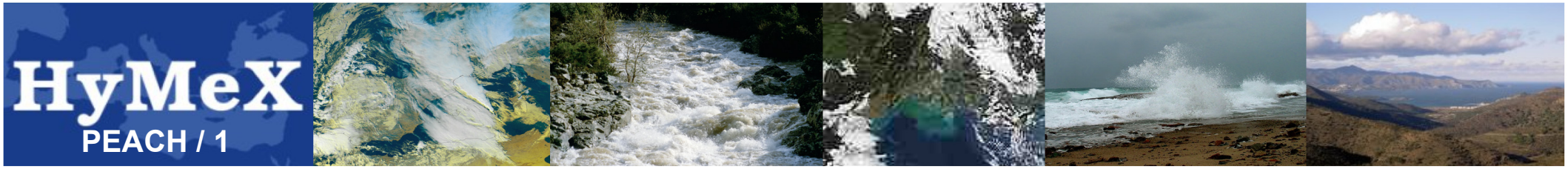

An Overview of The Electrical Activity Recorded During PEACH, the Atmospheric Electricity Component of HyMeX

[presented at ECSS 2013]

E. Defer[1], S. Coquillat[2], J.-P. Pinty[2], S. Soula[2], J.-F. Ribaud[2,4], E. Richard[2], J.-M. Martin[2], S. Prieur[2], W. Rison[3], P. Krehbiel[3], R. Thomas[3], D. Rodeheffer[3], V. Ducrocq[4], O. Bousquet[4], L. Labatut[4],O. Roussot[4], F. Honoré[4], S. Roos[4], T. Farges[5], L. Gallin[5], C. Vergeiner[6], F. Malaterre[7], S. Pedeboy[7], W. Schulz[8], P. Blanchet[9], G. Anderson[10], H.-D. Betz[11], B. Meneux[11], V. Kotroni[12], K. Lagouvardos[12], P. Ortéga[13], G. Molinié[14]

Acknowledgements : MISTRALS, ANR IODA-MED, Toulouse University, LEFE-IDAO, NASA-MSFC, NOAA GOES-R Visitor Program, TTO1h Instrument Hosts

HyMeX
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The PEACH Project in HyMeX

- HyMeX : Hydrological cycle in the Mediterranean Experiment

  A 10-year project with LOP, EOP and SOP for a better understanding and quantification of the hydrological cycle with emphasis on high-impact weather events

- PEACH : Projet en Electricité Atmosphérique pour la Campagne Hymex (Project in Atmospheric Electricity for HyMeX)

  Part of WG3 (Heavy Precipitation) HyMeX Activities

  Primary objective : multi-scale and multi-year lightning detection for observational- and modeling-based studies of the electrical activity in maritime and continental Mediterranean storms

  Second objective : characterization of the electrical nature of storms and lightning flashes

- SOP1 : North-western Mediterrean, 6 Sept. to 6th Nov. 2012

HyMeX
PEACH / 3

SOP1 TTO1h Instruments

INR

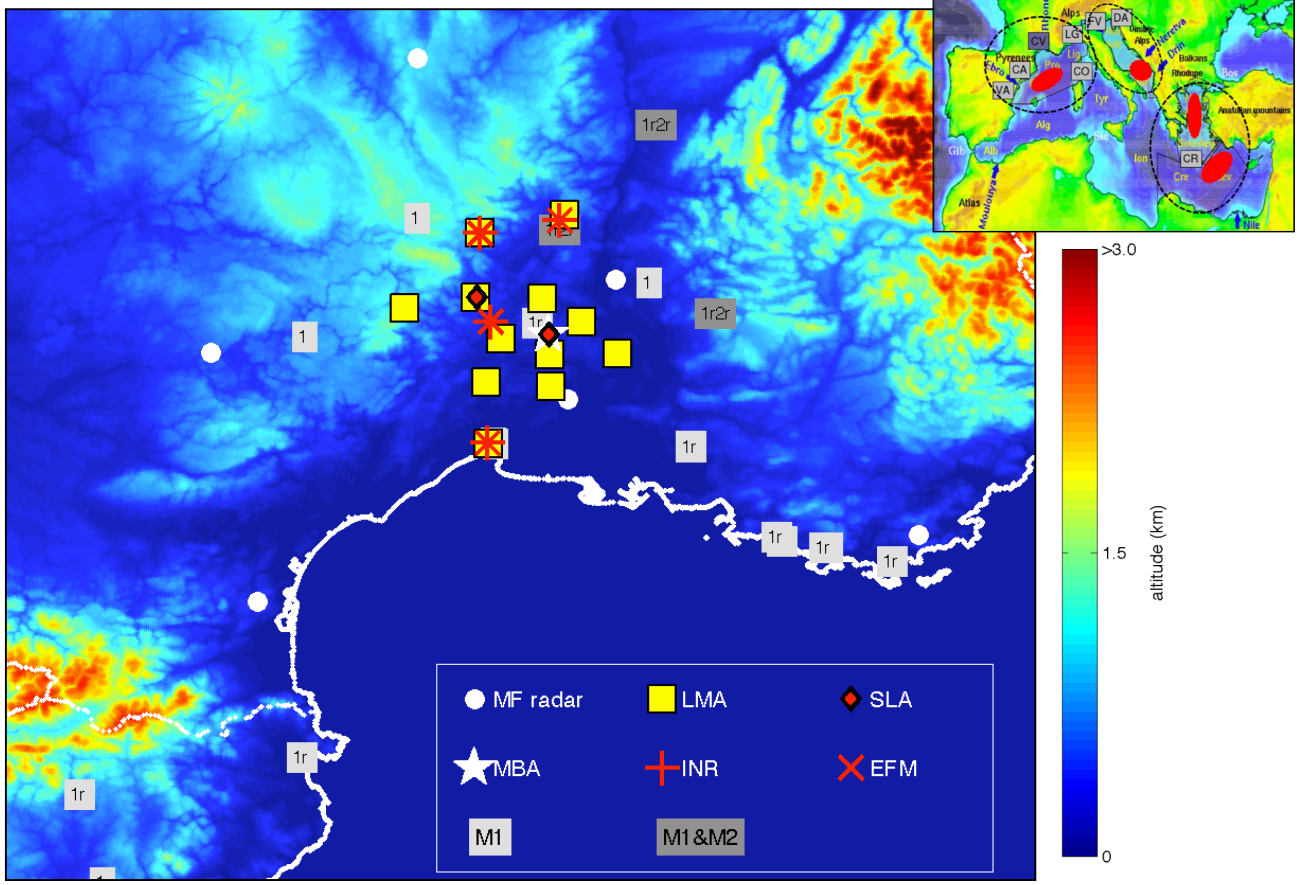
LMA

EFM

MLL

SLA

MBA/MPA



34 elements deployed over the SOP1 domain

+ Operational LLSs (ATDnet, EUCLID, LINET, ZEUS)

