

Contexte et Objectifs:

➤ Observatoire atmosphérique CORSiCA

- Financement: FEDER/CPER CTC, MISTRALS, ANR IODA-MED, UPS/OMP, LA

➤ Objectifs scientifiques

- Physique des décharges (initialisation, propagation, CG, IC, BFTB)
- Surveillance et simulation numérique des systèmes orageux
- Climatologie de la convection en Méditerranée occidentale
- Production d'oxydes d'azote par les éclairs
- Influence de la pollution et des aérosols sur l'activité électrique
- Validation réseaux foudre opérationnels (EUCLID, ATDnet, Linet, ZEUS)
- Validation pour l'observation spatiale des éclairs (TARANIS et MTG-LI)

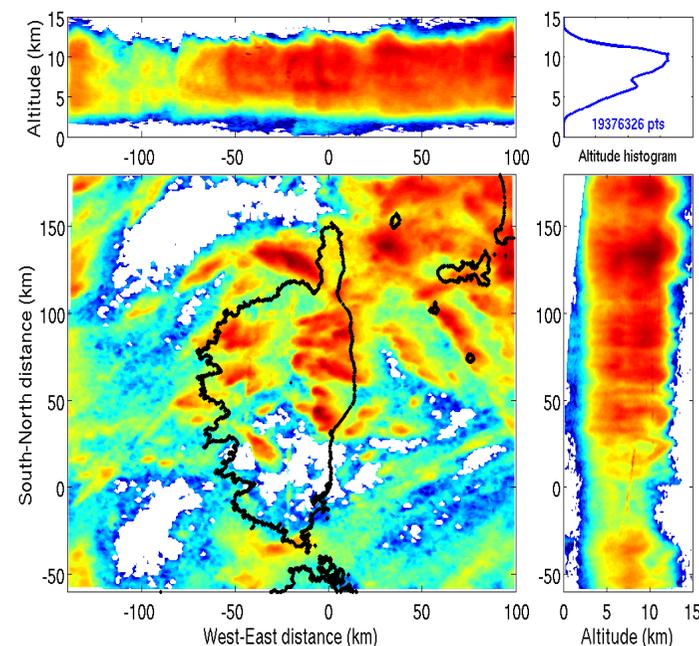
➤ SAETTA

- Suivi de l'Activité Electrique Tridimensionnelle Totale de l'Atmosphère
- 2014: du 14 juillet au 15 octobre
- 2015: depuis le 11 avril (fonctionnement désormais permanent)

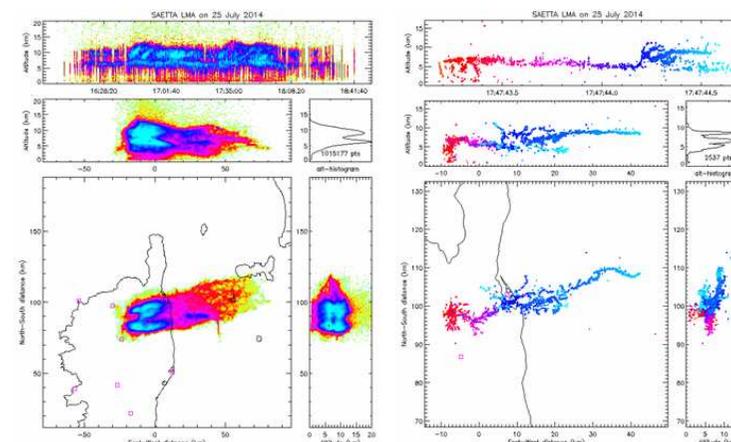
➤ Intérêt pour la communauté civile

- Sécurité civile, prévision à courte échéance
- Tourisme, activités de plein air
- Transport, aviation commerciale, aviation légère

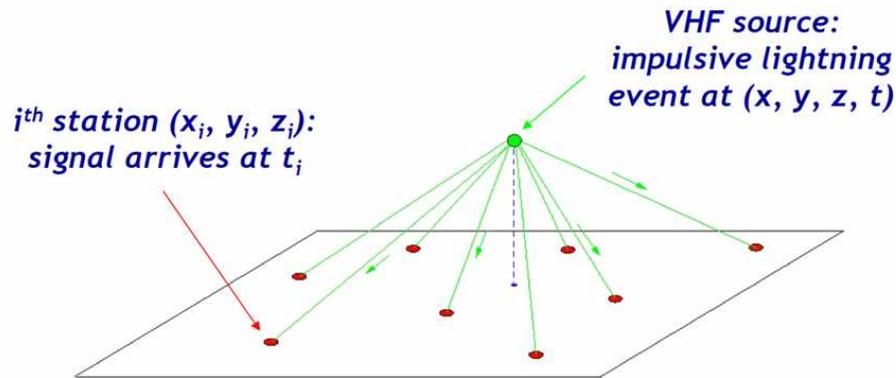
Densité de sources VHF (14/07-15/10 2014)



Orage et éclair CG du 25 juillet 2014



Time-of-arrival (TOA) technique



$$c \times (t_i - t) = \sqrt{(x_i - x)^2 + (y_i - y)^2 + (z_i - z)^2}$$

4 unknowns, measure t_i at 6 stations, solve for (x, y, z, t)

Méthodologie:

➤ Déploiement de 12 stations LMA

- Lightning Mapping Array, New Mexico Tech, USA
- Etendue: 70 km ↔ et 110 km ↓; portée: Ø 600 km
- Résolution temporelle: 80 μs
- Positionnement 3D des sources VHF: technique TOA

➤ Transmission temps réel

- Téléphonie 3G Orange
- Affichage site web

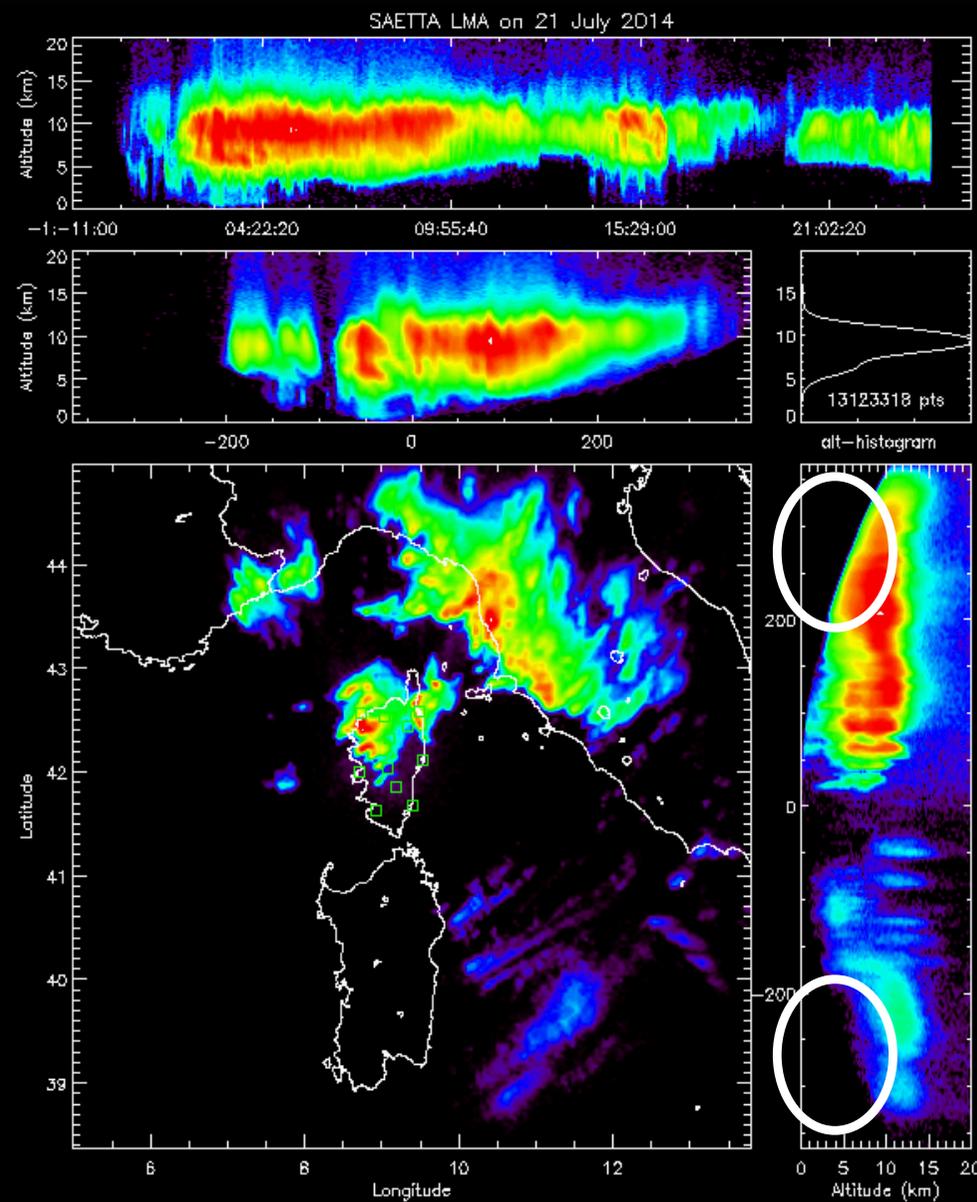
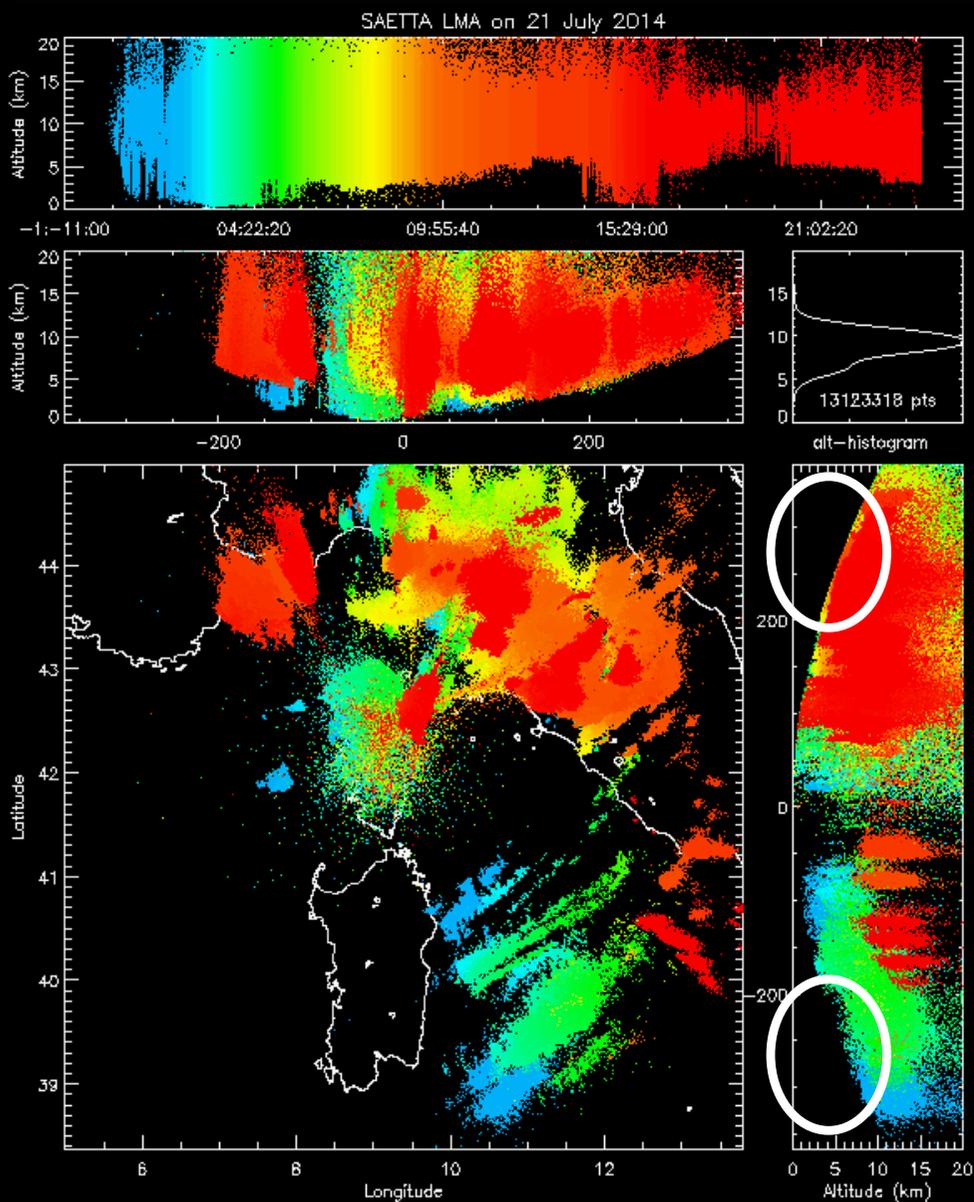
!!! Réseau Orange déficient !!!



