



## **Measurements of atmospheric electrical parameters and ELF electromagnetic emissions during a meteorological balloon flight.**

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Measurements of electric field and atmospheric conductivity were performed onboard a small payload flown under a meteorological balloon during a fair weather period. This experiment is part of a project to study thunderstorms and TLE organized in the frame of the engineering cursus at Ecole Polytechnique. The payload is equipped with 4 electrodes to measure the 3 components of the DC and AC electric fields up to 3.2 kHz. Dedicated sequences of operation, when one electrode is operated in the relaxation mode, have been used to determine the positive and negative electrical conductivities. Altitude profiles of the DC vertical electric field and conductivities in agreement with expected fair weather parameters were obtained from  $\sim 3.5$  to  $\sim 13$  km before the failure of a battery. At an altitude of  $\sim 9$  km slight disturbances in the electric field suggest the traversal of thin clouds with disturbed electrical characteristics.

Schumann resonances were observed up to the fifth harmonics at levels that are typical of a quiet period over Europe with most thunderstorms located over remote longitudinal sectors. EM waves due the power lines at 50Hz are detected during the whole measuring period and their altitude and horizontal variations will be presented as a function of the position of the balloon over the ground power network. A surprising and interesting observation was made of a Russian transmitter at 82 Hz located in Murmansk region and used for sub-marine communications. We shall present an initial analysis of the amplitude and polarization of the corresponding signal.