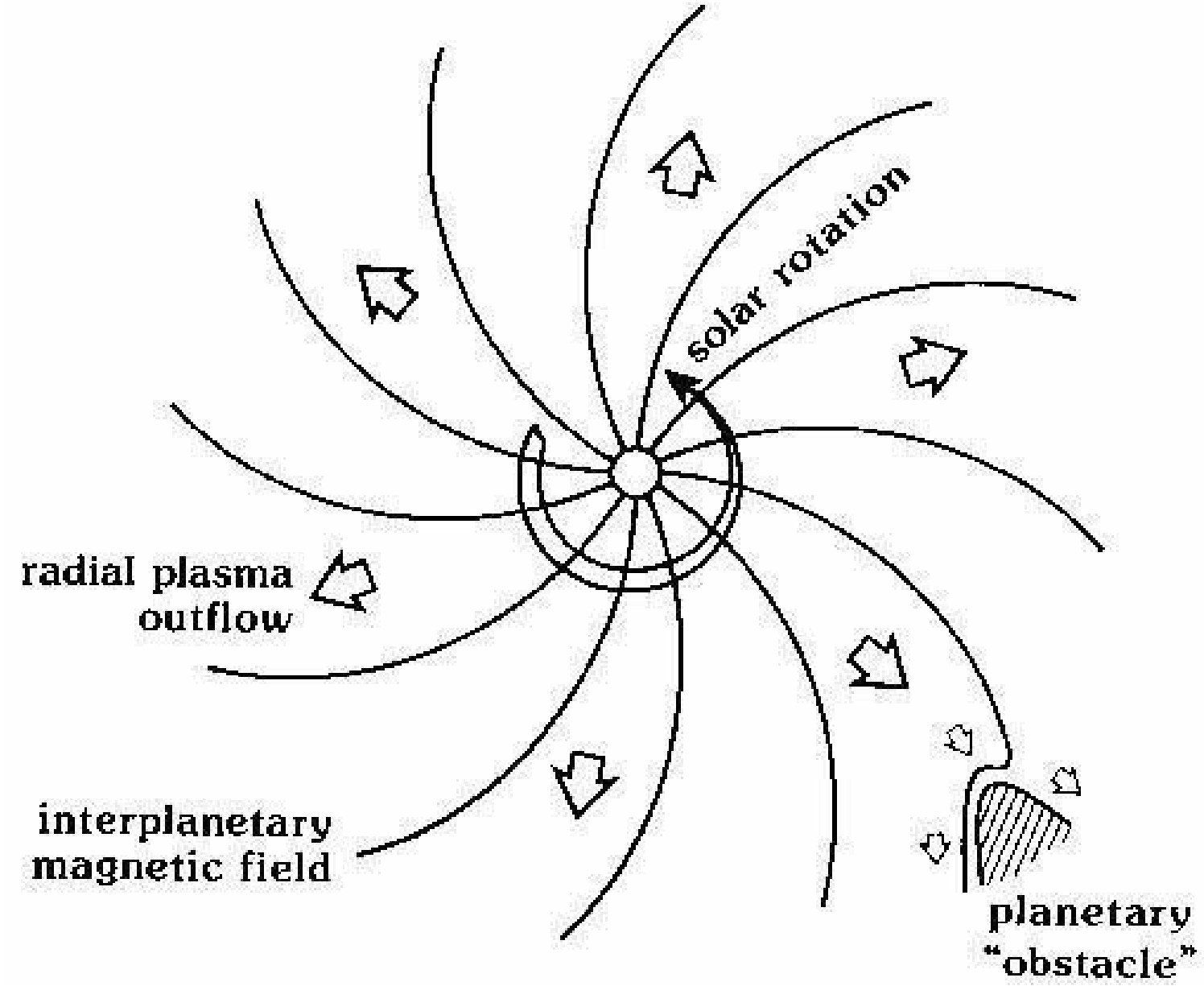
SOLAR WIND



http://pwg.gsfc.nasa.gov/istp/outreach/images/Gusts/windsprl.jpg

Table 1. Statistical Properties of the Solar Wind at 1 AU

Parameter	Mean	STD	Most Probable	Median	5-95% Range
n (/cm^3)	8.7	6.6	5.0	6.9	3.0 – 20.0
V_{sw} (km/s)	468	116	375	442	320 – 710
B (nT)	6.2	2.9	5.1	5.6	2.2 – 9.9
A(He)	0.047	0.019	0.048	0.047	0.017 – 0.078
T_p (x10^{5}K)	1.2	0.9	0.5	0.95	0.1 – 3.0
T_e (x10^{5}K)	1.4	0.4	1.2	1.33	0.9 – 2.0
T_α (x10^{5}K)	5.8	5.0	1.2	4.5	0.6 – 15.5
T_e/T_p	1.9	1.6	0.7	1.5	0.37 – 5.0
T_α/T_p	4.9	1.8	4.8	4.7	2.3 – 7.5
nV_{sw} (x10^8/cm^{2}s)	3.8	2.4	2.6	3.1	1.5 – 7.8
C_s (km/s)	63	15	59	61	41 – 91
C_A (km/s)	50	24	50	46	30 - 100

n is proton density, V_{sw} is solar wind speed, B is magnetic field strength, A(He) is He^{++}/H^+ ratio, T_p is proton temperature, T_e is electron temperature, T_α is alpha particle temperature, C_s is sound speed, C_A is Alfven speed.

The Sun yearly loses ~6.8 x 10^{19} g to the solar wind, a very small fraction of the total solar mass of ~2 x 10^{33} g.

