Lab 4: Magnetosphere 2: A Magnetosphere in Different Places

Introduction
This lab will use model results to explore how changing the location of the Earth will affect the structure of the magnetosphere.

Before you begin, as a group discuss:
- What are the important drivers and parameters that affect the shape of the magnetosphere?
- How do these vary as you change location in the heliosphere?
- How do you expect the magnetosphere to change?

Magnetospheres in Different Locations
This link is to a table of runs for different dipole strengths.
http://ccmc.gsfc.nasa.gov/support/HSS_2013/11deg.php
The table not only gives links to the run outputs, but also gives you the run parameters. The "Keywords" indicate the simulated distance from the Sun, and the solar wind parameters are given.
- Is the variation in solar wind parameters consistent with what you discussed above?
- Why do the other parameters change?

Now let's look at the specific simulations.
- *Open up all of the simulation links in new tabs and click on "View Magnetosphere" and click "Update Plot".*
- *Use the "Plot Area" settings to adjust the image size.*

- Looking over all of the profiles, does the magnetosphere change qualitatively in the way you expect it to?
- What qualitative changes do you see?

Quantitative Changes
- Using the "Line(1D)" plots the way you did in the last lab, identify all of the quantities that we identified previously and tabulate them as a function of distance from the sun. The included:
  - on the day side: position of the bow shock and magnetopause, the position of the reconnection point ("X"- point), the width and maximum density of the magnetosheath.
  - on the night side: how far away does the current sheet first develop, and what the maximum value of the current sheet. (You may want to go back to the 2D slices for this?)
- What general trends do you see in these features?

A more in-depth demonstration of the magnetosphere tools will be provided.