



Extended magnetic reconnection across the dayside magnetopause

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The operation and extent across the Earth's magnetopause of fast magnetic reconnection (MR), the dominant process responsible for energy and plasma transport into the magnetosphere, has previously been only indirectly shown by observations. The key result here reports for the first time direct evidence of the X-line structure resulting from the operation of MR at two widely separated locations along the expected sub-solar merging line (line of maximum current) on the Earth's magnetopause; confirming the extended operation of MR across this region. The evidence results from observations of the associated ion and electron plasma distributions, present within the magnetic X-line structure, which are taken from a conjunction of the THEMIS-A spacecraft and the Double Star, TC-1 spacecraft, separated by ~ 9 RE near the low latitude, sub-solar region of the Earth's magnetopause, either side of noon. The two spacecraft passed through active MR regions on the predicted, tilted magnetic merging line simultaneously.