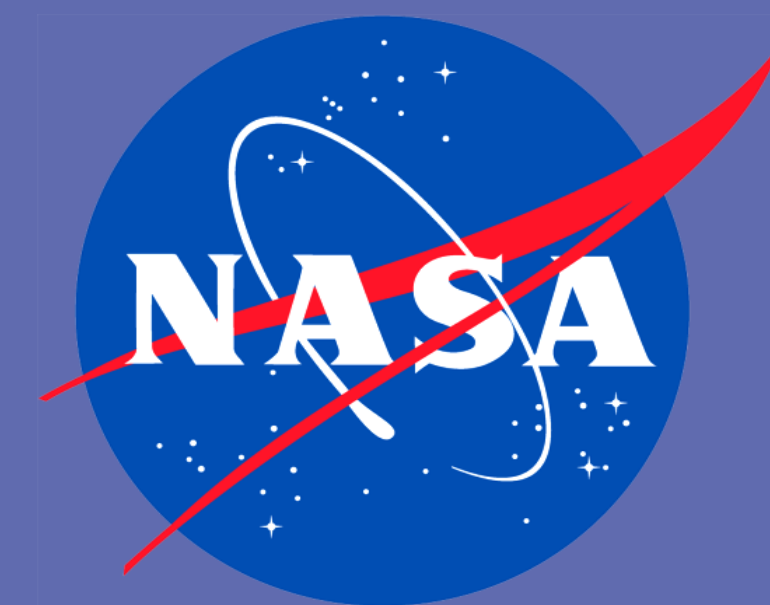




Toolsets for Airborne Data (TAD): User Interface Design and Development

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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.

