

EISCAT Tromsø UHF レーダーで観測された 電離圏イオン温度の長期変動とトレンド

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Long-term variations and trends of ionospheric temperatures observed with the EISCAT Tromsø UHF radar

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The upper atmosphere is strongly affected by variations in the solar EUV radiation, geomagnetic activity, and energy and mass exchange with the near Earth space. Trends over longer terms are predicted to be rather caused by anthropogenic increases of greenhouse gases and the global increase of the atmospheric temperature near the Earth's surface. The thermosphere is expected to on average cool down [e.g., Roble and Dickinson, 1989]. From European Incoherent Scatter (EISCAT) radar data gathered in the polar ionosphere above Tromsø we have derived the first significant temperature trends over 30 years (1981-2011). The results are a cooling of 10-15 K/decade near the *F*-region peak (around 220-380 km altitude). Height profiles of the observed trends are close to those produced by recent atmospheric general circulation model. Our results are a first quantitative confirmation of the simulations and so far rather qualitative expectations.

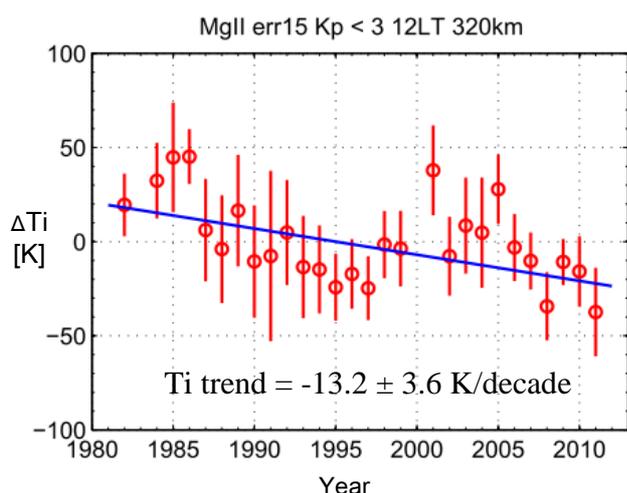


Figure: Yearly averaged ion temperature (residual variations after removing solar influenced variation pattern) at an altitude of 320 km measured with the EISCAT Tromsø UHF radar over 30 years and fitted trend (blue line).

References

Roble, R. G. and R. E. Dickinson, How will changes in carbon dioxide and methane modify the mean structure of the mesosphere and lower thermosphere?, *Geophys. Res. Lett.*, vol 16, pp1441–1444, 1989.