Orage du 21 juillet 2014

Affichage en fonction du temps

Affichage en densité de sources VHF



Serveur: <http://lma.aero.obs-mip.fr>

Mozilla Firefox
<http://lma.aero.obs-mip.fr/>

Serveur applicatif du LMA TEAM

MOIS

JOUR

Data des Campagnes HYMEX, SAETTA -> <http://data-lma.aero.obs-mip.fr>

Quicklooks de la Campagne HYMEX -> <http://hymex-lma.aero.obs-mip.fr>

Quicklooks SAETTA -> <http://saetta-lma.aero.obs-mip.fr>

Documentation stations LMA -> <http://doc-lma.aero.obs-mip.fr>

Stations LMA -> [Statut](#)

HEURE

Full Hour

SAETTA - 14/07/21 04:00:00-05:00:00 - 7 - 1

10 Minute Intervals

STATUS EN DIRECT

Corsica Lightning Mapping Array, Station Health Data

Information updated hourly, at twenty past - last updated: Sun Sep 13 09:20:01 2015 (UTC)

station	name	status	sdats	stime	load	uptime	l	bovl	levslvbm	sdats	PID	PIRO	PIRIL	PIDAT	PIIDEC	Phase	udate	etime	temp	apps	current	trafic	
corsica_a	Biguglia	offline	08/12/2015	06:16:02																			
corsica_b	Aïana	offline	08/12/2015	08:16:01																			
corsica_c	Piaggione	up	09/13/2015	09:18:01	0:000	0:10	05	11	0:000	0:10	05	11	19%	2176	2172	2174	2178	2176	30	03:5509	13:09	14:03:39	TC150913
corsica_d	Rivista	up	09/13/2015	09:16:02	0:000	0:10	05	41	0:000	0:10	05	41	39%	2137	2139	2141	2143	2145	30	03:5509	13:09	16:03:44	TD150913
corsica_e	Calcatoggio	offline	08/09/2015	22:16:01																			
corsica_f	Facca	offline	07/23/2015	07:10:01																			
corsica_g	Prana	offline	08/05/2015	19:16:03																			
corsica_h	Travena	offline	07/04/2015	10:18:01																			
corsica_i	Corcaia	offline	09/11/2015	13:18:01																			
corsica_j	Prinoleta	offline	03/03/2015	11:18:01																			
corsica_k	Coscione	offline	04/17/2015	17:16:01																			
corsica_l	Compiu	offline	06/04/2015	12:16:01																			

ID	sdats	stime	type	thresh	thrlvbm	tsat	time	files	files	files	current	datefile	PV Voltage	Batt Voltage	Load Voltage	PV Current	Batt Current	Load
C	09/13/15	09:18:59	V10	170	atdm	1743	8	39	56	144	144	LC_CORCOSA_STEC_150913_091000.dat	13.200	12.756	12.141	A.170	3.102	1.068
D	09/13/15	09:18:59	V10	170	atdm	1640	8	44	56	144	144	LD_CORCOSA_STED_150913_091000.dat	13.032	12.709	12.097	1.512	0.486	1.015

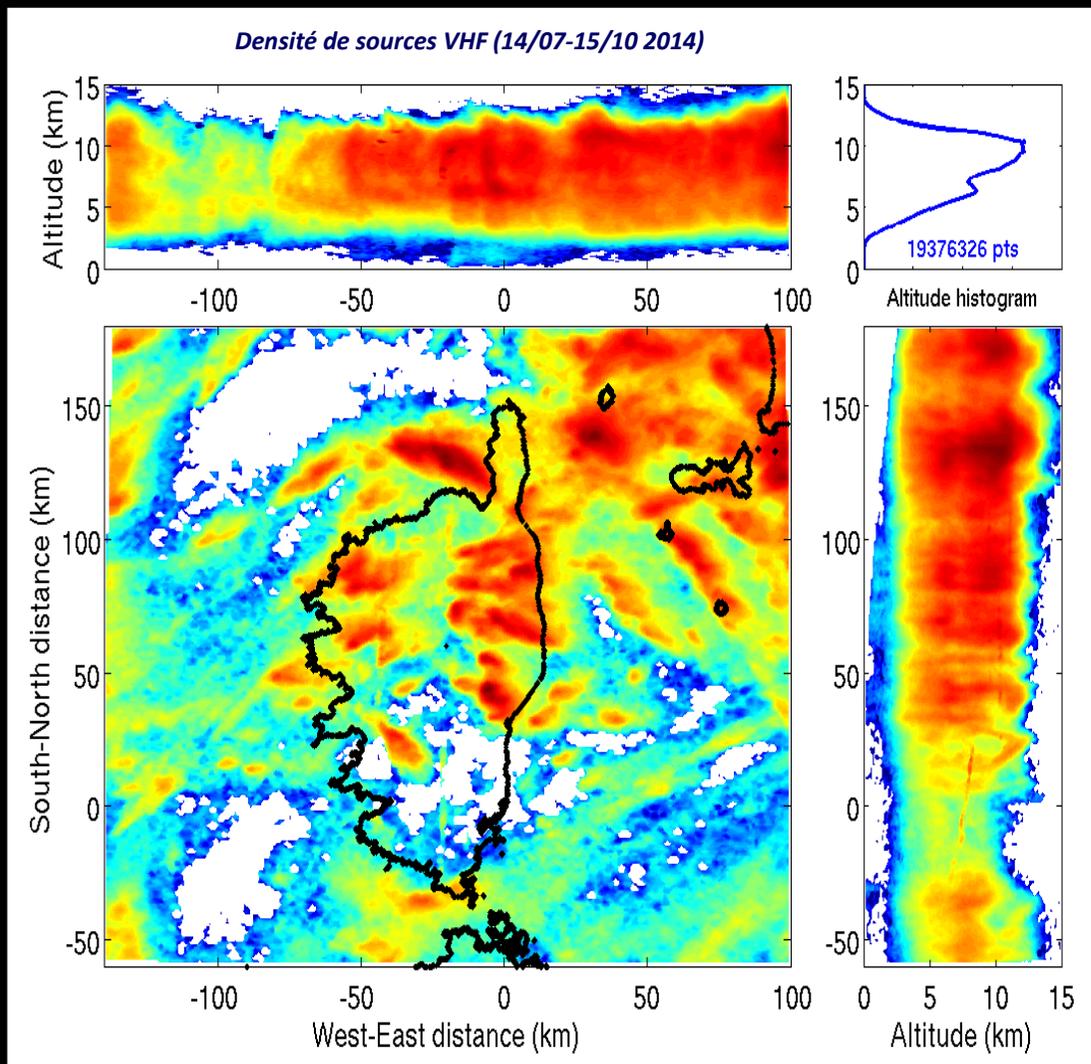
DIZAINE DE MINUTES

10 Minute Plot

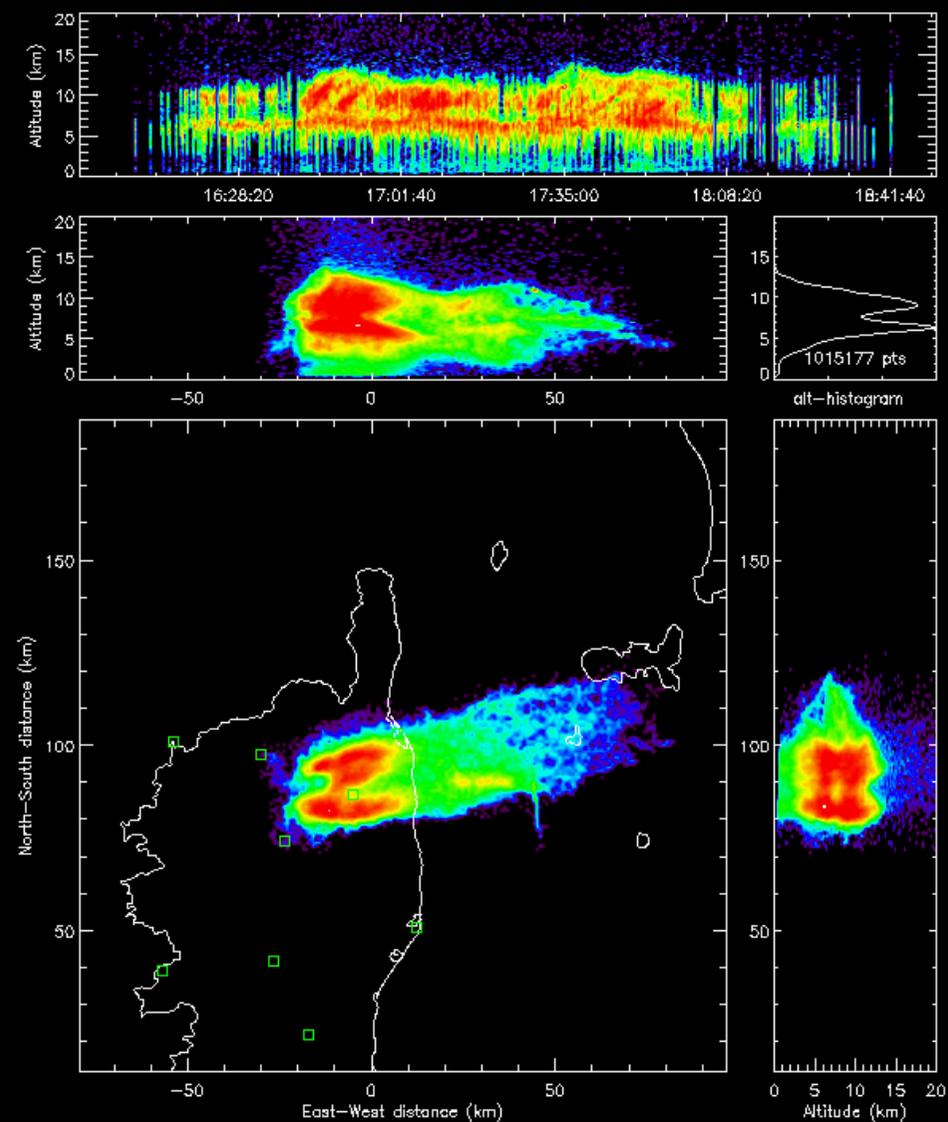
SAETTA - 14/07/21 03:50:00-04:00:00 - 7 - 1

