

Thermospheric neutral density observations using the EISCAT incoherent scatter radars

KOSCH, Michael^{1*} ; VICKERS, Hannah² ; OGAWA, Yasunobu³

¹Physics Dept., Lancaster University, Lancaster, UK, ²Institute for Physics and Technology, University of Tromso, Norway,

³National Institute of Polar Research, Tachikawa, Japan

We exploit a recently-developed technique, based on ion-neutral coupling, to estimate the thermospheric neutral density at ~350 km using measurements of ionospheric plasma parameters made by the EISCAT radars. The passive version of the technique is applied to a 13-year long data set from the EISCAT Svalbard Radar (ESR). Here we show that the thermospheric density in the polar cap is decreasing, consistent with satellite drag estimates at lower latitudes. The active version of the technique requires the EISCAT Heater to artificially induce ion up-flow by heating the electrons, with observations from the EISCAT UHF radar. Here we show that ion up-flow is consistent with the plasma pressure gradient, and we extract the thermospheric neutral density. At an altitude of ~500 km, where neutral composition is not always pure atomic oxygen, problems with the technique are discussed.

Keywords: Thermospheric density, Incoherent scatter radar