Understanding the different lightning detection technologies: A contribution from CHUVA-GLM field campaign

Rachel Albrecht ¹
Carlos Morales ²

Collaborators: Steve Goodman³, Richard Blakeslee⁴, Jeffrey Bailey⁵, Lary Carey⁵, Douglas Mach⁵, John Hall⁵, Monte Bateman⁶, Scott Rudlosky⁷, Hartmut Holler⁸, Hans Betz⁹, Enrique Mattos¹, Amitabh Nag¹⁰, Ryan Said¹⁰, Jean-Yves Lojou¹⁰, Stan Heckman¹¹, Osmar Pinto Jr¹, Kleber Naccarato¹, Antonio Saraiva¹, Marcelo Saba¹, Robert Holzworth¹², Graeme Anderson¹³, Melanie Collins¹³, Evandro Anselmo², Joao Neves²

¹ INPE, ² USP, ³ NOAA NESDIS/NASA GSFC, ⁴ NASA MSFC, ⁵ UAH, ⁶ USRA, ⁷ NOAA NESDIS, ⁸ DLR, ⁹ Nowcast, ¹⁰ Vaisala Inc., ¹¹ EarthNetworks, ¹² UW, ¹³ MetOffice
Understanding the different lightning detection technologies: A contribution from CHUVA-GLM field campaign.

Cloud processes of the main precipitation systems in Brazil: A contribution to cloud resolving modeling and to the GPM (GPM Precipitation Measurement)

Rachel Albrecht ¹
Carlos Morales ²

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CHUVA Project: Main Goals

• Improve Rainfall Estimation Using Satellites and/or Radar
• Improve the Skill of Cloud Resolving Models
• Compile a Climatology of the Main Precipitation Systems in Brazil and their physical and microphysical characteristics
• Develop Tools for Nowcasting.

**WORKING GROUP–1**: CHARACTERISTICS OF THE PRECIPITATING SYSTEMS AS FUNCTION OF THE REGION AND LIFE STAGE (Luiz Machado)

**WORKING GROUP–2**: PRECIPITATION ESTIMATION – DEVELOPMENT AND VALIDATION ALGORITHM (Daniel Vila)

**WORKING GROUP–3**: ELETRIFICATION PROCESS: MOVING FROM CLOUDS TO THUNDERSTORMS (Carlos Morales)

**WORKING GROUP–4**: CHARACTERISTICS OF THE BOUNDARY LAYER FOR DIFFERENT CLOUD PROCESSES AND PRECIPITATION REGIMES (Gilberto Fisch)

**WORKING GROUP–5**: MODEL IMPROVEMENTS AND VALIDATION, WITH FOCUS IN CLOUD MICROPHYSICS AND AEROSOL INTERACTIONS, FOR SATELLITE PRECIPITATION ESTIMATES IN BRAZIL (Maria Assunção Dias)
CHUVA Field Campaign Schedule

[Map of South America showing research sites and weather patterns]
<table>
<thead>
<tr>
<th>YEAR</th>
<th>JAN</th>
<th>FEB</th>
<th>MAR</th>
<th>APR</th>
<th>MAY</th>
<th>JUN</th>
<th>JUL</th>
<th>AUG</th>
<th>SEP</th>
<th>OCT</th>
<th>NOV</th>
<th>DEC</th>
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<td>2010</td>
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<td>Alcântara (NE)</td>
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<td>Fortaleza (NE)</td>
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<td>Fortaleza (NE)</td>
<td>Belém (N)</td>
<td>Belém (N)</td>
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<tr>
<td>2012</td>
<td>V. Paraíba (SE)</td>
<td>V. Paraíba (SE)</td>
<td>V. Paraíba (SE)</td>
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<td>2013</td>
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<td>Sta. Maria (SO)</td>
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<td>2014</td>
<td>Manaus (NO)</td>
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</tbody>
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Mobile Dual-Pol X-band radar
Micro-radars
Radiometers
Weather Stations (T, Td, V)
Solar Radiation
Parsivel Disdrometers
Thies Distdrometers
JW Disdrometers
Rain gauges
GPS humidity

