



## **Contributions of the external field to the observatory annual means and a proposal for their corrections**

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The data from 46 European geomagnetic observatories collected over 42 years (1960 - 2001) are used to investigate the contributions of the external field to the observatory annual means. We separate, interpret and explain magnetospheric and ionospheric signals present in the data. To characterise the various field components we use predictions from latest magnetic field models. The core field and its secular variation are described by the CM4 model and the magnetospheric contributions are successfully removed by parameterising the POMME model with the Dst index. We regard the remaining signal as caused by ionospheric currents. The annual averages of the Sq variation estimated by the CM4 model are subtracted from the residuals. A remaining variation in anti-phase with the magnetic activity index  $A_p$  finally can be removed with a function properly scaled by  $A_p$  and Dst. We offer an objective procedure to suppress the external field contributions in the annual means to an uncertainty level of  $\pm 2$  nT. Except for the ionospheric currents this could be achieved by applying recent magnetic field models, which shows that the quality of present day models is sufficient to correct observatory data for average external field contributions. Understanding the signal contained in the annual means is a prerequisite for obtaining reliable and physically meaningful results when such data are used in studies of the core field and its secular variation.