On the relevance of applying high-precision magnetic field models to magnetic data for studying the ionosphere

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Observations of the Earth's magnetic field are an excellent tool for remote sensing ionospheric currents. For a reliable analysis of the magnetic field sources in the ionosphere, contributions from the other sources have to be estimated and removed from the data. These sources are from the Earth's core and lithosphere and from large scale currents in the magnetosphere. The latter contributions can be estimated from recent geomagnetic field modeling. A standard model is the International Geomagnetic Reference Field (IGRF) that covers the contributions from the Earth's core field. More advanced high precision magnetic field models deliver as well a description of the lithospheric and magnetospheric contributions. This work discusses the relevance of applying high precision magnetic field models against IGRF for the analysis of different ionospheric current systems, during disturbed and quiet magnetic conditions. Therefore, we will present examples and statistical analyses of magnetic residuals of ground observatory data and high-precision magnetic field observations onboard satellites.