

Supplementary information:

This is the supplementary information on the paper SH046 presented in the Proceeding of the 35th International Conference (at Pusan in July 15-17, 2017).

1. Wolf's idea: We first describe Wolf's idea. Wolf hypothesized that sunspot activity could be described by two oscillations with slightly different frequencies. Recently, the author found a note in an old Japanese publication written by H. Yoshimura (p. 39, Modern Solar System, Gakusyu-Kenkyusya, 1990; in Japanese). (In the book, a paper was already included a puzzle on the solar neutrinos written by Nakahata.)

Therefore, I have investigated three reference of H. Yoshimura in his paper on the solar dynamo theory that appeared in ApJ, 226 (1978) 706-719: 1); Wolf, R., Astr. Mitt. Zurich, **1** (1856) 8, 2) Astr. Mitt. Zurich, **14**, (1862)119, and 3) Astr. Mitt. Zurich, **24** (1868) 111. Although Wolf's idea could not be found in these studies, I found an interesting note. Prof. Wolf hypothesized that sunspots may be produced by planetary movement (MNRAS, **19** (1859) 85). Recently, a similar idea was applied to global climate change by Scafetta et al. in Earth-Science Reviews, 162 (2016), 24-43.

Alan Julian Izenman also prepared a nice summary on the works of Wolf and Wolfer (J.R. Statist. Soc., A, **146** (1983) 311-318). However, Wolf's idea was not introduced. If anybody knows of a published account of Wolf's idea, please let me know via email: muraki@isee.nagoya-u.ac.jp.

2. Butterfly diagram of NSO Kitt Peak field measurements: from Astrophys. J. 768 (2013) 162, DOI: [10.1088/0004-637X/768/2/162](https://doi.org/10.1088/0004-637X/768/2/162) e-Print: [arXiv:1303.1218](https://arxiv.org/abs/1303.1218) [astro-ph.SR]. I have found two butterfly diagrams of solar magnetic spots. However, one of the plots uses different colors for the N and S poles than are traditionally used in Japan. Therefore, the butterfly diagram prepared by J.G.D. Petrie is presented below. The red points indicate north polarity, while the blue points indicate south polarity. An equivalent plot can be found in <http://obs.ucla.edu/torsional.html> (plot prepared by R.K. Ulrich).