10 Minute Plot

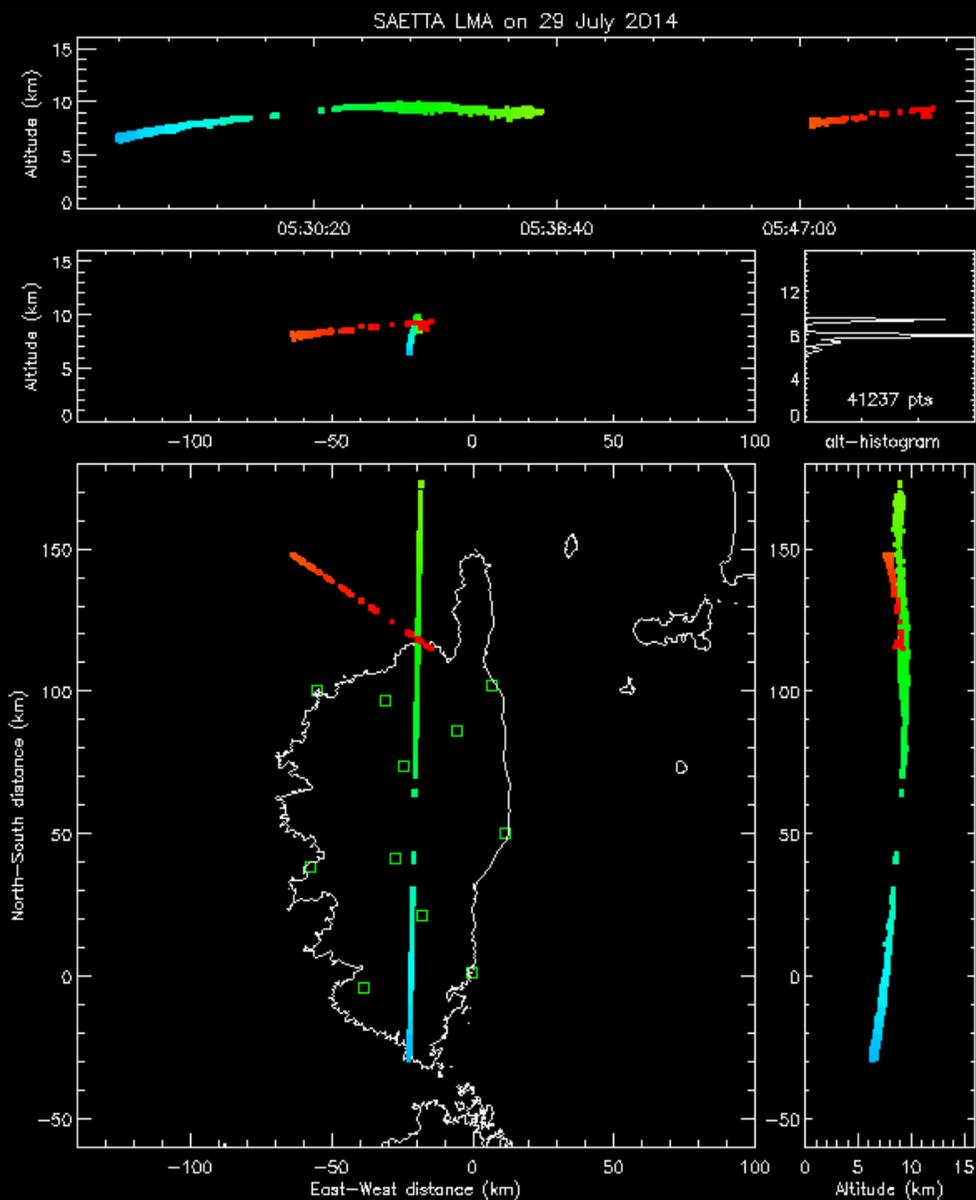
Climatologie été 2014



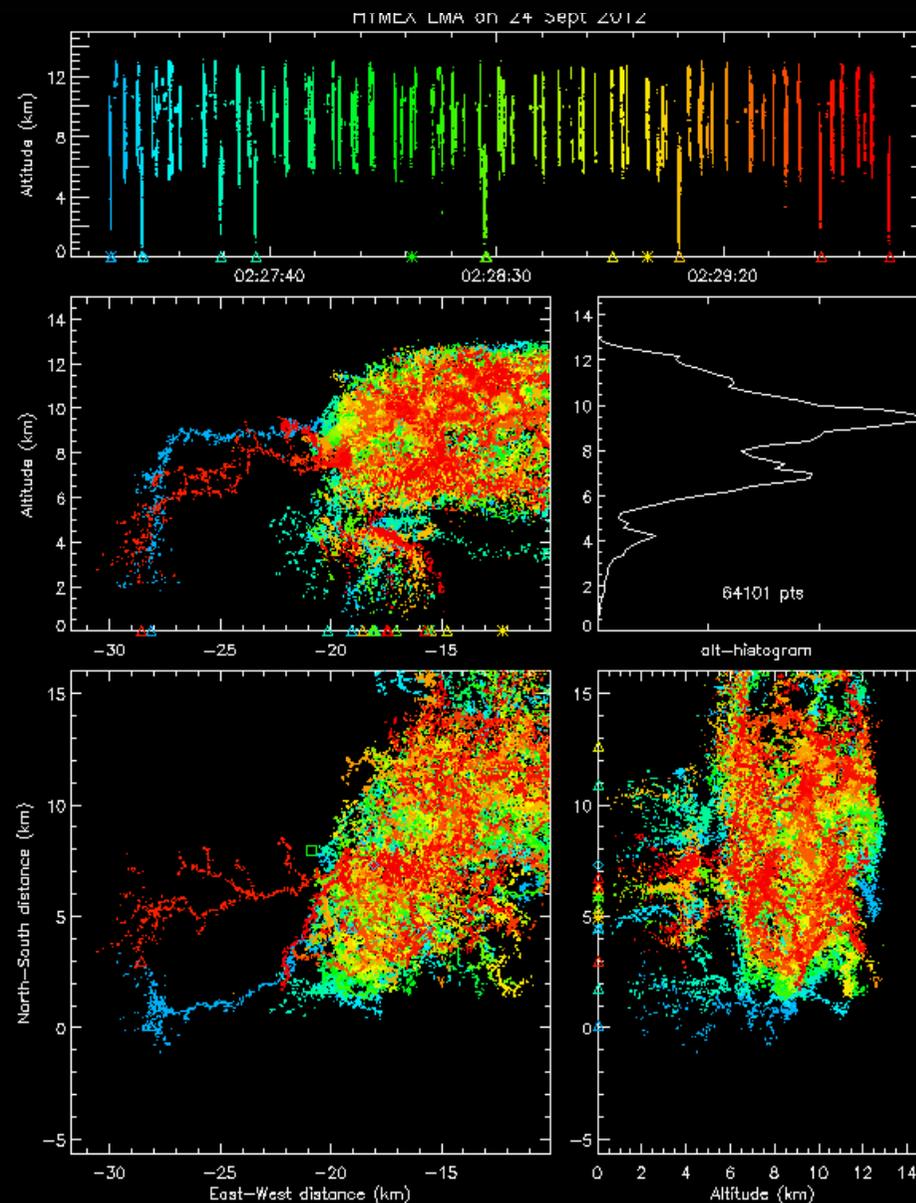
Orage du 25 juillet 2014



Trajectoires d'avion



Bolt from the blue

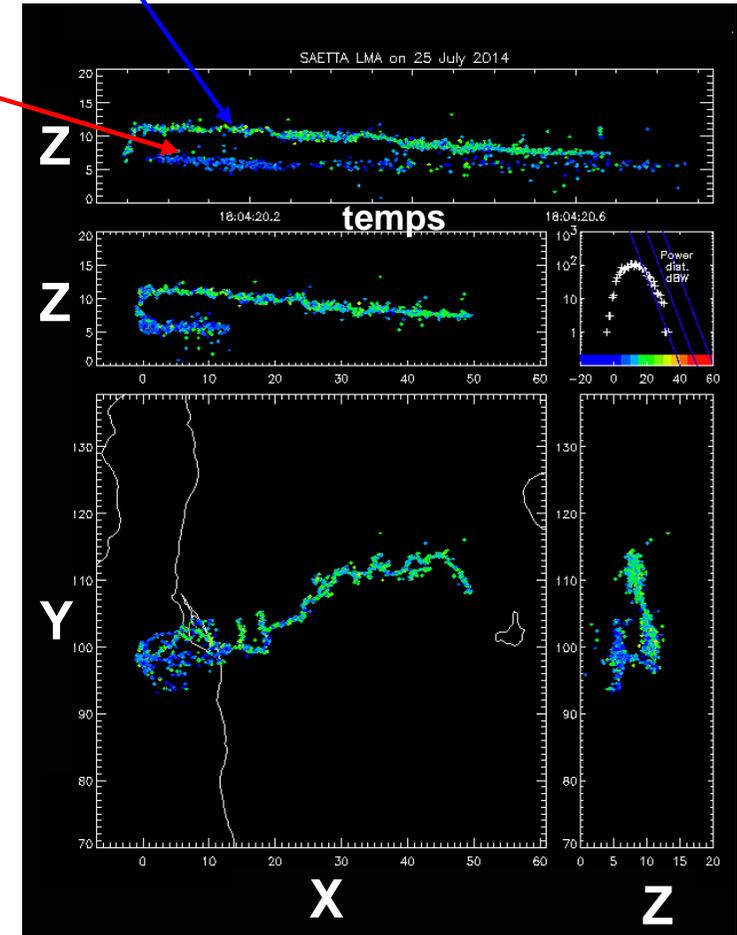
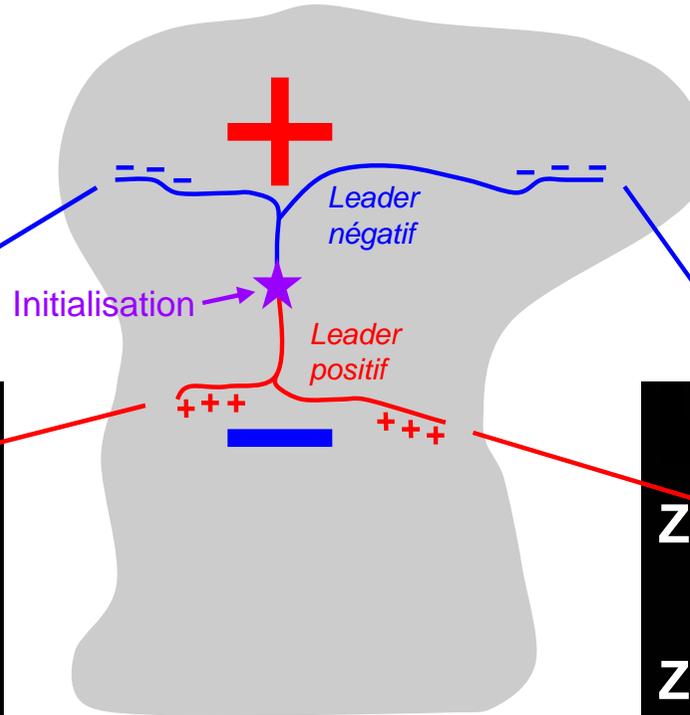
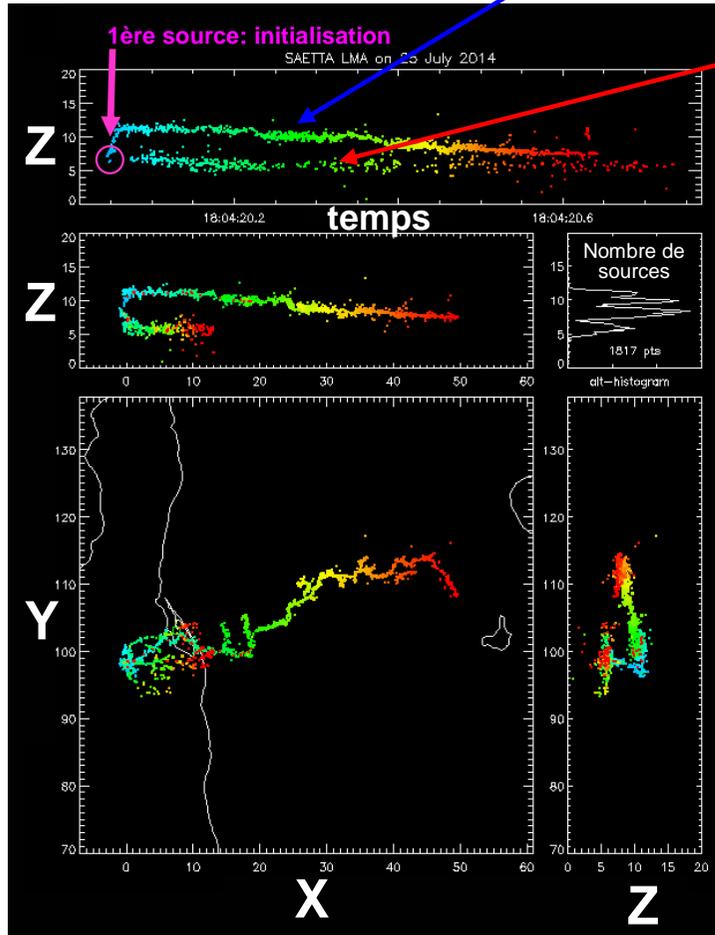


Clefs de lecture de l'affichage

