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Secular variation: from observatory monthly means and from global field models

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Thanks to the past decade of Geopotential Field Research, including the successful satellites CHAMP, Ørsted and SAC-C, recent core magnetic field models achieve an unprecedented accuracy. However, sophisticated models like GRIMM-2 or CHAOS-2 struggle in fitting some observatory secular variation (SV) estimates. These differences become evident when the short term SV is considered, i.e. very fast variations of a few months duration are not reflected by the models. The unmodelled signals can either be of internal or of external origin. After identifying the observatories for which SV time series are not properly fitted, we model the differences with the harmonic spline functions. Those basis functions are located at the selected observatory positions and permit an exact fit to the data, if required. Additionally, a model based on these harmonic spline functions can be easily translated in terms of SH, allowing for a direct comparison with the standard existing models. From the improved spatial and temporal description of these signals, we expect a better understanding of their underlying causes.