

Keynote presentation

HF radar studies of ionospheric irregularities and plasma convection

R. A. Makarevich

Department of Physics, La Trobe University, Victoria 3086, Australia

The Earth's ionosphere is filled with geomagnetic field and magnetic-field-aligned waves or irregularities in the plasma density. Small-scale irregularities scatter radio waves and are detected by HF coherent radars as ionospheric echoes. The echoes from the ionospheric F region (above 150 km in altitude) also act as tracers of the large-scale plasma convection in the ionosphere. In this paper, we review the coherent radar technique and some of the recent studies of auroral and sub-auroral ionosphere using the dual HF radars comprising the Tasman International Geophysical Environment Radar (TIGER) system and other similar HF radars in the Super Dual Auroral Radar Network (SuperDARN) of which TIGER is an integral part. We concentrate on the decameter-scale waves in the E ionospheric region (around 110 km in altitude) and localized plasma flows in the sub-auroral ionosphere. Future research opportunities in view of the planned extension of TIGER and SuperDARN to mid-latitudes are also discussed.