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THE TASMAN GEOSPACE ENVIRONMENT RADAR (TIGER) AND MAGNETIC CONJUGACY STUDIES OF THE AURORAL AND SUB-AURORAL IONOSPHERE

M. L. Parkinson[1], A. Grocott[2], P. L. Dyson[1], R. C. Healey[1], M. Pinnock[3], J. C. Devlin[4]

[1]Department of Physics, La Trobe University, Melbourne, Victoria 3086, Australia, [2]Department of Physics and Astronomy, University of Leicester, Leicester LE1 7RH, United Kingdom, [3]British Antarctic Survey, Natural Environment Research Council, Cambridge CB3 OET, United Kingdom, [4]Department of Electronic Engineering, La Trobe University, Melbourne, Victoria 3086, Australia

TIGER is the Australian contribution to the international Super Dual Auroral Radar Network (SuperDARN), and consists of two HF over-the-horizon radars, one located in Tasmania (−55º magnetic) and the other in New Zealand (−54º magnetic). The fields of view of the radars overlap in the auroral ionosphere above the Southern Ocean, thereby allowing the 2-D circulation of ionospheric plasma to be measured. Another SuperDARN radar is located on King Salmon, Alaska (57º magnetic), and has a field of view which is magnetically conjugate to the TIGER overlap region. This configuration has allowed the conjugacy of large-scale auroral and sub-auroral phenomena to be defined for the first time. An Auroral Westward Flow Channel (AWFC) is a jet of plasma flow in the sub-auroral ionosphere and is often synchronised to a substorm. An example of an AWFC observed in both hemispheres will be presented, and the differences explained by the distortion of magnetic flux tubes in the magnetospheric dipolarisation region, and the formation of nearby field-aligned potential drops and currents. A recent example of large-scale behaviour in the substorm onset/Harang discontinuity region of the auroral ionosphere throughout the lifetime of a ~1000 nT substorm will also be presented. Finally, we have developed an electronic phasing box to rotate the field of view of the Tasmanian radar to the magnetic conjugate point of the HAARP heating region. The detection of artificially generated ionospheric irregularities or Doppler signatures would create the possibility for controlled magnetic conjugacy experiments, thereby enhancing our understanding of wave-particle interactions in the inner magnetosphere.