thick: speed, thin: density

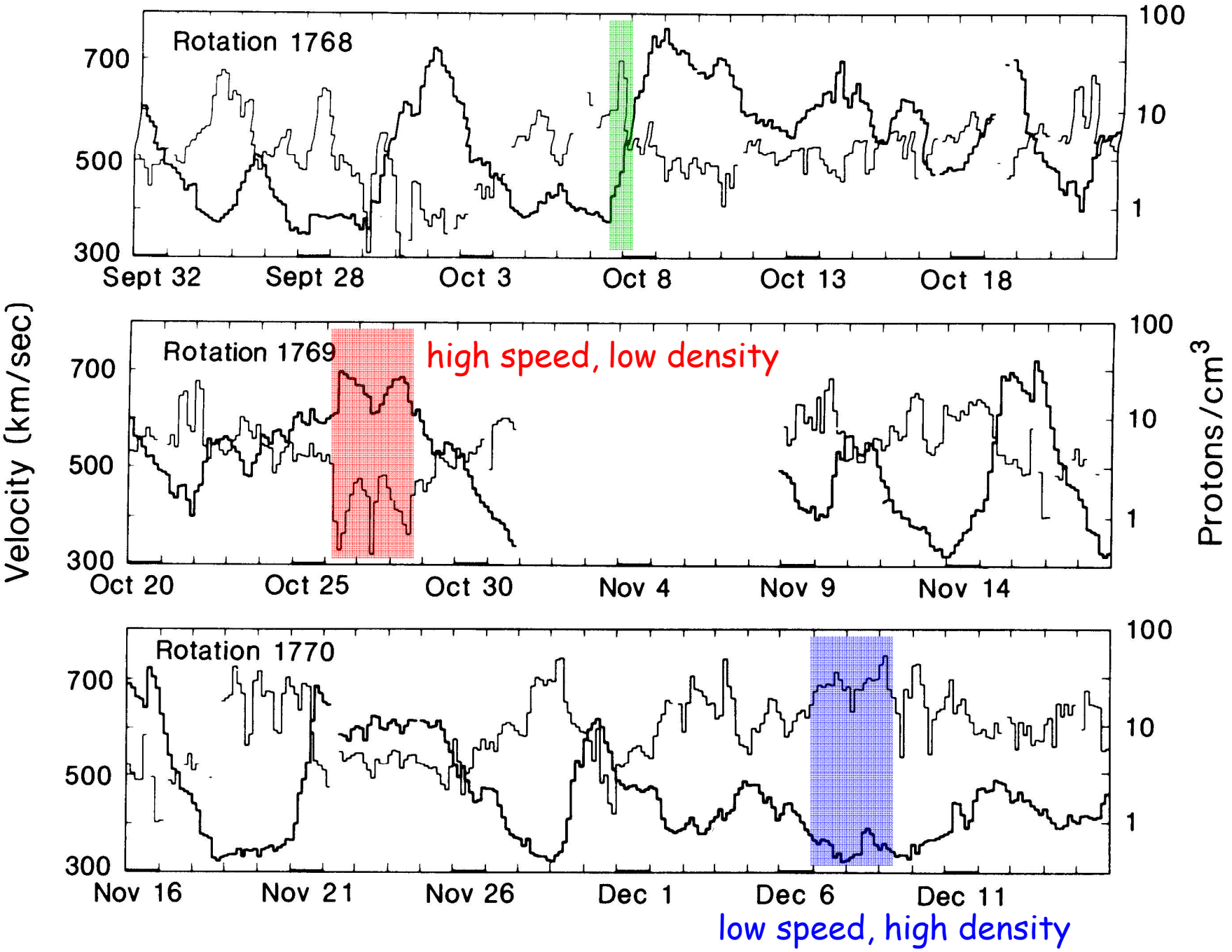


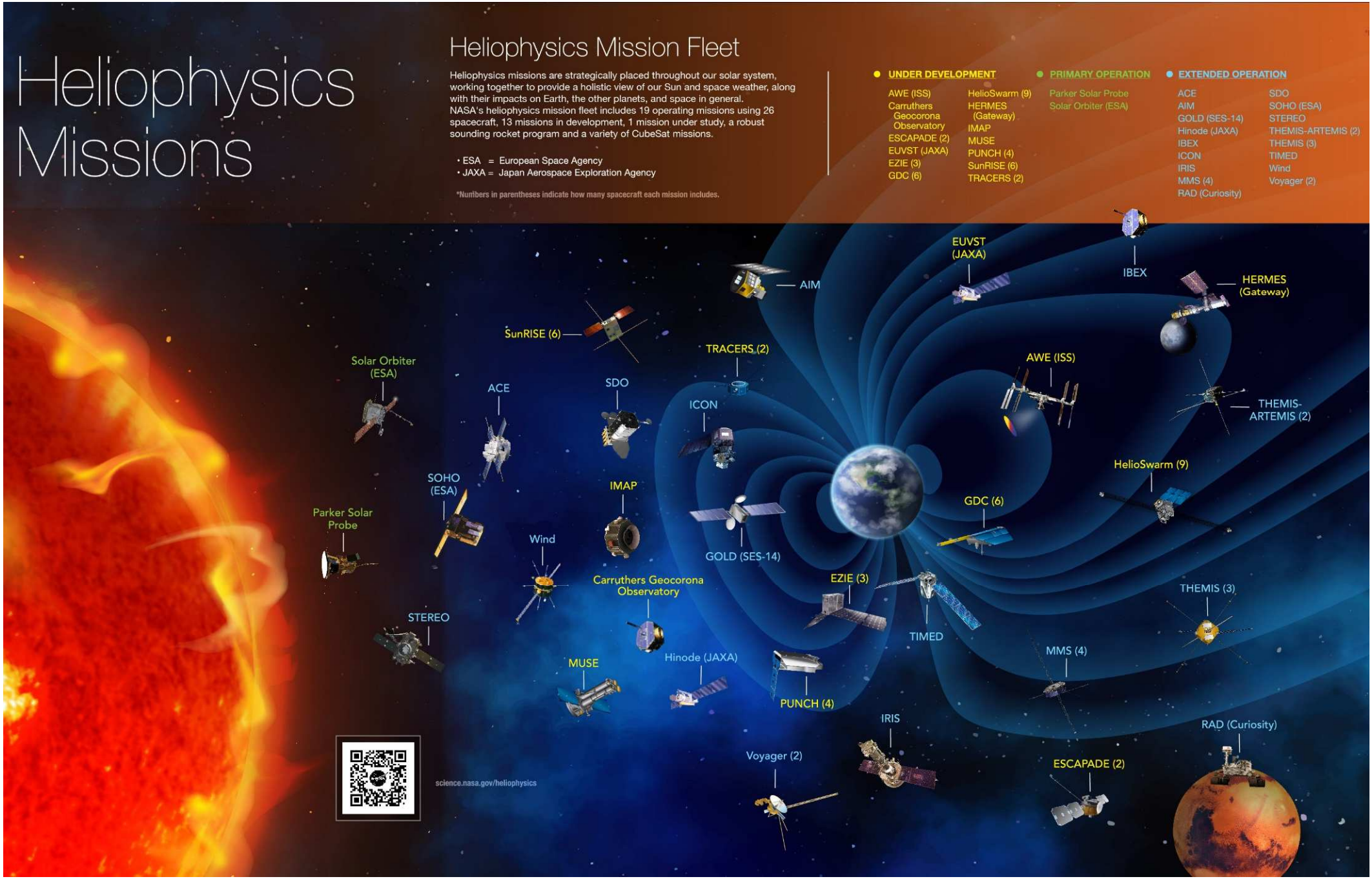
Table 2. Average solar wind parameters at 1 AU, for the time around solar activity minimum.

