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Parameterizing the Magnetopause Reconnection Rate from Observations of the Expanding Polar Cap

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We determine an expression for the magnetopause reconnection rate in terms of upstream interplanetary parameters. We quantify the dayside reconnection rate from observations of the expanding polar cap when the nightside reconnection rate is assumed to be zero. The polar cap open flux is calculated from auroral images collected by the Imager for Magnetopause-to-Aurora Global Exploration (IMAGE) Far Ultraviolet camera (FUV), and its rate of increase is correlated with upstream solar wind and interplanetary magnetic field measurements from the OMNI data-set. We find that the reconnection rate is successfully reproduced by considering the magnetic flux transport within a 4 Re-wide channel within the solar wind (with an additional small correction for the solar wind velocity) and an IMF clock angle dependence with an exponent of 9/2. Contrary to several previous studies we do not find a dependence of the reconnection rate on solar wind density. We discuss our findings in the context of previous studies and solar wind-magnetosphere coupling models.