Atmospheric Chemistry and Physics Discussions

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Comment on acp-2022-407

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Community comment on "Nonlinear resonant interactions of atmospheric tides with annual oscillation based on meteor radar observation and reanalysis data" by Xiansi Huang et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-407-CC1, 2022

The paper states:

"Although nonlinear interactions between atmospheric waves have attracted wide attention, interactions of both global-scale tides and annual and semiannual oscillations were not reported yet."

Should add a citation to the research discovering the interaction of annual and semiannual cycles with the long-period tidal cycles generating the well-known ~2.33 year quasi-biennial oscillation (QBO) of the equatorial upper-atmosphere. As the QBO is a wavenumber=0 behavior, only the nodal 27.2/13.6 day cycle is involved and will produce an aliased *floor*(365.24 days/yr / 27.2 day/nodal) = 0.428/yr forced frequency response. The two match precisely and the harmonic satellite peaks are also observed in the QBO results.

1. Pukite, P., Coyne, D., & Challou, D. (2019). Mathematical Geoenergy: Discovery, Depletion, and Renewal (Vol. 241). John Wiley & Sons. Chap.11 https://agupubs.onlinelibrary.wiley.com/doi/10.1002/9781119434351.ch11

2. Pukite, Paul R. "Analytical Formulation of Equatorial Standing Wave Phenomena: Application to QBO and ENSO." AGU Fall Meeting Abstracts. 2016. https://ui.adsabs.harvard.edu/abs/2016AGUFMOS11B..04P/abstract

3. Pukite, Paul. "Nonlinear long-period tidal forcing with application to ENSO, QBO, and Chandler wobble." EGU General Assembly Conference Abstracts. 2021.

This paper by Huang *at al* should be published as it will focus attention on the non-linear (and aliased) tidal aspects of atmospheric and oceanic behavior, which have been overlooked in favor of the linear, non-aliased cycles, leading to divergent interpretations behind the physical gravity-wave forcing mechanisms.