Learning from concurrent Lightning Imaging Sensor and Lightning Mapping Array observations in preparation for the MTG-LI mission

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The upcoming decade will see the deployment and the operation of French, European and American space-based missions dedicated to the detection and the characterization of the lightning activity on Earth. For instance the Tool for the Analysis of Radiation from lightNIng and Sprites (TARANIS) mission, with an expected launch in 2018, is a CNES mission dedicated to the study of impulsive energy transfers between the atmosphere of the Earth and the space environment. It will carry a package of Micro Cameras and Photometers (MCP) to detect and locate lightning flashes and triggered Transient Luminous Events (TLEs). At the European level, the Meteosat Third Generation Imager (MTG-I) satellites will carry in 2019 the Lightning Imager (LI) aimed at detecting and locating the lightning activity over almost the full disk of Earth as usually observed with Meteosat geostationary infrared/visible imagers. The American community plans to operate a similar instrument on the GOES-R mission for an effective operation in early 2016. In addition NASA will install in 2016 on the International Space Station the spare version of the Lightning Imaging Sensor (LIS) that has proved its capability to optically detect the tropical lightning activity from the Tropical Rainfall Measuring Mission (TRMM) spacecraft.

We will present concurrent observations recorded by the optical space-borne Lightning Imaging Sensor (LIS) and the ground-based Very High Frequency (VHF) Lightning Mapping Array (LMA) for different types of lightning flashes. The properties of the cloud environment will also be considered in the analysis thanks to coincident observations of the different TRMM cloud sensors. The characteristics of the optical signal will be discussed according to the nature of the parent flash components and the cloud properties. This study should provide some insights not only on the expected optical signal that will be recorded by LI, but also on the definition of the validation strategy of LI, and on the synergetic use of LI and ground-based VHF mappers like the SAETTA LMA network in Corsica for operational and research activities.