

## Monitoring cusp with low energy neutral atoms

# Satoshi Taguchi[1], Michael R. Collier[2], Sheng-Hsien Chen[3], Thomas E. Moore[2], Mei-Ching Fok[2]

[1] Univ. of Electro-Communications, [2] NASA GSFC, [3] USRA NASA GSFC

We report that Low Energy Neutral Atom (LENA) imager on the IMAGE spacecraft can identify the direction of the cusp indentation from inside the magnetosphere with a time scale of two min, and present the characteristics of the motion of the cusp. The cusp can be identified with LENA inside the magnetosphere because neutral particles are emitted from the magnetosheath in the cusp indentation as the result of charge-exchanging with hydrogen geocorona. The emission can have a distinct direction because of the cusp indentation structure. Our two-dimensional modeling supports this idea, showing that the emission from the cusp can be identified as a peak in the distribution of the hydrogen count rates versus the LENA spin sector angles. Some events exist for which the line of sight for such a peak is rather stable, and in other cases it shows dynamic variations. Among the latter cases, we found an event when POLAR was located in a position close to IMAGE and observed multiple crossings of the boundary between the magnetosheath and magnetosphere. The line of sight for the LENA peak emission shows the corresponding equatorward/poleward motion, which gives evidence that the LENA can monitor the motion of the cusp. Most of our events are high dynamic pressure periods in the solar wind and also include a sudden impulse on the ground, created by the contact of a rapid increase in the solar wind dynamic pressure to the dayside magnetopause. Comparison of this sudden impulse timing with the change of the dynamic pressure at ACE agrees with the time delay of the solar wind to the magnetosphere with accuracy of a couple of minutes. The IMF variations shifted in this manner and the motion of the cusp identified with LENA have a significant correlation both for southward and northward IMF. Response of the cusp to various IMF conditions will be discussed.