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# NASA Tools and Resources for Airborne Data Users

— Deborah Smith (ADMG) —

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# Categories of “Tools” and “Resources”

Use of airborne and field data may need more than just data file access. There are various activities for which software (“Tools”) and information “Resources” can help data users.

ADMG categorizes tools as:

**Discover / Learn:** Explore what information is available and learn more from documents and details

**Search:** Find the data or information we may need to do our work and determine if it is useful

**Data Access:** Download or read needed data files

**Visualize:** Look at data in a spatial or temporal manner. Can include maps or figures.

**Analyze:** Use data in some way

# ADMG Airborne and Field Data Tools Table

Updated Mar 2022

Tool Type	Tool Name	Description	Available Campaigns
Search and Data Access	<a href="#">Earthdata Search</a>	General search tool for locating data using filters. Filter by organization to locate data at one DAAC [ALL]	All public campaign data in EOSDIS system
Search and Data Access	<a href="#">Suborbital Data Portal</a>	A specialized Earthdata Search Portal for Airborne and Field Data Product Discovery [ALL]	Most public campaign data products published at DAACs
Discover and Learn, Data Access	<a href="#">CASEI</a> Catalog of Archived Earth Science Investigations	A catalog of NASA airborne and field campaigns/projects [ALL] Released in June 2021 with roughly 30% of known campaigns, now has roughly 45%.	Contextual metadata for 70+ airborne and field campaigns
Visualize	<a href="#">SDAT</a> (Spatial Data Access Tool)	Visualize and download select data using OGC standards [ORNL DAAC]	ABoVE, AfriSAR, CARVE, LBA
Visualize	<a href="#">Soil Moisture Visualizer</a>	Subset, view, and download harmonized Soil Moisture data from various projects [ORNL DAAC]	AirMOSS, SoilSCAPE, SNOTEL, FLUXNET
Visualize	<a href="#">ADV</a> Airborne Data Visualizer	Visualize airborne campaign flight track measurements [ORNL DAAC]	ACT-America, ATom, CARVE
Discover and Learn	ASDC <a href="#">Project Catalog</a> and <a href="#">Explore Collections Tool</a>	Online access providing a means to explore data collections at ASDC and review description of all projects [ASDC DAAC]	All ASDC DAAC campaigns
Search and Data Access	<a href="#">SOOT</a> Sub-Orbital Order Tool Power User Interface	Search for data files from specific campaigns at ASDC. Download the data. Only power user interface is currently available. [ASDC]	ACEPOL, ARISE, CAMP2Ex, FIREX-AQ, LISTOS, LMOS, NAAMES, ORACLES
Visualize and Analyze	<a href="#">FCX</a> Field Campaign Explorer	A visualization environment built on Cesium for exploring various field campaigns in multiple dimensions [GHRC DAAC]	GOES-R PLT (IMPACTS will be added next)
Search and Data Access	<a href="#">Vertex</a>	A geographical and temporal search tool to locate and obtain SAR data [ASF]	AirSAR, UAVSAR
Visualize and Analyze	OpenSARLab	Jupyter environment for working with SAR data in the cloud, includes Jupyter Notebooks and python /SAR-specific tools. Approved testers only.	AirSAR, UAVSAR
Search and Data Access	<a href="#">Operation IceBridge Data Portal</a>	Provides a means to visualize and perform temporal, spatial and keyword filtering of all Operation IceBridge data for data download [NSIDC DAAC]	IceBridge

# Tool Demonstrations

- [CASEI](#) - Stephanie Wingo (ADMG)
- [SOOT](#) Power User Interface - Jennifer Tindell (ASDC)
- [ADV](#) and [SDAT](#) - Michele Thornton / Yaxing Wei (ORNL DAAC)
- [FCX](#) - Geoffrey Stano (GHRC)

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# CASEI

— Stephanie Wingo (ADMG) —

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# CASEI: The Catalog of Archived Suborbital Earth Science Investigations



The screenshot shows the top portion of the CASEI website. At the top left, there are the NASA logo and a circular icon containing a globe and a satellite. To the right of these is the text "NASA | CASEI". Further right, in the top right corner, are the navigation links "EXPLORE", "GLOSSARY", "ABOUT", and "CONTACT". The main content area features a large background image of a snowy mountain range seen from an airplane window. Overlaid on the left side of this image is the title "Catalog of Archived Suborbital Earth Science Investigations" in large white text. Below the title is the subtitle "An inventory of NASA's airborne and field campaigns". At the bottom left of the main content area is a white rectangular button with the text "Explore CASEI".

