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Interactive Comment

Interactive comment on "Comparisons of polar processing diagnostics from 34 years of the ERA-Interim and MERRA reanalyses" *by* Z. D. Lawrence et al.

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The authors provide a detailed intercomparison of two of the most recent reanalyses (ERA-Interim and MERRA) with respect to polar processes. Most of the authors are involved with the SPARC activity: Reanalysis Intercomparison Project. This paper provides a strong basis towards providing users with information about the recent reanalyses and how well they agree (or disagree) for various usages, in this case polar processes for determination of ozone depletion. This paper adds to the intercomparisons by G. Manney of earlier reanalyses. This paper successfully points out when and where ERA-Interim and MERRA differ as far as minimum temperatures, PSC and

vortex metrics and by how much, but also points out that as more data is assimilated the differences nearly vanish. A significant take away is that the two reanalyses' differences are greatest pre-Aqua in the SH polar region. Another take away is that the temperature differences were not of similar sign with altitude. This implies that the two reanalyses differ in thermal structure in the lower stratosphere. Although the purpose of this paper was not to determine which was correct, comparisons with radiosondes should provide that information.

The authors state that they will perform the same intercomparisons with the NCEP-CFSR and JRA55 reanalyses. A likely result would be that these two will also differ pre-Aqua and will show increased agreement from 2002 to present. Thus users should be wary of which reanalysis they chose to use prior to 2002, as the variance between the reanalyses will be larger during that time period. During the construction and running of each of these reanalyses, more was learned about how to use the TOVS (SSU, MSU, HIRS) observations. As the models and data assimilation schemes progress, one would expect to see better agreement in the pre-Aqua periods with the next generation of reanalyses.

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