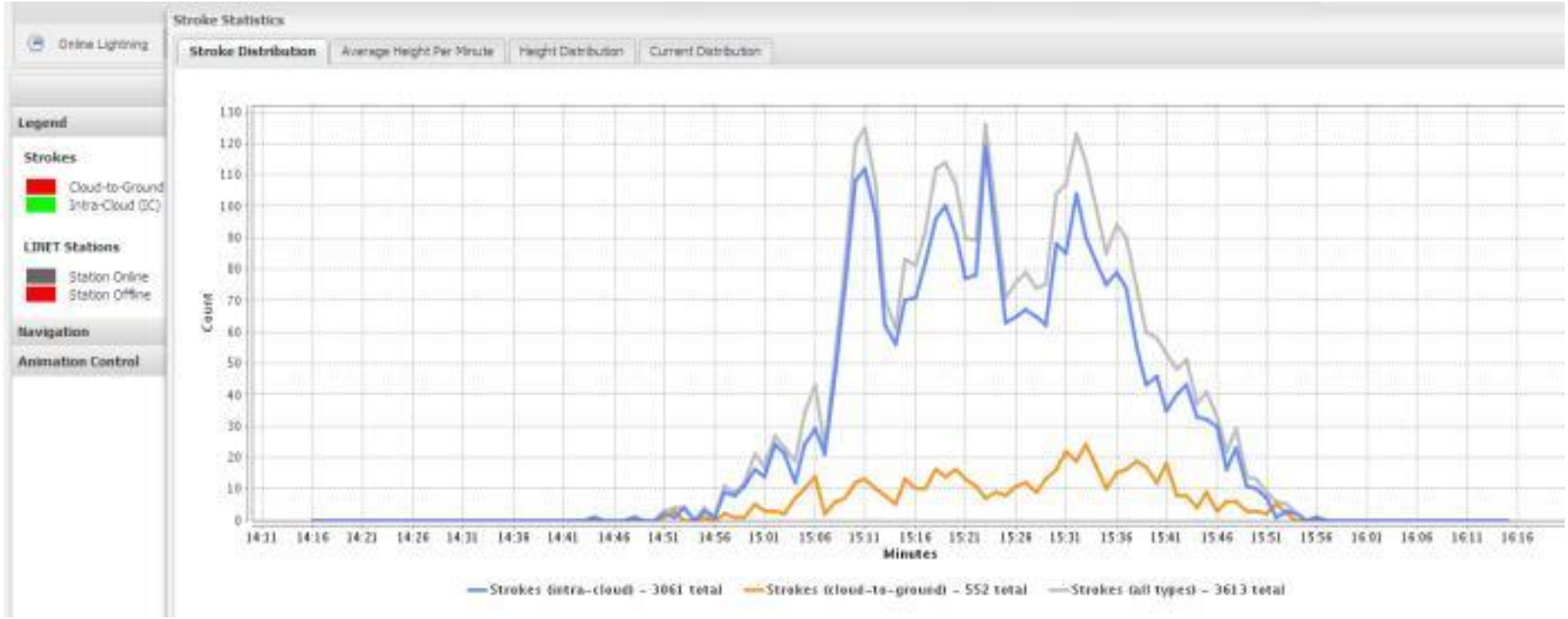
Mesoscale convective complexes over W-Africa on 15 July 2006. TRMM-TMI brightness temperatures indicate centers of convective elements

IC Rate and Altitude indicate Severe Weather

high-precision lightning detection.



