



Structure of the reconnecting magnetosphere under a strongly eastward-pointing IMF (but $B_z \leq 0$): Simultaneous Observations in both hemispheres under near-equinox conditions.

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Observations made in both hemispheres on April 17, 1999, allow us to infer a detailed picture of the spatial-temporal development of reconnection-related signatures in the magnetosphere. The interplanetary conditions were characterized by a steady and strong eastward ($B_y \approx 20$ nT) and a slightly southward magnetic field, conditions realized when the central regions of a magnetic cloud swept past Earth. Important for our purposes are also (i) the low plasma beta (~ 0.01) and the low Alfvén Mach number (~ 2). The behavior of particle precipitation, field-aligned currents and ionospheric plasma convection is examined with particle and magnetic field data from DMSP, Polar and ground magnetograms. In the northern hemisphere, we demonstrate the presence of polar arcs and associated merging and lobe cells. Pulsed ionospheric flows are seen, as are magnetic impulse events in the lobe cell related to a strong flow channel at the polar cap boundary. In the southern hemisphere, the presence of polar arcs, a latitudinally-bifurcated cusp, and an inverse ion energy-latitude dispersion provide good indications of a lobe cell in the southern ionosphere. We place the observations in the context of recent work on polar arcs, composite ionospheric circulation, which have emphasized in the main the need of summer conditions and/or northward IMF B_z .