

VLF radio signal propagation under severe stormy weather conditions

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Abstract: Due to the ongoing climate change, extreme weather events globally came to attention primarily since their more frequent occurrence, especially during the last decade. Severe stormy weather conditions and interrelated electrification processes in storm-bearing clouds are well known to get into relation with Earth's ionosphere through a global electric circuit, forming in lithosphere-atmosphere-ionosphere coupling processes. Very Low Frequency (VLF, 3-30 kHz) radio-propagation, taking place within the Earth-ionosphere waveguide, is strongly under the influence of such conditions. Atmospheric electric discharges and related transient luminous events, common for severe stormy weather, through electric processes cause abrupt and intense changes in electrical properties of their surroundings. VLF signals, propagating sub-ionospherically, are strongly influenced by these regions of changed electric properties and undergo perturbations of distinct features, which can be used for studying related processes and phenomena, through a remote sensing approach. Characteristic perturbations observed on monitored VLF signals transmitted from USA, UK, Germany, Italy and France and registered in Belgrade, Serbia, related to stormy weather

conditions in region over Balkan Peninsula during the last decade, were examined, with main findings presented in this research.

Keywords: stormy weather, electric discharges, radio-propagation, VLF perturbation