	Slow wind	Fast wind
Flow speed v_P	250–400 km s^{-1}	400–800 km s^{-1}
Proton density n_P	10.7 cm^{-3}	3.0 cm^{-3}
Proton flux density $n_P v_P$	3.7×10^8 cm^{-2} s^{-1}	2.0×10^8 cm^{-2} s^{-1}
Proton temperature T_P	3.4×10^4 K	2.3×10^5 K
Electron temperature T_e	1.3×10^5 K	1×10^5 K
Momentum flux density	2.12×10^8 dyn cm^{-2}	2.26×10^8 dyn cm^{-2}
Total energy flux density	1.55 erg cm^{-2} s^{-1}	1.43 erg cm^{-2} s^{-1}
Helium content	2.5%, variable	3.6%, stationary
Sources	Streamer belt	Coronal holes ← any others?

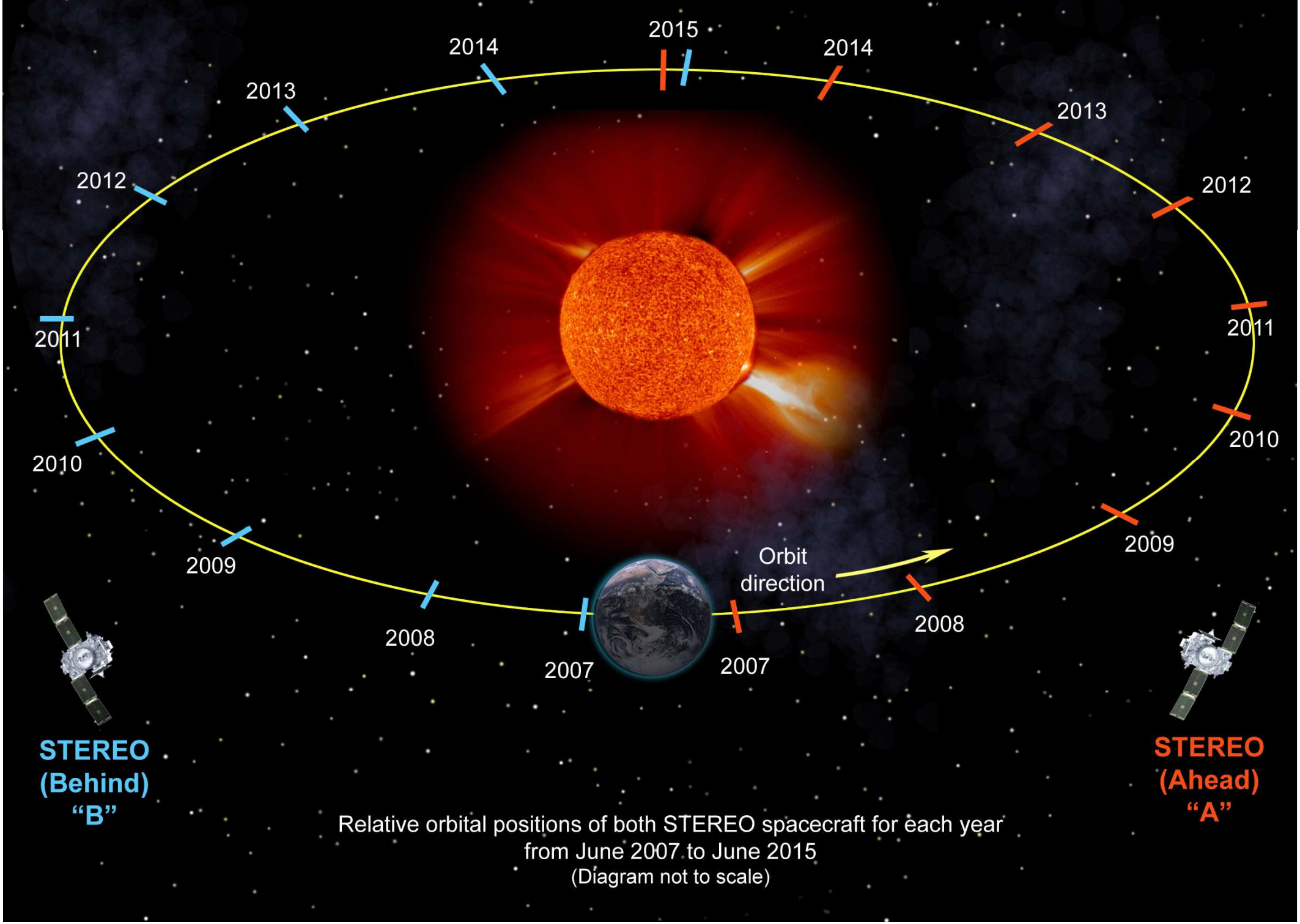
↓

Geo-effectiveness?