Couleur fonction du temps

Initialisation

Couleur fonction de la puissance



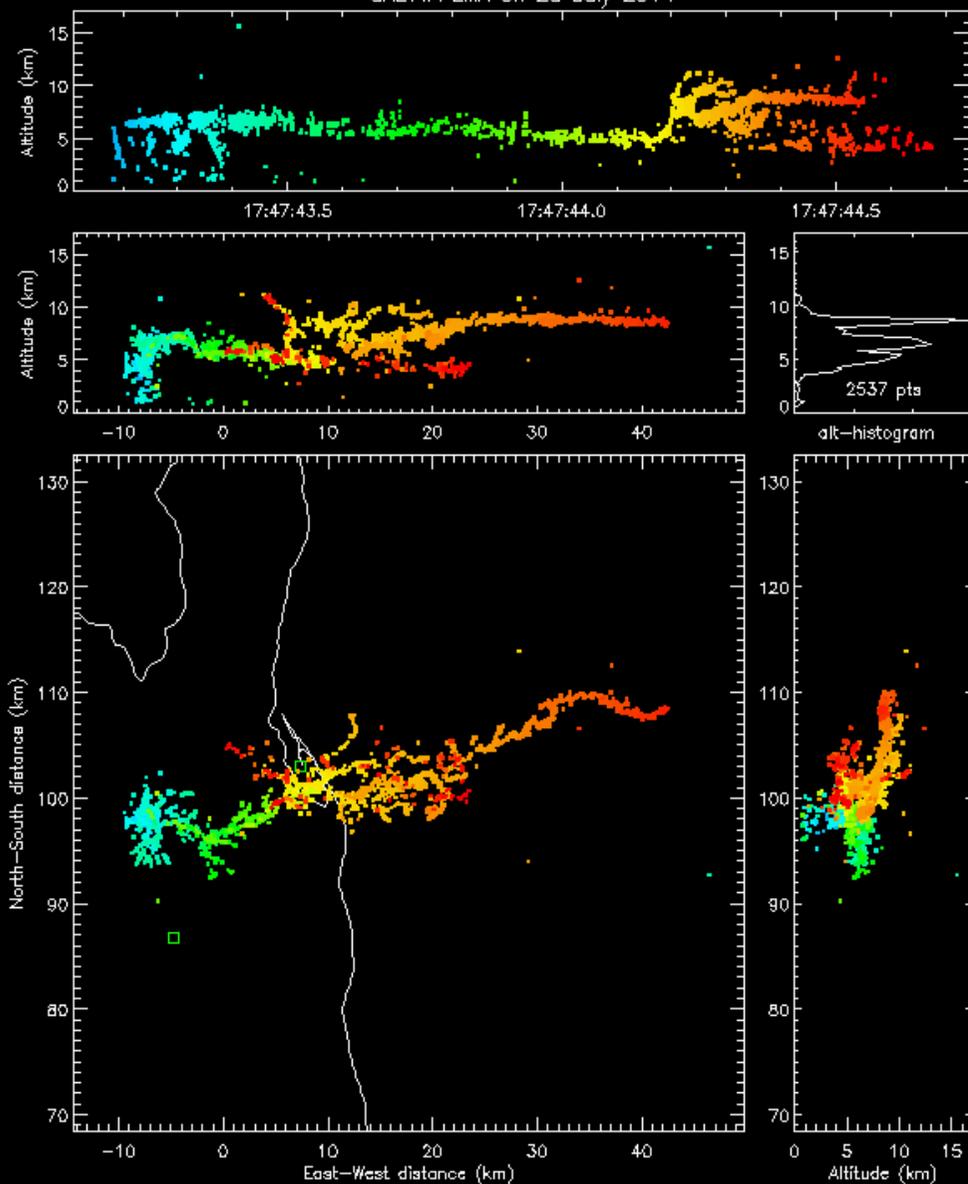
Leader négatif:
leader **pulsé** ($dl/dt \nearrow$)
rayonnement fort
⇒ **beaucoup de sources détectées**

Leader positif:
leader **continu** ($dl/dt \searrow$)
rayonnement faible
⇒ **peu de sources détectées**

