



## **The Induced Plasma Environment of Solar Probe Plus**

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Spacecraft thruster firings for attitude control can strongly perturb the local plasma environment. At 1 AU such attitude manoeuvres are usually infrequent and scientific data taking is reduced or turned off during such periods. However, Solar Probe Plus (SPP), which will eventually reach only 8.5 solar radii from the Sun's surface, will require frequent attitude changes for thermal control. Additionally it will be in an environment with much higher UV radiation and with very different plasma parameters from conditions typical for spacecraft at 1 AU. Data taking will be at a premium due to the relatively short time spent closest to the Sun. For these reasons it is interesting to examine the influence of thruster firings on the local plasma environment appropriate to the Solar Probe Plus mission

We have developed a model of the neutral gas plume for a generic monopropellant thruster. Using ionization rates appropriate to the range of solar distances for SPP, and the orbital velocity of SPP, we have performed 3D hybrid simulations of the interaction of the thruster exhaust with the local solar wind. We will present results for different scenarios of solar distance and solar wind parameters. Newly ionized particles can couple to the solar wind via mass loading, ion cyclotron instabilities and transient effects. We will discuss the types of interaction seen in the simulations and compare with similar phenomena seen in cometary environments. The induced environment at the spacecraft location will be described, as localized perturbations of plasma density, etc., may invalidate observations of the in situ solar wind.