

COMPARING A REGIONAL, SUBCONTINENTAL AND LONG-RANGE LLS OVER THE BENELUX AND FRANCE*

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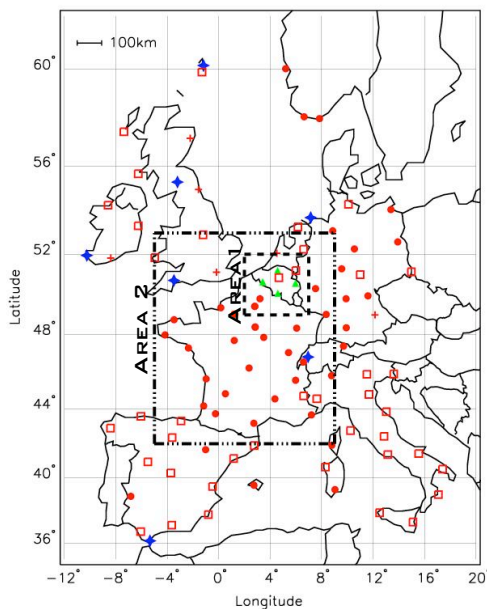
CONTEXT: Increasing possibilities for using lightning data necessitate proper spatial and temporal mapping of lightning events. It is therefore of importance to assess the capabilities and limitations of an LLS of interest

AIM:

- Compare spatial and temporal behavior of **three** 'overlapping' LLS
- Analyze lightning observations of **two storm seasons** between May-Sept 2011 & 2012
- Apply on **two areas**

METHOD:

- Group strokes into flashes in similar manner for each LLS
- Compare flashes using the relative detection efficiency (RDE) method, where $RDE(LLS_1-LLS_2) = n_{LLS_1}n_{LLS_2}/n_{LLS_1,2}$, and $n_{LLS_1,2}$ the amount of detection by $LLS_{1,2}$



1. RMIB:

- **SAFIR:** regional LF/VHF network since 1992
- Discriminates between CG and CC
- Adopt only CG in this study
- CG flash DE ~93%*
- LA ~6km*

2. MÉTÉORAGE:

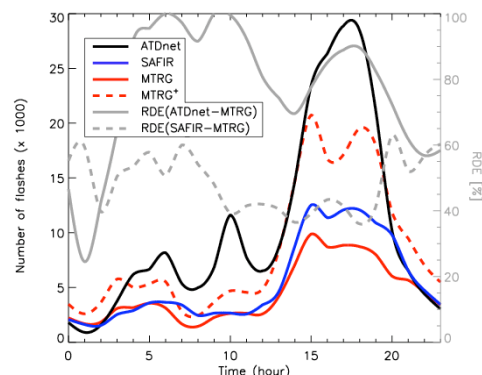
- Subcontinental LF network since 1986
- Discriminates between CG and CC
- **MTRG:** CG / **MTRG+:** CG+CC
- CG flash DE ~100%*
- LA ~440-600m*

3. UKMO:

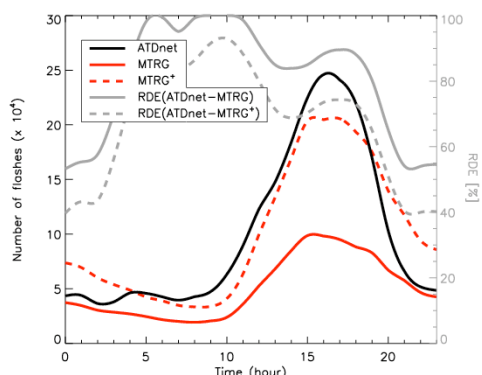
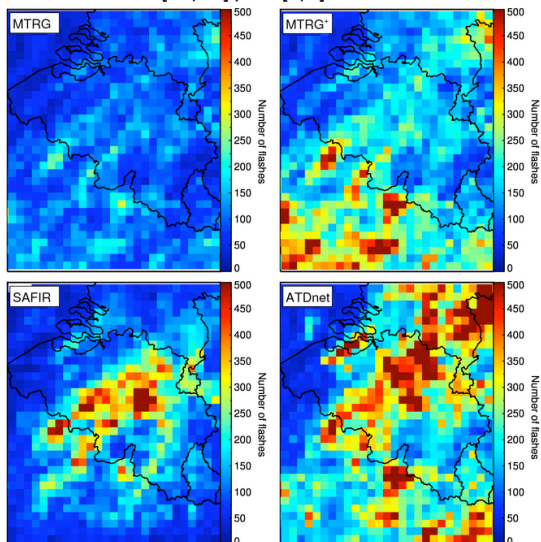
- **ATDnet:** long-range VLF network since 1987
- No discrimination between CG or CC
- CG flash DE ~88%*
- LA ~1km*