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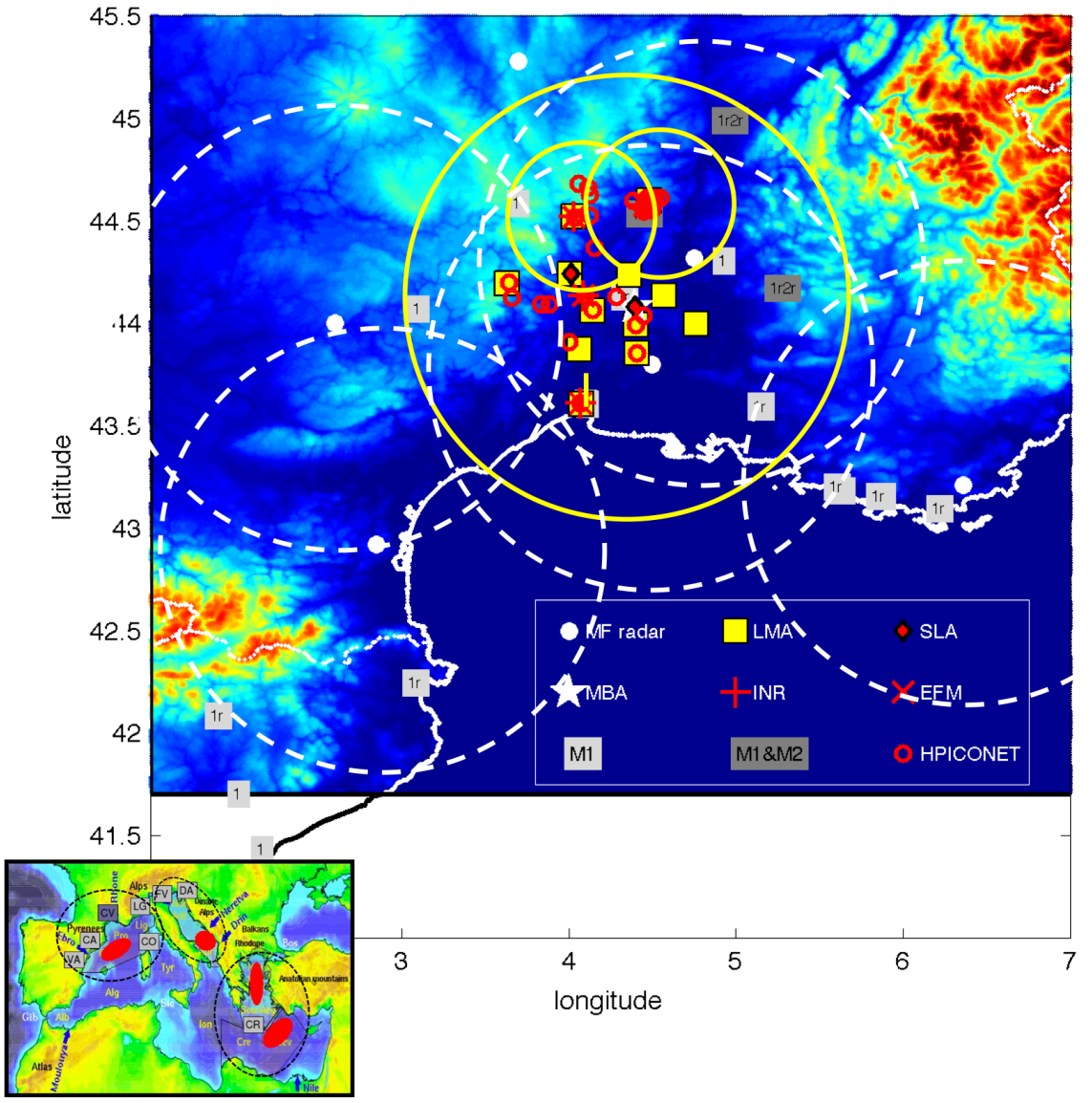
Other SOP1 HyMeX Instruments



MXPOL-9.4GHz

TARA-3.3GHz

NO XP-9.4GHz

Lamp-X 9.3GHz

MétéoFrance Operational Radars

RASTA-94GHz on F20

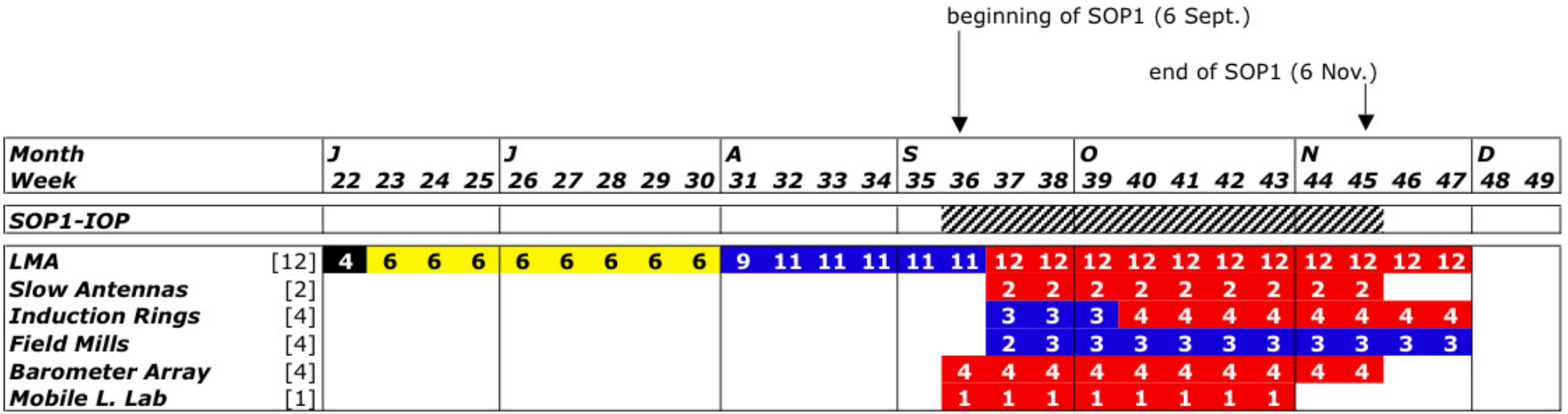
+ *MRR*
+ *operational RGs*
+ *microphysics probes*
+ *Lidar*
+ *…*
+ *TLE cameras*

HPICONET

HyMeX PEACH / 5

SOP1 Operation (6 Sept-6 Nov 2012)

- Atmospheric Electricity
  - Stand-alone LMA network (real time through wireless connection)
  - Other instruments recording continuously with post-event evaluation
  - MLL on “storm chasing mode” with guidance from HOC and TTO1h members
  - Operational LLSs in support inside and outside the SOP1 domain



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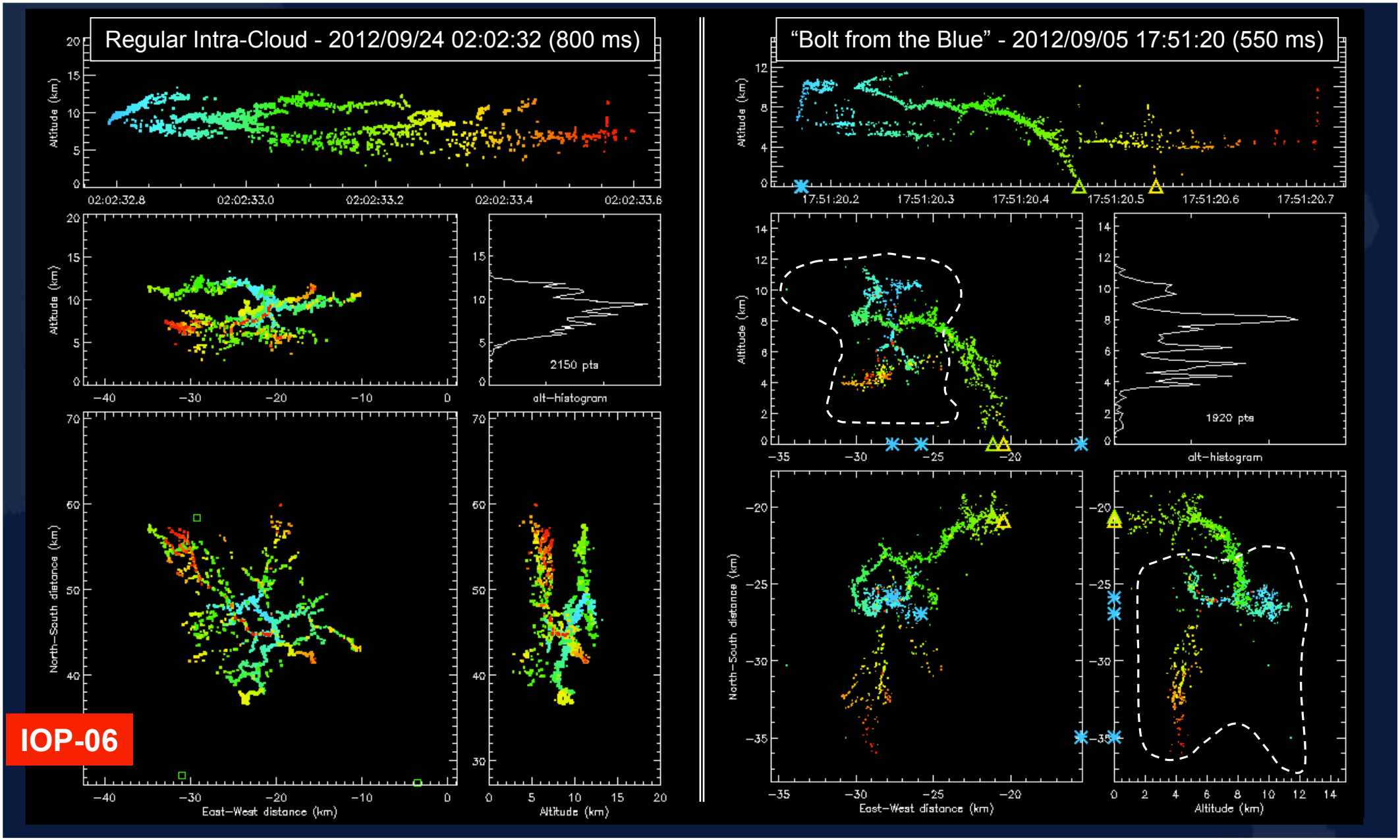
PEACH / 6

