

On Remote Sensing of TLEs by ELF/VLF Wave Measurements on board a Satellite

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First recordings of satellite ELF/VLF waveform data associated with TLE observations are reported from the Summer 2005 campaign coordinated by Stanford University and LPCE. TLEs are optically observed from the US Langmuir Laboratory, while ELF/VLF waveform data are simultaneously recorded on-board the CNES microsatellite DEMETER and on the ground at Langmuir. Analyses of ELF/VLF measurements associated with two sprite events observed on July 28 2005 around 05:02:45 UT are presented. Conditions to trace back the wave emissions from the satellite to the entry point within the ionosphere are discussed. The main results concern: (i) the identification from a low Earth orbit satellite of the O^+ whistler signatures of the causative lightning, (ii) the identification of the main propagation characteristics at the satellite altitude (wave analysis from the on-board field measurements) and at the altitude of the generation of the proton whistlers seen on DEMETER, (iii) the possible fact that the identification of the sprite-produced ELF burst being masked by the proton whistler, (iv) potential use of the proton whistlers characteristics to identify. The detection of the O^+ whistler signatures of the causative lightning is shown to be in agreement with the Budden (1985) second radio-window. Consequences on remote sensing of the bottom layers of night time ionosphere by VLF/LF wave measurements on board a satellite are examined.