NASA | CASEI

EXPLORE GLOSSARY ABOUT CONTACT

## Catalog of Archived Suborbital Earth Science Investigations

An inventory of NASA's airborne and field campaigns

Explore CASEI



## CASEI Provides a Holistic View of Campaigns

- “**Relating to or concerned with wholes** or with complete systems rather than with the analysis of, treatment of, or dissection into parts” *Merriam Webster*
- Big picture perspective
- Campaign data products do not exist in isolation, but are part of a **complete investigation** with a scientific purpose
- **Contextual Information is essential** - details connect the pieces of a campaign & explain the data collection environment - crucial for appropriate data use, reuse

→ **Return on NASA investment**



# Contextual Metadata Added in CASEI

## Relational Database of Contextual Metadata:

- Additional campaign information
- Aircraft/platform metadata; flight track data access
- Platform, instrument details
- Season, region, observation domain(s)
- Observed parameters
- Deployment and intensive operation period ranges
- Significant events
- Data product DOIs
- Links to related documents and publications
- Leadership, management, funding information
- Acronyms, aliases, logos

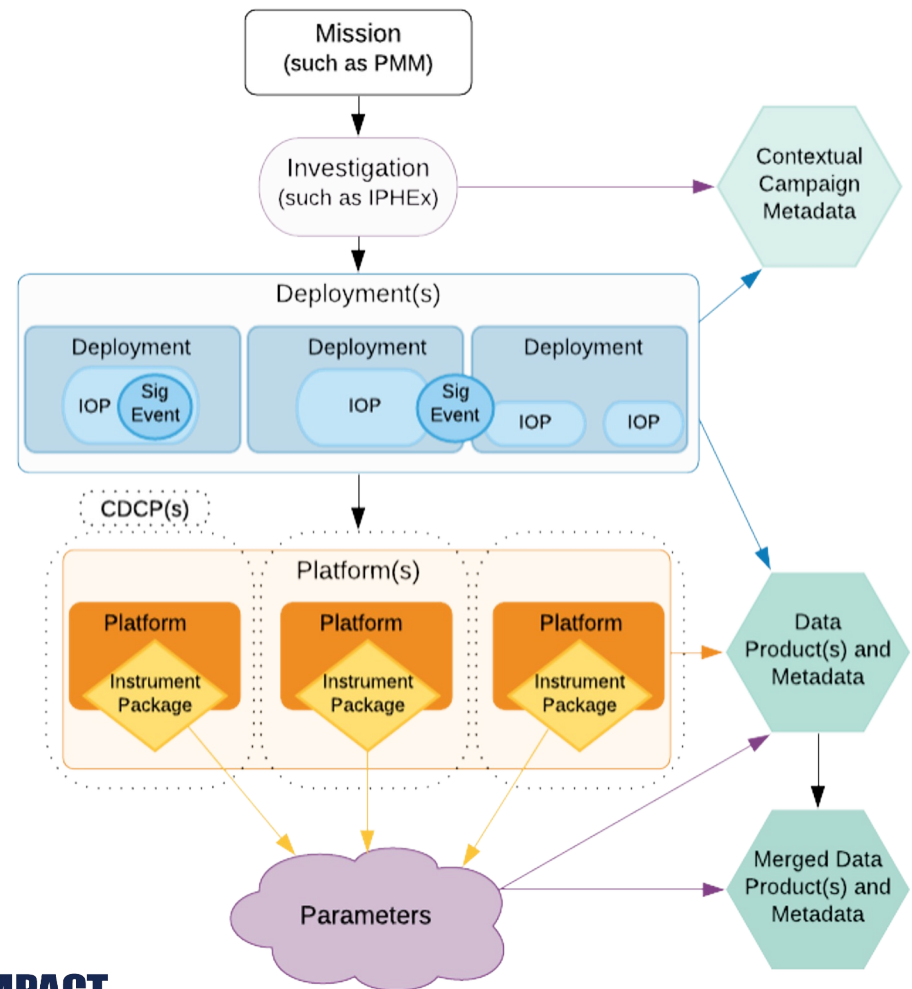
## All information is highly inter-linked

