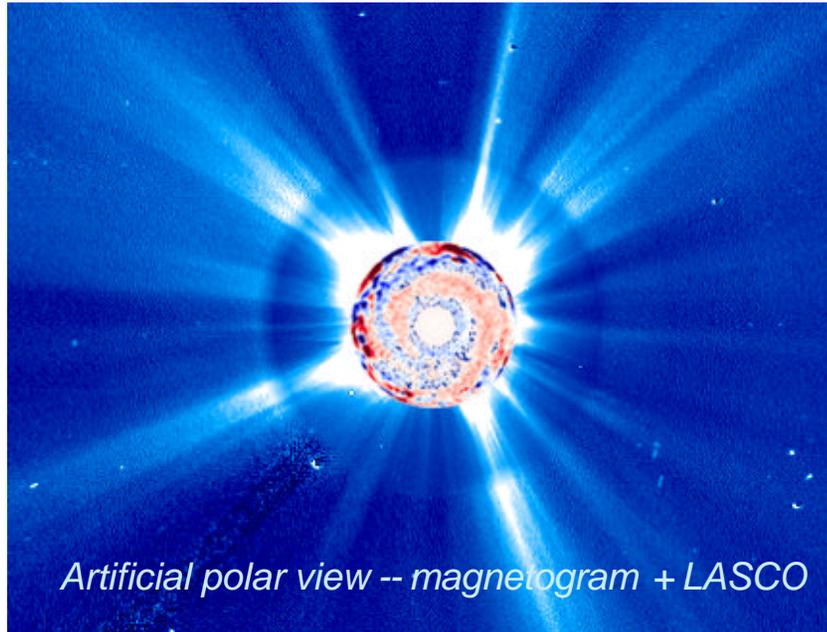




Solar Polar Pathfinder

Mission Concept Summary



Artificial polar view -- magnetogram + LASCO

The first look at the polar regions of the Sun will provide information on the role of the polar flows in the solar cycle and on the three dimensional structure and dynamics of the corona and CMEs. The mission is a pathfinder for a mission with a spacecraft in a polar orbit about the Sun.

Technology

- Lightweight subsystems and instruments
- High-rate KA band telemetry from deep space
- AI event selection and spacecraft autonomy

Fundamental Questions:

How do the flows in the polar regions effect the evolution of solar magnetic fields? What is the 3D structure of the corona and CMEs?

Science Objectives:

- Determine role of surface & subsurface polar flows in the solar cycle
- Determine 3D structure of the corona & longitudinal extents of CMEs
- Observe reaction of global corona to CMEs from a polar perspective
- Study transport of energetic particles transported to high latitudes

Mission Description:

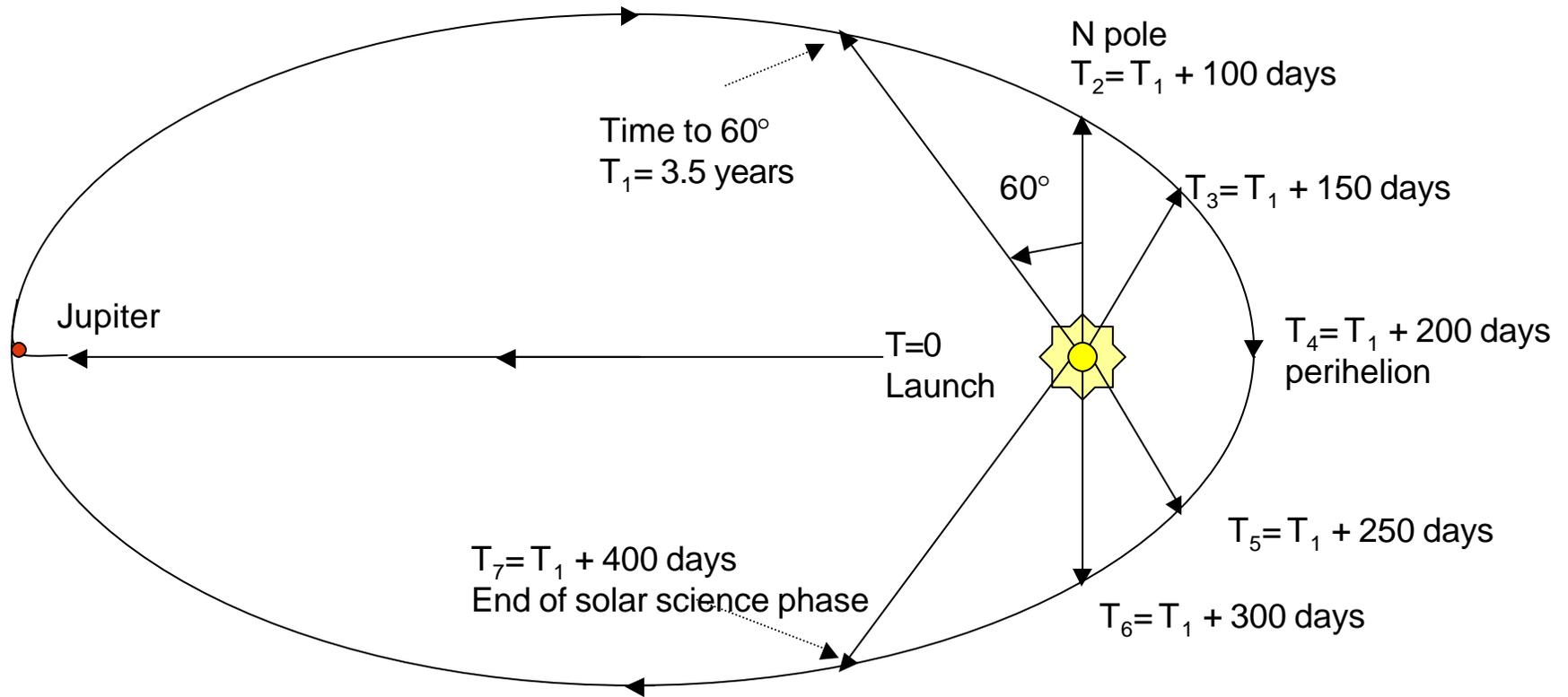
- Polar orbit (90° inclination) with 1 AU perihelion/ Jupiter aphelion
~3.5 year cruise
~1 year of solar science
- Ulysses-like trajectory with Jupiter Gravity Assist
- Solar array-powered three-axis stabilized platform
- Option for extended mission with second solar passage

Measurement Strategy

- Make pioneering measurements of the evolving polar magnetic field
- Make pioneering measurements of the surface and sub-surface flows in the polar regions and internal flows at greater depths
- Image coronal structure & dynamics from the polar perspective
- Image CME initiation and propagation from the polar perspective
- Measure solar wind plasma in polar regions in unique context provided by imaging + in situ magnetic field measurements

Solar Polar Pathfinder JGA Orbit

Cruise Phase (Earth to Jupiter to 60°) = 3.5 years; Solar Science Phase = 400 days



Orbit Comparison

Total time above 60°

Total solar science phase (T_1 to T_7)

1 AU Perihelion 0.5 AU Perihelion

300 days

400 days

150 days

190 days