



## External field noise in main field models at Earth's surface and at core/mantle boundary

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We show that the well known residual external effects in annual means provided by geomagnetic observatories map into main field models based mainly on annual means. Our analysis includes gufm1 (Jackson et al., 2000) and COV-OBS (Gillet et al., 2013), for which no provision has been taken to eliminate the external residual from data prior to spherical harmonic calculations. The temporal evolution and characteristics of this noise in models at surface and at core/mantle boundary is discussed and some consequences of the merits and especially demerits of its presence in models are indicated.