

Magnetic connectivity associated with SW reconnection events: STEREO/SWEA

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and the IMPACT team^{1,3,4,5}**

1: CESR/CNRS, Toulouse, France

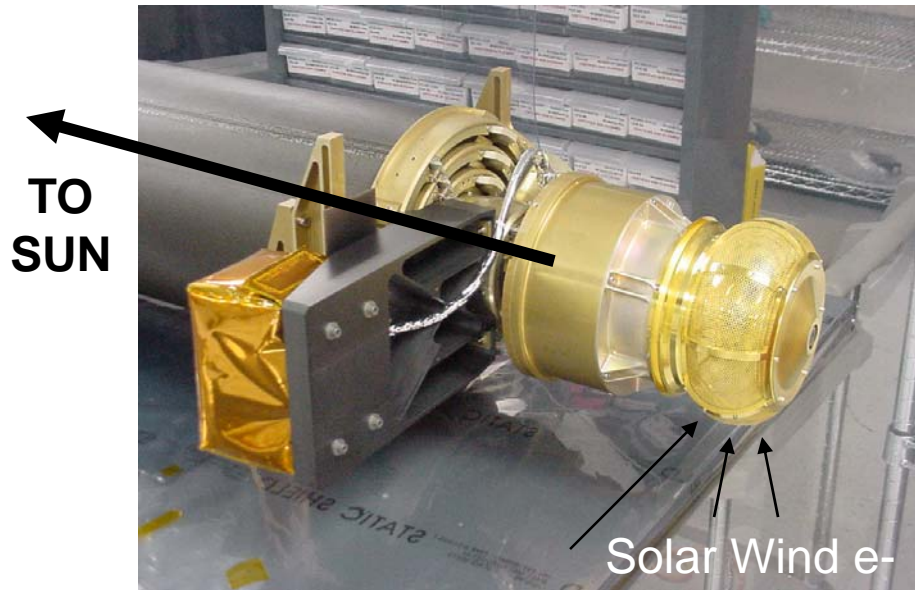
2: LASP, Boulder, Colorado, USA

3: SSL, U. Berkeley, USA

4: UCLA, Los Angeles, USA

5: NASA/GSFC, Maryland, USA, ...

The STEREO Solar Wind Electron Analyzer (SWEA) instrument

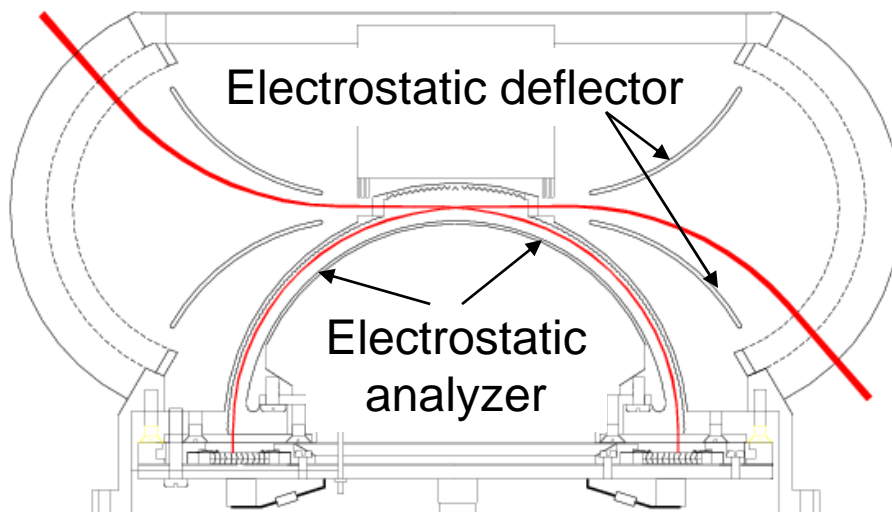


- SWEA instruments **identical** on ST-A and B

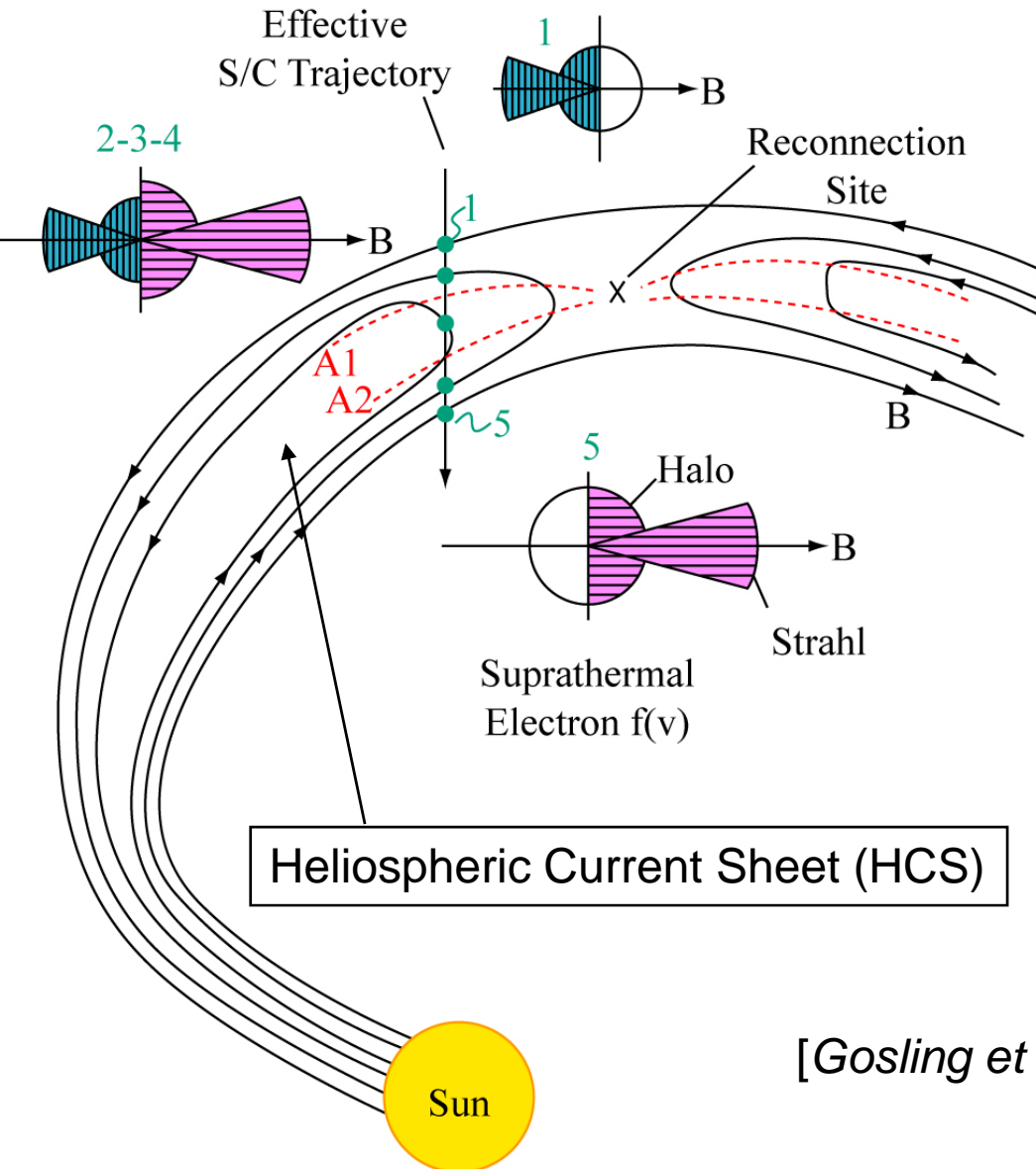
- **Preliminary** inter-anode and inter-deflection calibrations

