

Interactive comment on “Solar cycle in current reanalyses: (non)linear attribution study” by A. Kuchar et al.

Anonymous Referee #1

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This manuscript attempted to discuss 11-year solar signal in temperature, ozone and circulation characteristics in the stratosphere and the mesosphere. The three latest reanalysis data sets (MERRA, ERA-interim and JRA-55) were examined using multiple nonlinear techniques in addition to the traditional linear regression technique. The usage of nonlinear techniques is new and has a scientific value, though the results did not differ much from the linear technique. The followings are my comments. I think the revisions are needed before acceptance.

(1) Similar and comprehensive work has recently made by Mitchell et al.(2014, QJRM). They examined 9 reanalysis datasets by a multiple regression analysis. Please refer and discuss the accordance and difference between the present study and Mitchell et al (2014). They did not present dynamical analysis such as EP flux.

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Mitchell, D. M., et al., Signatures of naturally induced variability in the atmosphere using multiple reanalysis datasets. Q. J. R. Meteorol. Soc. (2014) DOI:10.1002/qj.2492. <http://onlinelibrary.wiley.com/doi/10.1002/qj.2492/abstract>

(2) Description of reanalysis product on solar cycle in irradiance and ozone is needed in dataset section. See Table 2 of Mitchell et al (2014).

(3) QBO3 is needed? I think regression results would not change without QBO3 term.

(4) NAO is needed? The NAO is modulated by 11-year solar cycle (Kodera, 2003, GRL) and the tropospheric NAO extends to the stratosphere as AO near solar maximum. So I think the NAO term might not be needed. Without the NAO term in regression equation (1), does the result change? If the results with/without NAO are similar for solar signal, the solar signal in this manuscript is robust.

(5) P391 line 20-21 This statistically significant response . . . From the figure, it seems to be insignificant

(6) P30897 line 15-25 Sentences and Figure 4d, h, l, indicate stronger BD circulation as summarized in the bottom figure of Figure 6. So, in February, BDC circulation is enhanced at solar maximum opposite to early winter. I think this is new and should be emphasized in the text.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 30879, 2014.