Examples of Lightning Flashes



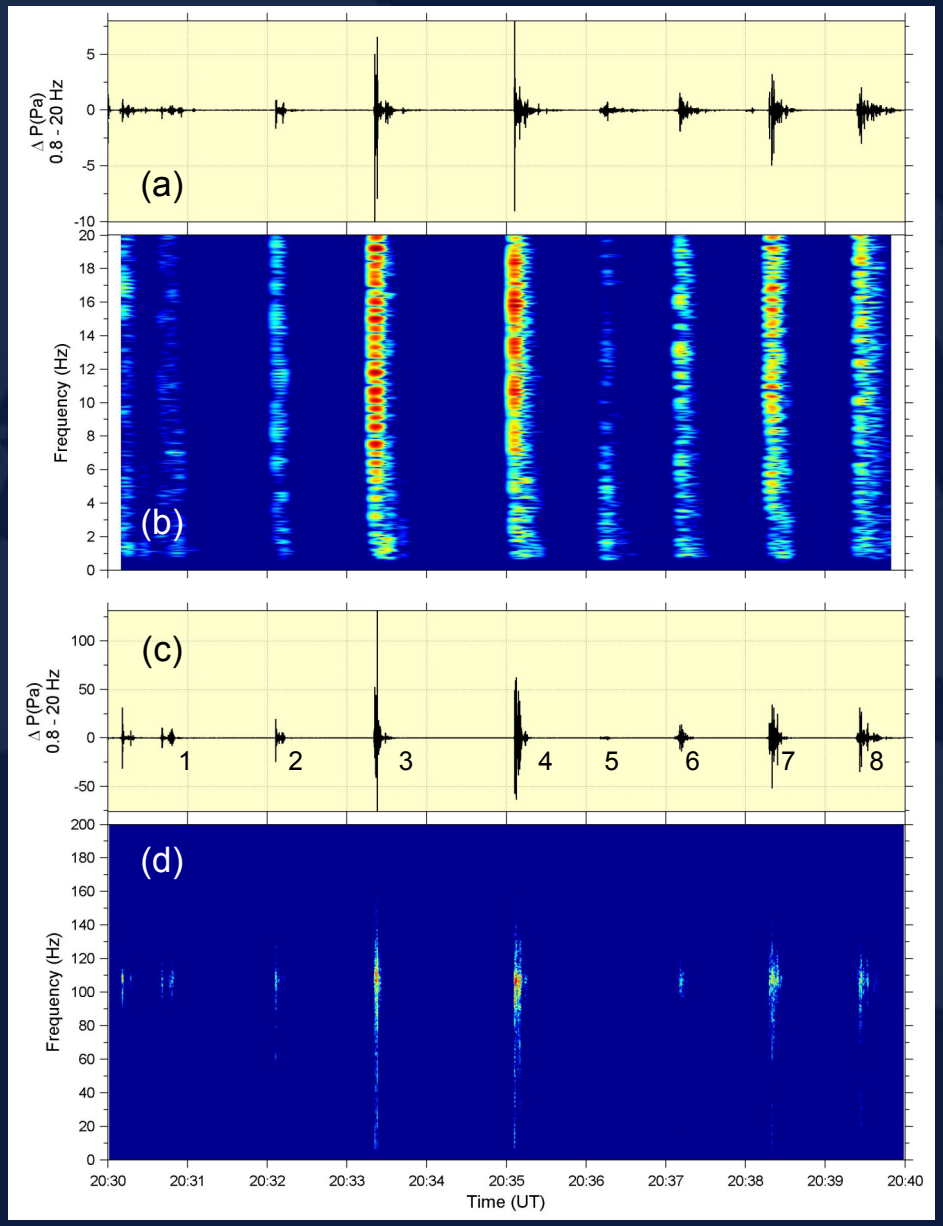
HyMeX

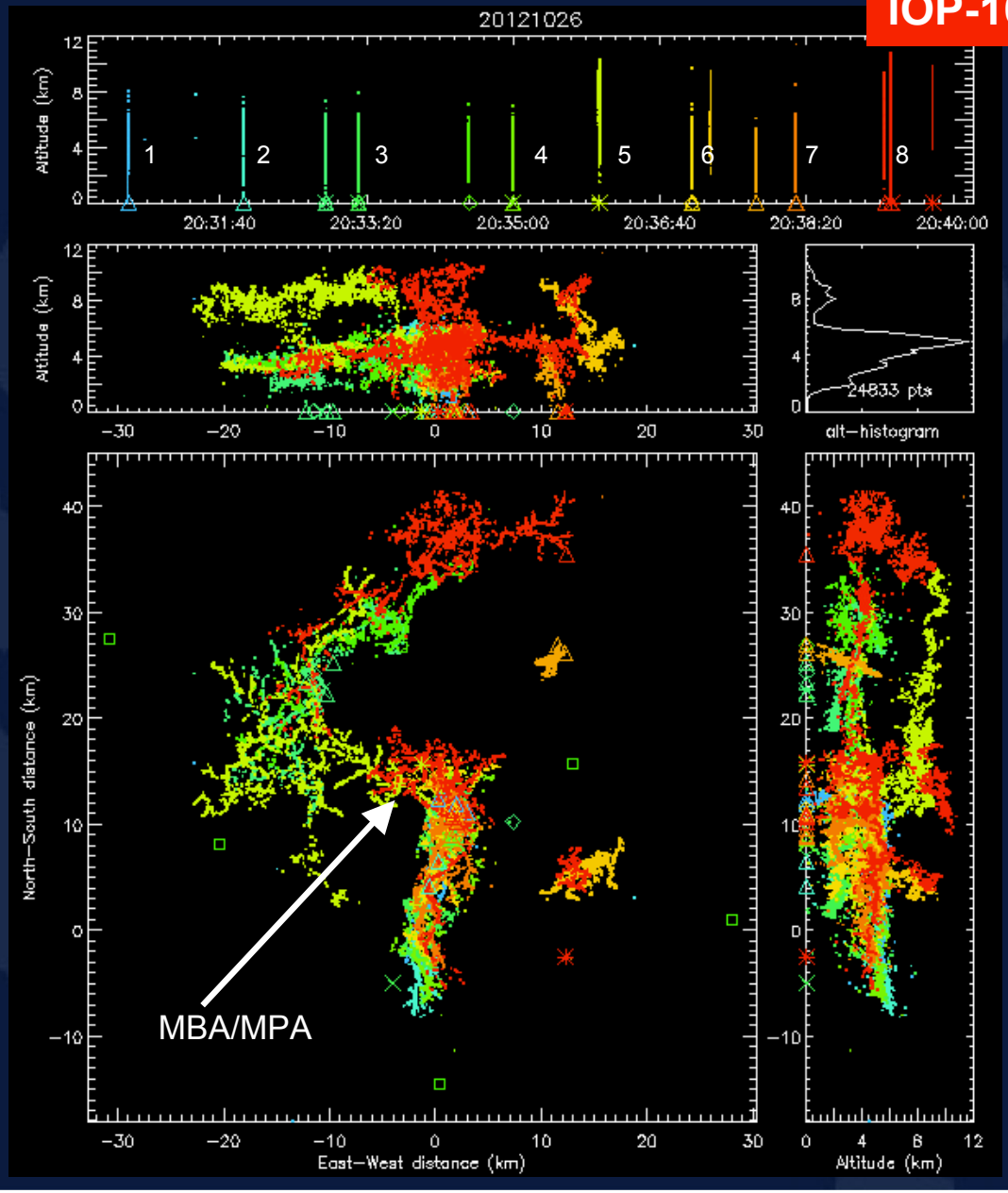
PEACH / 7

Acoustics, LF and VHF Records

[2012/10/26 20:30 - 2012/10/26 20:40]