- Pitch angle distributions should be OK in **relative sense**

- Refinements still to be done, as well as **absolute calibrations**



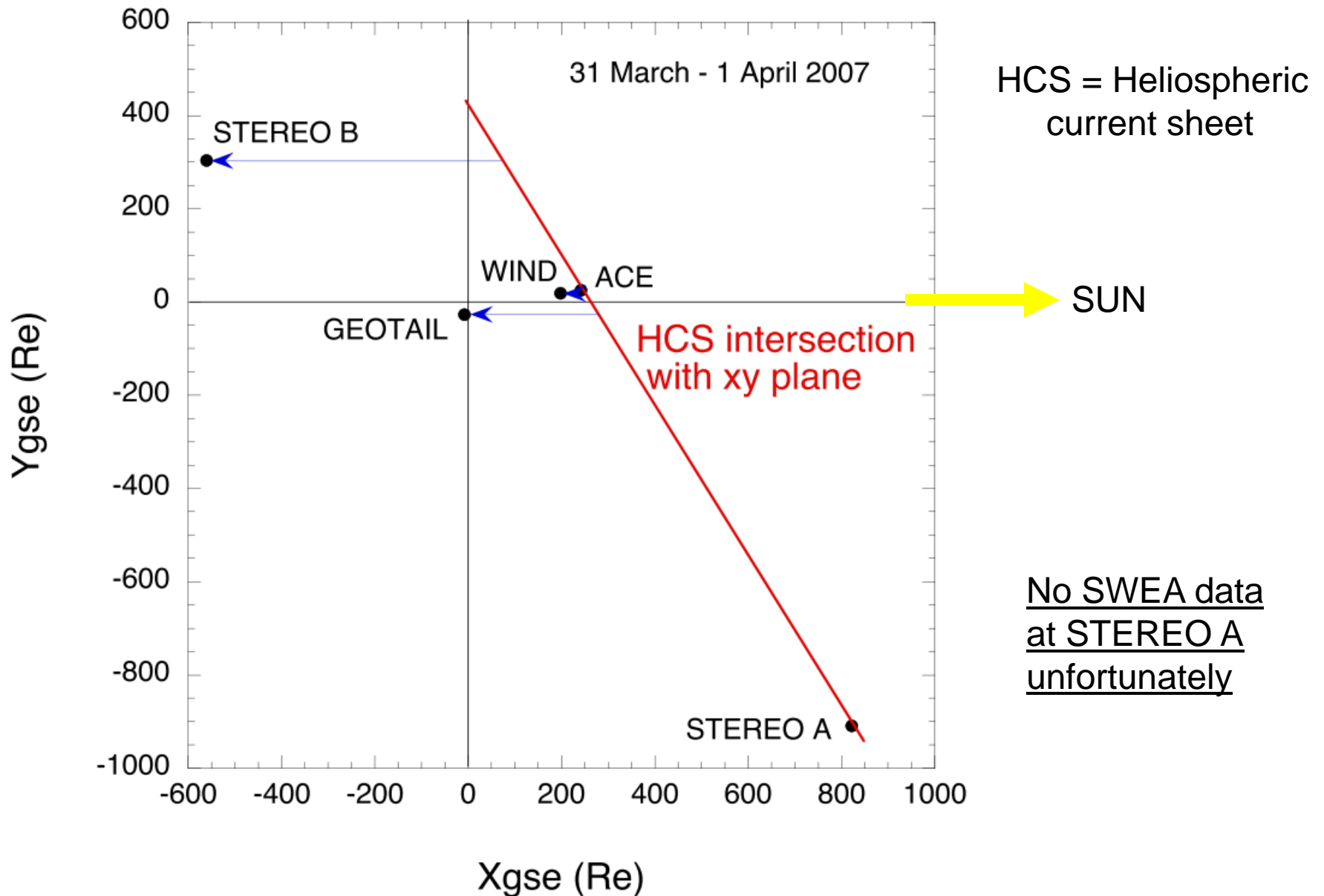
MOTIVATION :



