

Summary for ozone data set:

This data set consists of the ozone measurements made on the NCAR C-130 during the ACE-1 program. The data is one second data with a time base that is derived from the aircraft data system. Ozone instrumentation included instruments using the ultraviolet (UV) absorption method (Thermo Environmental Instruments (TECO) model 49, slightly modified by NCAR/RAF) and the chemiluminescent reaction of ozone with nitric oxide (RAF designed and built); this latter instrument is usually referred to as the fast ozone analyzer. The TECO 49 data parameter is identified as TE03C and the chemiluminescent ozone measurement as O3FC, respectively. Numerous problems were experienced with the UV instrument during the project, and its data were of very poor quality during most flights. The RAF chemistry group has elected to delete the standard ozone variable, TE03C, from the data set and to output only the analyses provided by the fast ozone instrument, found in variable O3FC, to minimize the potential for confusion. TE03C is included for the periods 2135-2200 of Flight 04b and 0000-0030 of Flight 5 during which the O3FC measurement reached extremely high concentrations which did not appear in TE03C. These flights were those during which a volcano plume was sampled and it appears likely that interference from some unknown source related to the plume occurred during these periods.

Because of difficulties encountered in interfacing a new photon counter from the fast ozone instrument to the RAF data system, high-rate data from the first transect (Flights 1-10) are of very poor quality and probably not useful. The previously used electrometer was reimplemented before flight 11 and a ground loop was eliminated following Flight 13, which improved the high-rate data quality greatly. No ozone data are available for Flight 6a because of in-flight work on the fast-ozone instrument.

Calibrations of the fast-ozone instrument against the UV absorption instrument were performed on all except Flights 1, 4, 5, and 9 using artificially generated ozone in zero air. Performance of the UV absorption instrument, whose calibration is traceable to the E.P.A. Region 7 standard reference photometer, was adequate during most calibration periods using the artificially generated ozone. Substantial flight-to-flight variation in calibration was encountered, and the calibration factor used for each flight was adjusted to match the results of the calibration period(s) during that flight; for the flights where no calibrations were performed, the data are the best estimate available based upon various factors. Data from all calibration periods and during fast ozone down time were replaced with -32767.0 in the data set.

This data set is available on-line for download. Publications that make general use of these data are requested to acknowledge Richard Schillawski, Andre Prevot and Greg Kok for providing the data. Co-authorship is requested for significant use of these data in a publication.