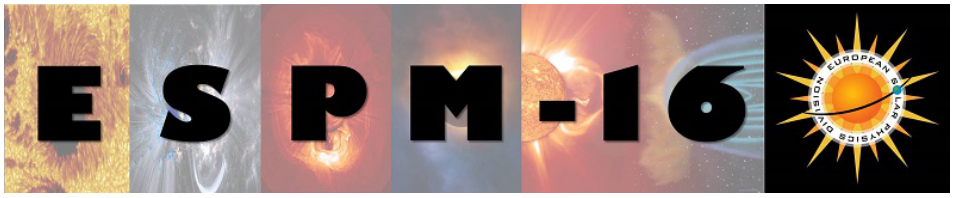

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Cycle dependency of the Quasi-Biennial Oscillation (QBO)

Tuesday, 7 September 2021 12:05 (13 minutes)

The quasi-biennial oscillation (QBO) is a low amplitude oscillatory signal commonly seen in solar activity proxies and may hold the key to a greater understanding of the solar dynamo. This will help us mitigate the risks that come with space weather which is driven by the solar magnetic field. In addition, mid-cycle oscillations have been observed on other stars, making the impact of this work extend beyond our own solar system. We use helioseismology to probe the solar interior by examining frequency shifts of p-modes to isolate the QBO and its associated periodicity. We also investigate the p-modes'spatial and frequency distribution, and examine how these distributions change over Cycles 23 and 24. We use data from the Global Oscillations Network Group, Michelson Doppler Imager and Helioseismic & Magnetic Imager in the intermediate-degree range, as well as solar activity proxies to investigate Cycles 21-24. We use Empirical Mode Decomposition which is adept at picking out quasi-oscillatory signals where the signal is allowed to vary in period, shape, phase, and amplitude. We find evidence of the QBO in both Cycles 23 and 24, although it is less significant in Cycle 24, which raises the possibility of a multiplicative relationship between the activity of a solar cycle and the presence of the QBO. We also see the evidence of the QBO across depths from 0.2-0.95 solar radii, suggesting that the magnetic field driving the QBO is likely to be located in the near surface region.

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