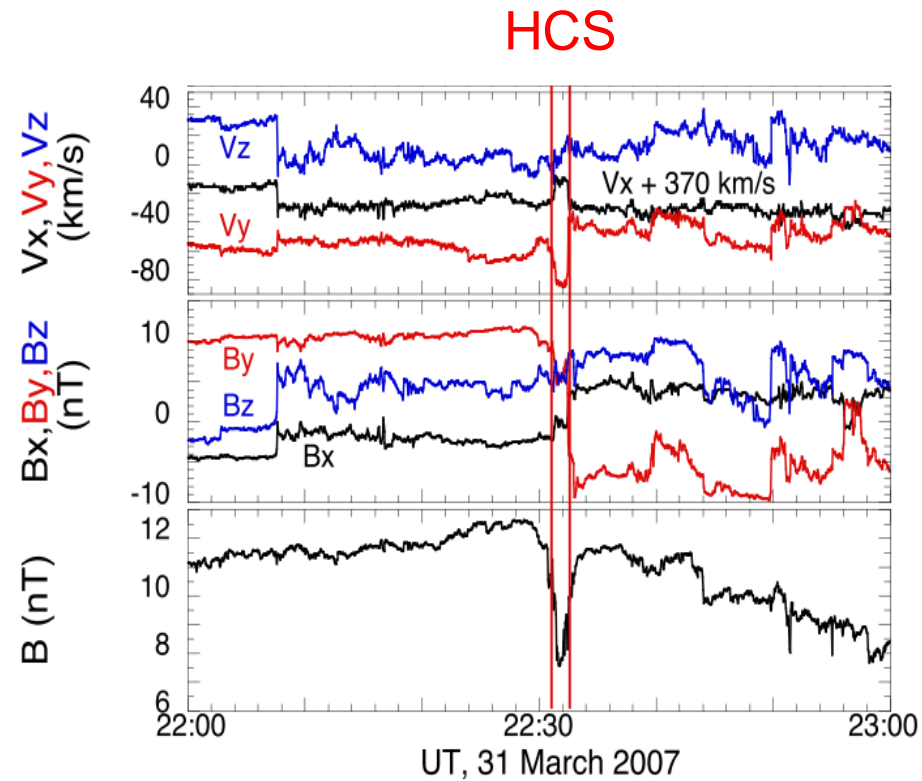
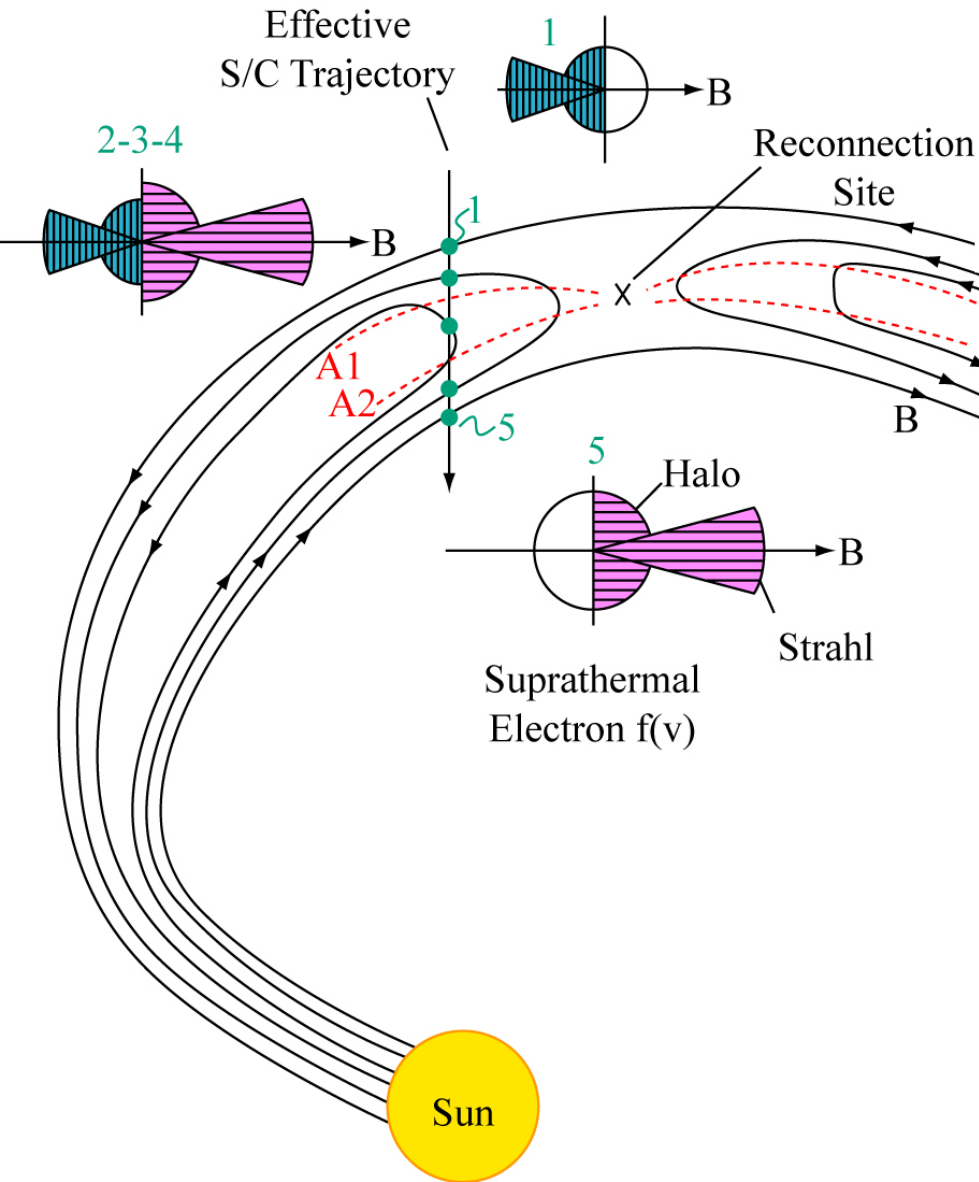
- Suprathermal (>200 eV) electrons are **very fast**: 1AU in a matter of hours
→ **Magnetic topology**
- Check whether **pitch angle distributions are compatible** at ACE and STEREO
- The case of solar wind reconnection events is most useful: **complex and variable PADs over short periods**

