LMA data and transient luminosity from high speed video recording of lightning at the Ebro Valley Laboratory in Spain + LMA in Colombia

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1. UPC Lightning Research Group

2. Ebro Valley Laboratory
   2.1 Facilities
   2.2 Basic lightning flash properties derived from LMA
   2.3 Luminosity properties from high speed video recording

3. LMA in Colombia
1. UPC Lightning Research Group

ASIM mission (ISS) Spanish branch

Laboratoire d'Aérologie Serge Soulà

ASIM

Meteorological Dept. Curaçao (high-speed camera)

Joan Montanyà
Oscar van der Velde
Ferran Fabró
David Romero
Gloria Solà

Servei Meteorològic de Catalunya
Nicolau Pineda
Oriol Argemí

Earle Williams (magnetometer)

LMA Colombia Jesús Lòpez

MIT

LI/GLM Workshop, 2015
27-29 May, Rome

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2.1 Facilities
High-speed video of lightning and x-ray pulses during the 2009–2010 observation campaigns in northeastern Spain.
Eurosprite Campaings: 
http://eurosprite.blogspot.com.es/
Two upward lightning at the Eagle Nest tower

Upward leader visible at the video

Detected RS (LLS)
LMA data viewer

10-min. period (+ LINET data)

flash selection
Bidirectional leader development in sprite-producing positive cloud-to-ground flashes: Origins and characteristics of positive and negative leaders†

Oscar A. van der Velde, Joan Montanyà, Serge Soula, Nicolau Pineda, Janusz Mlynarczyk
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2.2 Basic lightning flash properties derived from LMA

LMA sources are fitted into an ellipse: major axis, minor axis and inclination.

Confidence region defined by certain standard deviation.

Spatial Pattern of Lightning from Space

MTG LI Events

Size (major axis)

Duration
2.3 Luminosity properties from high speed video recording

Analysis of pixels luminosity frame by frame

- **CLOUD GLOWS**
  - 10log of pixels of brightness
  - > 5 - 20 – 80 - 240

- **RECOIL PULSES, CONT. CURRENT**
  - Max image brightness

- **STROKES, CURRENTS**
  - Max pixel brightness
difference between frames

- **LEADER GROWTH**
  - Mean image brightness
  - Number of pixels increased
  in brightness compared to
  previous frames
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2.3 Luminosity properties from high speed video recording
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2.3 Luminosity properties from high speed video recording

A) IC activity or recoils
B) Negative leader before the +CG, approaching and then going away
C) Leader to ground
D) 1st stroke + continuing current
E) Subsequent strokes + Continuing current
F) Recoils
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2.3 Luminosity properties from high speed video recording

A) IC activity or recoils
B) Negative leader before the +CG
C) Leader to ground
D) 1st stroke + continuing current
E) Subsequent strokes + Continuing current
F) Recoils
3. LMA in Colombia

Installation
9-18 April 2015

Test period
18 May 2015
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Campaign
May - December 2015
(to be defined)

Object
Record and analysis of tropical thunderstorms
OVERVIEW OF THE CLOUD TO GROUND LIGHTNING ACTIVITY IN COLOMBIA

Daniel Aranguren  Jesús López  Juan Inampeú  Horacio Torres  Hans Betz
Research Program FAAS – National University of Colombia, Keraunos SAS and nowcast GmbH

Figure 2 – Lightning location systems used in Colombia since 1997.
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Figure 4 – Ground Flash Density (CGflashes/km²/year) by Gallego [9] (Dataset: 2009).

Figure 5 – Ground Flash Density (CGflashes/km²/year) by Aranguren et al [10] (Dataset: 2012 and 2013). Peak currents higher than 10 kA are used.

Figure 6 – Minimum detectable return stroke peak current given in kA.
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