SUPPLMEMENTARY MATERIAL (CAN ACT AS AN APPENDIX TO OUR ARTICLE)

Despite the increased density of the magnetic observatories in Europe, their latitudinal distribution is fairly uniform, so any SA intensity increase (by modulus) anywhere will be reflected in the averages. Let us recall that we calculate averages separately for positive and negative SA values. Therefore, we believe that the averaging approach is relevant for the proposed SA pulse detection task. Moreover, we only aim to detect the appearance of the SA pulses; estimating the amplitude or power of the SA pulses is beyond the scope of our research.

To make sure that the averaging procedure does not mask the SA pulses, we have constructed the characteristic functions for SA pulse identification as it was done in our previous research [Soloviev et al., 2017]. Such function agreed well with the satellite-based models and turned out to be a good indicator for SA pulses. An example is shown in Fig. 1 in this document. This result is very close to averages presented in the manuscript. The spectra calculated in the same way as in the manuscript but based on the characteristic functions again display the peaks around 6 and 8 years (see Fig. 2 in this document).

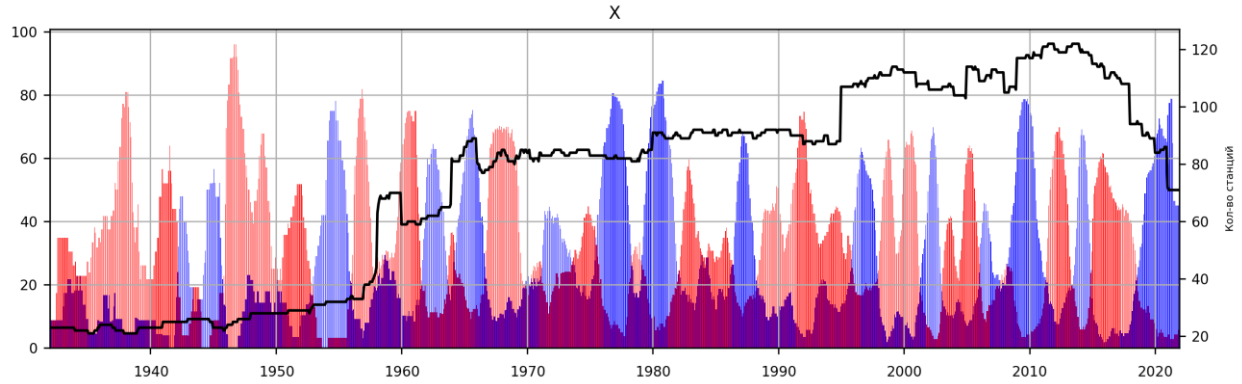

Fig. 1. SA characteristic function for the *X* component records with the threshold value = 2 nT/yr^2. Blue and red bars show monthly percentage of observatories where SA(*X*) < –2 nT/yr^2 and SA(*X*) > 2 nT/yr^2 respectively. Black polyline shows a total number of available observatories per month (right scale). See [Soloviev et al., 2017] for details

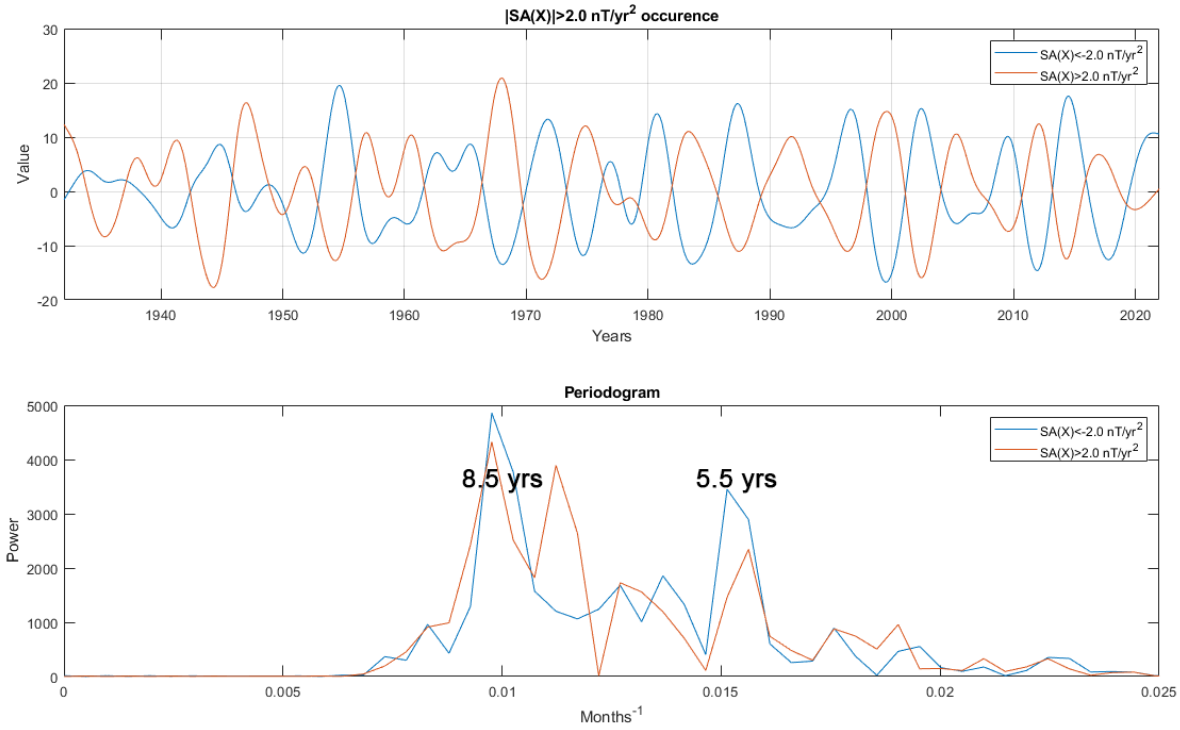

Fig .2. Positive (red) and negative (blue) envelopes of the SA based on the characteristic function approach from [Soloviev et al., 2017] for the *X* component (top) and their spectral power density (bottom)

JERKS AND PULSES:

Indeed, it is not possible to derive the correlation between the number of jerks and the intensity of SA pulses numerically, so our results are mainly qualitative, as they provide only visual correlation. A comparison of SA curves derived from individual observatory data with SA predictions according to CHAOS-6 model was presented in our previous research [Soloviev et al., 2017]. In the article [Sidorov et al., 2025] we have added a comparison of the derived global SA envelopes with the peaks in the global SA power at the CMB predicted by the CHAOS-7.18 over 1999-2020 and KALMAG models over 1932-2020.

Sidorov R., Soloviev A., Bogoutdinov Sh. A 6-year quasi-periodicity in the geomagnetic secular acceleration pulses over 1932–2022, Physics of the Earth and Planetary Interiors, Volume 361, 2025, 107330, ISSN 0031-9201, https://doi.org/10.1016/j.pepi.2025.107330

Soloviev A., Chulliat A., Bogoutdinov Sh. Detection of secular acceleration pulses from magnetic observatory data, Physics of the Earth and Planetary Interiors, Inter. 2017, Vol. 270, pp. 128–142. https://doi.org/10.1016/j.pepi.2017.07.005