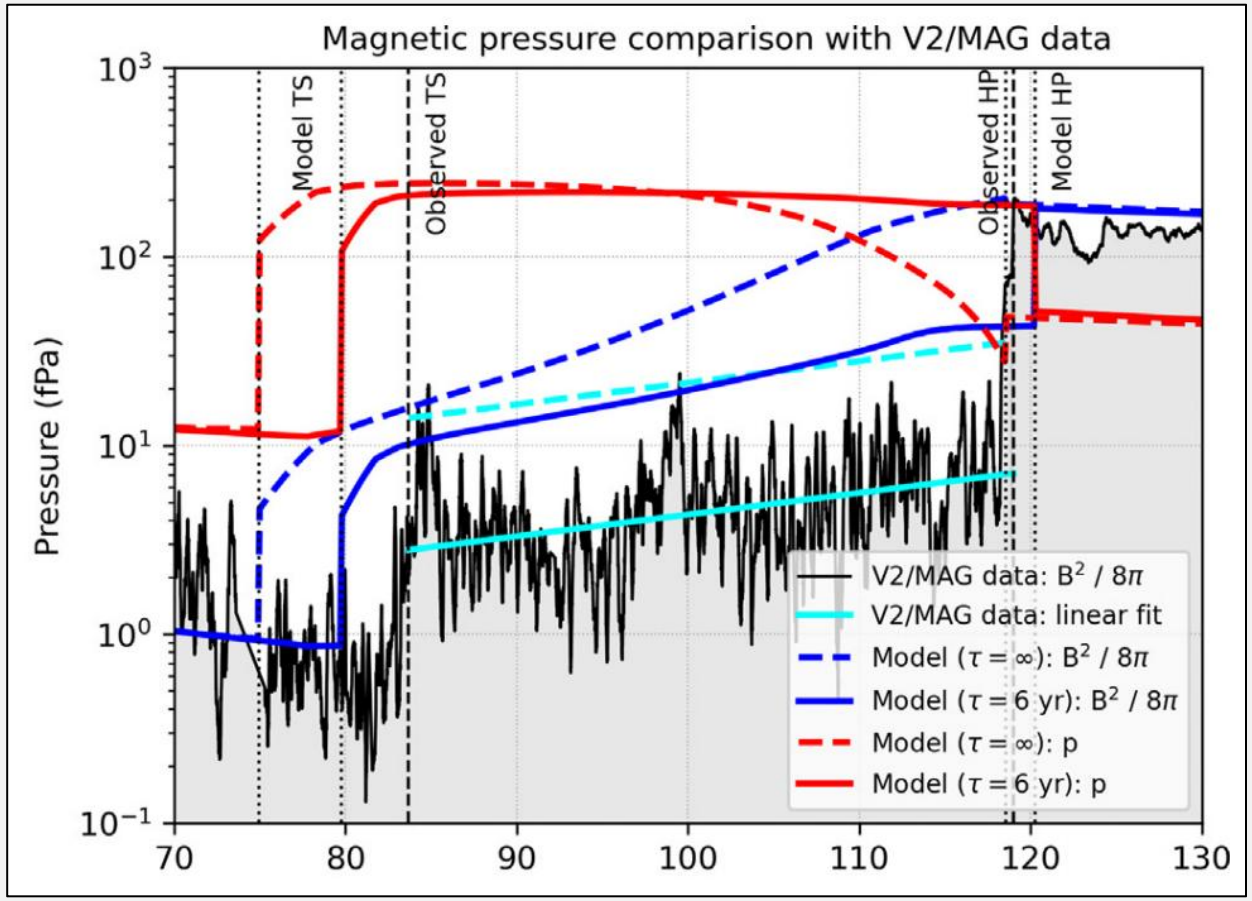
THE EFFECT OF MAGNETIC FIELD DISSIPATION IN THE INNER HELIOSHEATH: RECONCILING GLOBAL HELIOSPHERE MODEL AND VOYAGER DATA

Science Question:
How can we account for magnetic field dissipation from the unresolved Heliospheric Current Sheet in a global model to reconcile simulations with Voyager data?

Method or Approach:
We add a simple phenomenological dissipation term, $-\mathbf{B}/\tau$, to the magnetic induction equation. This term mimics the net effect of magnetic reconnection in the unresolved Heliospheric Current Sheet, converting magnetic energy to heat in the inner heliosheath.

Results and Implications:
With a dissipation timescale $\tau \approx 6$ years, the model reproduces Voyager-observed magnetic pressure and proton density trends (see Fig.). It removes the artificial magnetic pile-up at the heliopause, shifts the termination shock outward, and reduces the inner heliosheath width. This offers a practical way to include key kinetic-scale physics in global models.



Magnetic (blue) and thermal (red) pressure profiles from models with (solid) and without (dashed) magnetic dissipation, compared to Voyager 2 data (black). Cyan lines show linear fits to data. Vertical lines mark modeled and observed TS/HP locations.

Korolkov et al. *Adv. Space Res.* , [2026]; https://doi.org/10.1016/j.asr.2026.01.018