The polar cusp for northward IMF as deduced from IMAGE LENA and FUV observations

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Recent remote sensing studies with the low energy neutral atom (LENA) imager on the IMAGE spacecraft have shown that the emission distributions observed in the direction of the high-latitude magnetosheath reflect the cusp indentation in the magnetopause shape, which suggests a means for monitoring the cusp motion using LENA. While this high-latitude emission tends to be stronger during southward IMF than for northward IMF, the emission for the latter case is still significant as long as the solar wind dynamic pressure is relatively high. This solar wind condition is also very interesting in terms of the frequent observations of the proton aurora in the cusp through the far ultraviolet instrument (FUV) on IMAGE. The recent studies with FUV have shown that the proton aurora appears in a localized dayside region poleward of the general auroral oval, and that this is the signature of direct proton precipitation into the cusp after the lobe reconnection during northward IMF. In this study, we report the characteristics of the dynamics of the polar cusp for northward IMF as deduced by the comparison between the LENA emission in the direction of the high-latitude magnetosheath and the FUV proton aurora in the ionosphere. From LENA and FUV data for March-April 2001, we found several events in which both emissions are very clear. The direction of the LENA peak emission is somewhat fluctuating such that the source shifted somewhat equatorward or poleward in the high-latitude sheath. On the contrary, the location of the proton aurora in the ionosphere appears to be stable. We will present similarities and differences between the motion of the LENA emission mapped on the model high-latitude magnetopause and that of the distribution of proton aurora in the ionosphere, and discuss the dynamics of the polar cusp for northward IMF in terms of a timescale of a few minutes.