Agenda Week 36

Lecture 5

Solar wind

Properties u, n, T

Energy flux

Gas dynamics model

u(r)

n(r)

Lecture 6

Jetlines – Parker spiral – plasma, magnetic field

Sectoring, current sheets

B(r)

Cometary tails

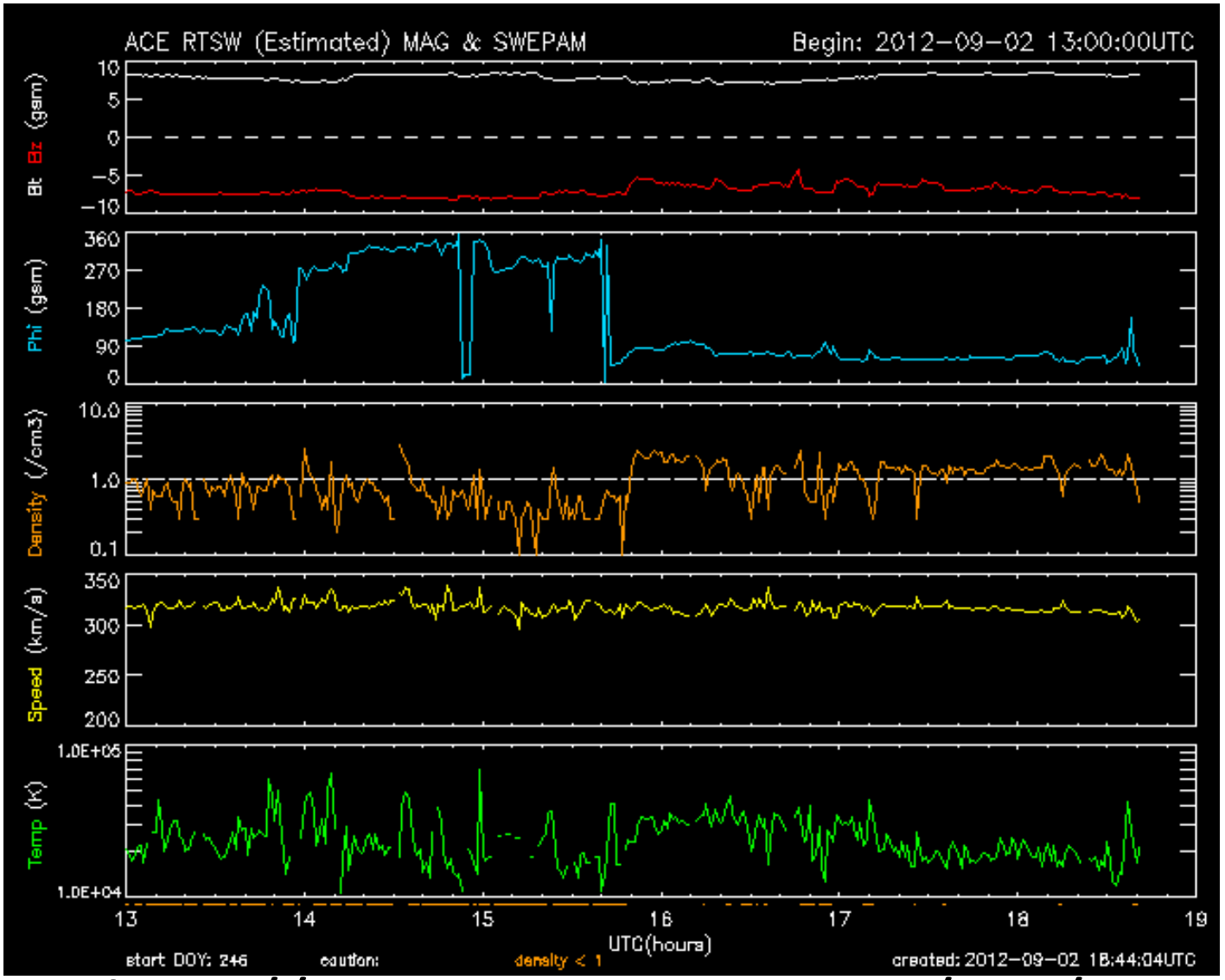
Comet tails come in two flavors: the **ion tail** and the **dust tail**. The **ion tail** is thin, blue and linear - points directly away from the Sun.

