



VLF transmitter signal variations before and after the eruption of the Eyjafjöll volcano (Iceland) in spring 2010

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We study the electric environment above the European VLF transmitter ground stations before, during and after the eruption of the Eyjafjöll volcano (19° 36' W, 63° 38' N, Iceland) in spring 2010. Four European transmitter signals are considered in this investigation: DFY (16.58 kHz, Germany), FTU (18.3 kHz, France), GBZ (19.6 kHz, Great Britain) and JXN (16.4 kHz, Norway). The VLF ground signals have continuously been detected by the DEMETER micro-satellite. We use the ICE electric field experiment onboard this satellite to estimate the amplitude variation of the electric field at specific VLF frequencies. We show that the seasonal effect is evident in the DFY signal but is nearly absent for the other transmitters when combining the ICE observations of 2009 and 2010. Also the geomagnetic activity is found to be insignificant for FTU and DFY transmitters but more pronounced for JXN transmitter. The signal amplitudes of the FTU, GBZ and JXN transmitters exhibit a quasi-constant intensity levels in the year 2009 but followed by clear drops in the year 2010. The increase of the transmitter signals is recovered in the beginning of August 2010. We assume that the attenuation of the transmitter signals is mainly due to the eruption of the Eyjafjöll volcano which disturbed the atmospheric conductivity up to the lower part of the ionosphere where the VLF transmitter signals are scattered.