

Interactive comment on “Large differences in the diabatic heat budget of the tropical UTLS in reanalyses” by J. S. Wright and S. Fueglistaler

Anonymous Referee #2

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This paper discusses the diabatic heat budget in the tropical UTLS from five major global reanalysis data sets. The diabatic heat budget in this region is key to the transport from the troposphere to the stratosphere and the distribution of various key species in the stratosphere. They found large differences in net diabatic heating and its individual terms among the five reanalyses, some of which show unrealistic results. I think that this paper has a significant contribution to the climate science community and thus will be acceptable for publication in Atmospheric Chemistry and Physics after considering the comments below.

In the beginning of Section 3, it is useful to include the following information: (1) an equation showing the individual terms of the total diabatic heat budget; (2) a table showing the terms/variables that are actually provided from each reanalysis (and actu-

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ally used or estimated in the analysis of this paper); and (3) a general description about which term (e.g., water vapour, ozone, CO₂ for radiative heating/cooling) is dominant at each altitude layer (see, e.g., Gettelman et al., JGR, 2004 for the case of clear sky conditions).

At the end of Section 3.1, the authors write about deep convection and the associated clouds. Isn't it possible to add a figure showing this? I think that some cloud parameters are available at least for some reanalyses. Similarly, isn't it possible to add a figure comparing ozone profiles (used in the radiative transfer calculations at the reanalysis centres) from these reanalyses? (in Section 3.2)

Other comments.

Page 8814, line 26, "warm-biased": This is true before mid 1990s, but is this really true for the 2000s?

Page 8815, lines 4-5, "lack of LW heating": Is this related to the biases in the radiative transfer model used in JRA-25? See Onogi et al. (2007), Sections 3.2.d, 4.8, and 4.9.

Page 8818, lines 8-10, "JRA has a systematic cold temperature bias ...": Is this also true for the 2000s after the SSU instruments were replaced by the AMSU instruments? The AMSU instruments have more channels in the stratosphere and may effectively correct the biased background in the assimilation procedure.

Page 8820, line 16: The following article may be more appropriate as the reference for the S-RIP. Fujiwara, M., S. Polavarapu, and D. Jackson, A proposal of the SPARC Reanalysis/Analysis Intercomparison Project, SPARC Newsletter, No. 38, 14-17, January 2012.

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