Post-noon Pc 1 micropulsation activity and auroral energetic proton precipitation on 27 January 2003

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Recent southern hemisphere balloon campaigns have afforded unique opportunities to study the coupling between geomagnetic micropulsations, energetic particle precipitation, stratospheric conductivity and the global electric circuit. This paper will present observations of precipitation of energetic protons by Pc 1 waves, and modulation of the stratospheric conductivity and the global circuit by this precipitation. The event occurred on 27 January 2003, when a very pronounced negative ion conductivity enhancement was observed by only one of two nearby balloons from 1500 to 2200 UT. During this event, the conductivity doubled for an interval of about 7 hours. This perturbation was associated with an extensive Pc 1 or Pi 1 wave event that was observed by several Antarctic ground stations, balloon PPB 10, and the Polar spacecraft. No appreciable X-ray precipitation was observed in association with this event, which would point to energetic proton precipitation as a possible magnetosphere-stratosphere coupling mechanism responsible for the conductivity enhancement. Such precipitation is consistent with the wave data. Precipitating > 16 Mev protons were observed by the Akebono and NOAA POES spacecraft. This paper will explore the relationship between the wave data, the proton observations and stratospheric electrodynamics. During the latter half of the event, E_z was briefly positive. There was a tropospheric Southern Ocean storm system underneath the balloon during this interval. The observations show that an electrified Southern Ocean storm and associated electrodynamic perturbations occurred during major perturbations in stratospheric conductivity driven by an auroral disturbance. This event might represent a hitherto unrecognized source of modulation of the global circuit current.