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Troposphere slant delay corrections from numerical weather models - status and outlook

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Microwave space geodetic and remote sensing applications suffer from the fact that electromagnetic waves are delayed and bended when they propagate through the Earth's atmosphere, an effect known as troposphere refraction. Beside post-processing methods, which rely on simplified models about the atmospheric behavior, numerical weather models can be used to compute the atmospheric delay and apply corrections on the observation level. Nevertheless, even the most sophisticated weather models are not capable to represent the true 3D refractivity field, in order to derive millimeter accurate delay corrections. Therefore, we discuss strategies to handle such model imperfectness, yielding optimum performance in reducing atmospheric delays within the processing chain. It will be shown how space geodetic and remote sensing techniques benefit from the application of ray-traced troposphere corrections and how this impacts geophysical target parameters and interpretation of the results. Moreover, a hybrid approach, which iteratively improves the numerical weather model in interaction with the space geodetic measurements, will be presented as well.