

Interactive
Comment

***Interactive comment on* “Interannual variability and long term changes in planetary wave activity in the middle atmosphere observed by lidar” by A. Hauchecorne et al.**

Anonymous Referee #1

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This article by A. Hauchecorne, P. Keckhut and M.L. Chanin provides an interesting data set of transient planetary wave (PW) energy in the middle atmosphere. There are new results and clearly two modes of transient wave energy are distinguished, which may be interpreted as PW1 and 2. These results are worth being published in ACP. However, there are some problems that have to be dealt with before.

The main problem is that, given the method with which the data are obtained, only transient PW can be studied. This is mentioned at some places, but the discussion mostly is about PW energy in general and may lead to confusion. This must be rectified. The strongest dynamic effects in the stratosphere are from stationary waves, transient

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waves modulate these, sometimes counteracting the effects of stationary waves. To use an appropriate picture here, the data provided can describe the ripples, but not the waves. It would be very useful to include data from ERA40 for stationary wave EP flux since only then the net forcing of stratospheric circulation may be discussed. I would expect interesting information on the distribution of PW energy into stationary and transient in different years.

Further problems: - Figure 2: This does not fit with the text at p 11304, are the Figures swapped?

- Figure 4: The statistical analysis is weak. First of all it is not mentioned which statistical test is used. I would wish a non-parametric since the variance of transient PW energy is extremely decreasing with time. A linear correlation is highly questionable.

- Figure 5 shows that there is much more variability at QBO East, possibly the extreme years determine the correlation. This weakens the PW-QBO conclusions very much. I suggest combining with stationary PW and discussion of the potential reasons for the decrease in interannual variability.

- P 11306, L 10 Ę: With so few data this remains pure speculation. What are the other years of type 2? What is the contribution of stationary waves?

- P 11306 , L 15 Ę This discussion does not distinguish between stationary and transient planetary wave flux. This is misleading in the context of only transient waves being measured by the OHP lidar.

Typos:

P 11300, 19: greenhouse gas in P 11301, 7: General Circulation models or Climate models, but not a mix of both! 13: Chlorine 25: there are very few data sets 28: data sets P 11302, 15: values 16: values

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