

The influence of dynamical variability on the observed Brewer-Dobson circulation

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The strength of the Brewer-Dobson circulation (BDC) is predicted to increase due to climate change. However, this increase has yet to be robustly detected in observational analyses. In this study a long control simulation is used to calculate the Time of Emergence of the BDC trend and how much of that trend may be masked by dynamical variability in current observations. A Time of Emergence of around 30 years is found (assuming a 2%/decade trend in the BDC), similar to the length of current reanalysis data sets. However, the discrepancies in vertical velocities between different reanalysis products remain far larger than any predicted trend. Furthermore, dynamical variability can completely mask the BDC trend on time scales shorter than around 12 years. Thus, more robust observational analyses of vertical velocity are likely to be needed for at least the next decade before detection of a statistically significant trend can be expected.

Key words: Brewer-Dobson circulation, variability, trend, Time of Emergence

References

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