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On the IMF BY dependence on polar cap patch exits at night

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Polar cap patches are islands of enhanced F-region electron density within the polar cap. They form near the cusp inflow region at day, transit the polar cap when frozen into twin-cell convection, and finally exit the polar cap at night into the night time auroras. When exiting they change status from patches to blobs. Monitoring the presence of F-region plasma structures and their travel path is essential in order to develop reliable space weather forecasts for the high latitude ionosphere in future. This paper presents a comprehensive study of a sequence of polar cap patches that exit the polar cap. Superimposing satellite images of the auroral oval and all-sky camera observations of airglow patches onto SuperDARN convection maps for an extended time period around magnetic midnight, provides an unparalleled opportunity to examine how plasma exits the polar cap. Under conditions of IMF BY predominantly positive (+5nT) we find that the patches exit both into the oval on the dusk cell pre midnight and on the dusk cell post midnight. This event study concurs with a statistical result also presented. The statistics show that the MLT distribution of patch exits, which is a $\sim$10 hours broad bell shaped function cantered on $\sim$23:30 MLT, is just marginally sensitive to the IMF BY polarity. This makes us conclude that the patches do not memorize on which cell they entered the polar cap.