

## Changes in the lower stratospheric residual circulation in JRA-55

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Future projections by many climate models suggest that the Brewer-Dobson circulation (BDC) will be intensified as a result of rising greenhouse gas concentrations. However, observations show a diversity of the BDC strength changes. In this study, we investigate the changes in the BDC using JRA-55 reanalysis data compared with JRA-55-related products. In JRA-55, the annual mean tropical upwelling shows a significant increasing trend in the lower stratosphere from 1979 to 2012. JRA-55C also indicate a significant increasing trend of the upwelling, but JRA-55AMIP does not. These BDC strengths are assessed by climatological zonal mean which is removed diurnal variations.

Recently, Sakazaki et al (2015) found zonally uniform tidal signals in the tropical stratosphere. The vertical wind diurnal amplitudes in the lower stratosphere is not a negligible amount compared with climatological upwelling.

The BDC trend in JRA-55 linked with the representation of the tidal signals change related to the observing system changes in the reanalysis. Comparison of the relation among the JRA-55 family members is discussed in the presentation.

Keywords: JRA-55, Brewer-Dobson circulation, lower stratosphere