[Gosling *et al.*, 2005; 2006]

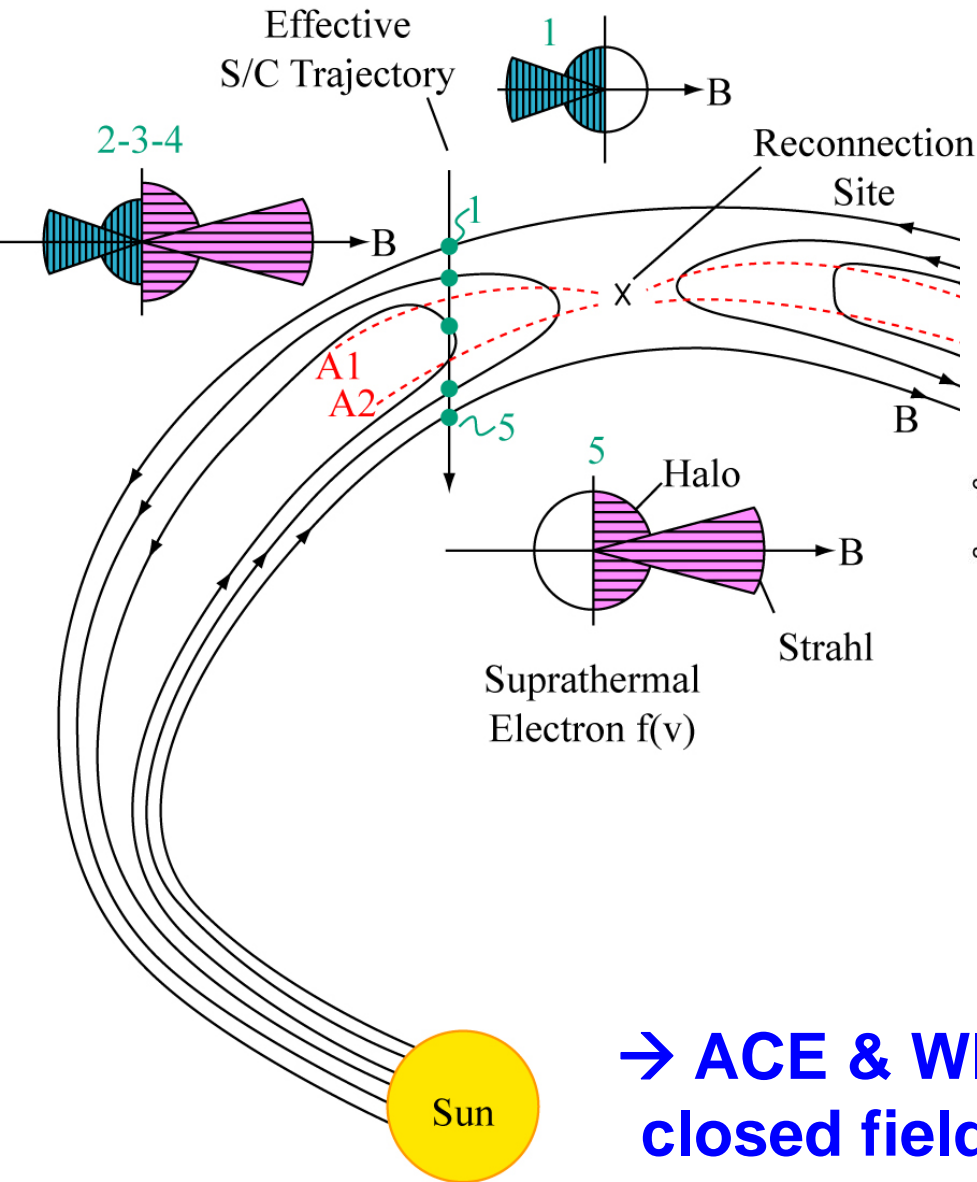
Spacecraft locations on March 31, 2007



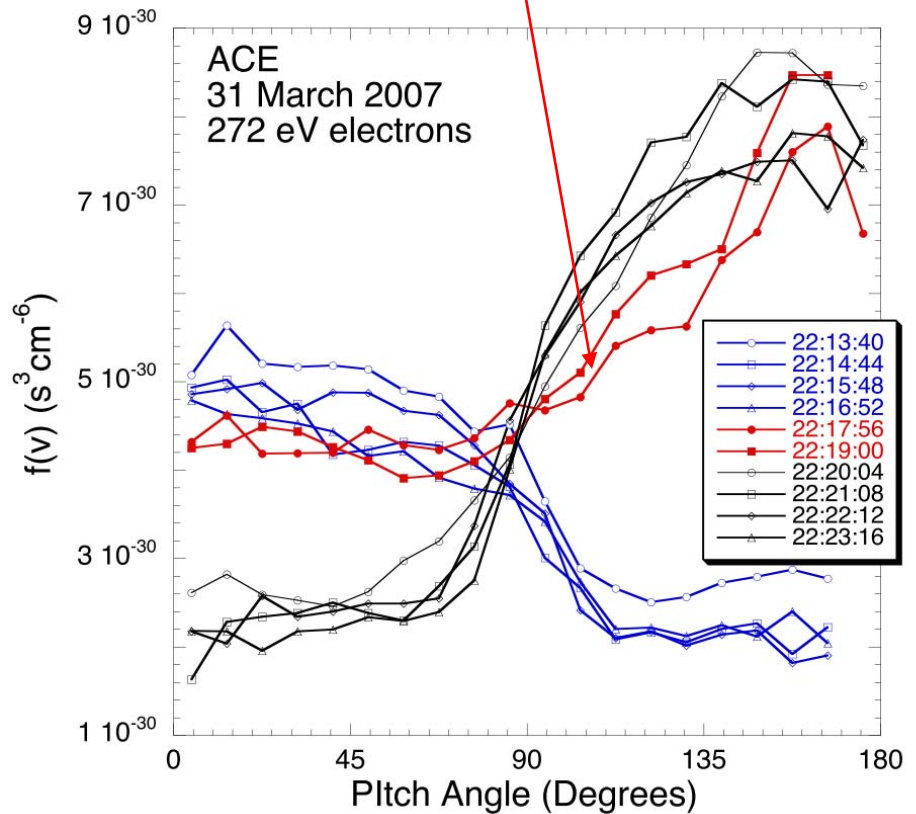
HCS reconnection layer at ACE/WIND



HCS reconnection layer at ACE/WIND



RED: distribution inside the layer



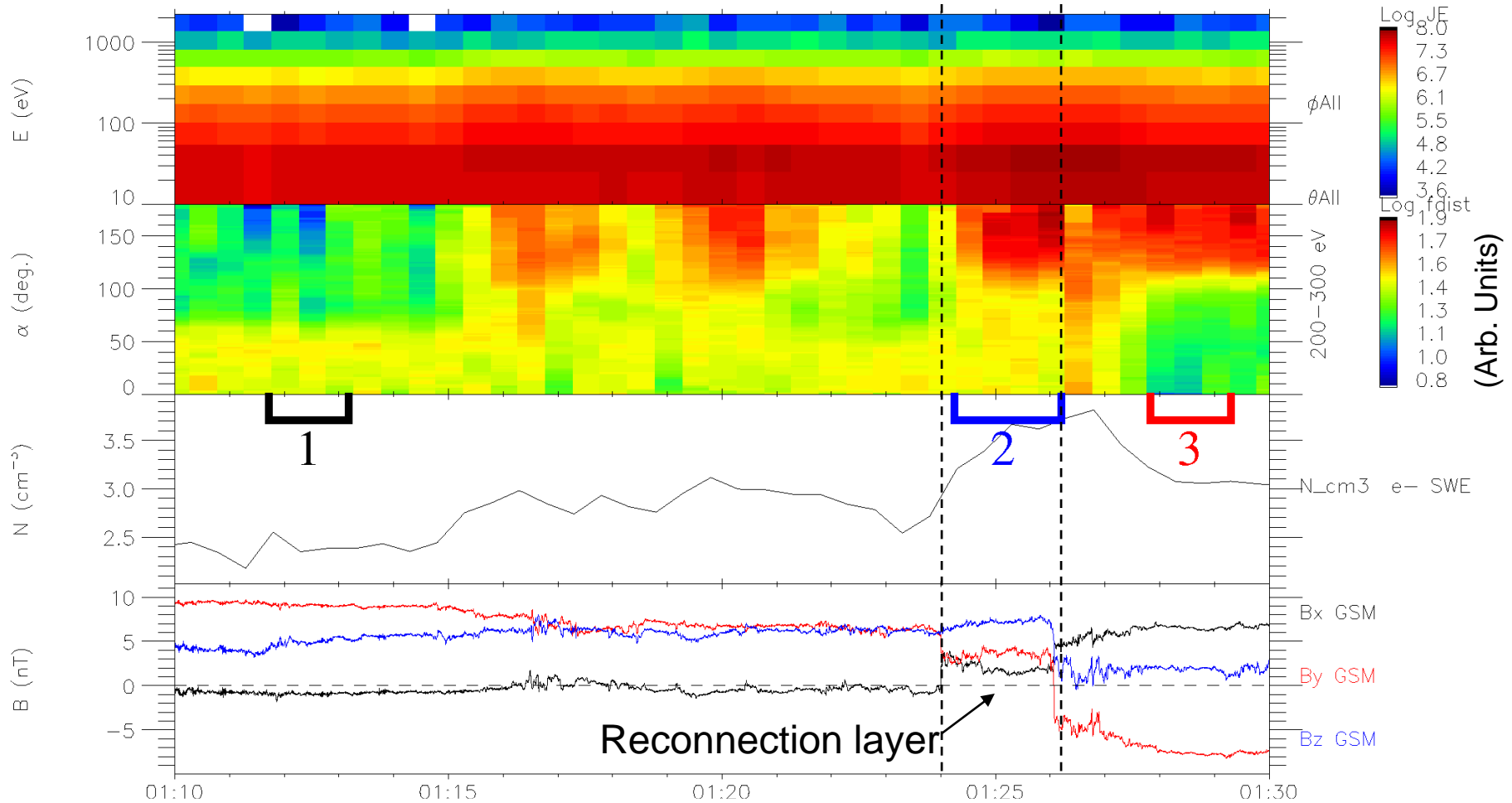
→ ACE & WIND are Sunward of X-line on closed field lines connected to the Sun