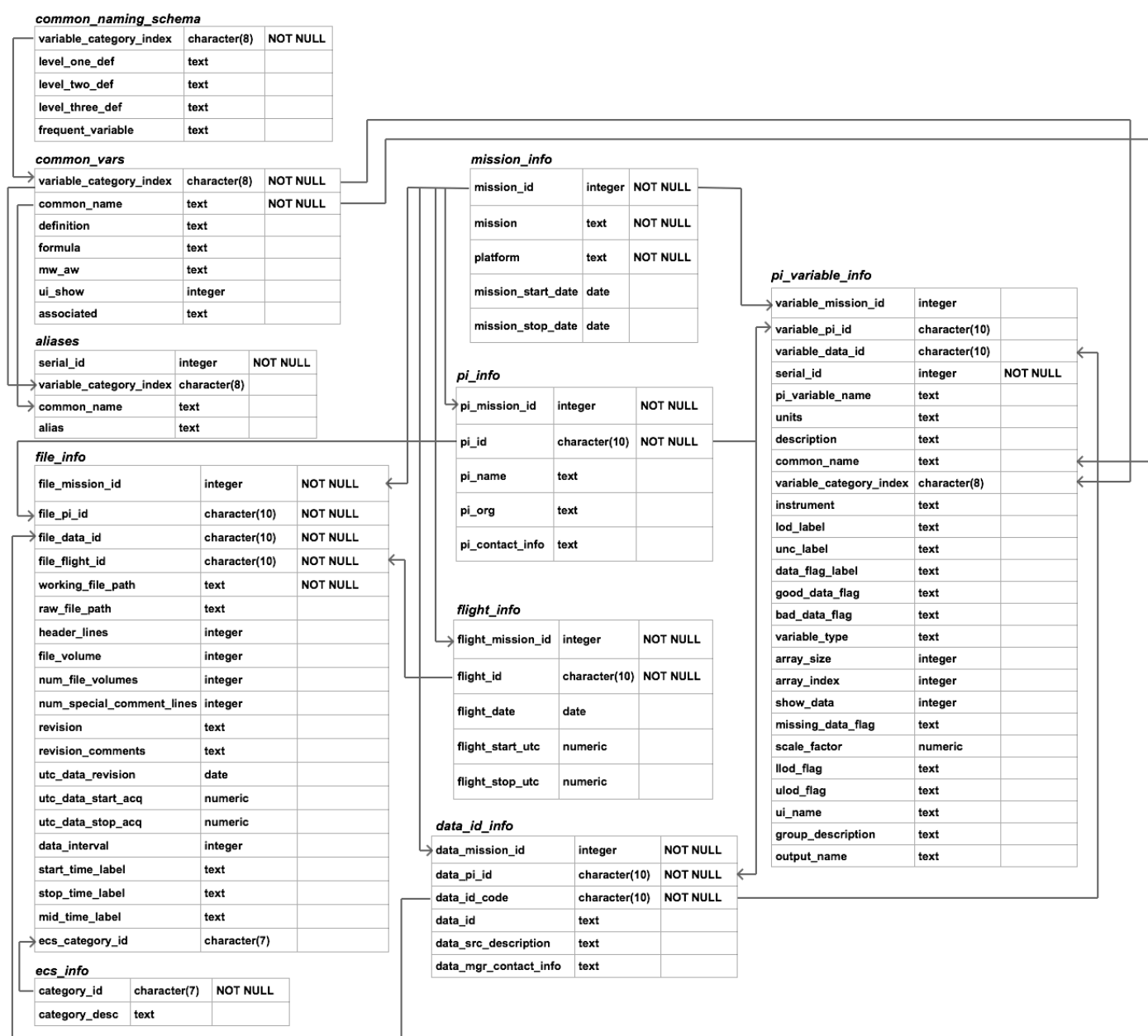
Motivation for TAD

The ASDC Toolsets for Airborne Data (TAD) is designed to serve the user community needs for aircraft data relating to scientific research on climate change and air quality relevant issues. To adequately support a broad range of users TAD will provide:

- Data access tailored to research needs of different users
 - For novice users : UI allows data search without requiring detailed knowledge of airborne campaign and/or aircraft measurements
 - For experienced users: UI allows global keyword search for quick access to specific data variables
- Access to highly sought-after geo-located data products from multiple airborne field studies
- Tools to streamline discovery and analysis of variables and data
- Web Coverage Service (WCS) capable tools to enhance the data usability for client-side rendering and modeling

TAD Metadata Database

TAD variable search is based on a comprehensive metadata database, which is extracted from the Principal Investigator (PI) ICARTT files. The database contains links between the PI variables and the common variables and descriptions for each of the PI variables. Below is a diagram of the database schema.



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.

Streamlined Cross-Mission Data Discovery

TAD allows the user to search for variables across missions and aircraft platforms based on options developed according to user community recommendations, detailed below.

TAD User Interface (UI) Search Page

Select Variables **Create Merge Data** **Request PI Data**

Basic Search

Follow the steps below to select your desired data variable(s) based on scientific parameter, mission/platform, or date range. Once selected, choose Create Merge Data to receive a weighted average of requested data merged into a chosen time base or Request Principal Investigator (PI) Data to receive raw data files based on the requested variables.

Global Search Contains Enter a Keyword...

Search by Mission Select Mission(s):

Search by Platform Select Platform(s):

Search by Date Range 06/26/2004 07/29/2011

Search by Category

- ☒ Aerosol
 - ☐ Composition
 - ☐ Microphysical Properties
 - ☒ Optical Properties
 - ☐ Cloud Properties
 - ☐ J values
- ☒ Meteorological/Navigational
 - ☐ Meteorological
 - ☐ AmbientPressure
 - ☐ AmbientTemperature
 - ☒ DewPoint
 - ☐ H2O_MR

