



## **Effect of solar flares flux on the propagation and modal composition of VLF signal in the lower ionosphere**

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The VLF radio waves propagating in the Earth-Ionosphere waveguide are sensitive to the ionospheric disturbances due to X rays solar flux. In order to understand the VLF signal response to the solar flares, the LWPC code is used to simulate the signal perturbation parameters (amplitude and phase) at fixed solar zenith angle. In this work, we used the NRK-Algiers signal data and the study was done for different flares classes. The results show that the perturbed parameters increase with the increasing solar flares flux. This increase is due to the growth of the electron density resulting from the changes of the Wait's parameters. However, the behavior of the perturbation parameters as function of distance shows different forms of signal perturbations. It was also observed that the null points move towards the transmitter location when the flare flux increases which is related to the modal composition of the propagating signal. Effectively, for a given mode, the plot of the attenuation coefficient as function of the flare flux shows a decrease when the flux increases which is more significant for high modes. Thus, the solar flares effect is to amplify the VLF signal by reducing the attenuation coefficient.