https://www.cfa.harvard.edu/~scranmer/ITC/eaaa_solar_wind_schwenn.pdf

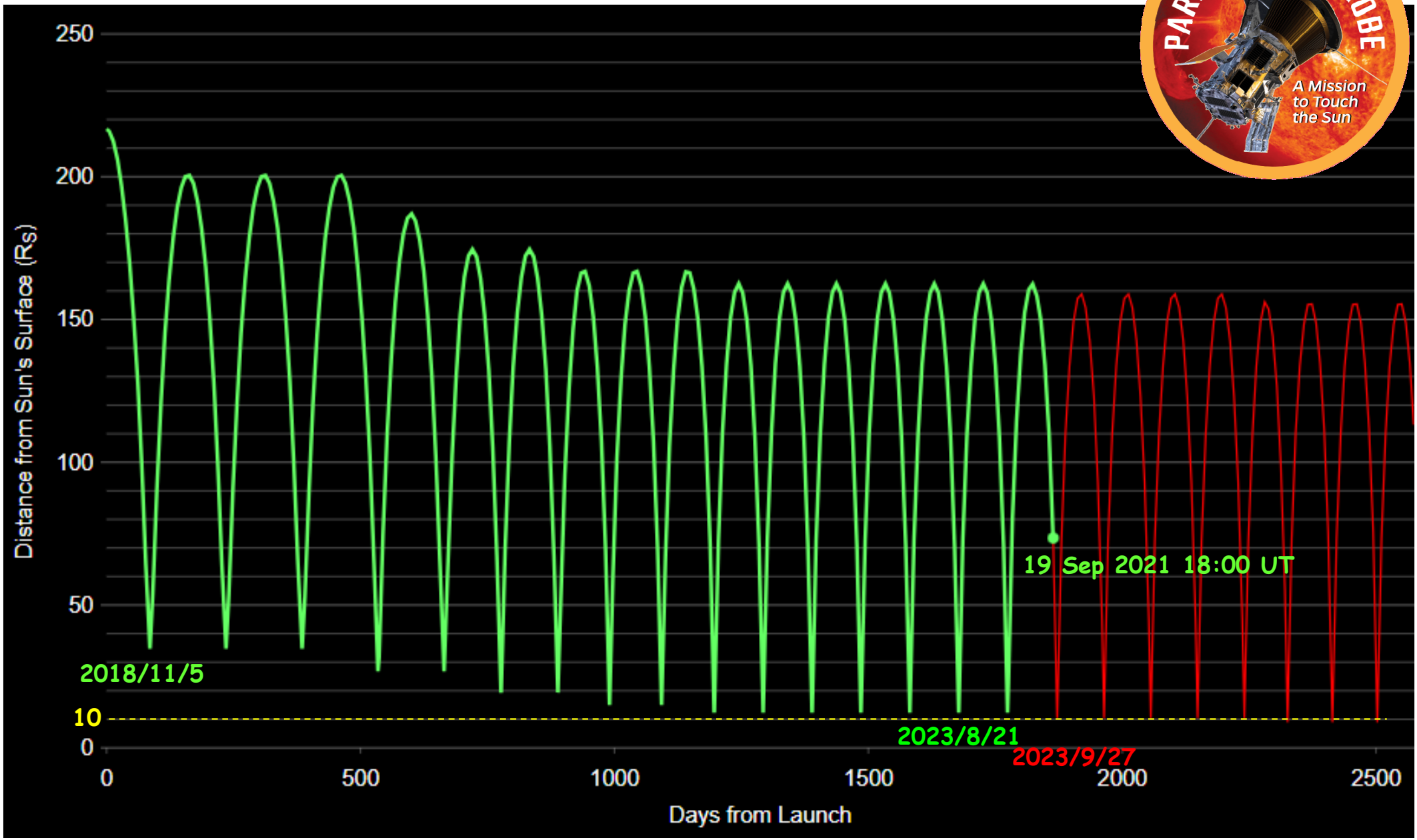