IOP-16



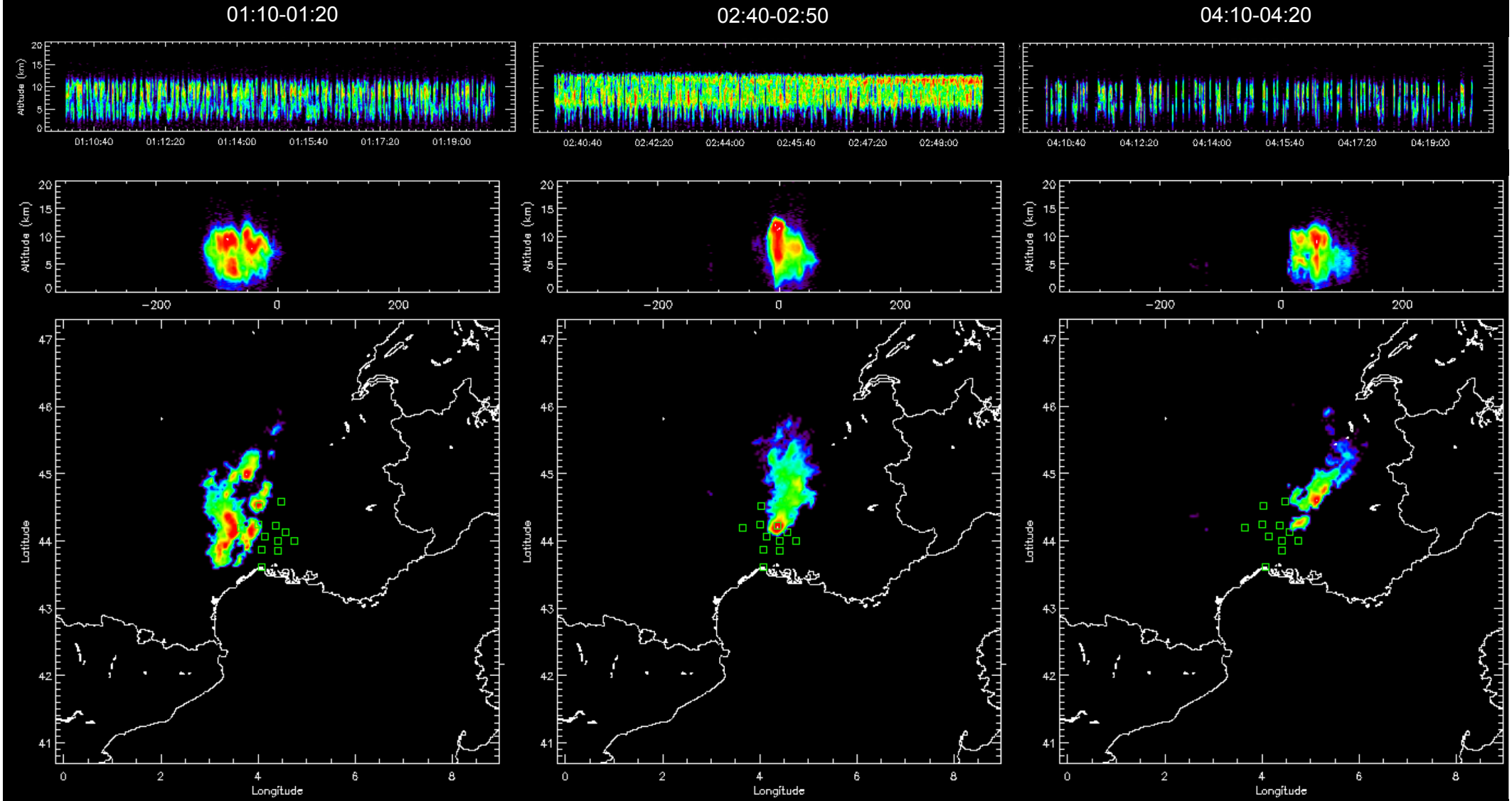


HyMeX
PEACH / 8

Lightning Activity at Storm Scale

[LMA source density, 2012/09/24]

IOP-06



ceaa cnrs EUCLID European Cooperation for Lightning Detection Observatoire Midi-Pyrénées OMP Université de Toulouse LA l'Observatoire de Paris LERMA LTHE Met Office METEO FRANCE Toujours un temps d'avance CNRM/GAME , URA1357 Météorage NATIONAL OBSERVATORY OF ATHENS NEW MEXICO TECH SCIENCE · ENGINEERING · RESEARCH · UNIVERSITY nowcast ONERA THE FRENCH AEROSPACE LAB