The **dust tail** is white, broad and points generally (but not precisely) away from the Sun

Composition:	$\simeq$ 96% H^+, 4% (0–20%) He^{++}, e^-		
Density:	$n_p \simeq n_e$	$\simeq$	6 (0.1–100) cm^{-3}
Velocity:	$u_p \simeq u_e = u$	$\simeq$	470 (170–2000) km/s
Proton flux:	$n_p\ u$	$\simeq$	$3 \cdot 10^{12}$ $m^{-2}s^{-1}$
Momentum flux:	$n_p\ m_H\ u^2$	$\simeq$	$2 \cdot 10^{-9}$ N/m^2
Energy flux:	$n_p\ m_H\ u^3/2$	$\simeq$	0.5 mW/m^2
Temperature:	T	$\simeq$	10^5 (3500–$5 \cdot 10^5$) K
Plasma sound velocity:	v_{PS}	$\simeq$	50 km/s
Random velocity:	$\overline{c}_p$	$\simeq$	46 km/s
	$\overline{c}_e$	$\simeq$	$2 \cdot 10^3$ km/s
Particle energy:	E_p	$\simeq$	1.1 keV (flow energy)
	E_e	$\simeq$	13 eV (thermal energy)
Mean free path:	$l_{p,p} \simeq l_{e,e}$	$\simeq$	10^8 km
Coulomb collision time:	$\tau_{p,p} \simeq 30\,\tau_{e,p}$	$>$	20 d