https://science.nasa.gov/heliophysics



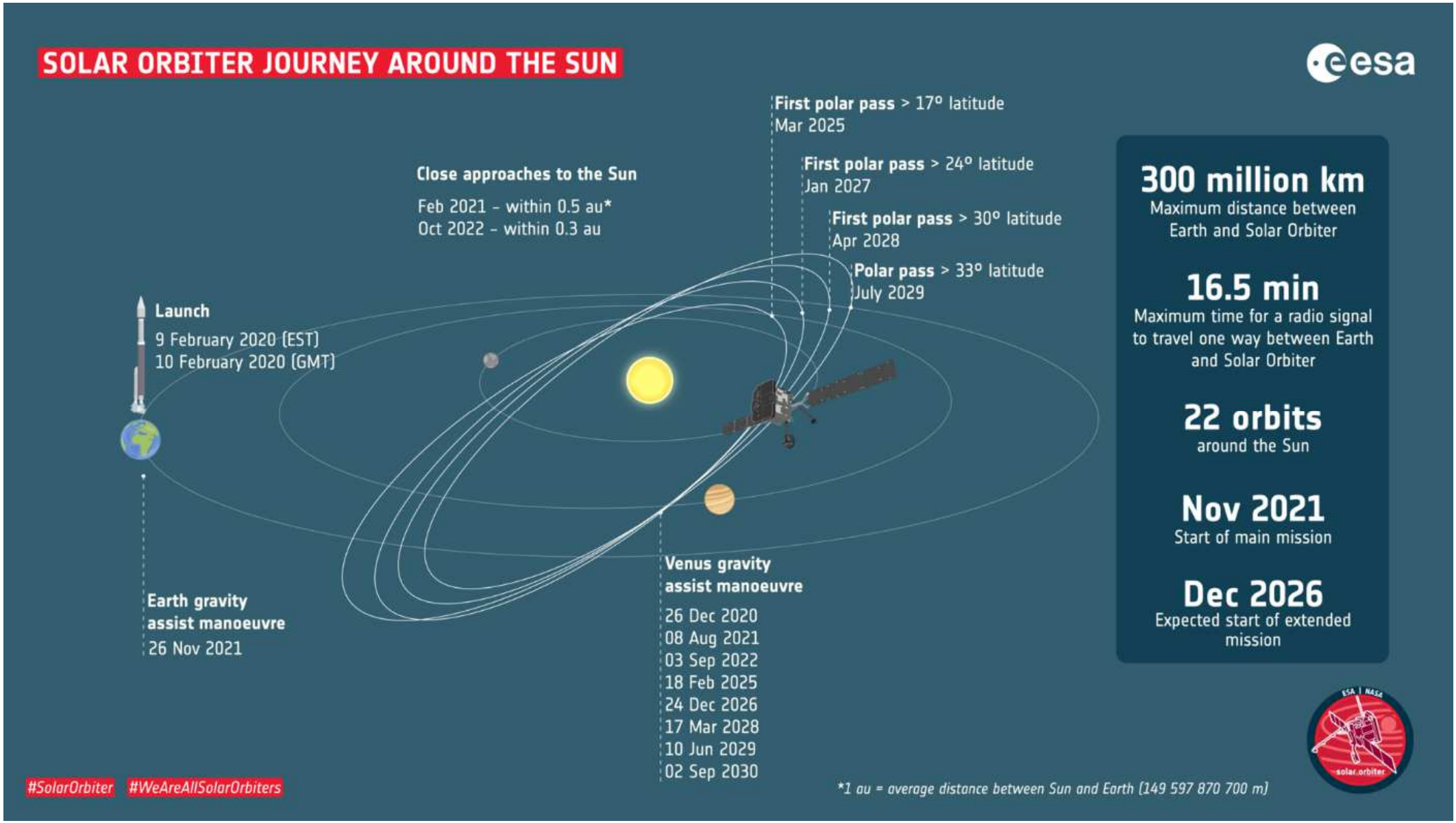
http://stereo.gsfc.nasa.gov/gallery/item.php?id=sciencevisuals&iid=11

