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Modelling the size and shape of Saturn's magnetopause using dynamic pressure balance

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The shape and location of a planetary magnetopause can be determined by balancing the solar wind dynamic pressure with the magnetic and thermal pressures found inside the magnetopause. Previous studies on the kronian magnetopause have argued that the boundary is Earth-like (Slavin et al. 1985) and Jupiter-like (Arridge et al. 2006) in terms of its dynamics. In this poster we hope to find a solution by presenting a new pressure-dependent model of the magnetopause, expanding on the work of Arridge et al. (2006).

Using a Newtonian form of the pressure balance equation, including the solar wind thermal pressure, we estimate the solar wind dynamic pressure at each crossing. By fitting the model to magnetopause crossings observed by the Cassini spacecraft we obtain a model which is consistent with the dynamic pressure estimates calculated. We build upon previous findings by including estimated values for the solar wind thermal pressure and taking the high beta case into account, by including low energy particle pressures from the Cassini plasma spectrometer (CAPS) and high energy particle pressures from the Cassini magnetospheric imaging instrument (MIMI).

The results are compared to previous models to see whether the size and the shape of the boundary vary with these additional parameters. Directions for future studies are also outlined.