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The induced and intrinsic magnetic fields from Titan's interior determined from Cassini observations

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Cassini has obtained over ten years of data during more than a hundred Titan flybys, which allows us to better understand Titan's plasma interaction with its environment and estimate the induced and intrinsic fields from Titan's interior. The magnetic state of Titan could provide important constraints on its interior structures. If there is an induced field, there must be conductive layer/layers in Titan's interior, such as a subsurface ocean. If there is a long-term "permanent" intrinsic field, it could be dynamo-driven, remanent, or just due to the magnetization of Titan's interior. We use all the available data below 1100 km altitude to search for induced field signatures responsible for the ambient field variation at the period of SKR and a Saturn year. We have not found well-defined induced field signatures modulated by the SKR phase, but we will perform correlation study on the modeled Titan environmental field and the induced field orientations. The ambient field variation with Saturnian season has a long enough period to diffuse into the interior and magnetize it. The magnetized interior would appear like an intrinsic dipole moment for short observation time scales, except that this "intrinsic dipole" would change orientation as the ambient field changes after equinox. We compare the estimated dipole moments before and after equinox and find that their orientations change as expected due to a magnetized interior.