Soil humidity
Flux Station
Air Quality measurements
CCN counter
Lidar
Field-Mills
Lightning Location Systems
High Speed Video Camera
Radiosonde stations
Aircraft (microphysics)
CHUVA-GLM Vale do Paraíba
• CHUVA contribution for **GOES-R Geostationary Lightning Mapper (GLM)** and **MTG Lightning Imager (LI)** activities:
  • It is very important to know the LLS accuracy as they are used as proxy data on GOES-R and MTG activities (Risk Reduction, Algorithm Working Group, Calibration/Validation)

• Comprehensive Lighting Location Systems intercomparisons:
  • Lightning Mapping Array (NASA/UAH/NOAA) [2011-10-24 to 2012-03-31]
  • LINET (EUMETSAT/DLR) [2011-12-10 to 2012-03-31]
  • TLS200 (Vaisala) [2012-01-04 to 2012-03-31]
  • ENTLN (EarthNetworks) [2011-11-01 to 2012-03-31]
  • RINDAT (INPE) [2011-11-01 to 2012-03-31]
  • STARNET (USP) [2011-11-01 to 2012-03-31]
  • WWLLN (Univ. Washington) [2011-11-01 to 2012-03-31]
  • GLD360 (Vaisala) [2011-11-01 to 2012-03-31]
  • ATDnet (MetOffice) [2011-11-01 to 2012-03-31]
  • TRMM-LIS [2011-11-01 to 2012-03-31]
CHUVA-GLM Vale do Paraíba
EXAMPLE OF LIGHTING MEASUREMENTS WITHIN A CONVECTIVE CELL

- LLS measurements during a TRMM LIS orbit:
  Orbit #80202
  2011-12-14 17:02:48 UTC

- Squall line with a few convective cores and a trailing edge
LLS measurements during a TRMM LIS orbit:
Orbit #80202
2011-12-14 17:02:48 UTC

Squall line with a few convective cores and a trailing edge
• LLS measurements during a TRMM LIS orbit:
  Orbit #80202
  2011-12-14 17:02:48 UTC

• Squall line with a few convective cores and a trailing edge

• LLS intercomparison on a single convective core
EXAMPLE OF LIGHTING MEASUREMENTS WITHIN A CONVECTIVE CELL

LLS measurements

LIS
LINET
RINDAT
STARNET
WWLLN
ATDnet
GLD360
ENTLN
This is only a preliminary result and most of the LLS data did not receive any Quality Control yet.
EXAMPLE OF LIGHTING MEASUREMENTS WITHIN A CONVECTIVE CELL

LIS
LMA
LINET
RINDAT
STARNET
WWLLN
ATDnet
GLD360
ENTLN
EXAMPLE OF LIGHTING MEASUREMENTS WITHIN A CONVECTIVE CELL

LIS
LINET
RINDAT
STARNET
WWLLN
ATDnet
GLD360
ENTLN
• CHUVA-GLM collected data from a large variety of convective systems over Brazil:
  • Several Golden Cases from tropical convection through large MCSs

• Brazil is observed both by GOES and MSG:
  • Great environment for GOES-R and MTG activities:
    • Risk Reduction (nowcasting algorithms)
    • Algorithm Working Group (proxy data)
    • Calibration/Validation

• **CHUVA data is openly available for the research community:**
  • Collaborations are greatly welcome!!!
  • CHUVA-GLM data is currently on QC process and will be available soon.
CHUVA WEB-
http://chuvaproject.cptec.inpe.br/
Data Access

First step – Sign up;

Second Step – Sign In

Third Step – You must accept a Term of use.
Data Access

- Fourth Step – There are 3 options:
  - FTP Access – For a ftp client;
  - Winscp Software – If you have not a client ftp, you can make a download of it;
  - Data Access: Direct access by browser.

What is WinSCP?

WinSCP is a SFTP client and FTP, which allows you to access, transfer and manipulate files remotely, or you have access to all files without needing to be allowed in front of the computer. It is also possible to transfer files between your computer and devices like iPhone, PDA and any device with support for FTP or SFTP connections.
Thanks

rachel.albrecht@cptec.inpe.br

http://chuvaproject.cptec.inpe.br/