

SAETTA: high resolution 3D mapping of the lightning activity in the Mediterranean basin around Corsica

Sylvain Coquillat, Mathilde Chabasset, Eric Defer, Didier Gazen, Dominique Lambert, Jean-Michel Martin, Jean-Pierre Pinty, Véronique Pont, Serge Prieur, and Jean-François Ribaud

Laboratoire d'Aérologie, Université de Toulouse, CNRS, UPS, France (sylvain.coquillat@aero.obs-mip.fr)

In the frame of the French atmospheric observatory CORSiCA (<http://www.obs-mip.fr/corsica>), a total lightning activity detection system adapted to storm tracking at regional scale was acquired to strengthen the potential of observation of convective events causing heavy rainfall and flash floods. This detection system called SAETTA (Suivi de l'Activité Electrique Tridimensionnelle Totale de l'Atmosphère) is a network of 12 LMA stations (Lightning Mapping Array). Developed by New Mexico Tech (USA), the instrument allows observing lightning flashes in 3D and real time, at high temporal ($80 \mu\text{s}$) and spatial resolutions. It detects the radiations emitted by cloud discharges in the 60-66 MHz band, in a radius of about 350 km from the centre of the network, in passive mode and standalone (solar panel and battery).

Initially deployed in May 2014, SAETTA operated from July 13 to October 20 in 2014 and from April 19 to December 1st in 2015. It is planned to operate again from April 2016. Many high quality observations have been performed so far that provide an accurate location in space and time of the convective events. They also bring interesting dynamical and microphysical features of those events. For example the intensity of the convective surges, the transport of charged ice particles in the stratiform area of the thunderclouds or the location of graupel and ice crystals can be deduced from SAETTA observations. Specific events have also been detected as well: bolts-from-the-blue, inter cloud discharges, high level discharges in convective but also in stratiform areas, inverted dipoles. The lightning patterns of 2014 and 2015 illustrate the complex influence of the relief, probably via slope and valley winds over Corsica and via induced lee-side convergences over the sea.

SAETTA is expected to operate for at least a decade over Corsica so it could participate to validation studies of upcoming lightning detectors from space such as MTG-LI. For this purpose, an extension of SAETTA towards Italy would be beneficial to increase the observing area of the electrical activity in the Mediterranean.

Acknowledgements: Collectivité Territoriale de Corse through the Fonds Européen de Développement Régional of the European Operational Program 2007-2013 and the Contrat de Plan Etat Région; HyMeX/MISTRALS; Observatoire Midi-Pyrénées; Laboratoire d'Aérologie) and many individuals and regional institutions in Corsica that are hosting the 12 stations of the network or helped us to find sites.