

Interactive comment on “Planetary wave activity in the Arctic and Antarctic lower stratospheres during 2007 and 2008” by S. P. Alexander and M. G. Shepherd

Anonymous Referee #2

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In this paper, the authors examined planetary wave activity in the polar stratosphere during 2007 and 2008 using the COSMIC GPS-RO temperature data. They extract traveling wave components along with stationary one on the basis of a linear least squares fitting technique and found the large Northern Hemisphere wave activity associated with stratospheric sudden warmings (SSWs) as well as large changes of planetary wave frequency and wavenumber distribution. However, most of presented results have been reported by former studies of many other authors. In addition, the application of the linear least squares fitting method to extract the wave components seems to be unsuitable for a study of the nonlinear field with rapid evolution such as for periods including SSWs. I agree that the used data have excellent vertical resolution and ac-

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curacy. Hence, I recommend the authors perform analyses to show new viewpoints of large-scale dynamics by utilizing the advantage of the data. Consequently, I consider that the manuscript is not worth being published in the Atmospheric Chemistry and Physics in present form.

Major Comments

(1) The linear least squares fitting method implicitly assumes the steadiness during the analysis period of 46 days to give harmonic components in time with discrete periods of 5, 8, 10, 12, 16 and 23 days. However, stratospheric circulations often show rapid changes during the analysis period, as in the case of SSWs, which leads to large variations of phase speeds and amplitudes of decomposed waves due to rapid deceleration and acceleration of the polar night jet. Under the condition, wave spectra would show broad peaks for the analysis period. Hence, the steady harmonic components could not represent the rapid evolution of nonlinear disturbances by a linear superposition of them, although the superposition of instantaneous harmonic components might be useful.

(2) The authors shortly mention that the geopotential height shows large variances of westward traveling while the temperature shows those of eastward traveling (P.14262, L.6-13). They should discuss more details of such a point with some plausible reasons.

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