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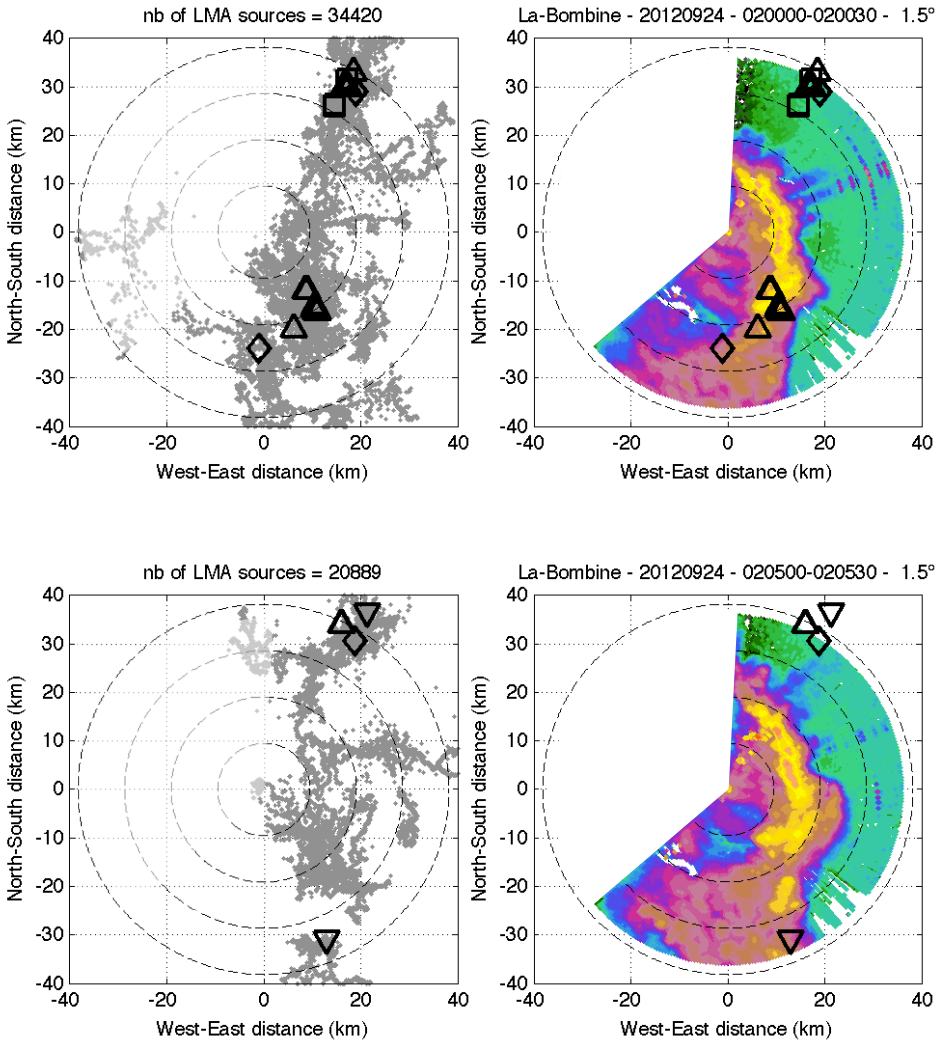
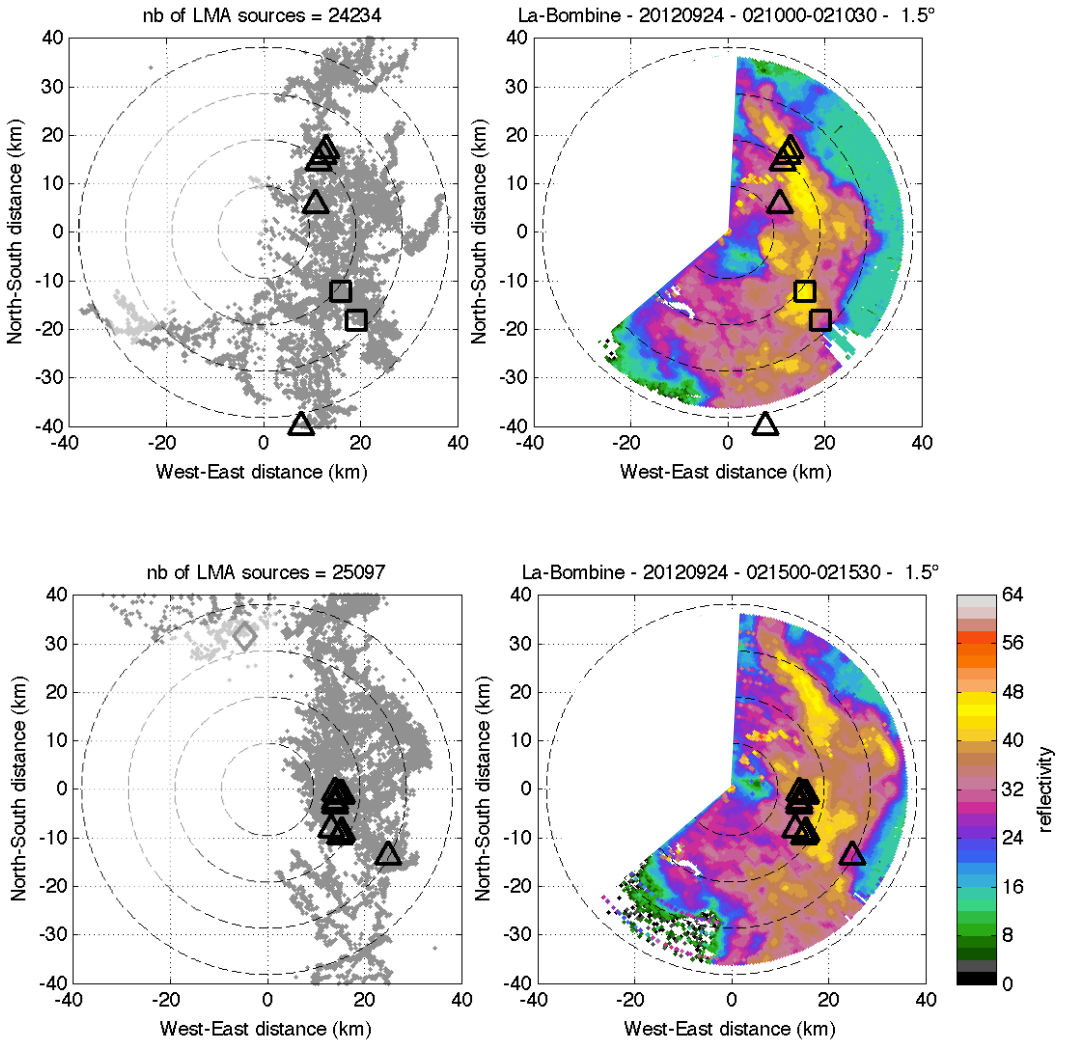
PEACH / 9

Lightning Activity & Precipitation

[LMA, Euclid & LaMP-X - 2012/09/24 02:00-02:15]

IOP-06



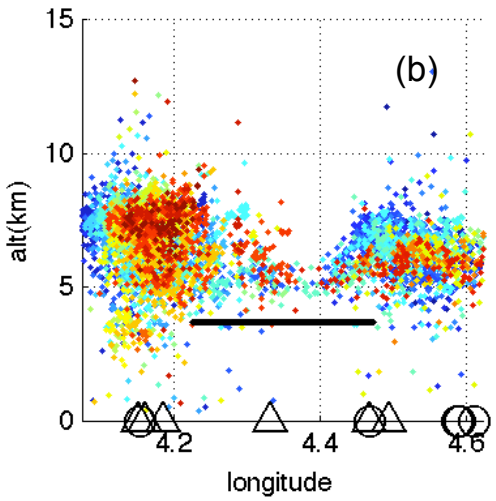


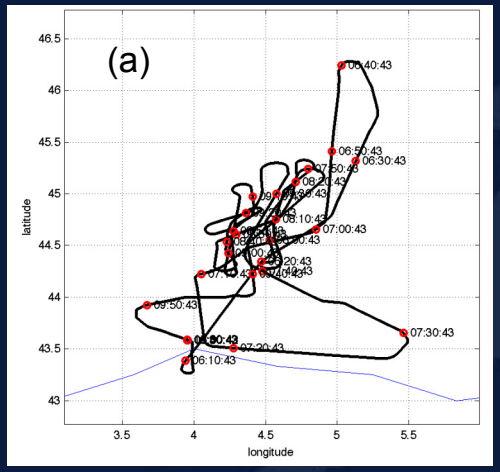
HyMeX
PEACH / 10

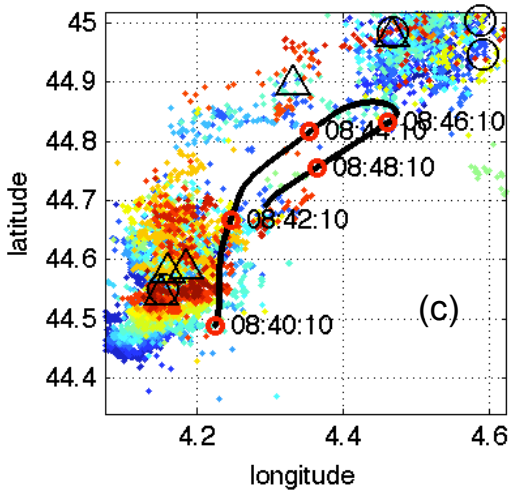
Lightning Activity & Cloud Proerties

[LMA, RASTA & microphysics - 2012/09/26 08:40-08:50]