Orage du 25 juillet 2014

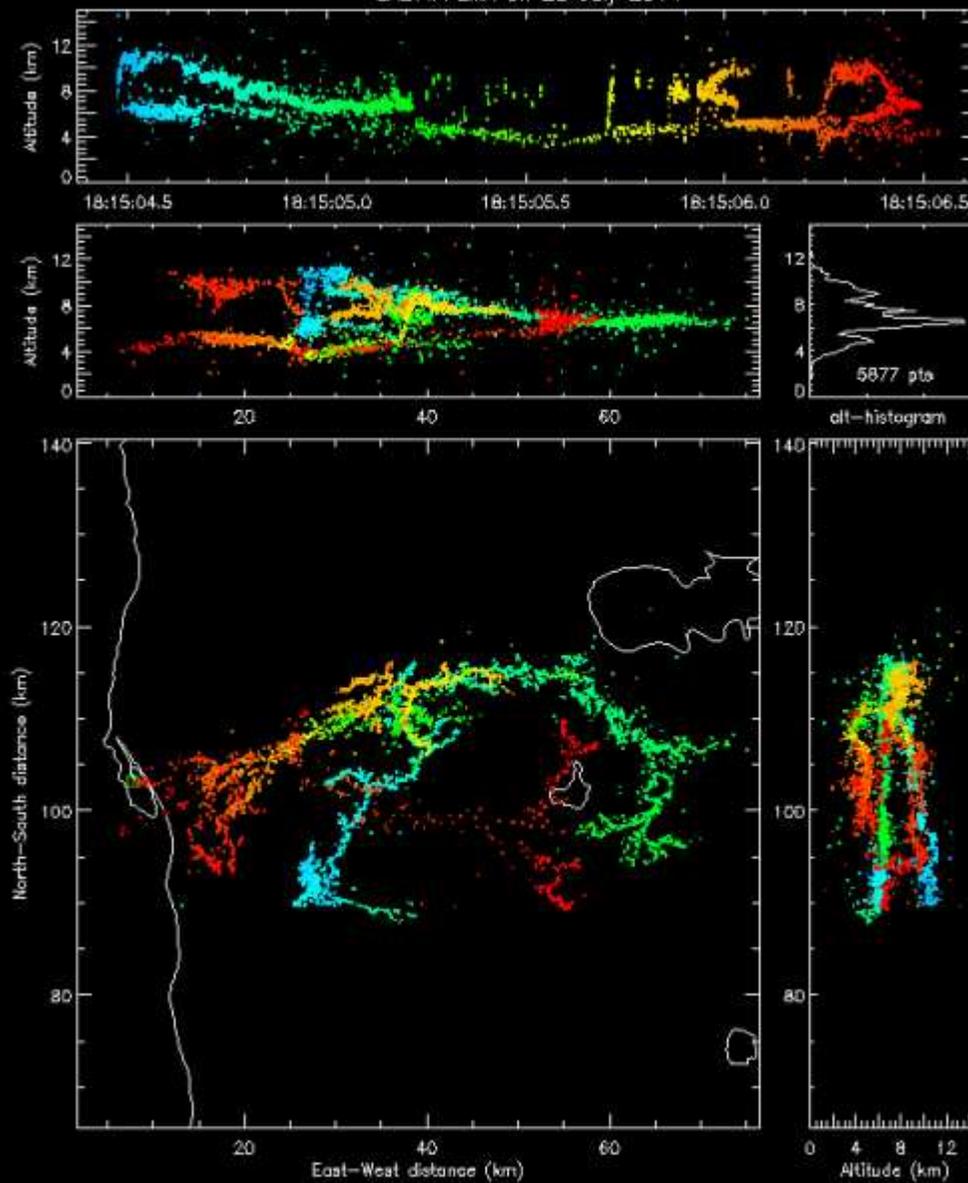
Eclair CG

SAETTA LMA on 25 July 2014

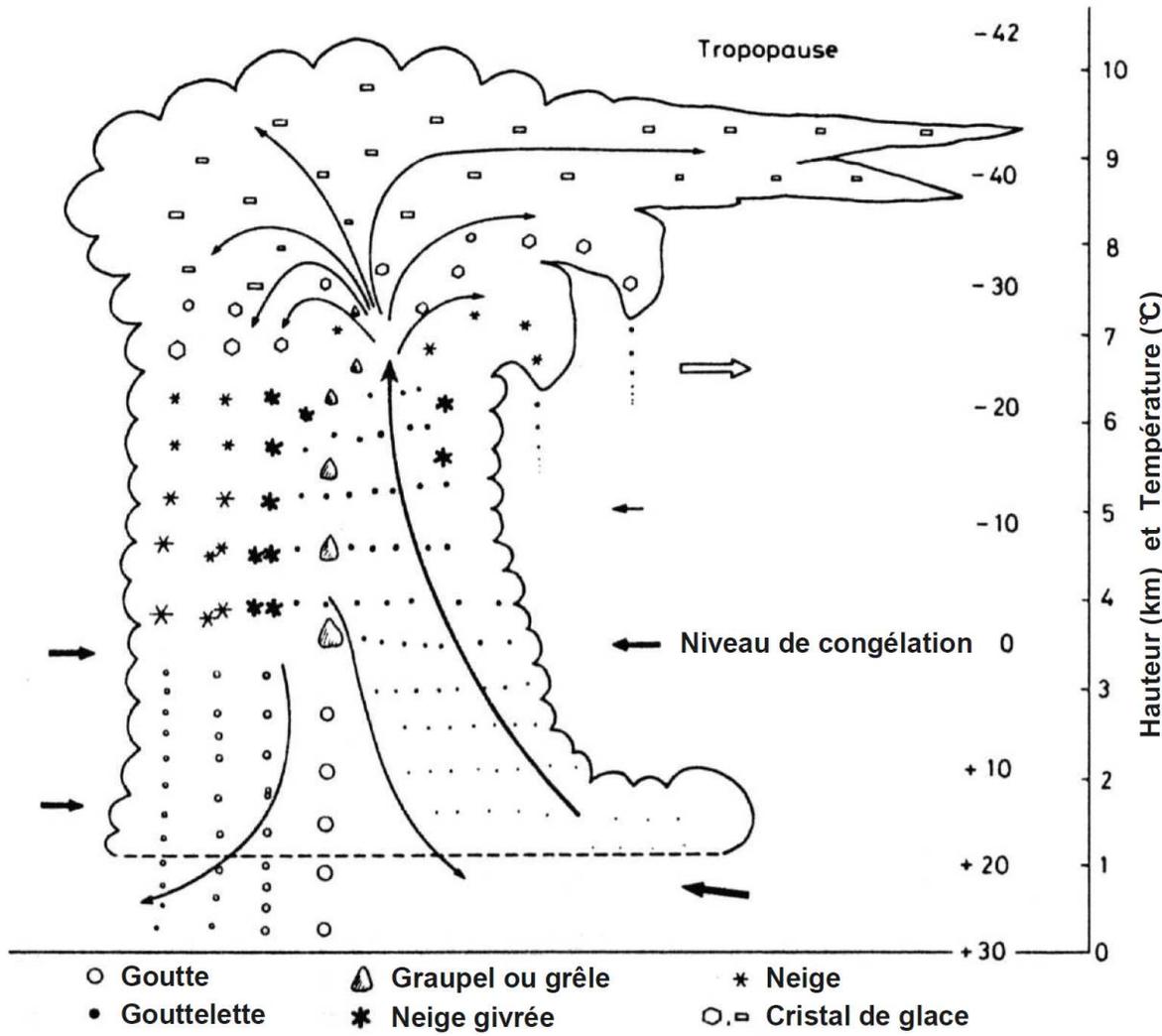


Eclair IC

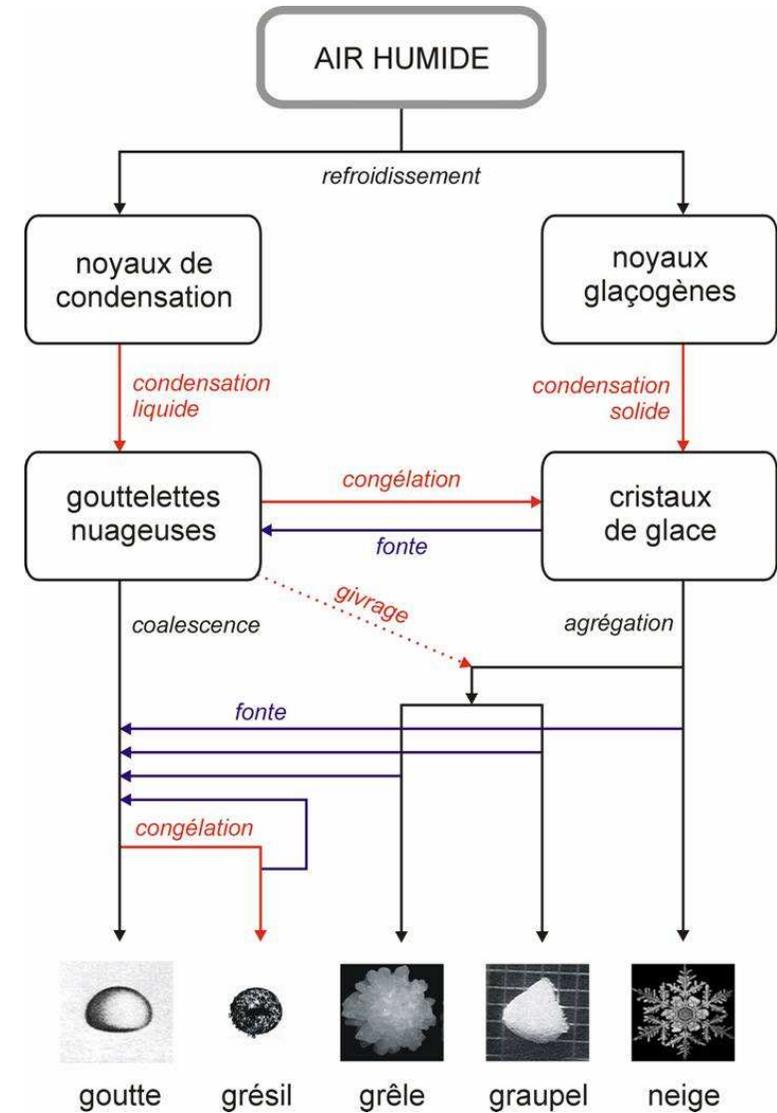
SAETTA LMA on 25 July 2014



Structure d'un orage



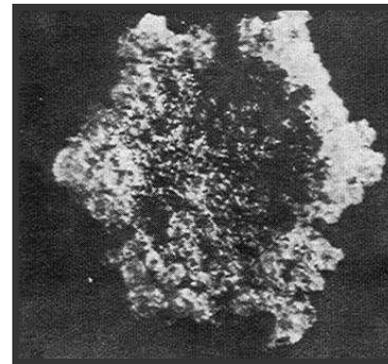
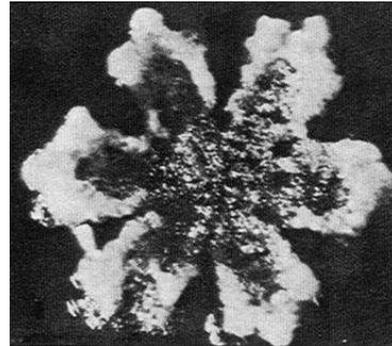
Distribution des hydrométéores dans un nuage d'orage



Structure d'un orage



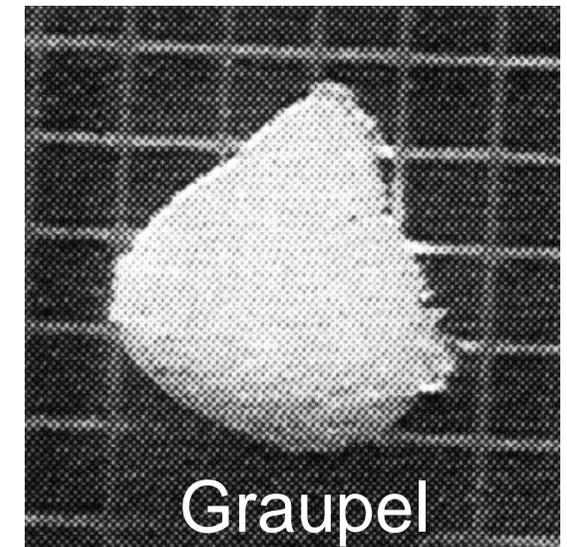
Cristal



Cristal givré



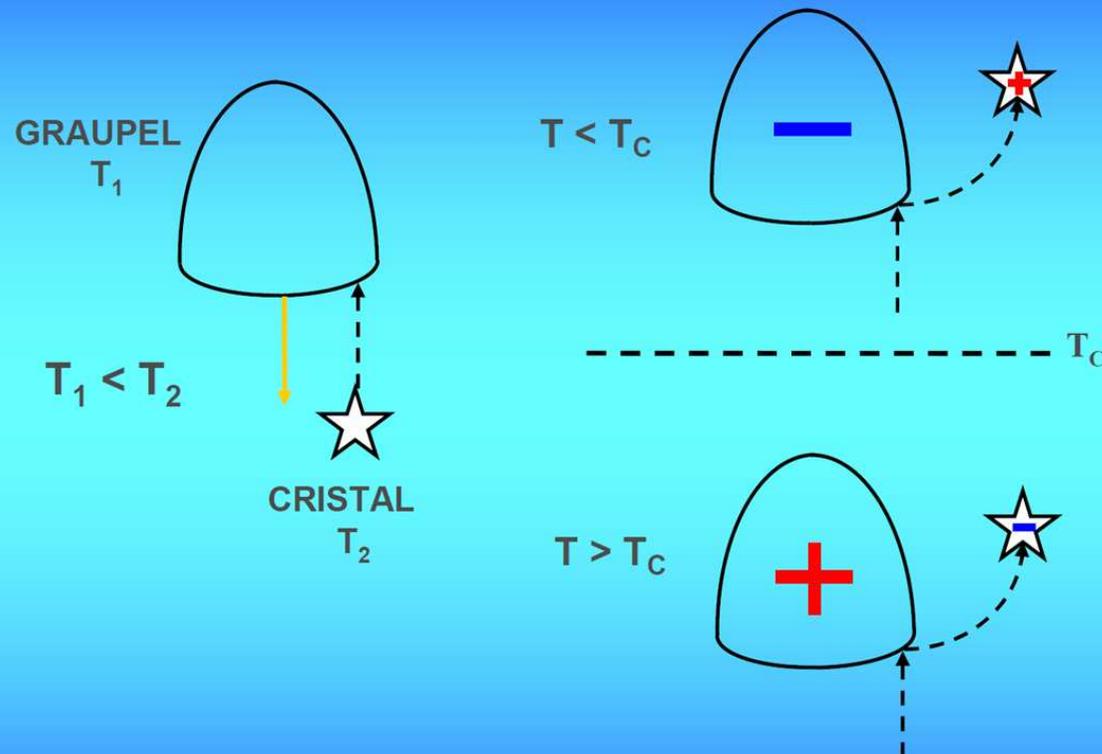
Croissance par
accrétion ou givrage



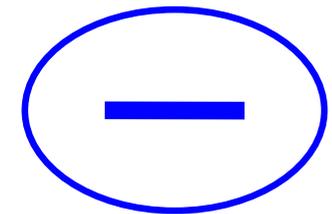
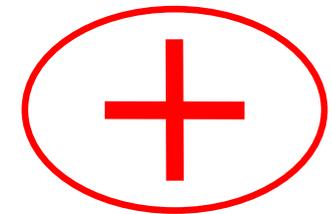
Graupel