### Platforms

- type
- owner
- image (if available)
- GCMD name

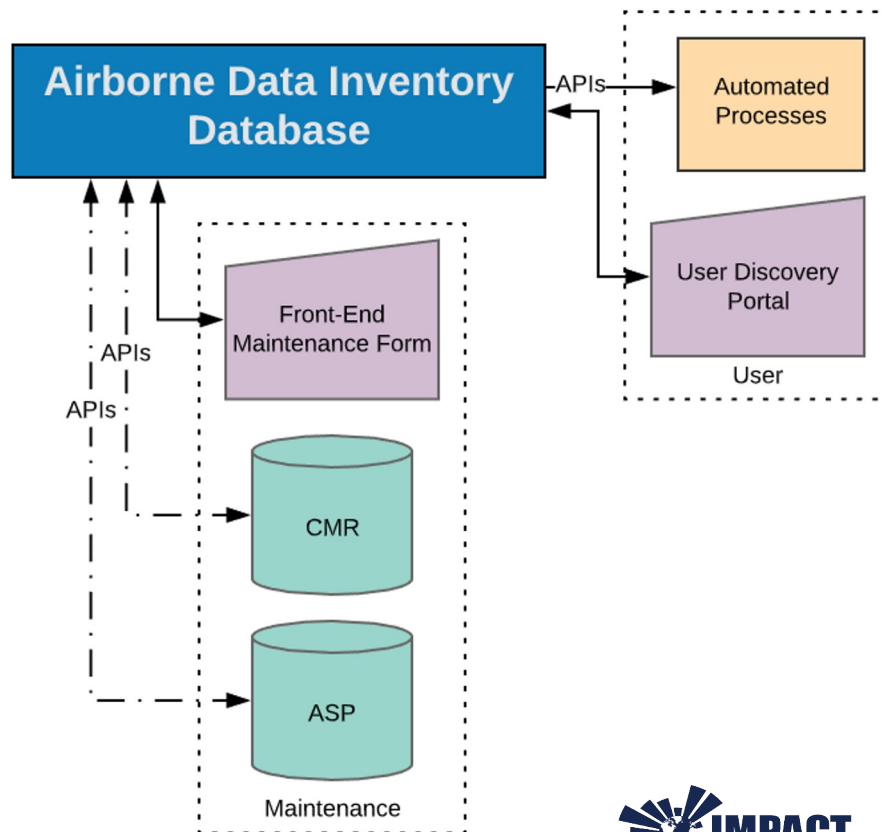
### Instruments

- measurement style/type
- owner, image (if avail)
- measurement region
- resolutions
- GCMD name





# CASEI - Overall Design & Goals



**User Portal** - public user interface/website

- submit queries
- obtain information
- link to data access
- find campaign details

**Maintenance Interface** - metadata curation

- add new information
- curation reviews of existing information
- perform routine error checks
- access inventory user statistics (dev)

**APIs** for external database access

- NASA Common Metadata Repository (CMR)
- NASA Airborne Science Program database



# CASEI Design and Function

NASA | CASEI  
Catalog of Archived Suborbital Earth Science Investigations

Explore Glossary About Contact

Search for campaigns, platforms or instruments

DATE RANGE | FOCUS AREA | GEOGRAPHICAL CONCEPT | SEASON | GEOGRAPHICAL REGION | PLATFORM | FUNDING AGENCY

100% Program

CAMPAIGNS (26) | PLATFORMS (48) | INSTRUMENTS (289)

