Tropical Winds in GEOS-4 Meteorological Analyses

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Brief Abstract:

This paper will examine aspects of the tropical wind distributions in the GEOS-4 meteorological analyses, especially their sensitivity to certain assumptions made in the assimilation system and the input data. A chronic problem with GEOS-n (n=1-4) analyses has been their inability to represent a near-zonally symmetric QBO. This has been rectified with a new formulation of the horizontal length scales (Gaspari, Cohn, Guo and Pawson, submitted to Quart. J. Royal Meteorol. Soc.) which allows the implementation of a zonally elongated length scale in the assimilation. Discussion of a multi-annual assimilation using this new length scale will be a focus of this paper, showing the morphology of the QBO and the impacts on transport and mixing in the Tropics and Sub-Tropics of the GEOS-4 assimilation system. Direct validation is complicated, because of the near absence of independent wind information in the Tropics, but some aircraft and ultra-long duration balloon measurements are available for limited periods. Additional validation will be given by examining monitoring statistics from the ozone assimilation, where transport plays an important role. Comparison with other analyses will be made. The focus of the presentation will be on the realism of the assimilated winds and the dependence on the assumptions made in the assimilation.