Heliospheric current sheet reconnection layer at ST-B

STEREO-SWEA

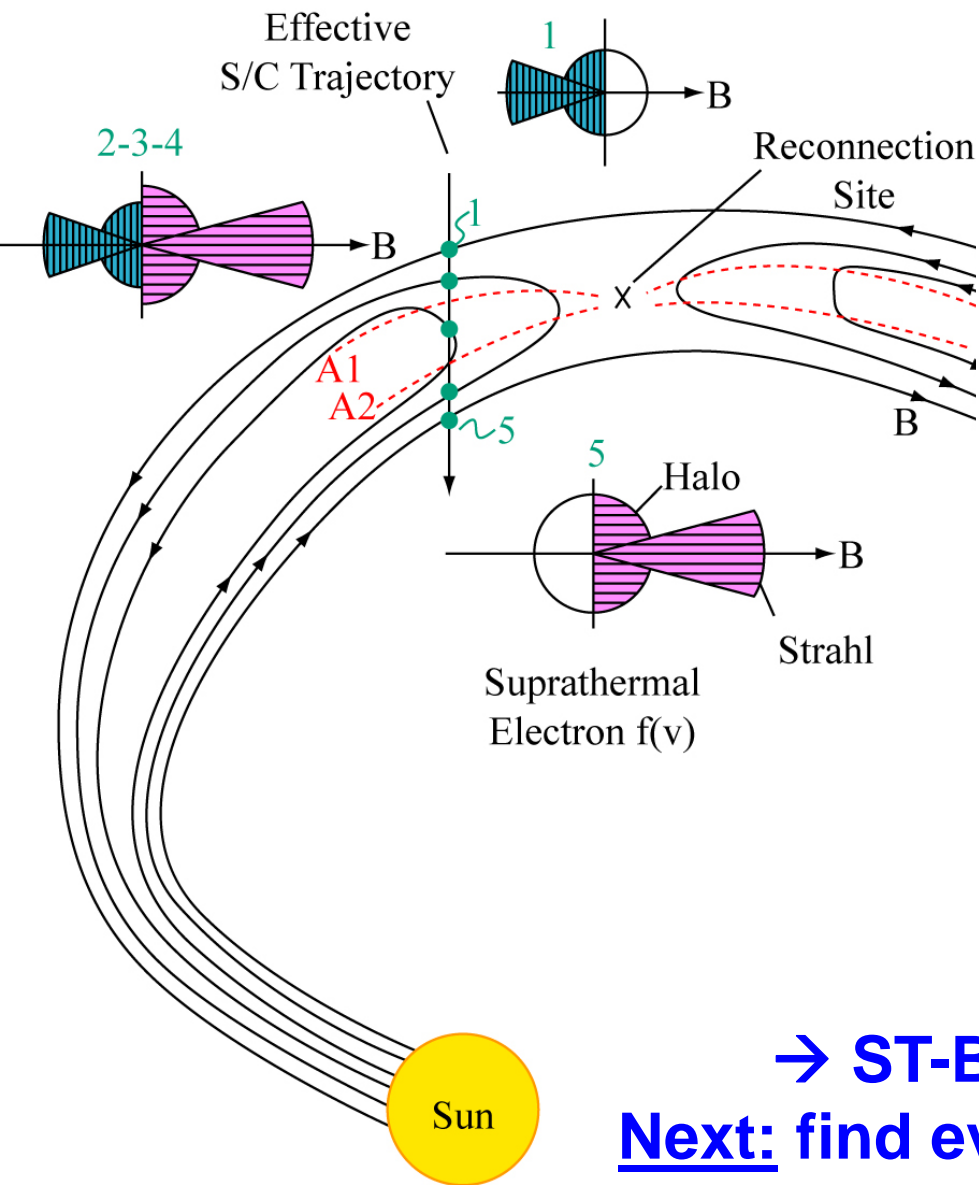
BEHIND (SC 2)