Structure d'un orage

mécanisme de charge non inductif par collisions entre particules de glace => électrisation

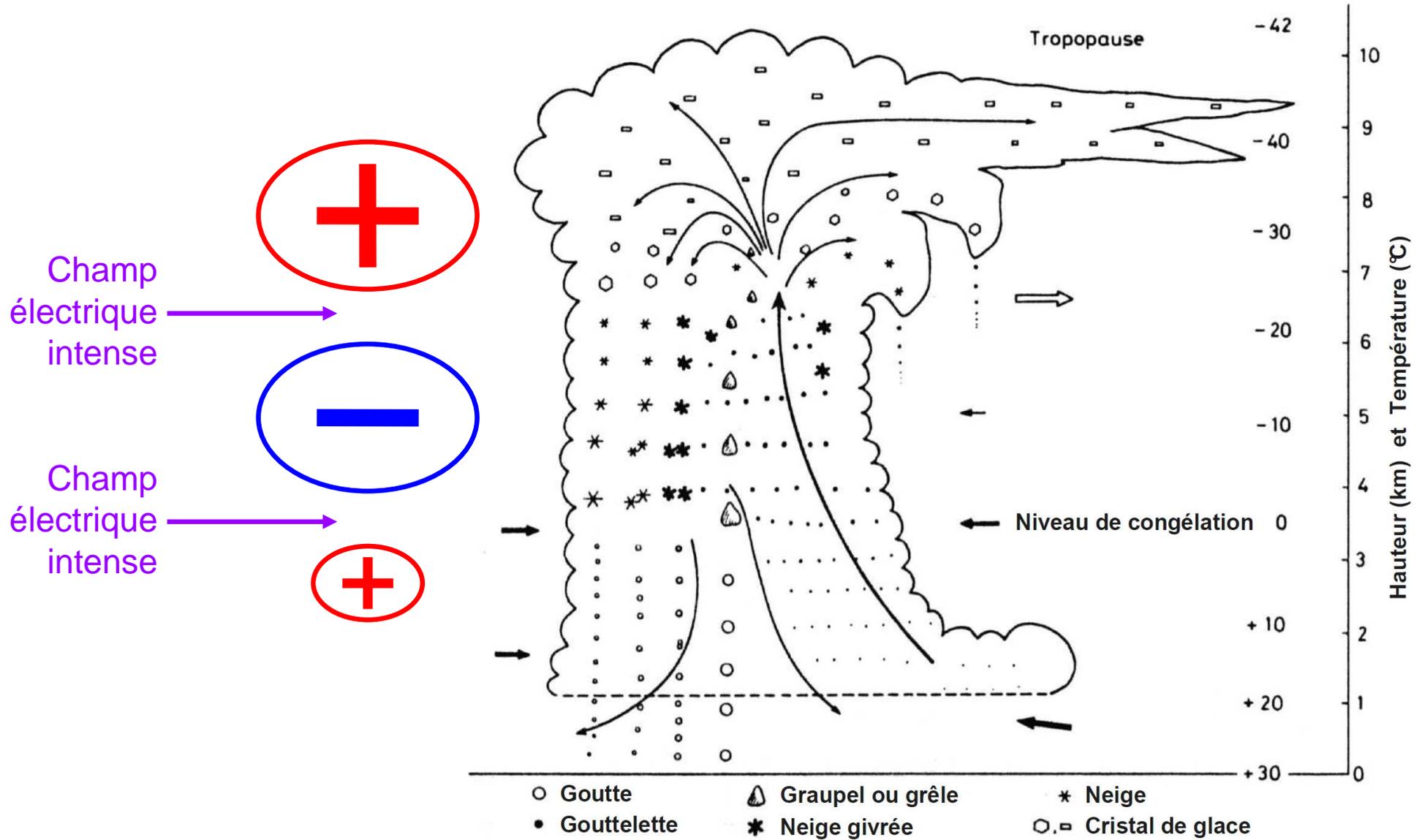


structure tripolaire



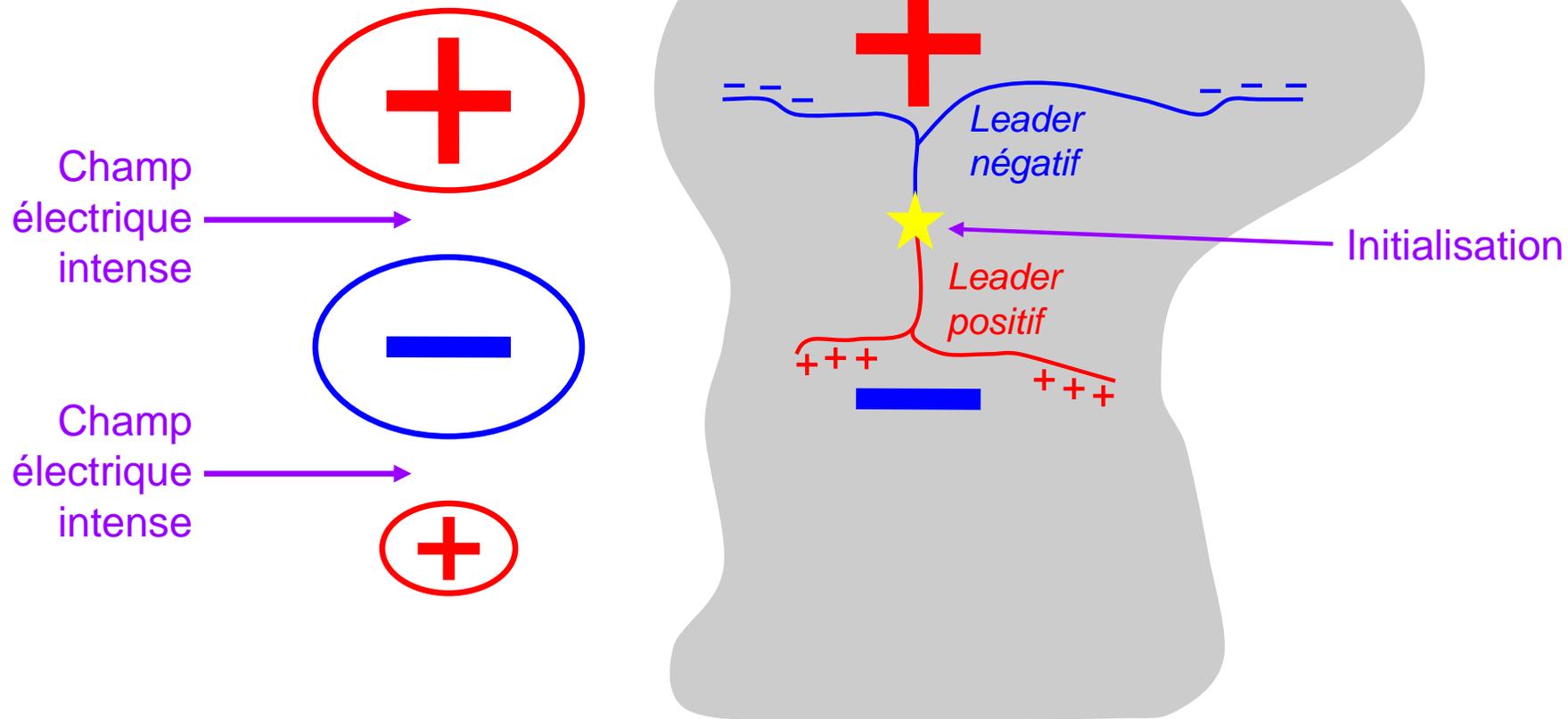
- Polarité et charge échangée = $f(T)$
- Température d'inversion de polarité $T_c = f(\text{contenu en gouttelettes surfondues})$

Structure d'un orage



Distribution des hydrométéores dans un nuage d'orage

Eclair intra nuage



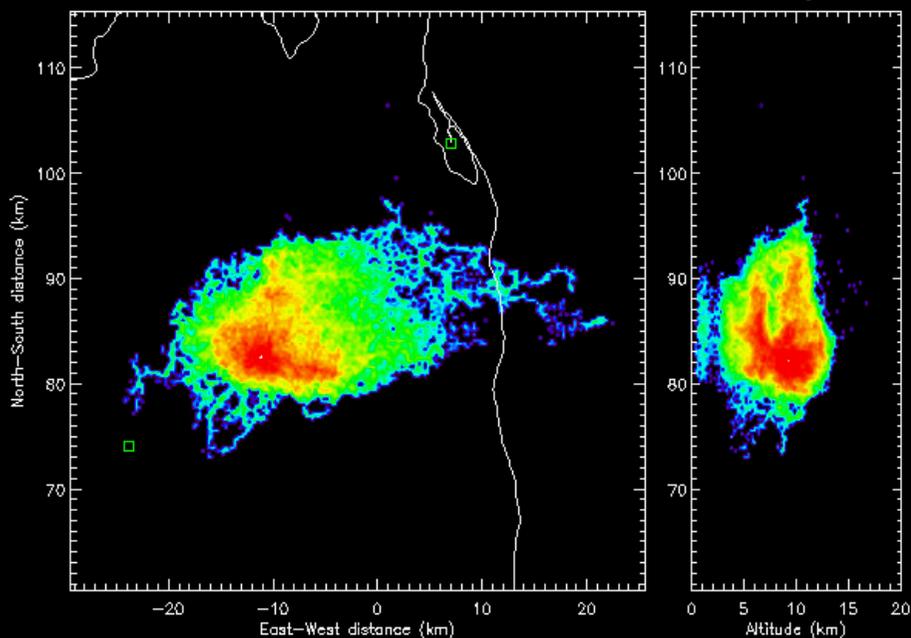
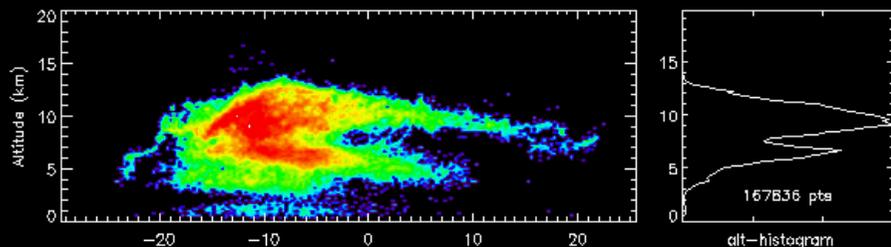
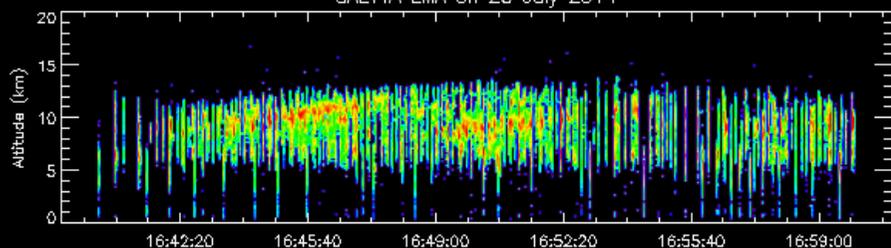
Leader négatif: leader pulsé

