

# Observations of Natural and Artificial Airglow in the Mesosphere at the 56°N Latitude

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In a recent paper (Kagan et al., *Phys. Rev. Lett.*, 9494(9), 095004, 2005) we have reported vibrationally excited OH\*(9-3) Meinel band emissions generated by high-power radiowaves launched by the Sura facility in Russia (56.10° N, 44.20° E). The key in these observations is that the light detected in a 2 nm wide filter centered on 630 nm was seen 1-2 s after launching radiowaves. This short response and the behavior of the 630-nm emission intensity during the heating cycle rule out the 630 nm emission from atomic oxygen. Several minutes after on the same night and with the same (630.0+,-1)-nm filter we observed a natural phenomenon seen as an intensity depletion stretched in the east-west direction to the north of the Sura facility. Next night we observed the similar event with two filters: (557.7+,-1)- and (630.0+,-1)-nm, accompanied by weak gravity wave activity. There were tropospheric clouds part of the night, but for the clear sky conditions the abovementioned natural phenomenon reminded mesospheric bores. First reported by *Taylor et al. (Geophys. Res. Lett.*, 22(20), 2849-2852, 1995) as “a spectacular gravity wave event” this phenomenon was attributed to an internal undular bore in mesosphere by *Dewan and Picard (J. Geophys. Res.*, 103(D6), 6295-6305, 1998), who later outlined the necessary conditions for mesospheric bores (*Dewan and Picard, J. Geophys. Res.*, 106(D3), 2921-2927, 2001). The hydroxyl and OI(557.7 nm) emissions naturally occur centered on 87 km and 95 km respectively. We are going to discuss the ionosphere conditions that triggered mesospheric bores and possibly set up preconditioning for generation of artificial red hydroxyl airglow.