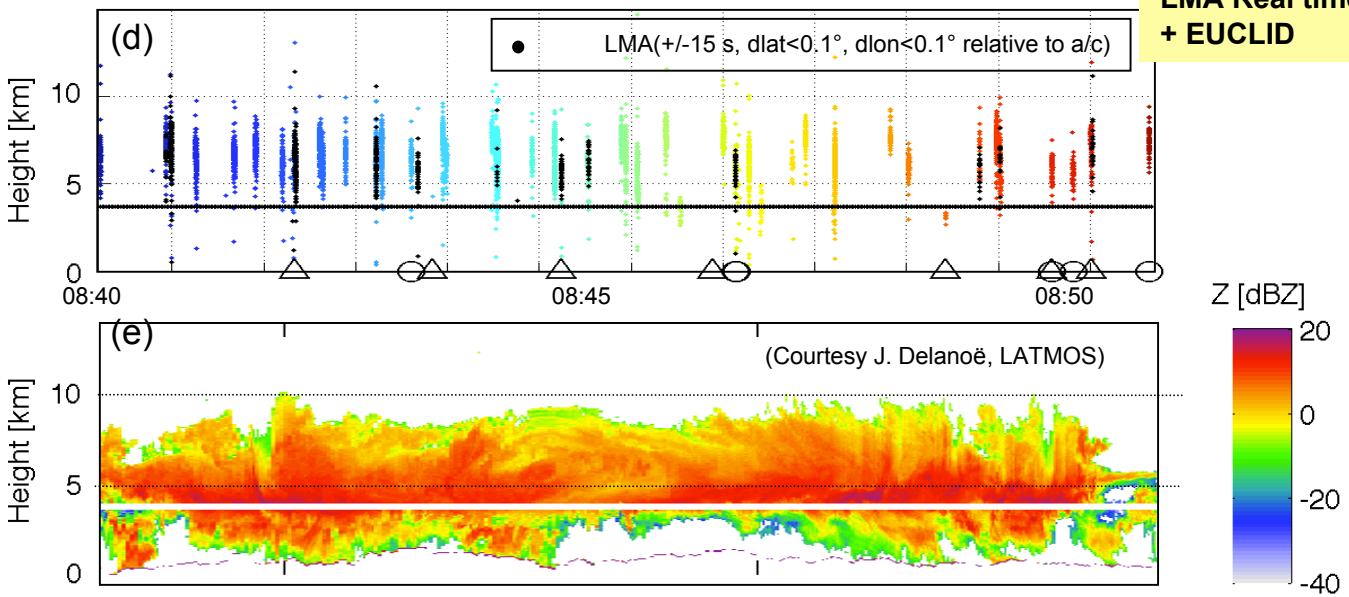
IOP-07







LMA Real time + EUCLID



HyMeX
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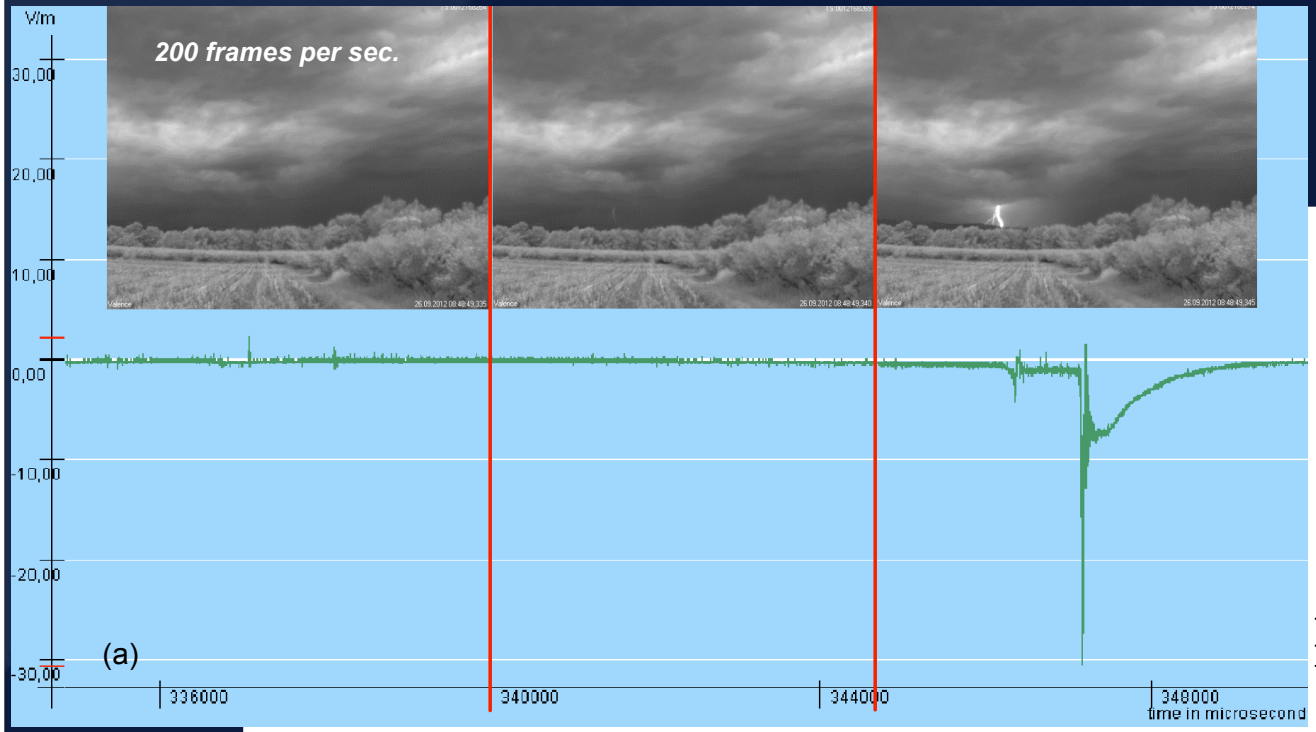
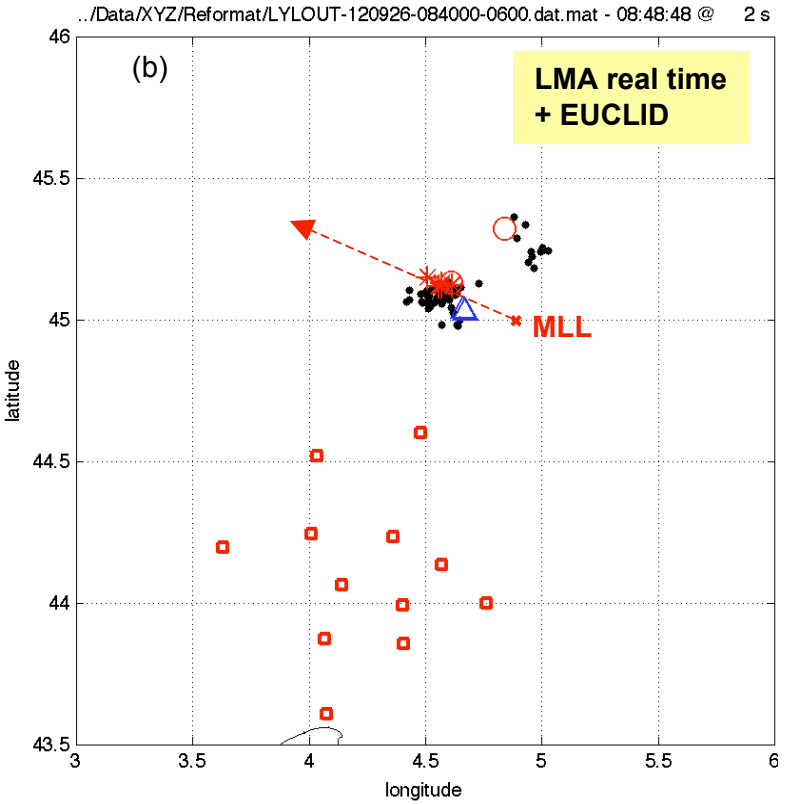
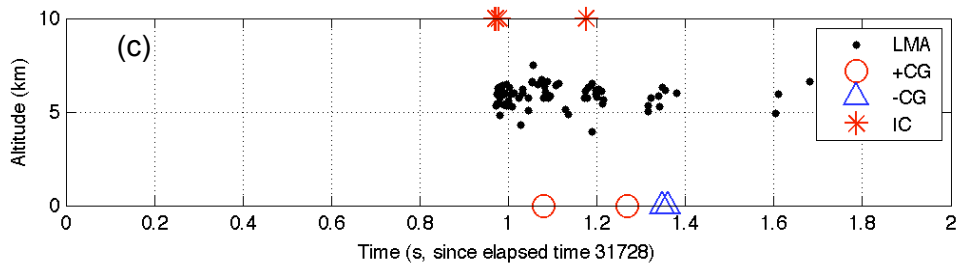
Optical, EFM and VHF Records

[Negative Cloud-to-Ground flash, 2012/09/26 08:48:49]

