Topic area: **STSP** *Presenting author's name:* **M. L. Parkinson**

Towards a Synthesis of Substorm Electrodynamics: HF Radar and Auroral Observations

Grocott, A.[1], M. Lester[1], M. L. Parkinson[2], T. K. Yeoman[1], P. L. Dyson[2], and H. U. Frey[3]

[1]*Department of Physics & Astronomy, University of Leicester, Leicester LE1 7RH, UK*
[2]*Department of Physics, La Trobe University, Victoria 3086, Australia*
[3]*Space Sciences Laboratory, University of California Berkeley, Berkeley, CA 94720, USA*

e-mail of corresponding author: m.parkinson@latrobe.edu.au

At 0835 UT on 21 November 2004, the onset and subsequent expansions of an interval of substorm activity were captured in the southern hemisphere by the Far UltraViolet (FUV) instrument on board the IMAGE spacecraft. This was shortly followed at 0838 UT by the onset of Pi2 activity and magnetic bays, evident in ground magnetic data from both hemispheres. Further intensifications were then observed in both the auroral and ground magnetic data over the following ~3 h. During this interval the fields-of-view of the two southern hemisphere Tasman International Geospace Environment Radars (TIGER) moved through the evening sector towards midnight. Whilst initially low, the amount of backscatter from TIGER increased considerably during the early stages of the expansion phase such that by ~0920 UT an enhanced dusk flow cell was clearly evident. During the expansion phase the equatorward portion of this flow cell developed into a narrow high-speed flow channel, consistent with the sub-auroral polarisation stream (SAPS) type flows identified previously, such as auroral westward flow channels (AWFCs) and substorm-associated radar auroral surges (SARAS). At the same time, higher latitude transient flow features were observed and as the interval progressed the flow reversal region and Harang discontinuity became very well defined. These detailed flow observations and their relationship to the substorm aurora and currents contribute significantly to a synthesis of substorm electrodynamics.