

# Long-term variations in electric conductivities measured by the EISCAT Tromsø UHF radar

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As the EISCAT UHF radar system in Northern Scandinavia started its operations in the early 1980s, the collected data covers several solar cycles. The long time-series of collected data provides us the opportunity to study long-term variations of ionospheric parameters in the auroral zone. Such variations are expected to be caused by several mechanisms: solar and geomagnetic activities, upper atmospheric cooling effects, change in the geomagnetic field, and so on. It is critical to understand how the ionosphere varies during different conditions and to determine the relative importance of the different mechanisms in operation.

In the present study we have used the EISCAT Tromsø UHF data to investigate variations in electric conductivities in the E-region around noon. The initial results show that both the Hall and Pedersen conductivities at their peak altitudes (~110 km for Hall and ~120 km for Pedersen) during high solar activity are about 1.6 times higher than those during low solar activity. Clear seasonal differences in the magnitude are observed for both the Hall and Pedersen conductivities. The peak altitude of the Hall conductivity varies semi-annually with maximum altitudes occurring around the equinoxes. These semi-annual variations in peak height can usually be observed in the Pedersen conductivity as well, but are often smaller than for the Hall conductivity.

In this paper, we discuss what causes the characteristics of the variations in the electric conductivities.