01/Apr/2007

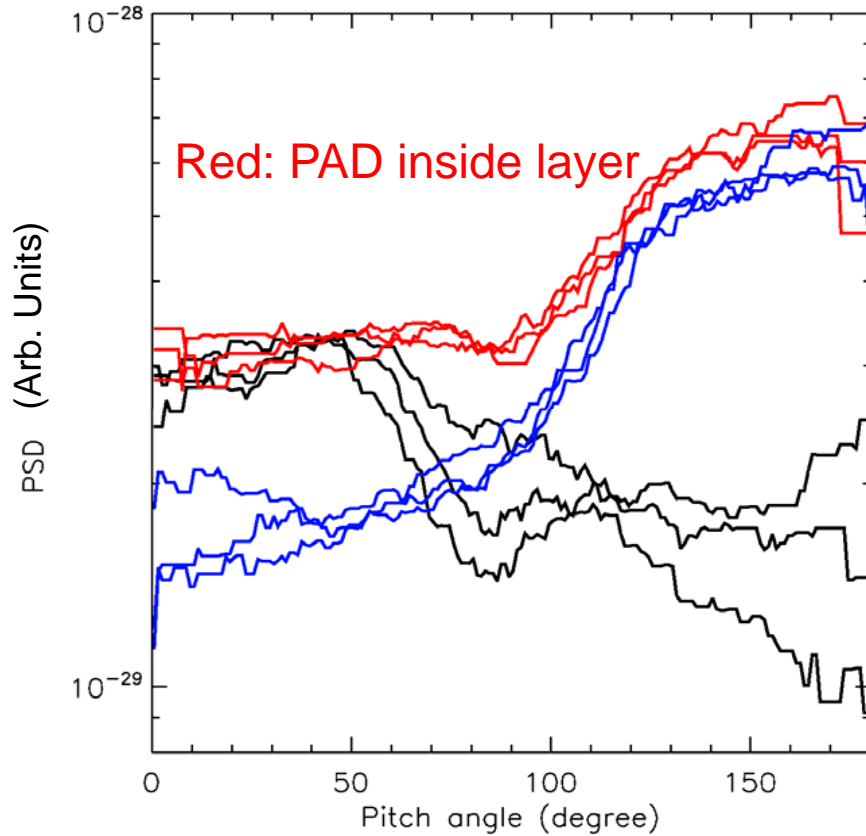


→ Marked differences in pitch angle distrib. inside the layer

Closed field lines observed at STEREO-B as well



Note: Absolute PSD values are off, but relative behavior is meaningful



