Conditions for topside ionline enhancements

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High frequency (HF) enhanced ion line spectra as a response to magnetic field aligned HF pumping of the polar ionosphere in an O-mode polarization can be observed at the top and bottomside F-region ionosphere under certain conditions. The European Incoherent Scatter (EISCAT) UHF radar was directed in magnetic zenith on 18th and 19th October 2017 while stepping the pump frequency of the EISCAT Heating facility across the double resonance frequency of the fourth harmonic of the electron gyrofrequency and the local upper hybrid frequency, in a 2-min-on, 2-min-off pump cycle, stepping both upward and downward in frequency. We present observations of two separate cases of topside HF enhanced ion lines (THFIL). THFIL simultaneous to bottomside HFIL (BHFIL) and conditioned by the relative proximity to the double resonance frequency, consistent with previous observations [Rexer2018] were observed for heating pulses on 19th October. Recurring THFIL with a second set of characteristics were observed on 18th October, appearing independently from BHFIL and possibly conditioned by the proximity of the topside double resonance frequency. Propagation of the pump wave to the topside ionosphere is consistent with L-mode wave propagation facilitated by density striations in the plasma. We consider the conditions for the occurrence of THFIL for two cases/types of observations.