Reconnection Site and Spatial Extent Revealed by Simultaneous Equator-S - Geotail Observations of Reconnection at the Magnetopause

- Equator-S and Geotail skimmed dawn MP
- S/C separation: 4 RE north-south
  3 RE east-west
EQ-S and Geotail Detected Opposite Reconnection Jets

M’sphere

N_p, EQS
(cm⁻³)

V_L, EQS
(km/s)

V_L, GTL
(km/s)

N_p, GTL
(cm⁻³)

IMF
\tan^{-1}(B_z/B_y)
(degrees)

hhmm
1998 Feb 11

1330
1400

EQ-S
Geotail
M’sheath
Magnetosheath

EQ-S

Magnetosheath

GTL

M’sphere

V

L

M

\hat{M}

\hat{L}

\hat{N}
EQ-S and Geotail Detected Opposite Reconnection Jets

Equatorial (EQ-S) and Geotail (GTL) detected opposite reconnection jets, showing variations in magnetic field strength ($B_L$, $nT$), plasma velocity ($V_L$, km/s), and IMF angle ($\tan^{-1}(B_z/B_y)$, degrees) over a selected time period on February 11, 1998.
Comparison with Reconnection Theory: Equator-S

\[ \Delta v_{th} \equiv v_{t2} - v_{t1} = +[B_{t2} (\mu_0 \rho_2)^{-1/2} - B_{t1} (\mu_0 \rho_1)^{-1}] \]

\[ |\Delta V_{obs}| / |\Delta V_{th}| = 0.97 \]

angle = 6.7°

\[ |\Delta V_{obs}| / |\Delta V_{th}| = 1.05 \]

angle = 2.4°
Comparison with Reconnection Theory: Geotail

\[ \Delta v_{th} \equiv v_{t2} - v_{t1} = -[B_{t2}(\mu_0 \rho_2)^{-1/2} - B_{t1}(\mu_0 \rho_1)^{-1/2}] \]

\[ \frac{|\Delta V_{obs}|}{|\Delta V_{th}|} = 0.88 \quad \text{angle}= 8.7^\circ \]

\[ |\Delta V_{obs}| / |\Delta V_{th}| = 0.89 \quad \text{angle}= 0.8^\circ \]
The Big Picture: Extended X-line along Equatorial Magnetopause