IOP-07







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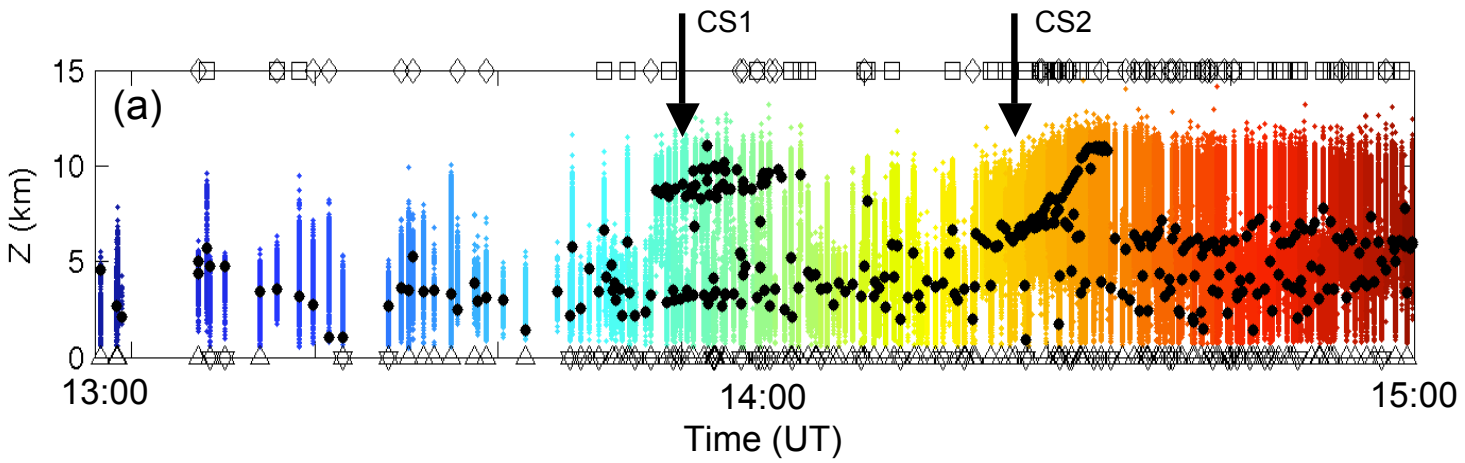
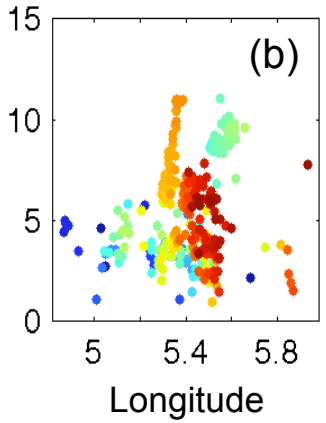
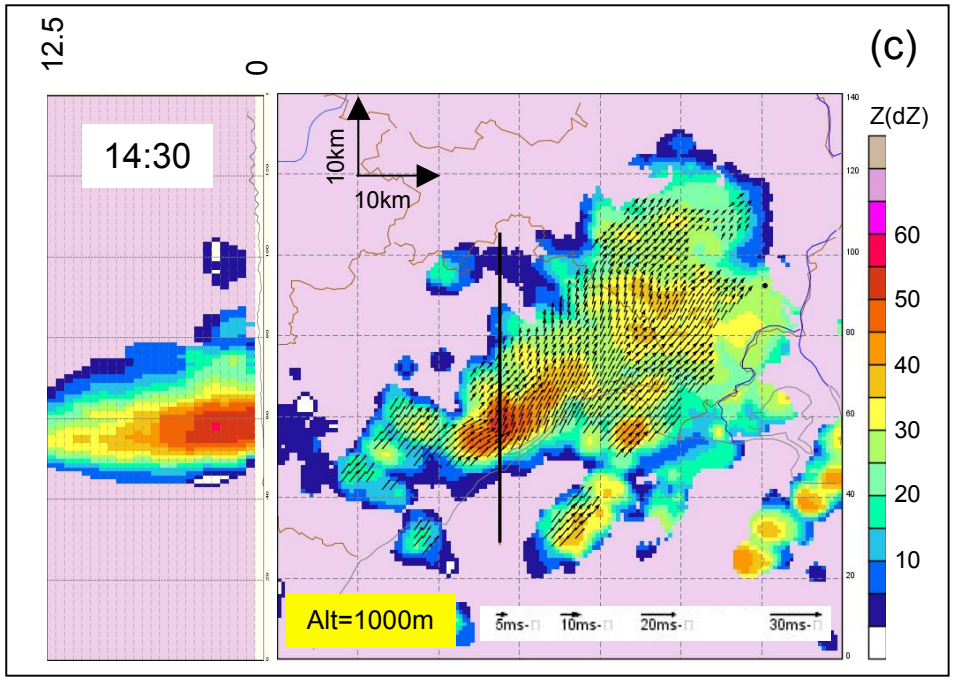
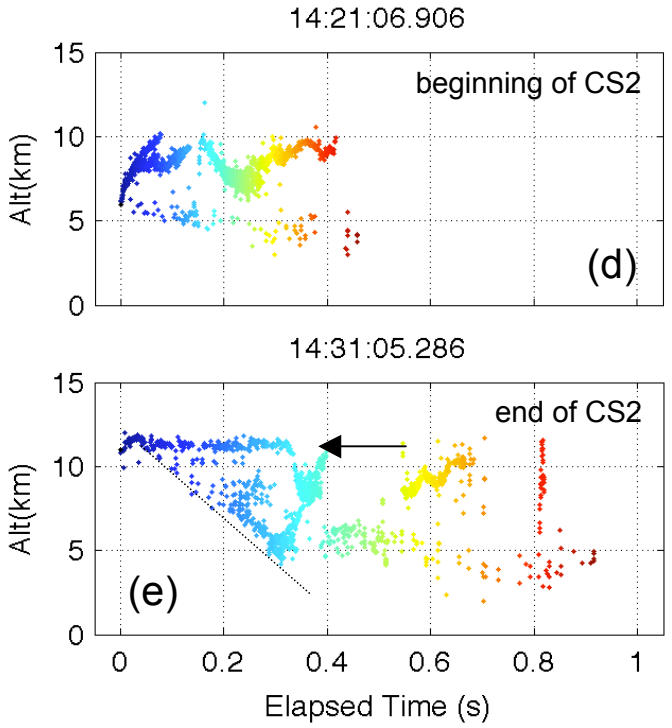
Tornado Case near Marseille
[LMA, EUCLID and Op. MF Radars - 2012/10/14 13:00-15:00]

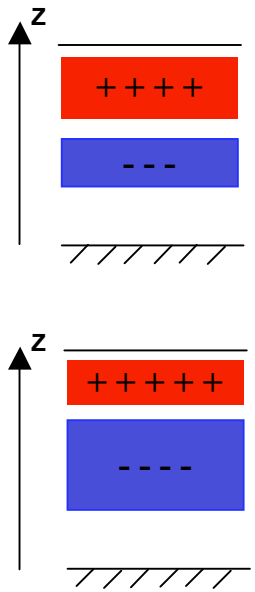
IOP-13











Perspectives (1/2)

- Comprehensive and unique dataset to perform studies at flash and storm levels over continental and maritime North-Western Mediterranean Basin

- *Flash Level*
  - Description of the same flash by different instruments
  - Inter-comparison and cross-normalization of available LLSs
- *Storm Level*
  - Links between dynamics, rain/hail/microphysics, electrification and lightning occurrence
  - Interpretation with the use of electrified cloud models
- *Regional and Mediterranean Basin levels*

Perspectives (2/2)

- Use of PEACH observations for verification and improvement of NWP simulations and cloud modeling (e.g. lightning data assimilation)
- Interact with local Weather Office based on lessons learned during SOP1

- Observations and products of interest for HyMeX Community :

Type	Δt	Δx	Parameter	S	E	L	Applications
3D & 4D maps	sec. to days	100's of m to 100's of km	Flash and storm locations and density maps	X	X	X	real time display, storm tracking/monitoring, assimilation, climate
	sec. to few hours	few 10's of km	Charge layer structures in parent clouds	X	-	-	storm monitoring and analysis
Time series	sec. to days	100's of m to 1000's of km	Flash rate, IC/CG ratio, flash duration, maximum of flash density…	X	X	X	real time display, storm monitoring and analysis
	sec. to few hours	few 10's of km	Charge layer structures in parent clouds	X	-	-	storm monitoring and analysis

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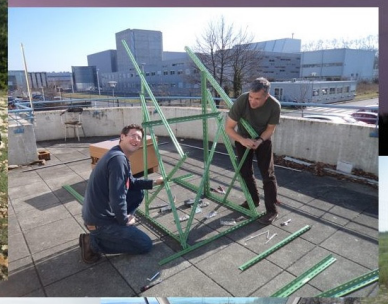
PEACH / 15

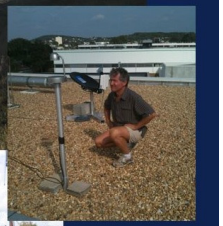
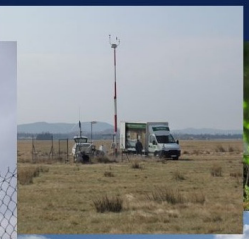
Thanks to PEACH SOP1 team!