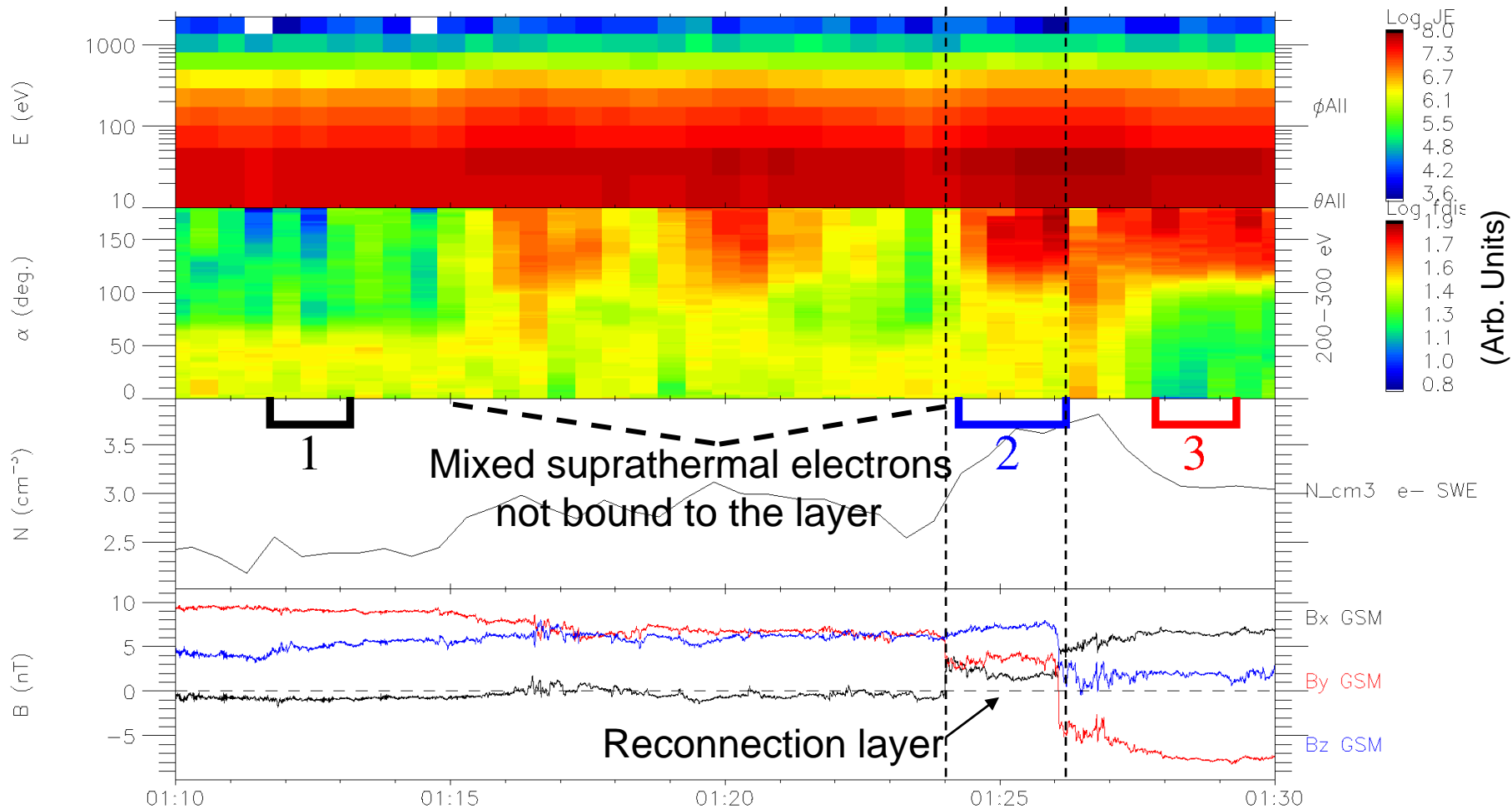
→ ST-B also sunward of X-line
Next: find event with X-line in between...

Closed field lines observed at STEREO-B as well

STEREO-SWEA

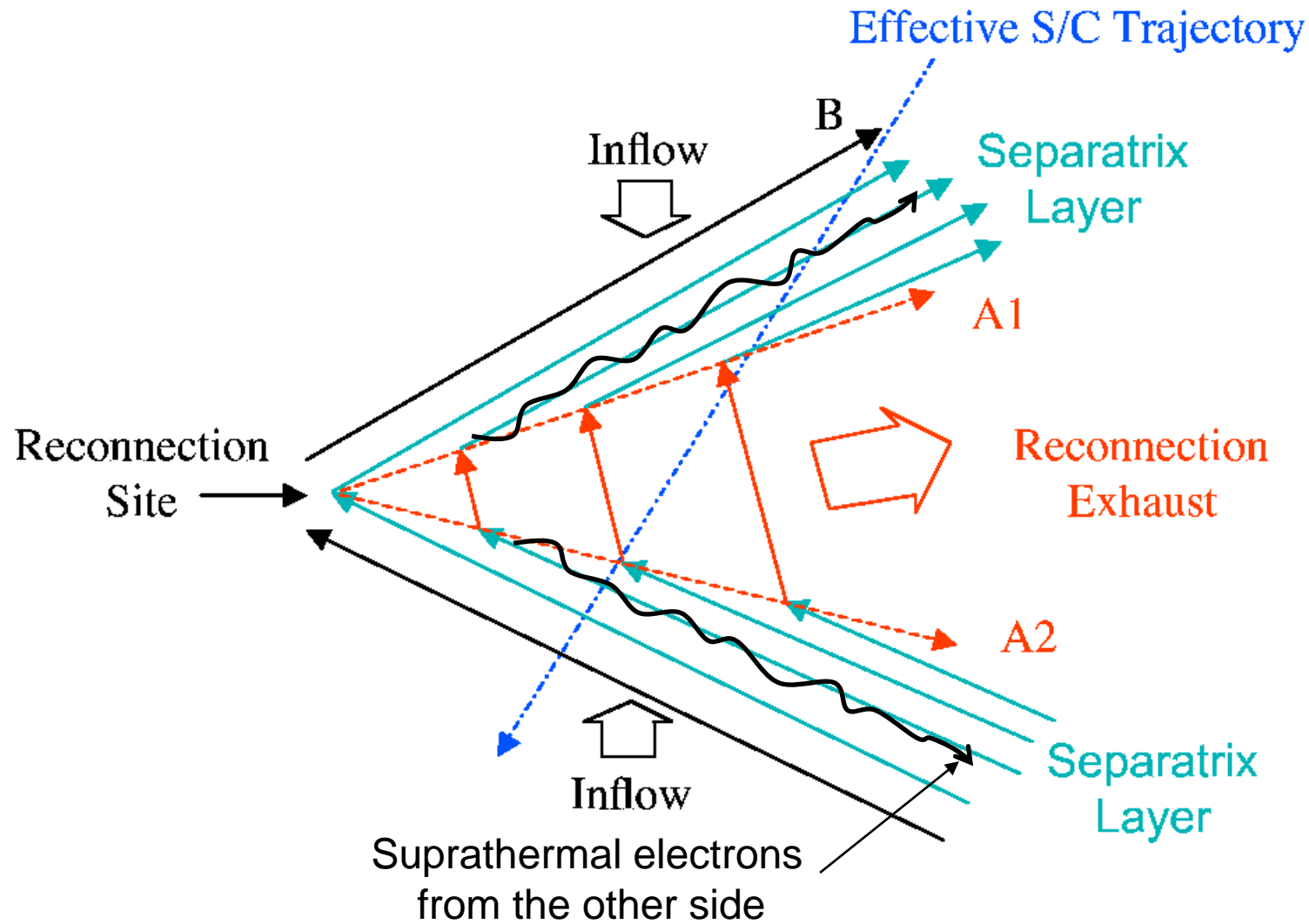
BEHIND (SC 2)

