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A northern hemisphere geomagnetic field model for the last 14ka

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In this work, we propose a first regional geomagnetic field model for the Northern Hemisphere based on archaeomagnetic and lava flow data. The regional model, called scha.dif.14k, allows us to analyse the low degree of the geomagnetic field secular variation for the last 14000 years: from 12000 BC to 1900 AD. The inversion process of the declination, inclination and intensity palaeomagnetic data was carried out iteratively, using the spherical cap harmonic analysis (SCHA) up to degree K = 4 in space and penalized cubic B-spline in time with a knot point of 100 years for the whole time interval. Three starting models have been tested: a) A constant axial dipole field, b) a time-dependent axial dipole field and c) a time-dependent inclined dipole field. The last two starting models were estimated by using directly the archaeomagnetic data. These starting models have been perturbed in order to obtain a regional model with a higher spatial and temporal variability. We have compared the model with the recent published palaeosecular variation curves and with the global model for the Holocene: CALS10K.1b. Our model fits reasonably well the different palaeosecular variation curves and improves the prediction of the CALS10K.1b global model.