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## **Comment on angeo-2021-51**

Anonymous Referee #2

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Referee comment on "Long-term studies of mesosphere and lower-thermosphere summer length definitions based on mean zonal wind features observed for more than one solar cycle at middle and high latitudes in the Northern Hemisphere" by Juliana Jaen et al., Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2021-51-RC2>, 2021

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Reviewer Report on the manuscript angeo-2021-51

Long-term studies of MLT summer length definitions based on mean zonal wind features observed for more than one solar cycle at mid- and high-latitudes in the northern hemisphere

by J.Jaen, T Renkwitz, J.L.Chau, et al.

## General Remarks

- 1) The paper presents an interesting data set of zonal winds obtained from several measurement stations.
  
- 2) The data are interpreted in terms of the "summer length" and compared to other data.
  
- 3) Different definitions of "summer length" are used, part of which are not convincing.
  
- 4) The paper is difficult to read because of the many abbreviations used.
  
- 5) The paper can be recommended for publication after major changes have been made.

## Major Comments

- 1) The definition of the summer length in the MLT is dubious. If I understand your text correctly you determine the begin and end of summer at two different altitudes (as well at mid as at high latitudes). A justification is not given. At both times the wind reverses from westward to eastward. This is confusing, as at lower altitudes opposite reversals are used for begin and end of summer. You can, of course, analyze your data this way, however, you should not call this a "summer length". And has it a meaning?

By the way: The high altitudes in Fig.1 indicate a semi-annual oscillation which is

difficult to reconcile with a summer/annual oscillation.

- 2) Fig. 5a: The data after 2008 show a clear four-year signature after the "break". If

there is a real break in the atmosphere one might calculate the spectra separately for

the two intervals. The four-year oscillation has been analyzed in detail recently by

French, Klekociuk, and Mulligan, ACP 2019. The time interval before 2008 has been analyzed for the summer duration by Offermann et al. 2010. These authors find a substantial increase contrary to what is shown in Fig. 5a.

Fig.5 b) and c): Please elaborate on these spectra. What are the ordinates? Are there no longer periods?

3) To read the paper is somewhat strenuous because of the many abbreviations used.  
I

have counted more than a dozen of them. Please try to reduce this, at least in the text.

4) The title of Section 5.2 "Mid-latitudes" is misleading. The text discusses the MLT as well.

5) Table 1, Column 4: Please explain "A-T", "J-C" "Jul"

#### Minor Comments

1) The title of the paper is a bit misleading as the text always presents MLT- and M-results.

2) Fig.3 and 4: The print in the text of the Figures is too small. Part of it can be read only by

means of a magnifying glas.

3) Lines 167-168: left and right columns are interchanged.

- 4) Lines 266 and 273: Do the two notions "leafed length" and "growing season" mean the

same?

- 5) Line 280: "definition is not sensible..." Do you really mean "sensible", or rather

"sensitive"?

- 6) Line 306 and others: "from west to east" Please change to: "from westward to eastward"