Period and amplitude persistence of long period oscillations in sunspots

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Abstract: Long period oscillations in the microwave radiation intensity generated above the sunspot of NOAA AR 10330 are studied with the Nobeyama Radioheliograph (NoRH) over the course of 9 days. Periodogram and global wavelet analyses reveal oscillatory components in the range P=50-120 min over the course of at least 6 days of observation. The ground-based nature of the instrument naturally introduces long gaps in the data which prohibit any conclusion as to the stability of the phases of the oscillations.

3. Presence of long period oscillation in the signals

Time series of microwave intensity generated from sequences of images of AR10330 (left) and normalised power spectra obtained for each of the 9 detrended signals (right), using the global wavelet (black) and Lomb-Scargle periodogram (red).

4. Persistence of period and amplitude

Long gaps in the data, due to ground base character of the observations, do not allow to draw any conclusions from the phase analysis.

5. Conclusions

- Long period oscillations (P \geq 50 min) are present in each of the analysed signals
- The dominant long period component appears to be stable over at least 6 days of observation
- Large gaps in the data prohibit analysis of the phases of the oscillations.

References:
Efremov, V. I., Parfenenko, L. D., & Solov’ev, A. A. 2009, Cosmic Research, 47, 277