

On the mechanism of enhanced 630.0 nm airglow induced by powerful electromagnetic waves transmitted from the ground

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During an ionospheric heating experiment in Tromsø during February 16, 1999, the simultaneous observations of 630.0 nm airglow enhancement by the auroral large imaging system (ALIS) and the ionospheric parameters by EISCAT-UHF radar were carried out. A region of enhanced airglow was imaged by three stations in the ALIS. These images allowed for a tomography – like inversion of the volume emission of the airglow. The altitude of maximum emission was found to be around 235 ± 5 km with typical vertical scale of 20 km. For the same time the HF pump wave reflection altitude varied from 245 to 250 km and the altitude of maximum electron temperature was about 220 km. Optical and EISCAT data was analyzed with the ionospheric model. Modeling calculation showed that the ionospheric heating and the enhanced airglow are likely to be generated by different mechanisms of the interaction between the HF radio waves and the ionospheric plasma.