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Broad-band electric field measurements above thunderstorms by the IME-HF instrument prepared for the TARANIS mission

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A broad-band analyzer of the IME-HF instrument ("Instrument de Mesure du champ Electrique Haute Frequence") is prepared for the TARANIS (Tool for Analysis of RAdiation from lightNING and Sprites) micro-satellite of the French space agency CNES. The spacecraft is based on the MYRIADE series platform. It will be launched on a Sun synchronous polar orbit at 700 km altitude. TARANIS will carry a complex payload of six scientific instruments to study radiation from lightning and optical phenomena (Transient Luminous Events) observed at altitudes between 20 and 100 km (blue jets, red sprites, halos, elves). The scientific instruments onboard TARANIS will detect electromagnetic radiation from very low frequencies up to 37 MHz, optical radiation, X rays (with an aim to study the Terrestrial "Gamma-ray" Flashes), and energetic electrons.

The IME-HF instrument will record waveform measurements of fluctuating electric fields in the frequency range from a few kHz up to 37 MHz, with the following scientific aims: (i) Identification of possible wave signatures associated with transient luminous phenomena during storms; (ii) Characterization of lightning flashes from their HF electromagnetic signatures; (iii) Identification of possible HF electromagnetic or/and electrostatic signatures of precipitated and accelerated particles; (iv) Determination of characteristic frequencies of the medium using natural waves properties; (v) Global mapping of the natural and artificial waves in the HF frequency range, with an emphasis on the transient events. The instrument will be also able to trigger and record interesting intervals of data using a flexible event detection algorithm.