Time evolution of CG and IC rates during severe weather



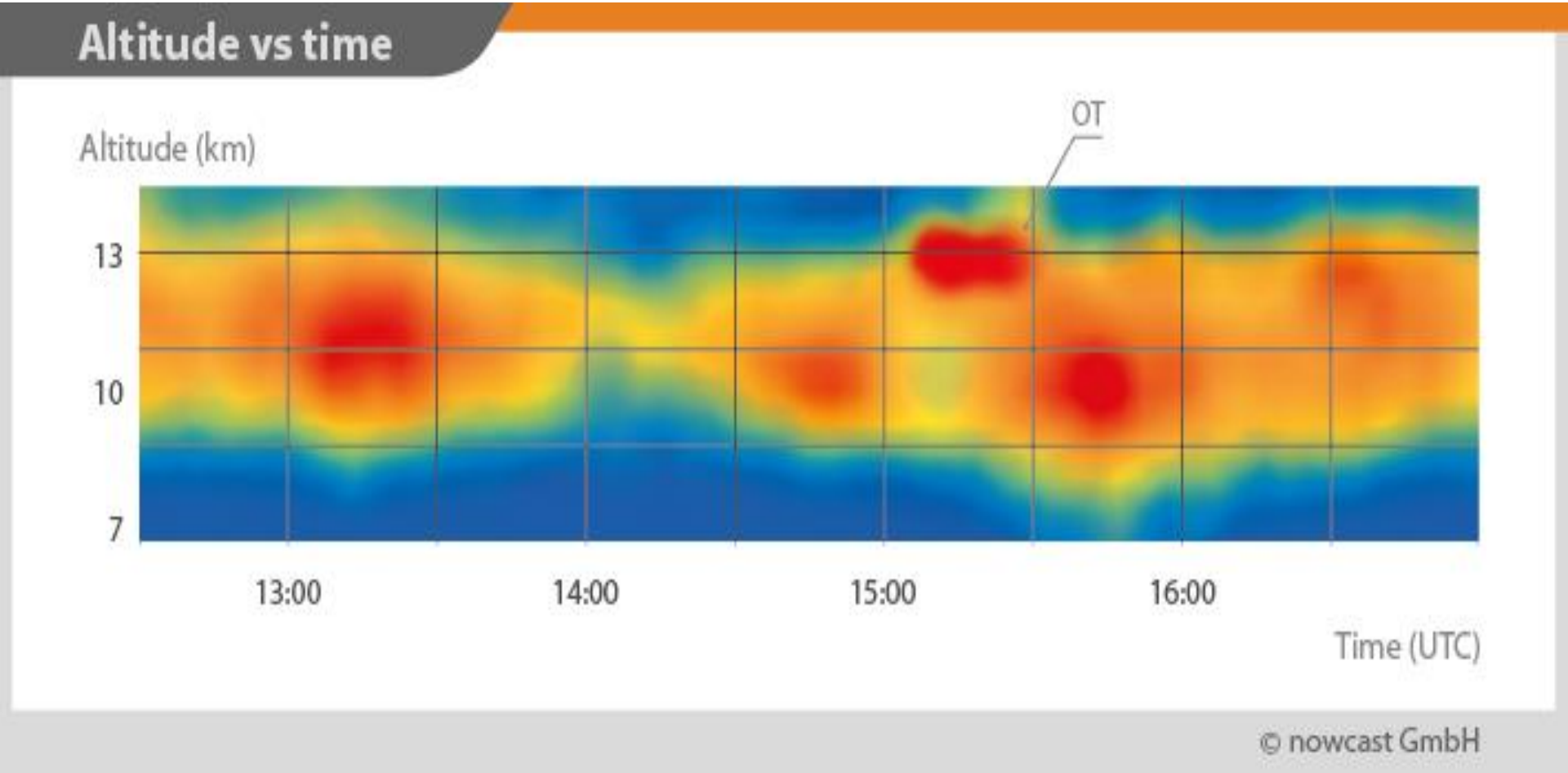
27 July 2013

Thunderstorm in northern Germany:

The severe cell produces 10x as many IC as compared with CG

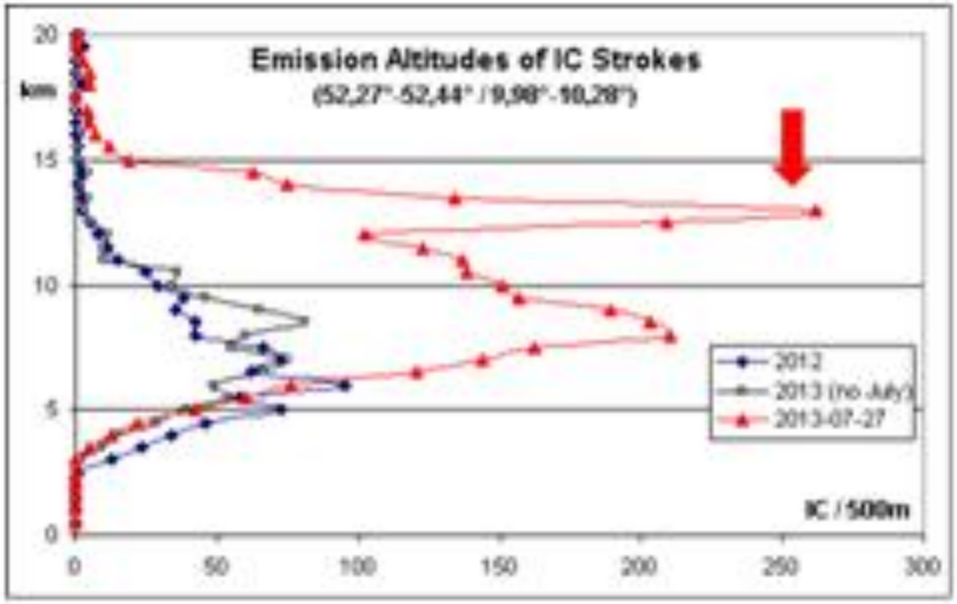
IC Rate and Altitude indicate Severe Weather

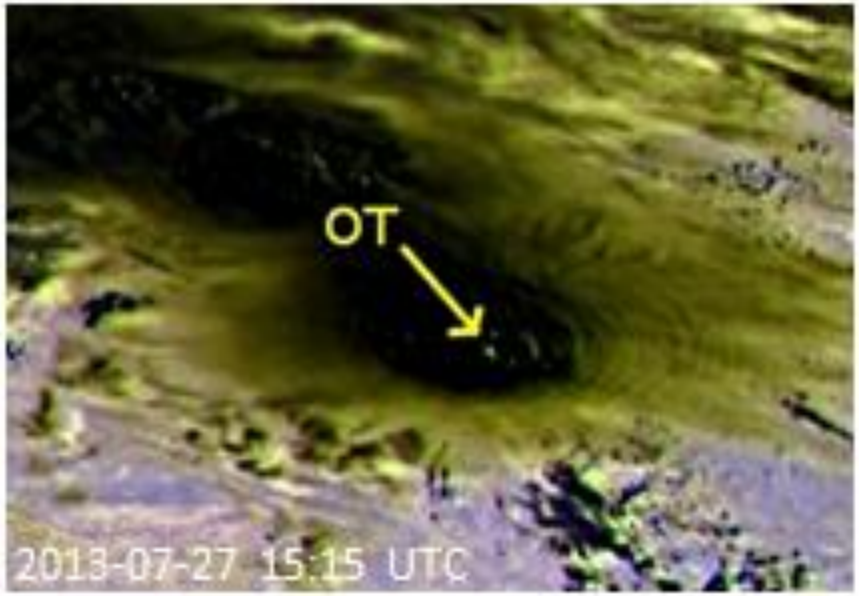
high-precision lightning detection.



Time-evolution of IC strokes in different altitudes during a severe thunderstorm with hail. Color signifies the IC rate. At 15:10 a very severe hail-cell develops in 13 km.