MOST RECENT

LOGO ACT-America Atmospheric Carbon and Transport - America 2016-2019 Midwest, Mid-Atlantic, Southern US 8 Deployments | 8 Data Products

LOGO ACEPOL Aerosol Characterization from Polarimeter and Lidar 2017 North Atlantic, Gulf of Mexico, Caribbean Oceanic region 1 Deployment | 4 Data Products

LOGO CPEX Convective Processes Experiment 2017 North Atlantic, Gulf of Mexico, Caribbean Oceanic region 1 Deployment | 1 Data Product

LOGO GOES-R PLT GOES-R Post-Launch Test 2017 Continental United States 1 Deployment | 17 Data Products

LOGO OLYMPEX Olympic Mountains Experiment 2015-2016 Olympic Peninsula in U.S. Washington State 1 Deployment | 38 Data Products

LOGO AfrisAR Global Tropical Rainfall 2017 1 Deployment | 8 Data Products

Explore Page

NASA | CASEI  
Catalog of Archived Suborbital Earth Science Investigations

Explore Glossary About Contact

OLYMPEX

## Olympic Mountains Experiment

Weather, Global Water & Energy Cycle

1 DEPLOYMENTS | 58 COLLECTION PERIODS | 36 DATA PRODUCTS

OLYMPEX Overview Focus Platforms & Instruments Timeline Data Program Info

Overview

This campaign's focus area was the Olympic Peninsula in Washington, USA. This campaign used airborne instruments as well as radar and ground station instruments to gather in-situ data of rain and snow to compare to satellite observations of the same systems. This campaign also studied how topography may affect the measurements produced by the satellites. OLYMPEX supported the Global Precipitation Measurement mission and Ground Validation project.

STUDY DATES: 2015-11-01 — 2016-05-01

REGION: Olympic Peninsula in U.S. Washington State

FOCUS AREA: WEATHER, GLOBAL WATER & ENERGY CYCLE

GEOSPHERICAL CONCEPTS: Radiation & Energy Budget, Mid-Latitude Cyclones, Precipitation, Terrestrial Hydrology

FOCUS INSTRUMENTS: GPS SATELLITE MEASUREMENT ACCURACY, PRECIPITATION BY MID-LATITUDE FRONTAL SYSTEMS, TOPOGRAPHIC OROGRAPHIC EFFECTS ON PRECIPITATION, ATMOSPHERIC BUBBLES, PRECIPITATION CHARACTERISTICS

PLATFORMS & INSTRUMENTS

DC-8

9 CAMPAIGNS | 11 FLIGHTS

DC-8 Overview Related Campaigns & Instruments Data

Overview

NASA operates a highly modified Douglas DC-8 jetliner as a flying science laboratory. The aircraft, based at the NASA Armstrong Flight Research Center facility in Edwards, California, is used to collect data for experiments in support of projects serving the world's scientific community. Data gathered with the aircraft at flight altitude and by remote sensing have been used to study environmental science, geophysics, hydrology, meteorology, oceanography, volcanology, atmospheric chemistry, cryosphere, science, soil science and biology.

Related Campaigns & Instruments

MAMMA BOREAS ARCTAS CPEX SEACARS GRIP DC3 OLYMPEX GEXE

DROPSONDE (DRIPSPROBES)

Droprobes or Dropprobes are fitted with Global Positioning System (GPS) receivers that atmospheric data parameters (range, humidity, and speed) are located in 3-dimensional space during the probe's descent once each half sec. Measurements are transmitted by the aircraft from the level of release and at ocean's surface.

