Atmos. Chem. Phys. Discuss., 11, C12157–C12160, 2011
www.atmos-chem-phys-discuss.net/11/C12157/2011/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Mean winds, temperatures and the 16- and 5-day planetary waves in the mesosphere and lower thermosphere over Bear Lake Observatory (42deg; N 111deg W)" *by* K. A. Day et al.

Anonymous Referee #2

Received and published: 21 November 2011

A review of the paper "Mean winds, temperatures and the 16- and 5-day planetary waves in the mesosphere and lower thermosphere over Bear Lake Observatory (42° N 111°W)" by K. A. Day, M. J. Taylor, and N. J. Mitchell

General comments

The paper consists of two parts. The first part presents some climatology based on new wind data obtained by a meteor radar at Bear Lake. The second one presents parameters of the 5-day and 16-day oscillations in wind and temperature based on the

meteor wind measurements and MLS temperature measurements. The topic of the work is appropriate for the journal and is very interesting for the MLT science community. The paper address relevant scientific question within the scope of ACP. However, I think that the paper needs some revision. The overall presentation is not quite consistent. The points, which the authors should elucidate, are given below.

Specific comments

Some climatology is presented for the prevailing winds. Parameters of the year-to-year variability were not estimated in spite of the fact that the authors perform a comparison with the URAP model, for example. There are no estimations of parameters of the seasonal course. There are climatological models for the prevailing wind and tides. Therefore, it seems more consistent to study at first the prevailing winds and tides and then planetary waves.

For a given planetary wave (a given zonal wave number and a wave period) height-latitude distributions of temperature and wind perturbations are different. Therefore, it is not clear why one can expect significant correlations between oscillations in temperature and wind taken at one and the same altitude and latitude. Moreover, it is not clear why the oscillations in wind and temperature discussed in the paper are resulted from the same waves. There is no any discussion about it.

Another point is the use of the variance of the band-passed time series (Fig.6). During a SSW one can observe both a strong long-period oscillation and a sudden decrease and recovering of the prevailing zonal wind. A discussion is necessary whether one can consider the variance calculated in the last case as a proxy of the 16-day wave activity.

The performed comparison with the URAP model does not look useful. This is in fact a comparison between zonal mean winds and local winds. The authors gave a few reasons for the differences. As a result it is not clear what can be inferred from this comparison.

Abstract

“Our zonal wind observations..” It sounds a bit strange that the observations are more weakly eastward.

Introduction

The Brewer-Dobson circulation is a model of the hemispheric scale meridional circulation in the winter stratosphere with air moving upward in the tropics. Rossby waves of tropospheric origin dominate the wave driving of this circulation. The zonal- mean meridional circulation in the MLT region is primarily driven by gravity waves. The authors state that the Dobson-Brewer circulation implies a connection between the MLT temperatures and meridional winds. A corresponding explanation seems to be quite necessary.

Results

P.30388. L.28. The authors states that the lag of about two weeks between meridional wind and temperature minima is seen. Please, provide a calculation of this lag and its error. It seems that 5-point time series is short for a definite conclusion.

P.30392 L.15 Please, explain the term “wavenumber” for the Morlet wavelet transform.

P.30394 L.25 Please, clarify the height which was used for the correlation analysis. Why did the authors take the zonal winds for the analysis? Meridional winds seem to be more relevant for such an analysis. Are the correlations statistically significant? Can the authors calculate the correlations for the meridional winds?

P.30394 L.13-17. There are 16-day oscillations in Fig,6. in January of years 2009 and 2010. There is no winter 2008.

P.30395 L.16. There is no sense to write about the zonal-mean amplitude for a wave of a particular zonal wavenumber.

P.30398 L.4 Please, provide a reference about the measurement biases. Figures 4,5,

7-9 Please, provide reasons for the choice of the 90km height.

Please, provide errors for the wind and temperature values shown in the paper.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 30381, 2011.