Leader positif: leader continu

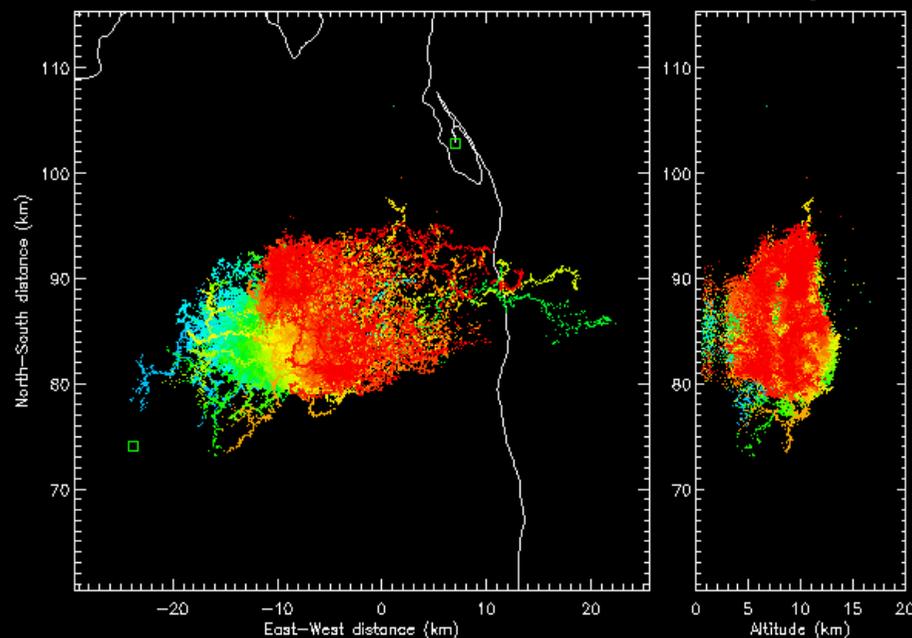
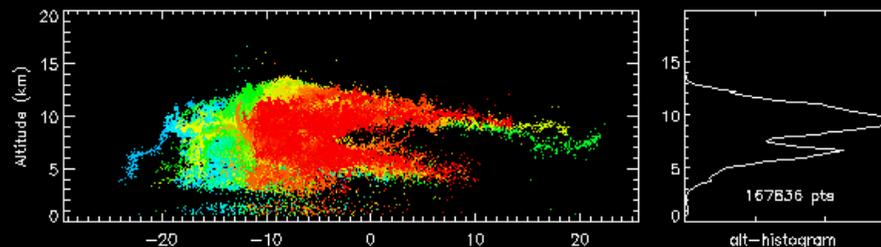
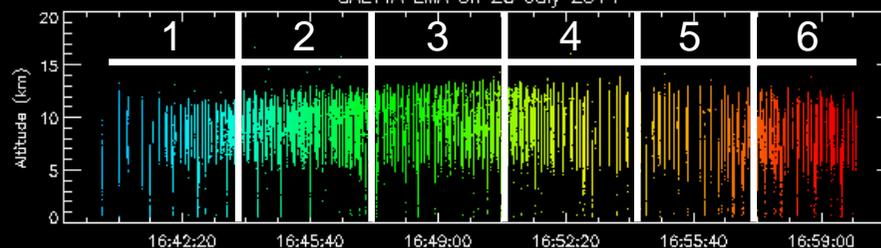
Bolts from the blue (SAETTA 2014)

/home/caqs/Documents/RECHERCHE/LMA/XLMA/SAETTA_20140725_164013_165955-bftbs-color.png - Tue

SAETTA LMA on 25 July 2014

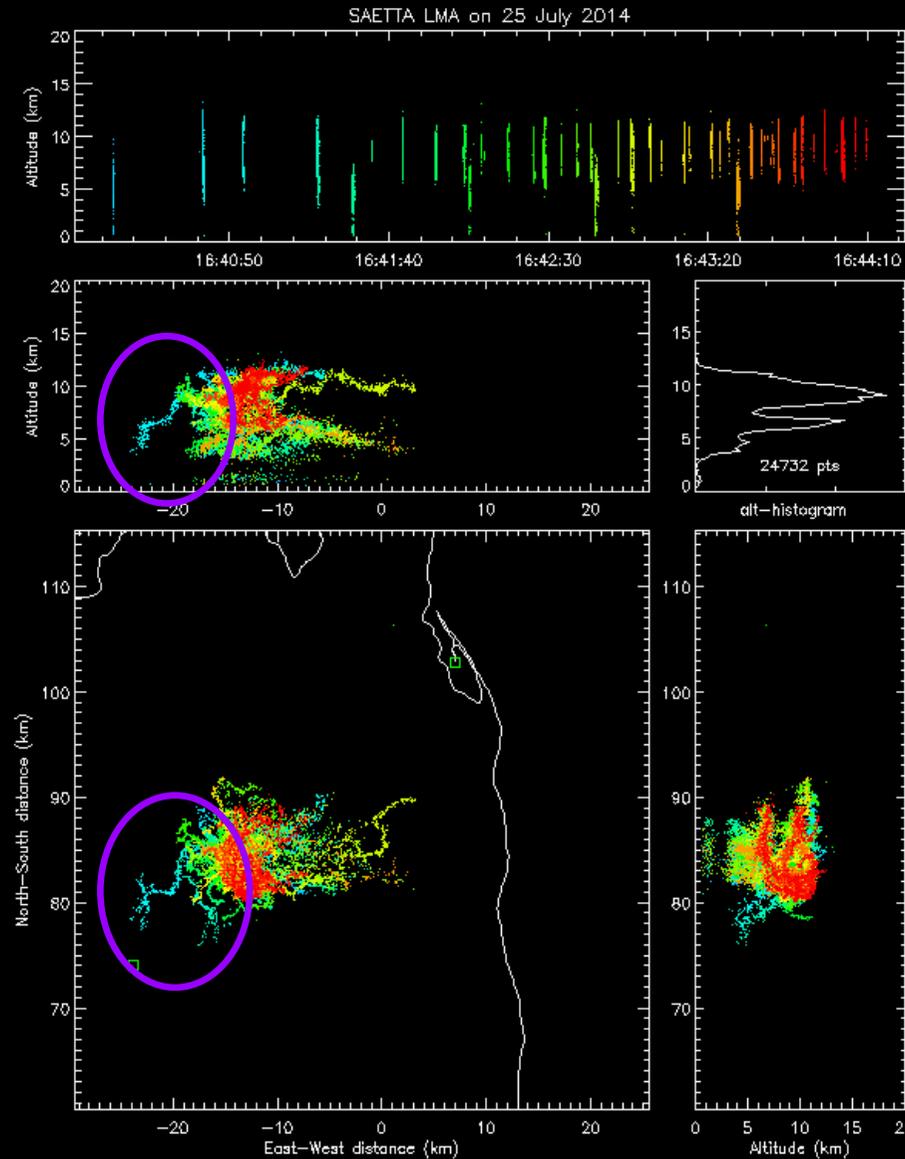


SAETTA LMA on 25 July 2014



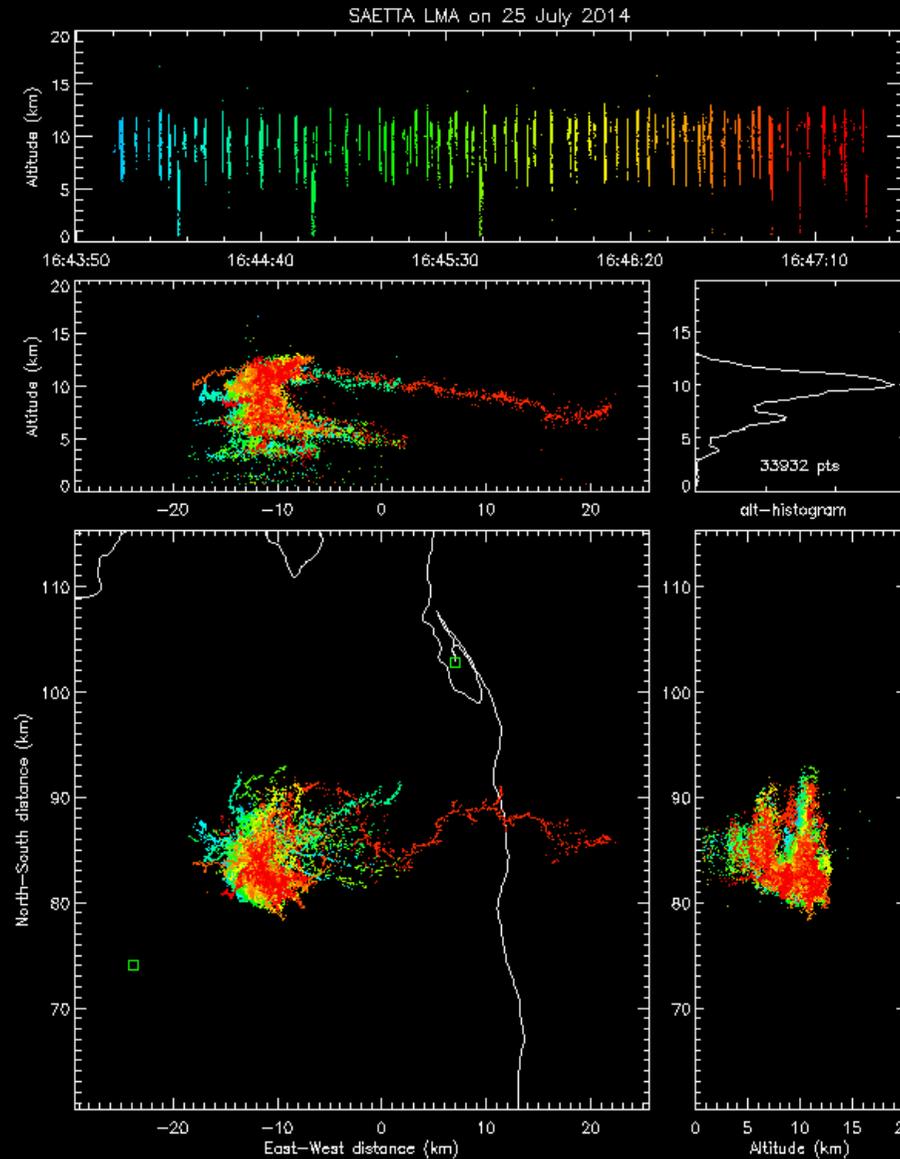
Bolts from the blue (SAETTA 2014)