INSTRUMENTS SEARCHED: ATMOSPHERIC PRESSURE > ATMOSPHERE > ATMOSPHERIC TEMPERATURE > ATMOSPHERIC WIND VECTOR > ATMOSPHERE > WIND VECTOR RESOLUTION > ATMOSPHERIC WINDS > ATMOSPHERE > WIND PROFILES > WIND DIRECTION > ATMOSPHERIC WINDS > ATMOSPHERE > WIND PROFILES > WIND VELOCITY > ATMOSPHERIC WINDS > ATMOSPHERE > WIND PROFILES > ATMOSPHERE > ATMOSPHERE

LEARN MORE →

AIRBORNE EXPENDABLE BATHYOTHERMOGRAPHY (AEBT)

Data Products

CAMPAIGNS | INSTRUMENTS

GPS GROUND VALIDATION AIRBORNE SECOND GENERATION PRECIPITATION RADAR (S-Pol) 10.5067/GPMV3/GCPCV/AR2/DATA101

GPS GROUND VALIDATION CONICAL SCANNED WIND MILLER-BAIRD RESOLVE (RESOLVE) CONEX (CONEX V1) 10.5067/GPMV3/GCPCV/CONEX/CONEX\_V1

GPS GROUND VALIDATION DC-8 CAMERA (DC-8) 10.5067/GPMV3/GCPCV/DC8/CAMERA/DATA102

GPS GROUND VALIDATION DC-8 IMAGINATION AND DROPPROBE DATA (DC-8 V1) 10.5067/GCPCV/IMV/DATA101

GPS GROUND VALIDATION DC-8 MICROPHYSICS (DC-8) 10.5067/GCPCV/MICROPHYSICS/DATA101

GPS GROUND VALIDATION ADVANCED VERTICAL PROFILER (AVR) (DC-8) 10.5067/GCPCV/AVR/DATA101

Campaign Page

NASA | CASEI  
Catalog of Archived Suborbital Earth Science Investigations

Explore Glossary About Contact

DC-8

## Douglas DC-8

9 CAMPAIGNS | 11 FLIGHTS

DC-8 Overview Related Campaigns & Instruments Data

Overview

NASA operates a highly modified Douglas DC-8 jetliner as a flying science laboratory. The aircraft, based at the NASA Armstrong Flight Research Center facility in Edwards, California, is used to collect data for experiments in support of projects serving the world's scientific community. Data gathered with the aircraft at flight altitude and by remote sensing have been used to study environmental science, geophysics, hydrology, meteorology, oceanography, volcanology, atmospheric chemistry, cryosphere, science, soil science and biology.

Related Campaigns & Instruments

MAMMA BOREAS ARCTAS CPEX SEACARS GRIP DC3 OLYMPEX GEXE

DROPSONDE (DRIPSPROBES)

Droprobes or Dropprobes are fitted with Global Positioning System (GPS) receivers that atmospheric data parameters (range, humidity, and speed) are located in 3-dimensional space during the probe's descent once each half sec. Measurements are transmitted by the aircraft from the level of release and at ocean's surface.

INSTRUMENTS SEARCHED: ATMOSPHERIC PRESSURE > ATMOSPHERE > ATMOSPHERIC TEMPERATURE > ATMOSPHERIC WIND VECTOR > ATMOSPHERE > WIND VECTOR RESOLUTION > ATMOSPHERIC WINDS > ATMOSPHERE > WIND PROFILES > WIND DIRECTION > ATMOSPHERIC WINDS > ATMOSPHERE > WIND PROFILES > WIND VELOCITY > ATMOSPHERIC WINDS > ATMOSPHERE > WIND PROFILES > ATMOSPHERE > ATMOSPHERE

LEARN MORE →

AIRBORNE EXPENDABLE BATHYOTHERMOGRAPHY (AEBT)

Data Products

CAMPAIGNS | INSTRUMENTS

GPS GROUND VALIDATION AIRBORNE SECOND GENERATION PRECIPITATION RADAR (S-Pol) 10.5067/GPMV3/GCPCV/AR2/DATA101

GPS GROUND VALIDATION CONICAL SCANNED WIND MILLER-BAIRD RESOLVE (RESOLVE) CONEX (CONEX V1) 10.5067/GPMV3/GCPCV/CONEX/CONEX\_V1

