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A meteorological overview of the ARCTAS 2008 mission

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Abstract. The Arctic Research of the Composition of the Troposphere from Aircraft and Satellites (ARCTAS) mission was a multi-aircraft project whose major objective was to investigate the factors driving changes in the Arctic's atmospheric composition and climate. It was conducted during April and June–July 2008. The summer ARCTAS deployment was preceded by a week of flights over and around California to address state issues of air quality and climate forcing. This paper focuses on meteorological conditions during the ARCTAS Spring and Summer campaigns. We examine mission averaged large-scale flow patterns at the surface, 500 hPa, and 300 hPa and determine their departures from climatology. Results from runs of the *Weather Research and Forecasting* (WRF) model are used to describe meteorological conditions on individual days. Our WRF configuration included a nested grid approach that provided horizontal spacing as small as 5 km. Trajectories calculated from the WRF output are used to determine transport pathways to the Arctic, including their origins and the altitudes at which they reach 70° N. We also present backward trajectories from selected legs of individual ARCTAS flights. Finally, the FLEXPART Lagrangian particle dispersion model, with the high resolution WRF data as input, is used to determine the paths of anthropogenic and biomass burning-derived CO. Results show that there was frequent and widespread transport to the Arctic during both phases of ARCTAS and that the three ARCTAS aircraft sampled air having a multitude of origins, following a myriad of paths, and experiencing many types of meteorological conditions.

[Final Revised Paper](#) (PDF, 5681 KB) [Discussion Paper](#) (ACPD)

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