Parker Solar Probe

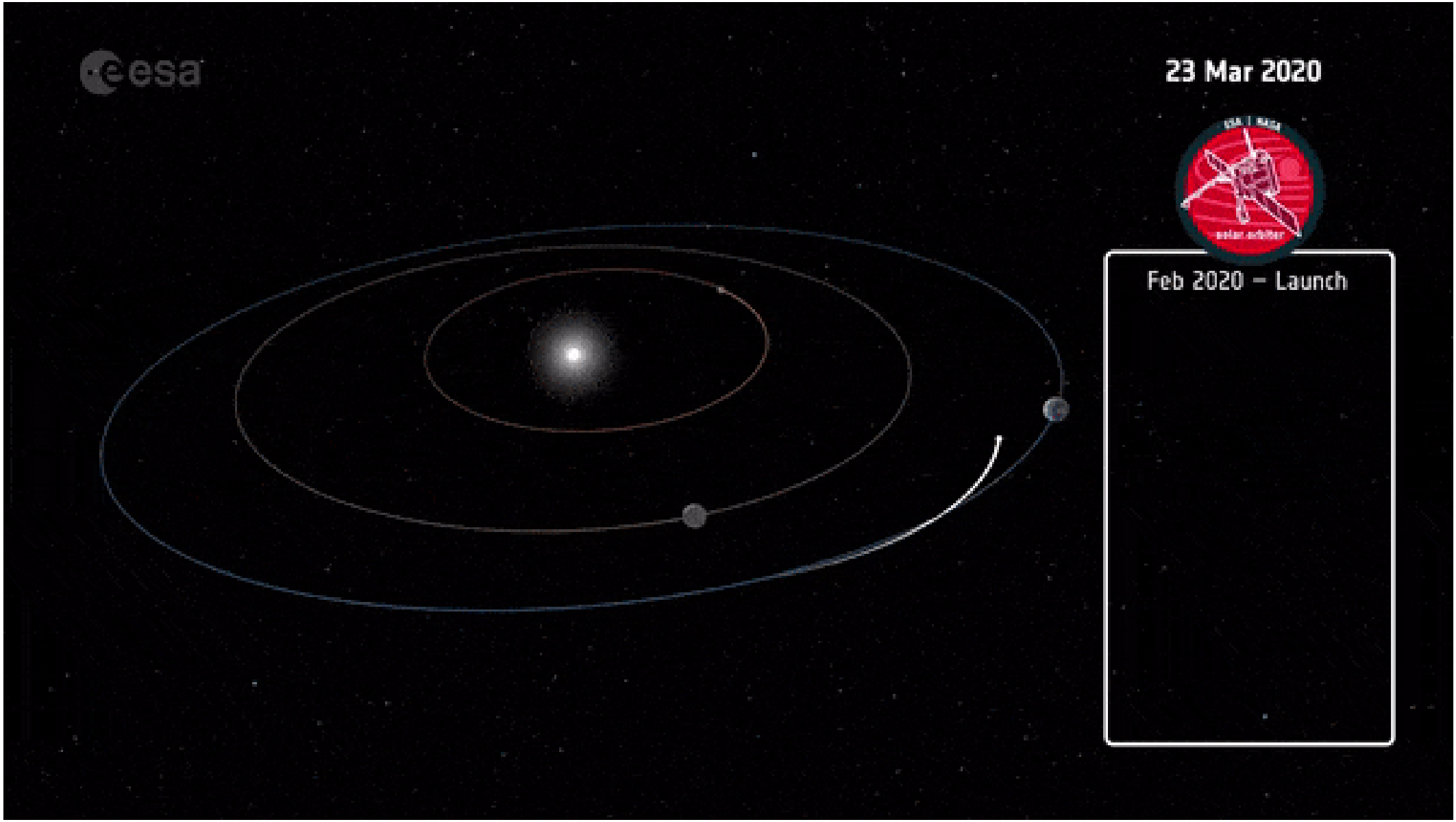


http://parkersolarprobe.jhuapl.edu/The-Mission/index.php#Where-Is-PSP

Solar Orbiter



https://www.esa.int/ESA_Multimedia/Images/2020/01/Solar_Orbiter_journey_around_the_Sun



https://www.esa.int/ESA_Multimedia/Images/2020/01/Solar_Orbiter_s_path_around_the_Sun