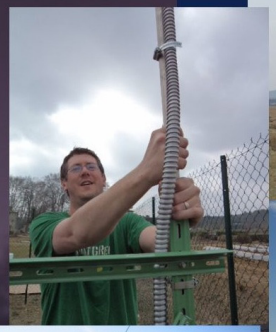
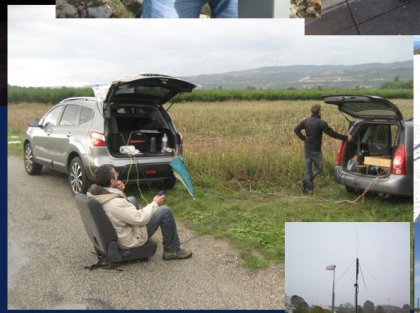
Contact : hymex-TTO1h@cnrm.meteo.fr

Soon : **ST-lightning@hymex.org**



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Soon : ST-lightning@hymex.org

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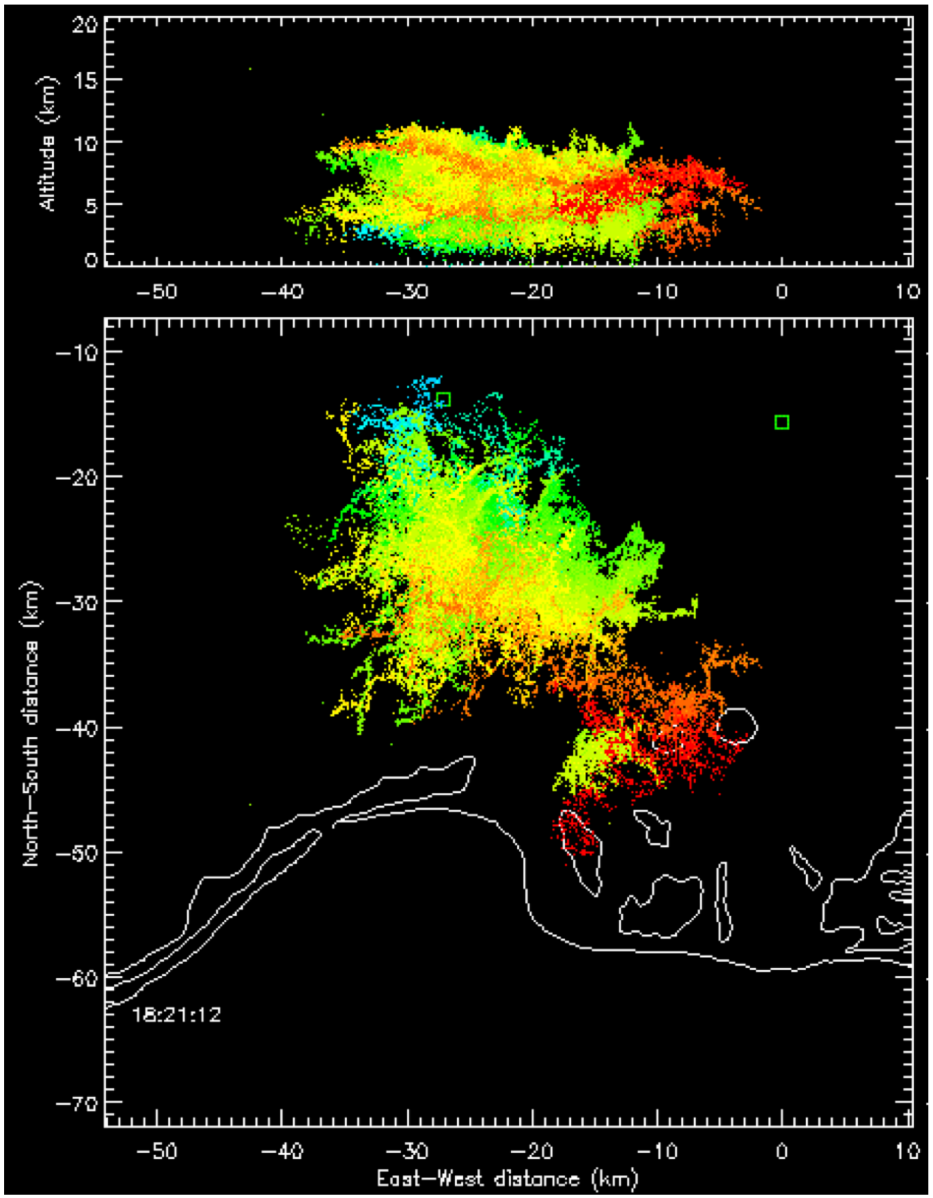
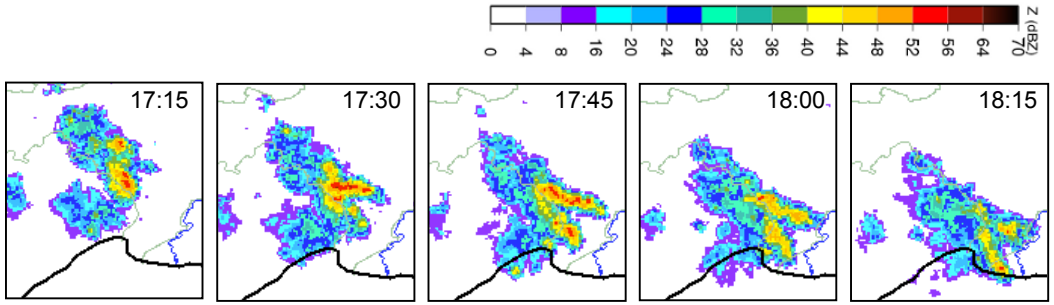
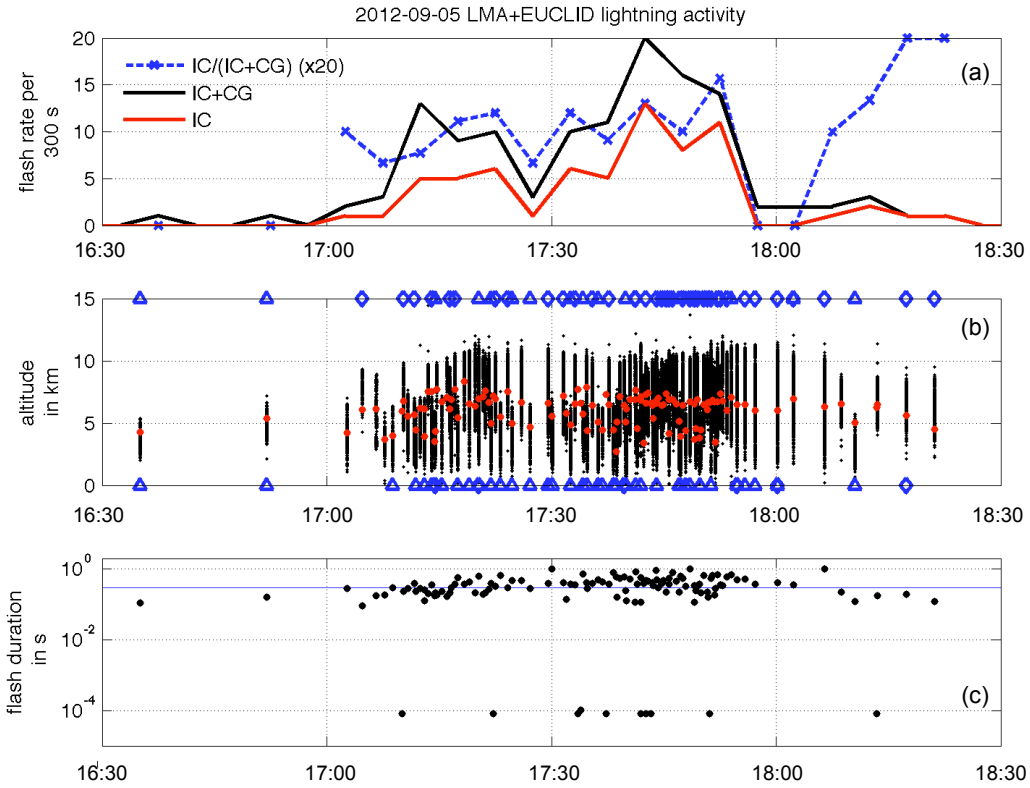
The 05 September 2012 Storm
[LMA, Euclid & Op. MF Radar Analysis Methodology]







See Pinty et al, tomorrow