GPS GROUND VALIDATION DC-8 CAMERA (DC-8) 10.5067/GPMV3/GCPCV/DC8/CAMERA/DATA102

GPS GROUND VALIDATION DC-8 IMAGINATION AND DROPPROBE DATA (DC-8 V1) 10.5067/GCPCV/IMV/DATA101

GPS GROUND VALIDATION DC-8 MICROPHYSICS (DC-8) 10.5067/GCPCV/MICROPHYSICS/DATA101

GPS GROUND VALIDATION ADVANCED VERTICAL PROFILER (AVR) (DC-8) 10.5067/GCPCV/AVR/DATA101

Platform Page

NASA | CASEI  
Catalog of Archived Suborbital Earth Science Investigations

Explore Glossary About Contact

INSTRUMENT

## FSSP

Forward Scattering Spectrometer Probe

The FSSP is the general class of instruments called optical particle counters (OPCs) that detect single particles and size them by measuring the intensity of light that the particle scatters when passing through a light beam.

FSSP Instrument Details Instrument Operation Data

Instrument Details

INSTRUMENT TYPE: N/A

MEASUREMENT/AVAILABILITY: CLOUDS, ATMOSPHERE, CLOUD MICROPHYSICS, PARTICLE SIZE DISTRIBUTION, CLOUDS, ATMOSPHERE, CLOUD MICROPHYSICS

MEASUREMENT RESOLUTION: Full column profile

TEMPORAL RESOLUTION: 0.1 s

Spatial Resolution: 10 µm at 200m

MEASUREMENT FREQUENCY: 20-19 Hz

OPERATION DETAILS: https://www.nasa.gov/pdf/10.17751/1000.105067/GCPCV/DC8/OLYMPPEX2.002

CALL NUMBER INFORMATION: https://airborne.science.nasa.gov/instruments/FSSP

LEAD INVESTIGATOR: Paul Lawson, Russel Poveeher

TECHNICAL CONTACT: Paul Lawson

DISTRIBUTION SOURCE: Particle Measuring Systems Inc.

FUNDING SOURCE: N/A

DATA LOCATIONS: N/A

ARCHIVES: Atmospheric Science Data Center (ASDC), Global Hydrology Resource Center (GHRC)

