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The polar thermospheric neutral density long-term trend using incoherent scatter radar data

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Abstract content
 (Max 300 words)
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We exploit a new technique to estimate the thermospheric neutral density at ~ 350 km using measurements of ionospheric plasma density, temperature and velocity by incoherent scatter radar. The passive version of the technique is applied to a 13-year long data set from the EISCAT Svalbard Radar. We show that the thermospheric density in the polar cap is decreasing, consistent with satellite drag estimates at lower latitudes as well as climate change. The active version of the technique requires the EISCAT ionospheric modification facility to artificially induce ion up-flow by heating the electrons with high power radio waves. Here we show that ion up-flow is consistent with the plasma pressure gradient. At altitudes above ~ 400 km, where neutral composition is not always pure atomic oxygen, problems with the technique are discussed. Here we estimate the electric field strength due to anomalous resistivity.

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