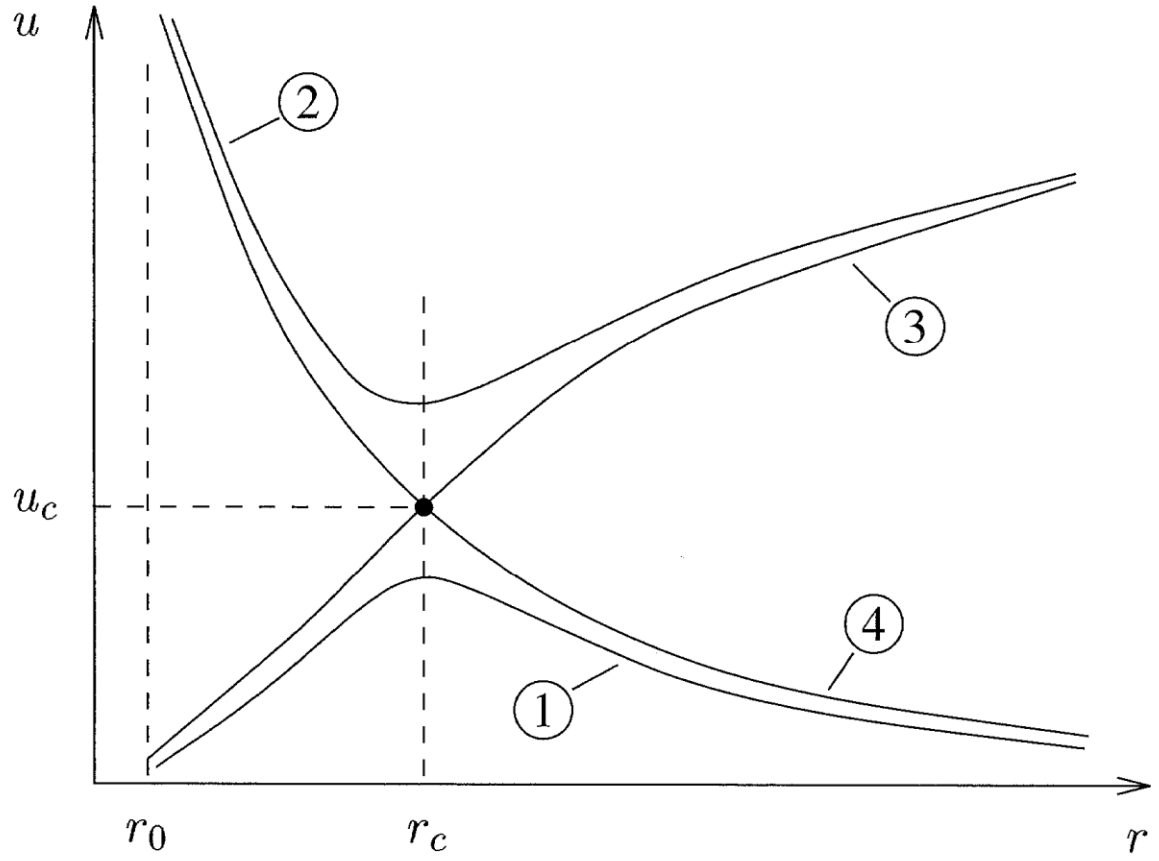
ACE solar wind data

Situated at L1

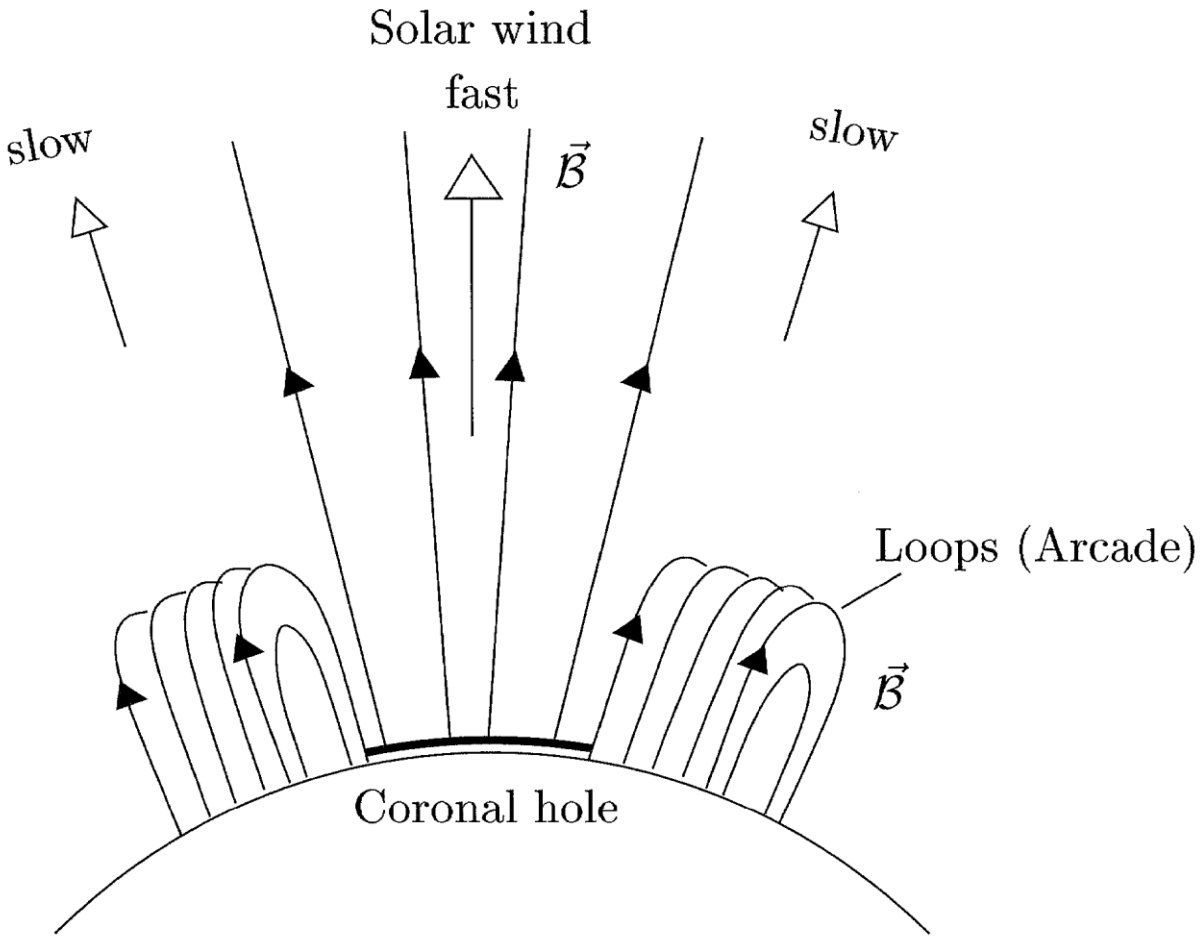


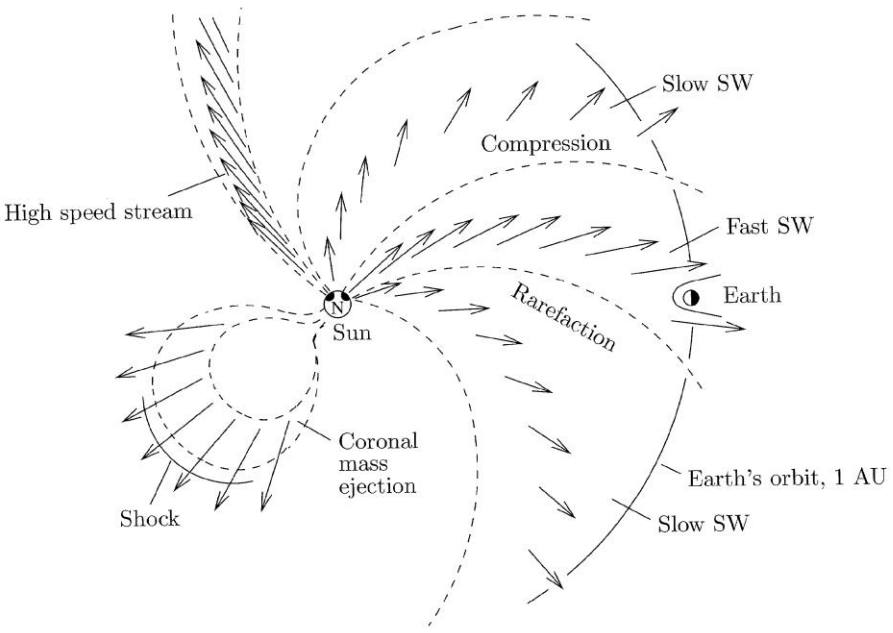
- http://www.swpc.noaa.gov/ace/

Gas dynamic model solutions

