

# **The Role of the Change in the Magnetotail Open Magnetic Flux in Storm SYM-H Decreases**

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Changes in the Dst index, or the similarly constructed high-resolution SYM-H index, are generally thought to indicate changes in the total energy content of the ring current. However, this is not always the case. In this talk I will consider the effect that a changing polar cap flux can have on the SYM-H index, examining two magnetic storms, both driven by very large ( $> 40$  nT maximum) southward IMF intervals, one on March 31, 2001, and the other on August 24, 2005. In both cases the arrival to Earth of the strongly southward IMF produced an immediate negative response in the SYM-H index. However, in both cases energetic particle and magnetometer data from geosynchronous orbit indicate that there was no immediate ring current response to the southward IMF. Instead the near-Earth magnetotail exhibited a growth phase, with the injection of energetic particles coming later in the event. Data from the DMSP spacecraft for both events demonstrate that the polar cap flux grew rapidly in response to the strongly southward IMF. Thus, one can argue that in the initial part of the storm main phase, the decrease in SYM-H was due to increasing polar cap flux and not to an increase in the ring current. Moreover, one can claim that the different magnitude of response to the polar cap flux change in the two events is due to the different solar wind dynamic pressures in the events. These findings strongly support the relationship between Dst and the polar cap flux proposed by Vasyliunas (2006).