



Use of aircraft measurements for model evaluation studies.

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Integrating observational and modeling studies is becoming a requirement for adequately understanding and predicting dynamical and chemical processes over a wide range of temporal and spatial scales. Recently, a new version of the WACCM3 model has been developed that allows the model to be run with specified (external) meteorological fields, either from data assimilation centers or from climate models. This approach essentially turns the WACCM3 model into a chemical transport model, which is useful for studies that involve synoptic scale comparisons to satellite and aircraft data. Initial comparisons were conducted with the START08 aircraft campaign, which targeted specific transport pathways between the troposphere and stratosphere. The advantage of these observations is the very high vertical resolution that allows evaluating sharp tracer gradients, for example the transition of tracers across the tropopause. Another advantage is the suite of tracer correlations that provide a powerful diagnostic tool to evaluate chemistry and dynamics in the model. Aircraft observations in the tropics were also used to examine bulk characteristics of bromine in the troposphere and TTL. In order to facilitate the use of previous aircraft campaigns, an aircraft climatology for tropopause referenced tracers in the NH UTLS was developed by combining data from various aircraft campaigns. The UTLS was grouped into three regions that describe distinct dynamical conditions and therefore tracer characteristics. Since this climatology was developed to describe the general tracer behavior in different regions and seasons, it can be used for model validation efforts of free running CCMs. Examples from the studies mentioned above will be presented.