

EGU21-13101

<https://doi.org/10.5194/egusphere-egu21-13101>

EGU General Assembly 2021

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Rapid intensity variations during the second half of the first millennium BCE in Central Asia and global implications.

Raquel Bonilla-Alba^{1,2}, Miriam Gómez-Paccard², Francisco Javier Pavón-Carrasco¹, Elisabet Beamud³, Verónica Martínez-Ferreras⁴, Josep Maria Gurt-Esparraguera⁴, Enrique Ariño-Gil⁵, Judit del Río², Alicia Palencia-Ortas^{1,2}, Fátima Martín-Hernández^{1,2}, Annick Chauvin⁶, and María Luisa Osete^{1,2}

¹Complutense University of Madrid (UCM), Madrid, Spain

²Institute of Geosciences IGEO (CSIC-UCM), Madrid, Spain

³CCITUB-Geo3Bcn, Geosciences Barcelona CSIC, Barcelona, Spain

⁴University of Barcelona, Barcelona, Spain

⁵University of Salamanca, Salamanca, Spain

⁶University of Rennes

Recent archeomagnetic studies performed in different regions of the world have revealed unusual periods of sharp changes in intensity during the first millennium. Here we focus on the study of intensity variations between 600 BCE and 600 CE in central Asia, where an important intensity decrease seems to be present during the second half of the 1st millennium BCE. For this purpose, we present a new paleosecular variation (PSV) curve obtained from 51 new archeointensities and the selected previous data located within a radius of 1000 km around Termez (Uzbekistan). The new curve shows an intensity maximum around 400 BCE followed by a rapid decrease. When the virtual axial dipole moment (VADM) values are compared with the Dipole Moment estimations derived from different global geomagnetic models key differences are observed, suggesting an important non-dipolar effect for this feature. Finally, in order to constrain the spatial behaviour of this phenomenon and its global implications, we investigate the PSV intensity and VADM trends from twelve regions distributed among Central America, Europe and Asia. A VADM maximum is observed in Western Europe (Iberia and Germany) around 450 BCE, associated to rates of change of about 9 $\mu\text{T}/\text{century}$. This feature is also observed eastwards, in the Caucasus and the Levant, but associated to lower rates of changes. In Central Asia (Uzbekistan) our new study suggests that maximum values of about 14 $\mu\text{T}/\text{century}$, between 400-300 BCE, were achieved. In other regions, as Eastern Asia and Central America, rapid variations of the intensity are not observed during the targeted period.