Instrument Operation

PLATFORMS WHERE THE PLATFORM WAS USED WITH THIS INSTRUMENT

LOGO LPVKA University of Wyoming Ring of Gold Field

LOGO LPVEX Light Precipitation Evaluation Experiment 2016 Gulf Field

LOGO DC-8/800 (Camel) DC-8/800

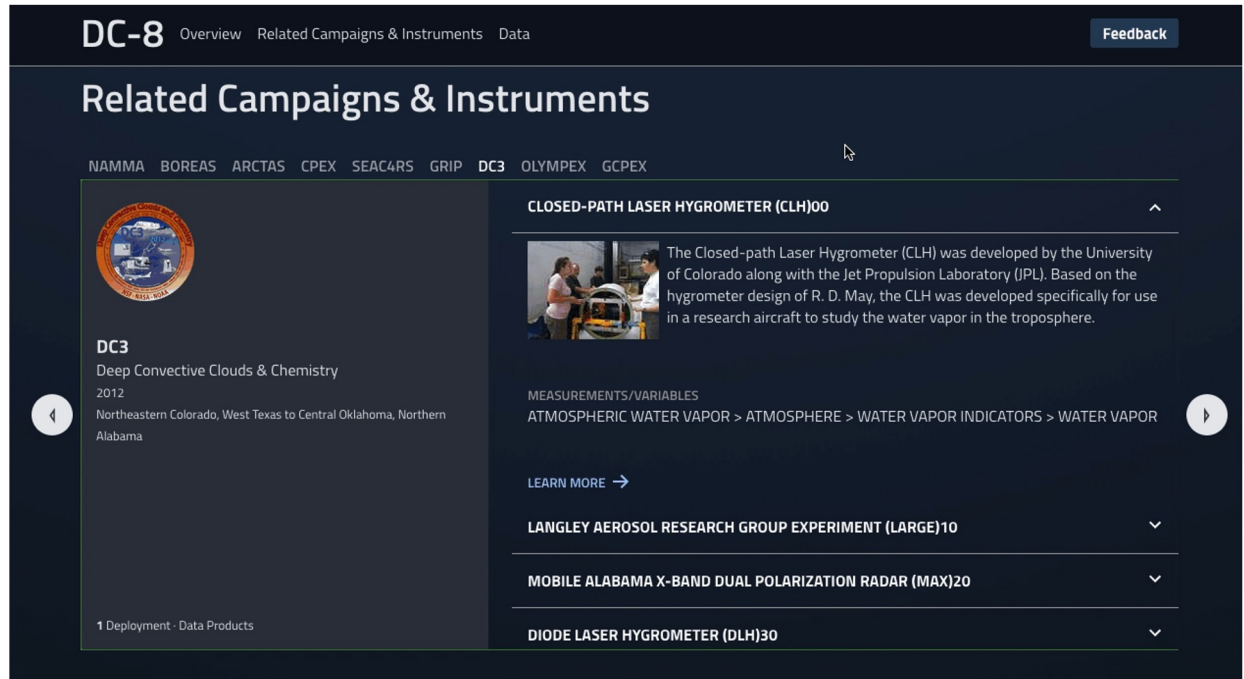
LOGO GCPEX Global Cold Season Precipitation Experiment 2016 North Carolina to southern portion of the United States (U.S., Mexico, Cuba)

Instrument Page



# CASEI User Portal Overview

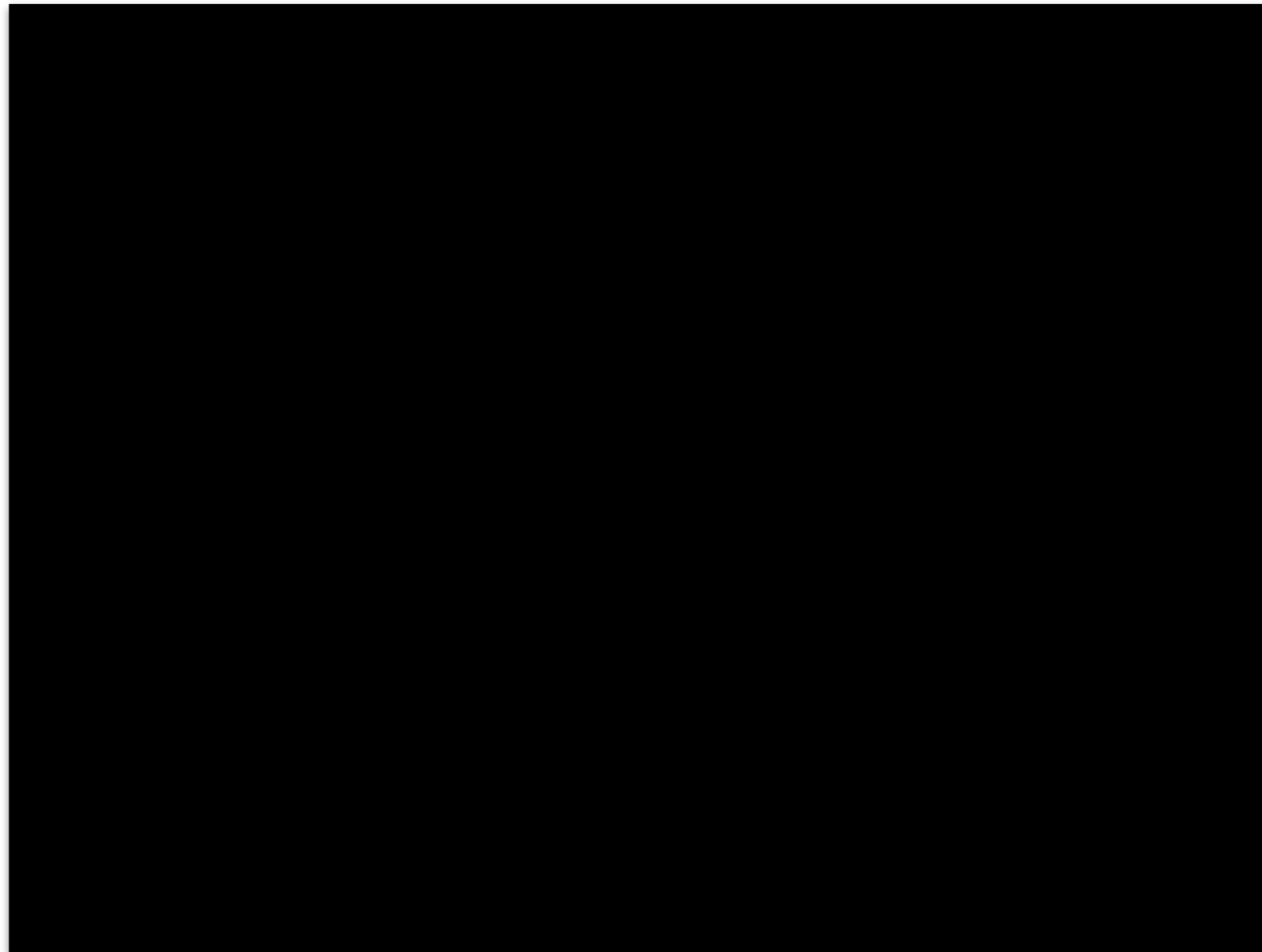
- Information pages approach:
  - Synthesis of information
  - Relationship(s) of information
- Interconnected campaigns, platforms, and instruments
- Heterogeneous data products connected via single interface
- Initial SME/user testing focused on important questions:
  - What are common user goals?
  - What search paths need to be prioritized?
  - Where do users run into informational dead ends?