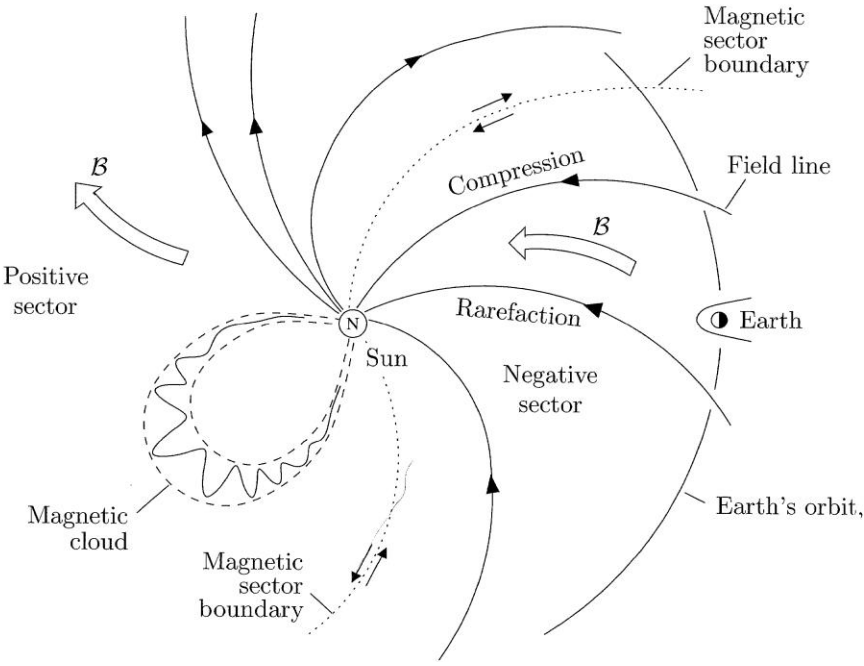


Magnetic field not contained in the gas dynamic solar wind model is also important!!





Plasma Flow



Magnetic field

Parker Spiral

http://www.youtube.com/watch?v=cSuiAGfBaHk&feature=channel&list=UL