01/Apr/2007



→ Evidence for the separatrix layer outside the exhaust

Closed field lines observed at STEREO-B as well



→ The existence of separatrix layers is confirmed for this event, although it is not always observed (?)

Some topics of interest

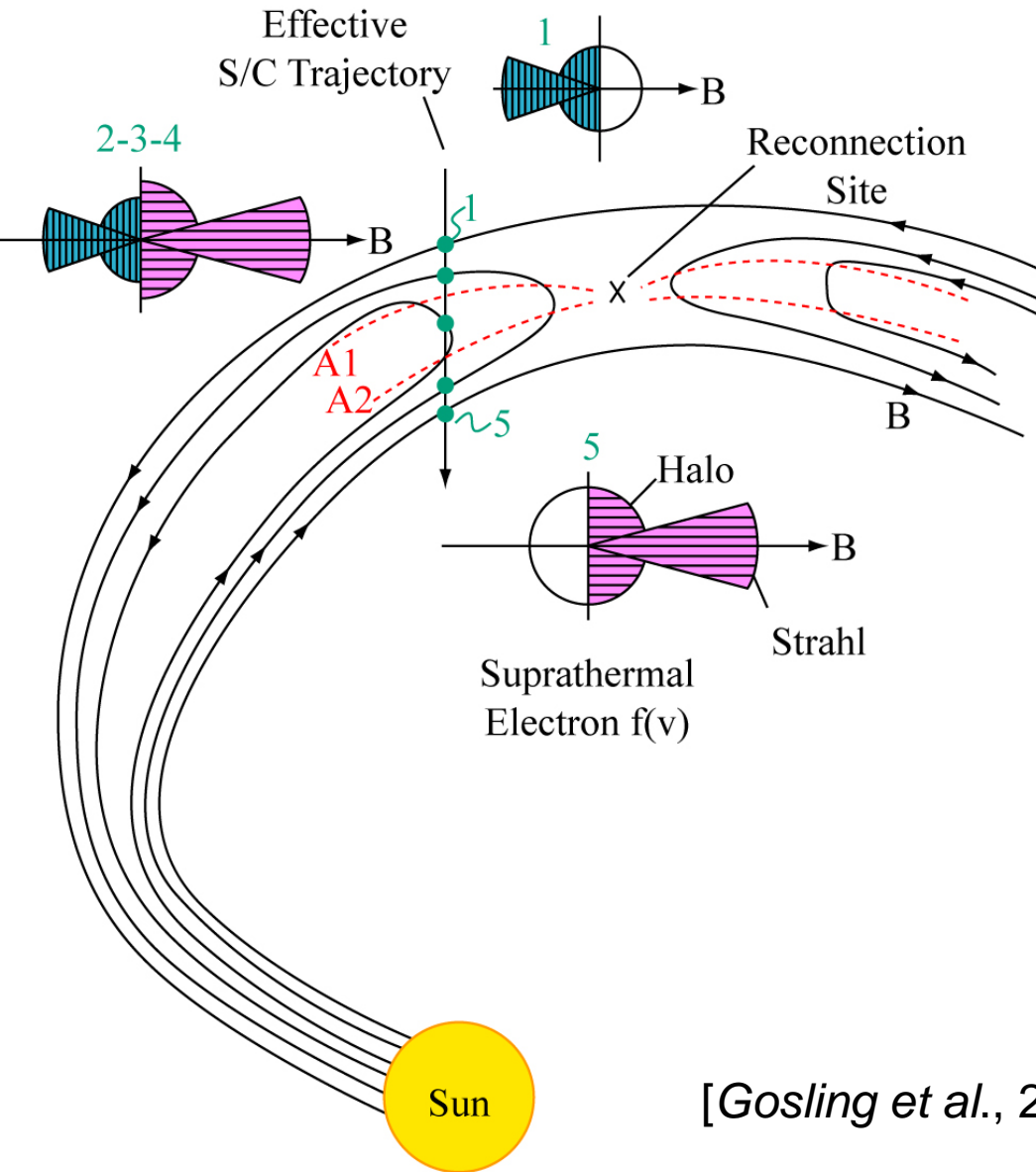
- Continuous nature of reconnection
- X-line spatial extent
- Particle acceleration/heating at X-line
- Particle heating at exhaust boundaries

All of the above potentially different
at Earth's magnetosphere !?

CONCLUSIONS :

- Although additional corrections are **still to be done**, SWEA pitch angle data are meaningful
- The case of solar wind reconnection events is most useful for that purpose: **complex and variable**
- SWEA observations of high energy electron leakage **confirm that the boundaries of the reconnection layer are open**, as expected
- **Other interesting topic:**
 - Is heating occurring at the boundaries?**
 - Different from Earth's magnetopause?**

MOTIVATION :



- Check whether **pitch angle distributions are compatible** at ACE and STEREO

- The case of solar wind reconnection events is most useful: **complex and variable**

- We may observe the change in connectivity between **widely separated spacecraft**

- For **reconnection events in between the spacecraft** we may contribute to the debate about **strahl disappearance**

[Gosling et al., 2005; 2006; Crooker and Pagel, 2008]