The screenshot displays the CASEI User Portal interface for the DC-8 campaign. At the top, there is a navigation bar with 'DC-8' and links for 'Overview', 'Related Campaigns & Instruments', and 'Data'. A 'Feedback' button is located in the top right corner. The main heading is 'Related Campaigns & Instruments', with a breadcrumb trail: 'NAMMA > BOREAS > ARCTAS > CPEX > SEAC4RS > GRIP > DC3 > OLYMPEX > GCPEX'. The left sidebar features a circular logo and details for 'DC3: Deep Convective Clouds & Chemistry, 2012, Northeastern Colorado, West Texas to Central Oklahoma, Northern Alabama', with a '1 Deployment - Data Products' indicator. The main content area highlights the 'CLOSED-PATH LASER HYGROMETER (CLH)00', including a photo of the instrument and a description: 'The Closed-path Laser Hygrometer (CLH) was developed by the University of Colorado along with the Jet Propulsion Laboratory (JPL). Based on the hygrometer design of R. D. May, the CLH was developed specifically for use in a research aircraft to study the water vapor in the troposphere.' Below this, there is a 'MEASUREMENTS/VARIABLES' section with a breadcrumb trail: 'ATMOSPHERIC WATER VAPOR > ATMOSPHERE > WATER VAPOR INDICATORS > WATER VAPOR'. A 'LEARN MORE' link with a right-pointing arrow is also present. At the bottom of the main content area, there are three expandable sections: 'LANGLEY AEROSOL RESEARCH GROUP EXPERIMENT (LARGE)10', 'MOBILE ALABAMA X-BAND DUAL POLARIZATION RADAR (MAX)20', and 'DIODE LASER HYGROMETER (DLH)30'.

CASEI Platform pages show related Campaigns and Instruments

**CASEI  
Design &  
Function:  
quick demo**



# CASEI Inventory Status

ADMG continuously adds curated metadata to the CASEI inventory & regularly pushes new content to the CASEI website.

*Campaigns  
in CASEI →*

\*Not all campaigns in CASEI have data in a NASA data center (yet)

\*Not all NASA campaigns have metadata in CASEI (yet)