Variable Selection

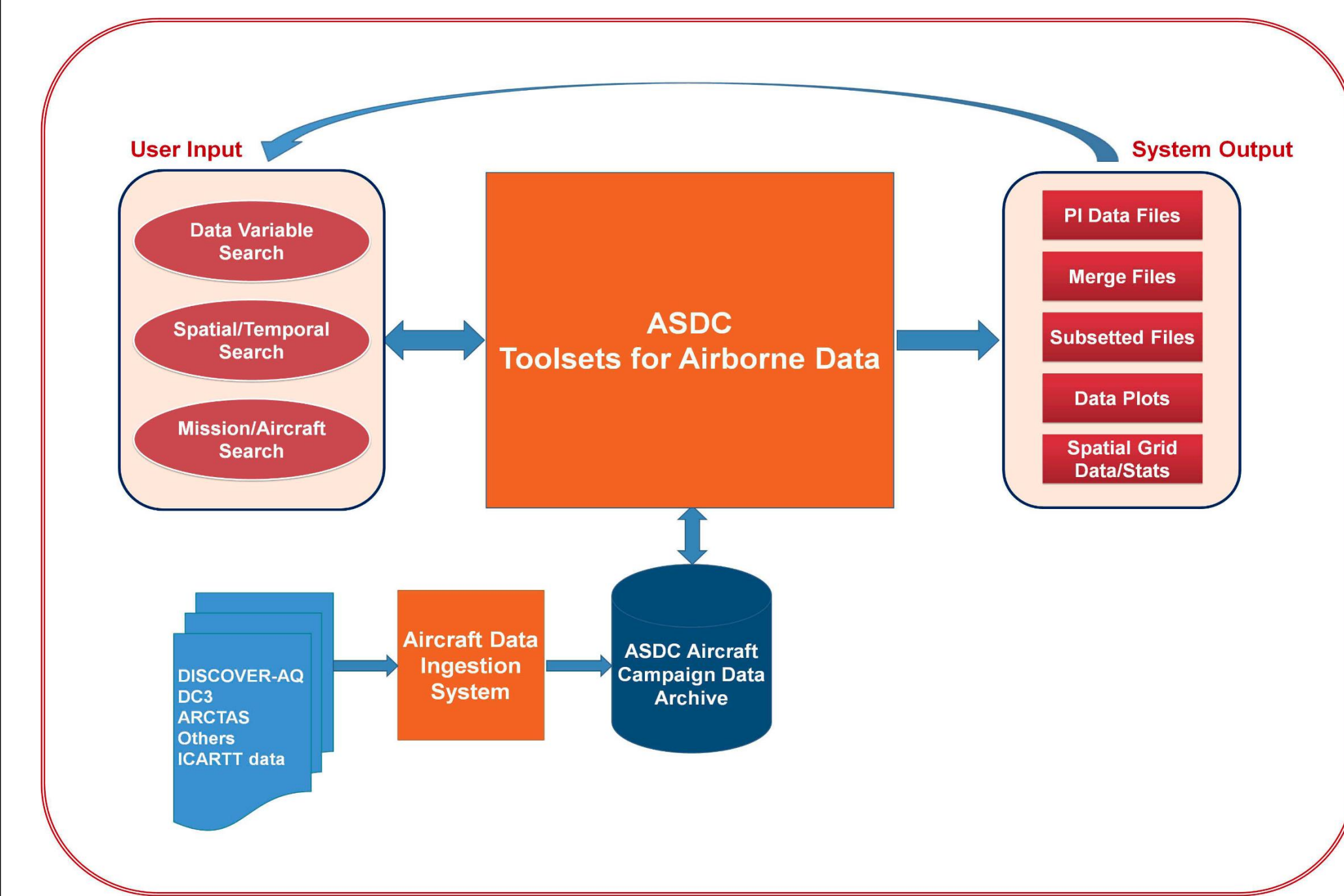
Common Name	Mission	Platform	Instrument	Definition
☐ Aer_Absrb_green	INTEX-B	DC8	PSAP	Aerosol Particle Absorption Coefficient At Gr...
☐ Aer_Absrb_green	TexasAQ5	NP3	PSAP	Aerosol Particle Absorption Coefficient At Gr...
☐ Aer_Absrb_green	ARCPAC	NP3	PSAP	Aerosol Particle Absorption Coefficient At Gr...
☒ Aer_Absrb_green	ARCTAS	DC8	PSAP	Aerosol Particle Absorption Coefficient At Gr...
☒ Aer_Absrb_green	CalNex	NP3	PAS	Aerosol Particle Absorption Coefficient At Gr...
☐ Aer_Absrb_green	CalNex	NP3	PSAP	Aerosol Particle Absorption Coefficient At Gr...
☐ Aer_Absrb_green	DISCOVERAQ MD	P38	PSAP	Aerosol Particle Absorption Coefficient At Gr...
☐ Aer_Absrb_green	INTEX-A	DC8	PSAP	Aerosol Particle Absorption Coefficient At Gr...
☐ Aer_Absrb_green	INTEX-B	C130	PSAP	Aerosol Particle Absorption Coefficient At Gr...
☒ Aer_Scattering_green	ARCPAC	NP3	derived	Aerosol Particle Scattering Coefficient At Gr...

