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POLAR observations of reconnection in the dayside magnetopause: component reconnection vs. antiparallel merging

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Reconnection controls the energy flow into the magnetosphere, its storage in the magnetotail and subsequent release into the night magnetosphere, yet the physics of reconnection remains one of the most enigmatic processes in space plasmas. One of the longest controversies and one of the most active areas of investigation is whether reconnection takes place by component reconnection or antiparallel reconnection. These two alternate theories are equivalent either to the existence of a finite magnetic field (guide field) at the X-line. Which situation occurs at the reconnection point controls where the x-line falls on the magnetopause i.e. the dividing line between flows accelerated northward and those accelerated southward. We use Polar magnetic field and 2D plasma velocity data (TIDE) at the magnetopause to identify which reconnection law best explains the observations. ACE and WIND are used to provide the needed interplanetary conditions.