

WAVE ENERGY TRANSFER TO THE POLAR ATMOSPHERE FROM THE OUTER MAGNETOSPHERE - FIRST OBSERVED IN ANTARCTICA

D.A. Neudegg¹, M.J. Underwood², B.J. Fraser³, F.W. Menk³, R.J. Morris⁴, G.B. Burns⁴

¹*IPS Radio and Space Services, Sydney NSW, Australia,* ²*CSIRO Southern Ocean Marine Science, Hobart Tasmania, Australia,* ³*Space Plasma Waves Group, Physics Department, University of Newcastle, Newcastle NSW, Australia,* ⁴*Space and Atmospheric Science, Australian Antarctic Division, Kingston, Tasmania, Australia*

A mechanism where reconnection between the Solar Interplanetary Magnetic Field and the Geomagnetic field, deposits energy in the polar atmosphere was first observed in Antarctica. The propagation and attenuation of plasma waves occurs in the polar ionospheric waveguide at 300km altitude, originating in the outer magnetosphere 50,000km Sunward of the Earth. A triangular array of induction magnetometers near the magnetospheric cusp projection was operated by vehicle traverse from Davis station onto the icecap in the winter of 1992 provided initial observations. Various geographic advantages in Antarctica allowed for these data to be gathered there several years before the northern hemisphere. Ion-cyclotron waves from the equatorial outer magnetosphere likely propagate in an Alfvén mode along geomagnetic field lines to the polar ionosphere and mode convert to isotropic mode waves in the F2 region ionospheric waveguide. The rare polar observed waveguide characteristics are compared with extensive mid-latitude observations and theoretical predictions. The interferometer array allowed wave propagation and source directions in the ionosphere to be determined and they are compared with magnetospheric regions projected onto the thermosphere over Antarctica. The ion-cyclotron waves are possibly connected with IMF reconnection driven, field-aligned-current systems on the dusk side of the merging gap near the cusp. The use of wave spectral types observed on the ground as diagnostics to determine magnetospheric mapping onto the polar ionosphere will also be affected by the horizontal waveguide propagation.