Development of Toolsets for Airborne Data (TAD) and their Application to CCMI Activities

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ASDC Introduction
The Atmospheric Science Data Center (ASDC) at NASA Langley Research Center is responsible for the ingest, archive, and distribution of NASA Earth Science data in the areas of radiation budget, clouds, aerosols, and tropospheric chemistry. The ASDC specializes in atmospheric data that is important to understanding the causes and processes of global climate change and the consequences of human activities on the climate. The ASDC currently supports more than 44 projects and has over 1,700 archived data sets, which increase daily. ASDC customers include scientists, researchers, federal, state, and local governments, academia, industry, and application users, the remote sensing community, and the general public.

Airborne Tropospheric Chemistry Studies
NASA has conducted airborne tropospheric chemistry studies for about three decades. These field campaigns have generated a great wealth of observations, including a wide range of the trace gases and aerosol properties. Even though the spatial and temporal coverage is limited, the aircraft data offer high resolution and comprehensive simultaneous coverage of many variables, e.g. ozone precursors, intermediate photochemical species, and photochemical products. The recent NASA Earth Venture Program has generated an unprecedented amount of aircraft observations in terms of the sheer number of measurements and data volume. The ASDC Toolset for Airborne Data (TAD) is being designed to meet the user community needs for aircraft data for scientific research on climate change and air quality relevant issues.

ASDC Airborne Data System and Tools for Airborne Data Conceptual Design Schematic Diagram

TAD Design Concept:
The ASDC Toolsets for Airborne Data (TAD) is designed to serve the user community needs for aircraft data for scientific research on climate change and air quality relevant issues, particularly:

- Provide timely access to a broad user community
- Without requirement of detailed knowledge of airborne campaign and aircraft measurements
- Timely ingest of the newly released airborne campaign data into ASDC airborne data system
- Provide an intuitive user interface to facilitate quick discovery of the variables and data
- Provide data products and tools to facilitate quick discovery of the variables and data
- Provide Web Coverage Service (WCS) capable tools to enhance the data usability.

TAD Metadata Database:
The ICARTT format in which the field campaign data is stored lacks standardization. To compensate, an extensive metadata database was created to track all Principal Investigator-provided metadata and to link the measurement variables to a common naming system.

Implemented and Expected Features:
- Data discovery through text search and by categories based on physical and chemical properties
- Data search can be further filtered by date, mission, aircraft, and instrument
- Merge files based on user selected variables and time scales
- Continuous time interval (1-1000 seconds) or other measurement time intervals
- Merge can be made for one flight or multiple flights for the one aircraft platform within one mission
- All data products in standard format and conforming to ontology-based standard variable naming convention
- WCS capable data variable search, merge, download features
- Data plotting features to allow user browsing data in terms of spatial distributions and the relationships between variables
- Spatial/temporal subsetting tools to be developed
- Scheduled beta-release in early June

TAD Search User Interface

TAD Merge User Interface

TAD Current & Future Campaigns

Summary of TAD Airborne Database and Status

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