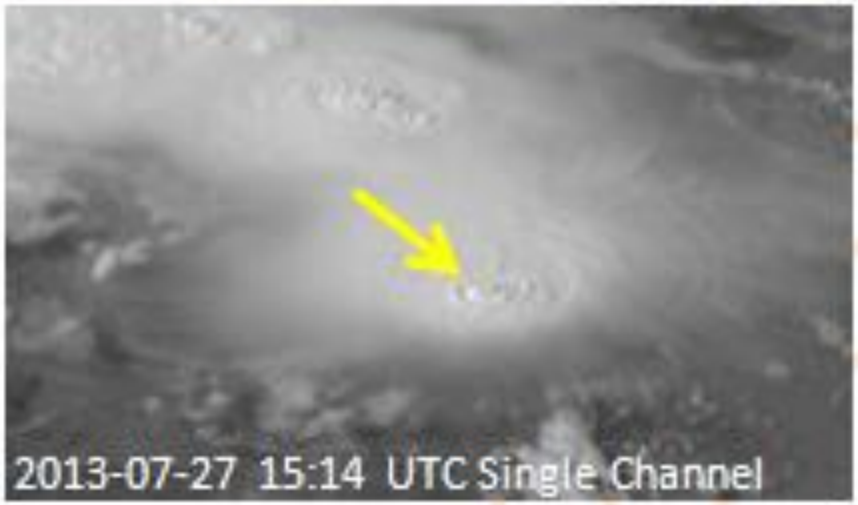
IC-Altitudes and Severe Weather



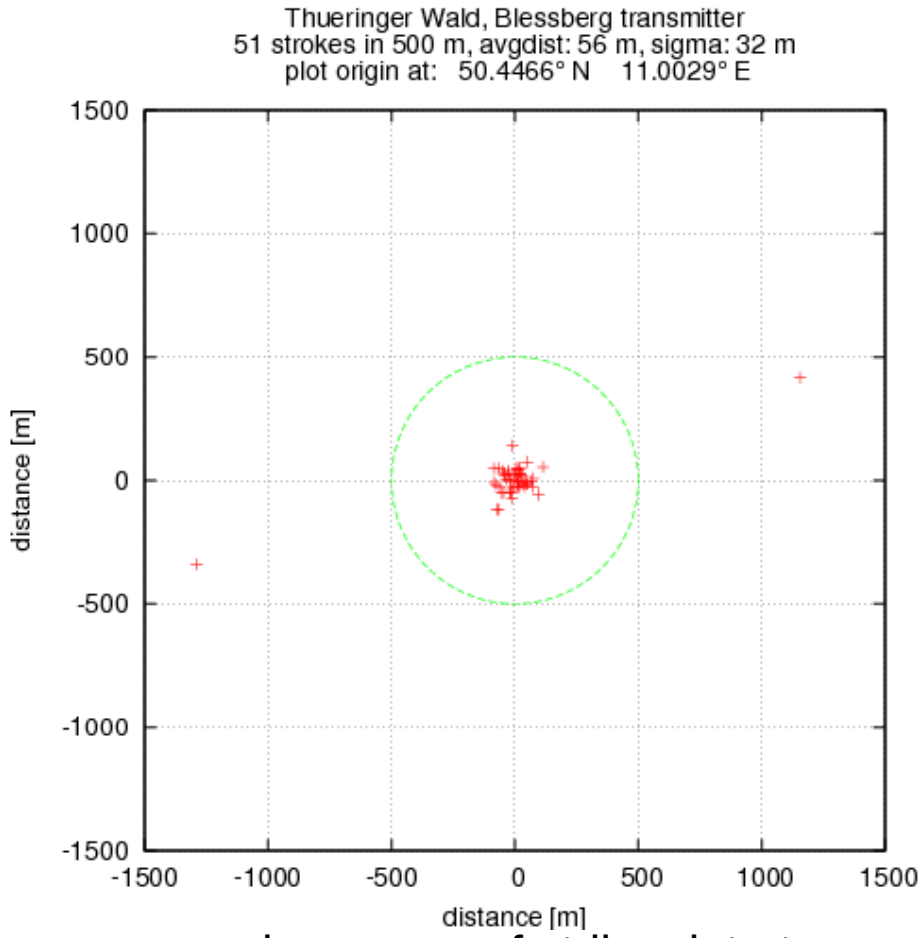


Indication of Severe Weather:

- IC rate increases
- IC Altitudes increase
- ➢ Development of Overshooting Tops



LINET Location Accuracy



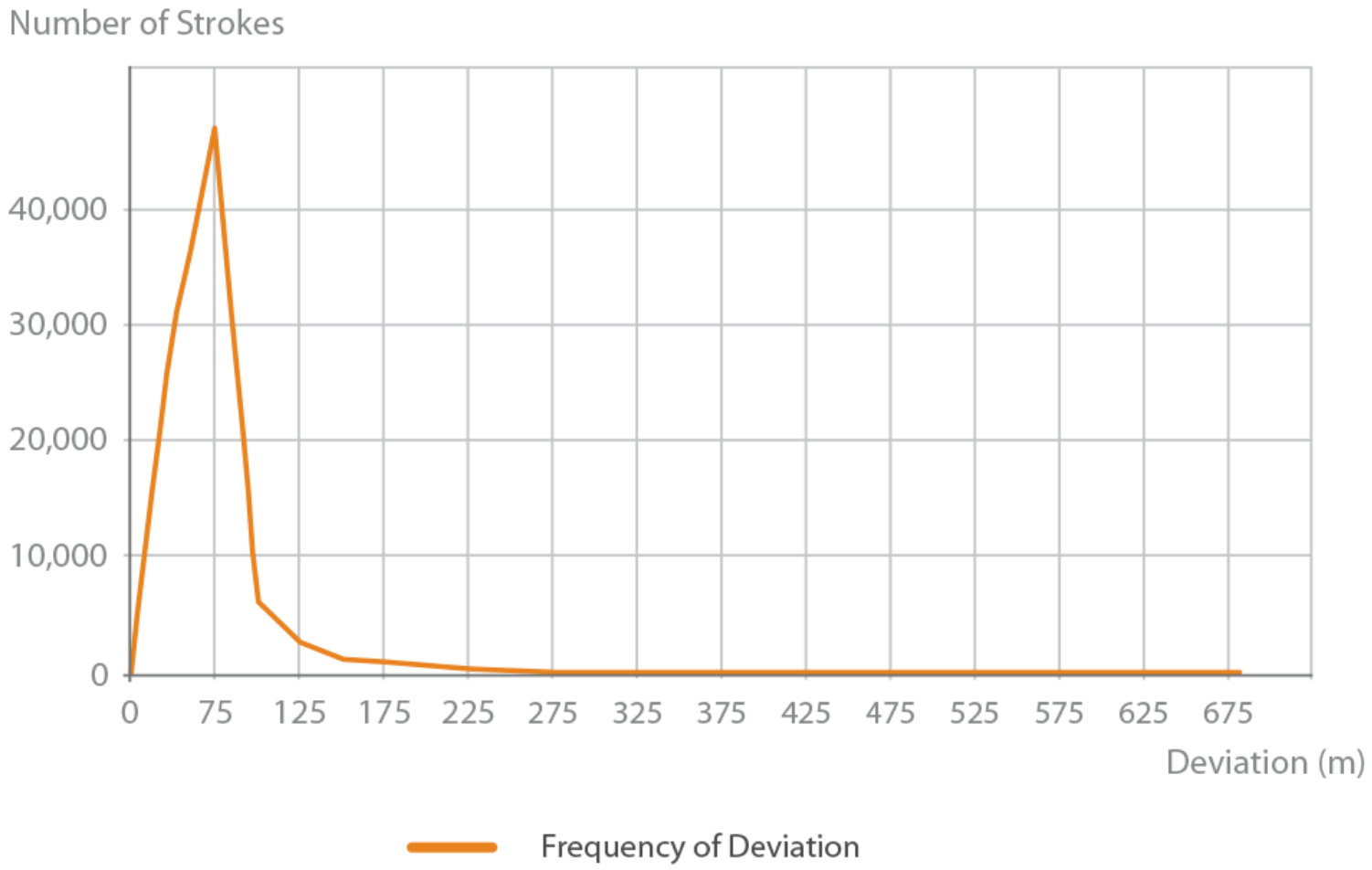
Verification of location accuracy by means of strikes into towers. The example shows a tower in the center; all strikes are located within 100 m from the tower.

Average deviation ~60 m

LINET Location Accuracy: average statistical error

high-precision lightning detection.

Mean Error



nowcast GmbH

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Albert-Rosshaupter-Straße 43
81369 München | Germany

Phone: +49 (0)89 5529.713.70
Fax: +49 (0)89 5529.713.71
info@nowcast.de
www.nowcast.de