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Cassini observations of the plasma environment near Titan's orbit

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Titan orbits Saturn at an average distance of 20 Saturn radii (R_S). It is mostly in the outer magnetosphere and interacts with the corotating plasma, but it may occasionally move into the magnetosheath near the noon sector of Saturnian local time (SLT) when the solar wind pressure is high. The upstream plasma and magnetic fields frozen into it are variable with SLT, which adds to the complexity of the Titan interaction. To obtain the statistical characteristics of the Titan plasma environment at different SLT, we study the magnetic fields and plasma measurements during Titan passes and also when Cassini passes Titan's orbit far from Titan. This study includes 98 Cassini orbits from Jun 2004 to Dec 2008. It also allows us to compare the plasma environments in Titan orbit with and without Titan near by. It appears that near the noon SLT the Saturn magnetopause is more frequently inside of Titan's orbit when Titan is far away than when it is nearby. This indicates that the presence of Titan near noon may enhance the local total pressure to push the magnetopause further, possibly by mass-loading. In general the magnetic field near Titan's orbit is more dipolar-like near noon and more stretched near midnight, but at some SLT it is more variable with Titan nearby. In this paper, we study the plasma environment near Titan orbit at different SLT and compare the different properties with and without Titan present. This study will determine the statistical characteristics of the plasma flow and magnetic field encountering Titan at different SLT and some implications about the influence of Titan on its plasma environment.