1



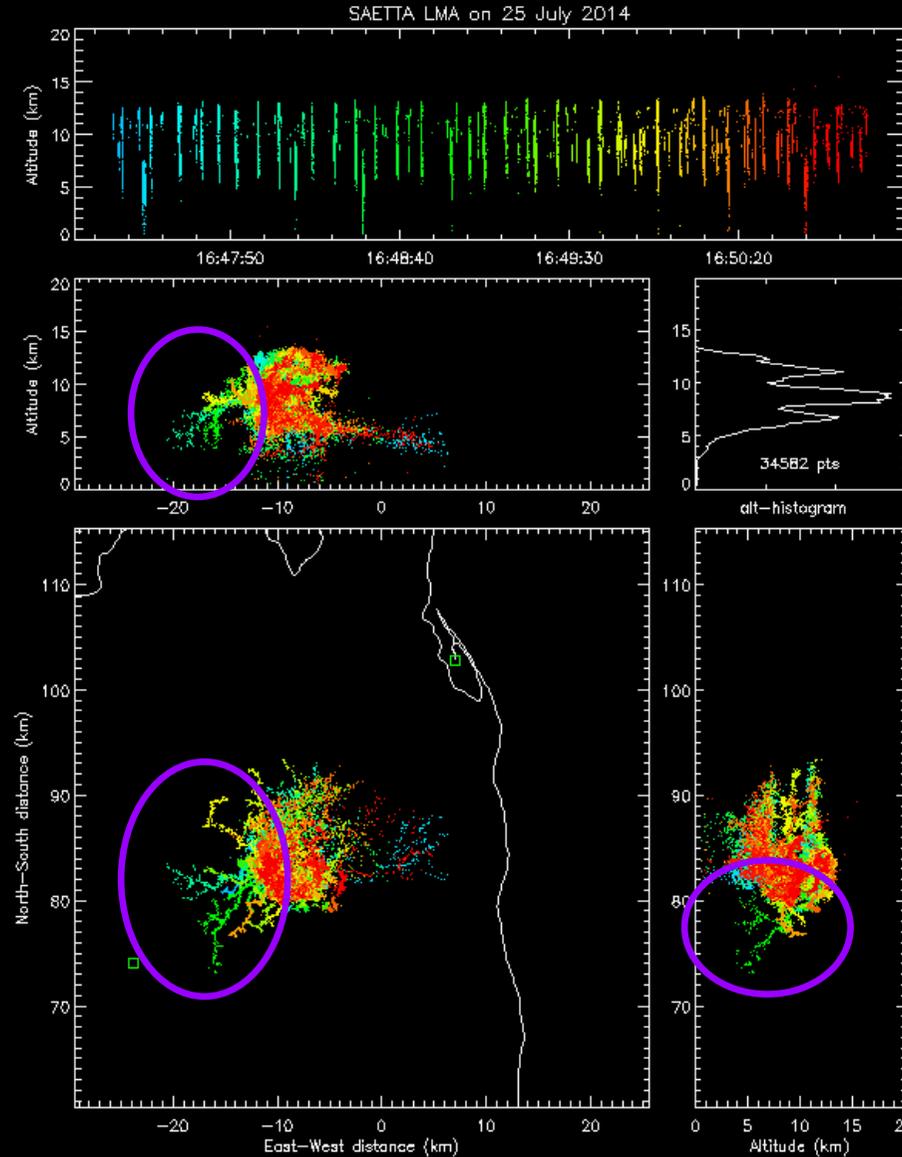
Bolts from the blue (SAETTA 2014)

2



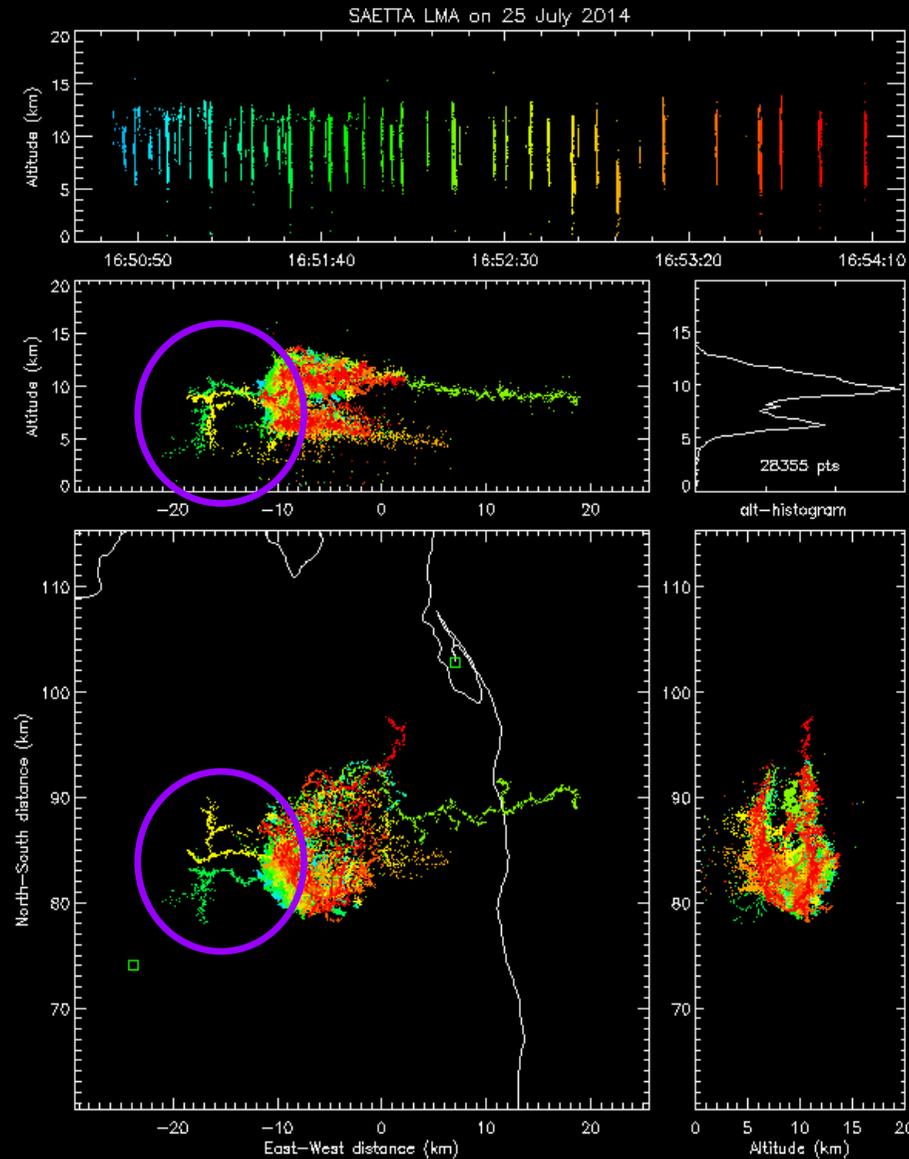
Bolts from the blue (SAETTA 2014)

3



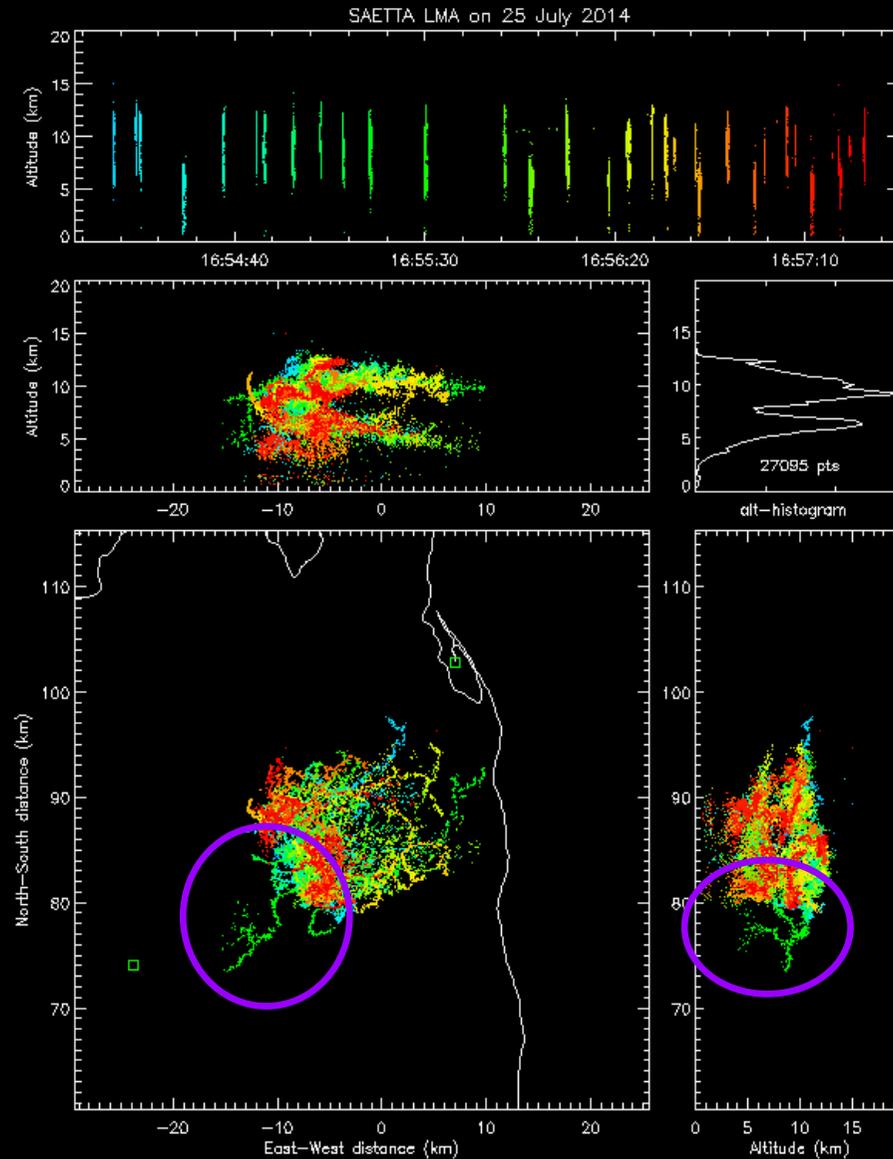
Bolts from the blue (SAETTA 2014)

4



Bolts from the blue (SAETTA 2014)

5



Bolts from the blue (SAETTA 2014)

6

