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Microphysical, dynamical and electrical properties of the thunderstorm sampled during the 17 September 2018 EXAEDRE IOP2 flight

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The 4-year ANR-16-CE04-005 EXAEDRE (EXploiting new Atmospheric Electricity Data for Research and the Environment) project aims at providing a comprehensive description of the electrical activity in thunderstorms in the northwestern Mediterranean region through innovative multi-disciplinary and state-of-the-art instrumentation and modeling tools. The observational part of the EXAEDRE project relies on i) existing lightning records collected during HyMeX Special Observation Period (SOP1; Sept-Nov 2012), and permanent lightning observations provided by the research Lightning Mapping Array SAETTA and the operational Météorage lightning locating system, ii) additional lightning observations mapped with a new VHF interferometer especially developed within the EXAEDRE project, and iii) a dedicated airborne campaign over Corsica. The modeling part of the EXAEDRE project relies on the electrification and lightning schemes implemented in the French cloud resolving model MesoNH and on Météo-France operational model AROME for innovative investigation of lightning data assimilation.

The EXAEDRE airborne campaign was conducted between mid-September and mid-October 2018 in the Corsica region. The French Falcon research aircraft was equiped with four microphysics probes, a cloud radar, eight electric field mills, and a series of high-energy particle detectors. Eight research flights were conducted during the campaign that sampled different types of convective and precipitating systems at different stages of their lifecyle few kilometers away from the electrical cells and farther in the stratiform region.

The scientific and technical objectives of the EXAEDRE airborne campaign will be first reminded. Then an overview of the eight EXAEDRE flights will be presented with an emphasis on the microphysical, dynamical and electrical properties recorded during the 17 September 2018 EXAEDRE IOP2 flight based on concurrent airborne and ground-based in situ/remote sensing observations.