



## **Anomalous higher frequency component of ISSN and relationship between sunspot lifetime and their birthrate: explanation with an AR-1 model**

Alexander Shapoval (1), Jean-Louis Le Mouél (2), Mikhail Shnirman (3), and Vincent Courtillot (2)

(1) NRU HSE, Moscow, Russia (abshapoval@gmail.com), (2) IPGP, Paris, France, (3) IEPT RAS, Russian Federation, Moscow, Russia

The higher frequency (HF) component of the daily ISSN time-series contributed anomalously weakly to total energy during the last epoch of high solar activity (lower boundary of HF component taken as 3–6 days). To explain this anomaly, we model the daily ISSN as an autoregressive process of order one, with a noise component modulated by the  $\sim 11$ -yr cycle. We link the observed anomaly to positive correlations between the "births" of sunspots in nearby locations when solar activity is high. We also analyze the relationship between birth rate of sunspots and their average lifetime. Our findings support the hypothesis that, on day-to-month scales, solar proxies reflect the solar dynamo itself, accompanied by modulated noise and effects linked to solar rotation. Representing solar activity as a combination of sunspot lifetime and intensity of sunspot births should narrow choices of solar dynamo models.