RESULTS:

- ATDnet outnumbers the other LLS between 0300 and 2000 UTC
- MTRG+ closer to ATDnet
- Highest RDE found between MTRG and ATDnet; $RDE(MTRG-ATDnet)=80\%$
- Lowest RDE found when comparing against SAFIR due to low LA
- $RDE(MTRG-ATDnet)=34\%$, however $RDE(MTRG^+-ATDnet)=57\% \Rightarrow \sim 25\%$ of ATDnet's flashes are of type CC



AREA 1 lat[49,52] / lon[2,7]

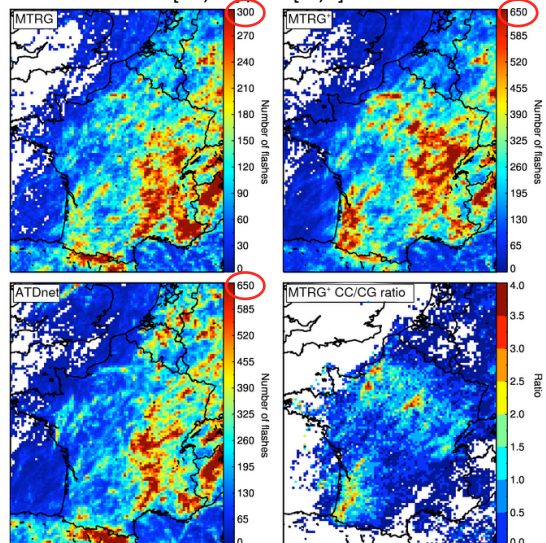


- Similar to Area 1, ATDnet detects more during the day, with MTRG+ following more closely ATDnet's temporal behavior
- MTRG and ATDnet have the same spatial pattern, albeit at lower flash rates
- Similar to Area 1, $RDE(ATDnet-MTRG^{(+)})$ is high during the day and drops at night. The latter due to changes in the ionospheric height influencing ATDnet's performance
- $RDE(MTRG-ATDnet)=40\%$ and $RDE(MTRG^+-ATDnet)=66\%$. Thus $\sim 25\%$ of ATDnet's flashes are of type CC, similar to Area 1

CONCLUSIONS:

- Sensor configuration, type of sensors & applied technology, quality control settings and sensor outages give rise to variations
- A lower limit of $\sim 25\%$ of ATDnet's flashes is of type inter/intracloud assuming a correct CG/CC discrimination by Météorage

AREA 2 lat[42,53] / lon[-5,9]



REFERENCES:

*Based on: Poelman D. R., F. Honoré, G. Anderson, and S. Pédeboy, 2013: Comparing a Regional, Subcontinental and Long-Range Lightning Location System over the Benelux and France, *J. Atmos. Oceanic Technol.*, 30, 2394-2405
*Poelman D. R., W. Schulz, and C. Vergeiner, 2013: Performance Characteristics of Distinct Lightning Detection Networks Covering Belgium, *J. Atmos. Oceanic Technol.*, 30, 942-951