

Analysis-ready Data from Aircraft Measurements using Open Source Software

Kurt Hibert and David Delene

The open source Airborne Data Processing and Analysis (ADPAA) software package is an established solution to process data from research aircraft. ADPAA automates data processing while incorporating the concept of missing value codes. It utilizes a standard ASCII file format to store measurements from individual instruments in separate files, which are processed to varying degrees using the concept of data levels. A summary file containing parameters of scientific interest for field projects is created for each aircraft flight as well. The variety of data and tools within ADPAA provides the ability to easily conduct quality assurance on the data obtained from research flights. Providing data that is ready for analysis is critical to many Weather Modification International (WMI) customers. ADPAA is able to process data from all WMI research flights over the past ten years and was recently implemented for the Korean Meteorological Administration (KMA) and Shanxi, China aircraft by tailoring the package to provide fully automatic and user-friendly processing.

Recent development on ADPAA includes writing wrapper scripts to integrate the System for OAP Data Analysis version 2 (SODA2) with ADPAA, which makes it possible to do automated optical array probe (OAP) processing. Images from OAPs are easily created by ADPAA, but most scientists want bulk microphysical information. SODA2 provides microphysical information such as size spectra, area ratios, and aspect ratios by using advanced image processing methods. While it takes a highly trained eye to do quality assurance on data after processing, SODA2 allows groups with limited processing resources to conduct industry leading research with products that are highly time-consuming to create or otherwise cost-prohibitive.

Aircraft data processing can be done on a laptop; however, a Linux operating system is required which some researchers are not very experienced using. Remote network access is easy to set up on processing laptops and allows WMI to provide software support and address instrument performance questions. Few users have experience processing data from the variety of instruments on today's research aircraft, so providing support is an important component to a successful research platform. Not only does this allow for streamlined data processing, but it is much easier for customers new to Linux. Training is straightforward and the progression toward doing science with a research aircraft moves forward more quickly.