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Changes of the Brewer Dobson Circulation due to natural forcing

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Monitoring and understanding the observed changes of the Brewer Dobson Circulation (BDC) is a major activity in current research. To better distinguish anthropogenic versus natural forcing components of the BDC, climate models are a helpful tool to better interpret them. Here in this study we want to concentrate on the period of the Mt. Pinatubo eruption as a natural forcing experiment in the present climate. Major volcanic eruptions have a significant impact on stratospheric and tropospheric climate, chemical composition and the atmospheric circulation. As the last three major volcanic eruptions (1963 Mt. Agung, 1982 El Chichon and 1991 Mt. Pinatubo) occurred during strong El Nino events and different Quasi Biennial Oscillation (QBO) phases, no stratospheric observations are available since the 1950s demonstrating a “pure” volcanic signal without a simultaneous El Nino event.

Based on the atmospheric general circulation model (GCM) MAECHAM5 we want to investigate the changes of the BDC following major volcanic eruptions and other natural forcing components as the El Nino Southern Oscillation (ENSO) and the QBO. For this purpose a set of single GCM forcings will be used to distinguish the effects of volcanic aerosols from ENSO, QBO and the ozone forcing on the BDC during the time period of the Mt. Pinatubo eruption. Deficiencies of the different model simulations and agreements with observations will be used to derive a better understanding of the natural driving processes of the BDC changes.