Selected Variables

PI Variable Name	PI	Mission	Platform	Units	Data ID	Instrument	Description
DewPTTempTDL	Alkin, Ken	CalNex	NP3	degC	CalNex-Aircraft	TDL-Hygrometer	TDL Dew Point Temperature (C) measu...
DewPTTemp	Alkin, Ken	CalNex	NP3	degC	CalNex-Aircraft	CM-Hygrometer	Dew Point Temperature (C) measured ...
Ammonium	Weber, Rodney	NEAQ5-ITCT2004	NP3	ug m-3	NEAQ5-ITCT20...	PILS-IC	Submicron Particulate Ammonium Con...
NH4_pstv	Dibb, Jack	INTEX-B	DC8	pptv	INTEXB-SAGAAE...	Filter-IC	Particle Ammonium Mixing Ratio
Ammonium	Anderson, Bruce E.	DISCOVERAQ MD	P38	ug m-3	DISCOVERAQ-L...	PILS-IC	Particle Ammonium Ion Concentration ...
PAS_532_dry_STP	Lack, Daniel	CalNex	NP3	Mm-1	CalNex-PAS	PAS	Total aerosol light absorption at 532n...
scatgreenhi	Lack, Dan	ARCPAC	NP3	Mm-1	ARCPAC-CRDExt	derived	Central scattering value with the upper...
ScatGreen	Lack, Dan	ARCPAC	NP3	Mm-1	ARCPAC-CRDExt	derived	Dry Aerosol Scattering Coefficient at 5...
scatgreenlo	Lack, Dan	ARCPAC	NP3	Mm-1	ARCPAC-CRDExt	derived	Central scattering value with the lower...
Abs532sub_Virk2010	Anderson, Bruce E.	ARCTAS	DC8	Mm-1	ARCTAS-LARGE...	PSAP	Submicron Absorption At 532 nm (Vir...

TAD Conceptual Design Schematic

The conceptual design schematic shows the eventual plan for TAD. The current UI design demonstrates the Data Variable Search and Mission/Aircraft Search.



TAD Merge User Interface

The merge feature allows users to request geo-located data files and/or combine multiple PI data sets on the same time scale. The TAD Merge UI provides multiple processing/output options based on the variables requested on the UI search page.

Select Variables **Create Merge Data** **Request PI Data**

Merge Data Variable(s)

Follow the steps below to order a weighted average of data based on the selected variables that has been merged into a chosen time base. The variables are separated into accordions based on each mission/platform and must be ordered individually. To learn more, select the information icon at each step.

Refine Variable Selection

Remove	PI Variable Name	PI	Units	Data ID	Instrument	Output Name
☒	DewPTTemp	Alkin, Ken	degC	CalNex-Aircraft	CM-Hygrometer	DewPTTemp_Alkin
☒	ext_gammaRt	Langridge, Justin	unitless	CalNex-CRDExt	Derived	ext_gammaRt_Langridge
☒	PAS_532_dry_STP	Lack, Daniel	Mm-1	CalNex-PAS	PAS	PAS_532_dry_STP_Lack
☒	PSAP_green_sr	Lack, Daniel	Mm-1	CalNex-PSAP	PSAP	PSAP_green_sr_Lack

Select Merge Time Base

Data ID Time Base: CalNex-CRDExt

Select Flight Dates (optional)

Select Start Date: Select End Date:

Select Processing/Output Options

☒ Average Only

☐ Average, Standard Deviation, Number of Points

☐ Average, Standard Deviation, Number of Points (with LOD processing)

Create Merge File(s)

Order Merged CalNex/PSAP Files:

Implemented and Planned Features

- Data discovery through global text search, categories of physical/chemical properties, date and mission/aircraft filtering
- Geo-located merge data files based on user selected variables and time scales
 - Continuous time interval (1-3600 seconds) or other measurement time intervals
 - Merge can be made for one or multiple flights for a single mission/platform
- 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
- Advanced time shift option for data merge to allow users to specify a range of ± 30 seconds to overcome sampling time difference between instruments

More Information



Special Thanks

NOAA Earth System Research Laboratory

Global Change Master Directory

NASA LaRC Airborne Science Data for Atmospheric Composition