

# Polar cap absorption events during the strong magnetic storms in October-November 2003

# Masanori Nishino[1]; Hisao Yamagishi[2]

[1] STE Lab. Nagoya Univ; [2] Upper Atmos. Phys., Natl. Inst. Polar Res.

It is generally known that solar proton events produce increased ionization at the lower parts of the polar ionosphere. The ionization caused by 1-100 MeV solar protons absorbs radio waves in the HF and VHF bands. Since the proton fluxes enter the terrestrial atmosphere over the polar caps, ones call polar cap absorption events (PCA). In early works, Potemra and Lanzelotti (1971) compared absorption intensities from the 30 MHz riometer at Byrd, Antarctica with equatorial proton fluxes measured on ATS-1 satellite. Reagan and Watt (1976) indicated twilight effects of effective electron loss rates in the D-region ionosphere by simultaneous satellite and radar observations for the intense proton events. Collis and Rietveld (1990) investigated the variations in electron density during four twilight intervals from the EISCAT UHF radar observations, showing that the increase of electron density was delayed by about 30 minutes below 66 km altitude. Ranta et al. (1995) revealed that midday recovery occurred near the cut-off latitudes during the noontime hours from multiple riometer records in the Nordic countries. Stauning (1996) indicated the day-night effect in PCA absorption intensities around sunrise and sunsets as a function of solar zenith angle from the central imaging riometer beams at Sondre Stromfjord, Greenland. The imaging riometer technique has improved the quality of the absorption observations: The narrowness of the beams enables a precise definition of the solar zenith angle at the ionospheric intersects and further the multiple beams allow the simultaneous observation of sunrise/sunset effects at different solar zenith angles.

Around 12 h UT on October 28, 2003 a strong proton event began, and continued until around 12 h UT on October 31. Thereafter, around 15 h UT on November 2, a strong proton event began and continued until about 21 h UT on November 5. Associated with these proton events, strong magnetic storms occurred. In this paper, PCA events observed by the imaging riometer at Ny & Aring;lesund, Svalbard (78.9N, 11.9E) during the strong magnetic storms are presented. The PCA events are investigated with regards to characteristic variations in absorption intensities around sunrise/sunset on October 29, October 30 and November 3, 2003.