Data User Guide

AAMH CPEX

Introduction

The AAMH CPEX dataset contains products obtained from the MetOp-A, MetOp-B, NOAA-18, and NOAA-19 satellites. These data were collected in support of the NASA Convective Processes Experiment (CPEX) field campaign. The CPEX field campaign took place in the North Atlantic-Gulf of Mexico-Caribbean Sea region from 25 May-25 June 2017. CPEX conducted a total of sixteen DC-8 missions from 27 May-24 June. The CPEX campaign collected data to help explain convective storm initiation, organization, growth, and dissipation in the North Atlantic-Gulf of Mexico-Caribbean Oceanic region during the early summer of 2017. These data are available from May 26, 2017 through July 15, 2017 and are available in netCDF-4 format.

Citation

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Keywords:

AAMH, CPEX, NOAA, MetOp, reflectivity

Campaign

The NASA Convective Processes Experiment (CPEX) aircraft field campaign took place in the North Atlantic-Gulf of Mexico-Caribbean Sea region from 25 May-25 June 2017. CPEX conducted a total of sixteen DC-8 missions from 27 May-24 June. The 16 missions covered a wide range of weather conditions from clear and calm wind, isolated convective cloud systems, to Tropical Storm Cindy (2017). It is the first field campaign that collected airborne observations continually from pre-tropical disturbance in the Caribbean Sea, to tropical depression, and formation of Tropical Storm Cindy in the Gulf of Mexico prior to

landfall. The three main science objectives of CPEX were: 1) Improve understanding of convective processes including cloud dynamics, downdrafts, cold pools and thermodynamics during initiation, growth, and dissipation. 2) Obtain a comprehensive set of simultaneous wind, temperature, and moisture profiles, using Doppler wind lidar (DAWN), microwave radiometer and sounder (HAMSR/MASC), and GPS dropsondes, conduct a quantitative evaluation of those profiles in the vicinity of scattered and organized deep convection measured by airborne precipitation radar (APR2), in all phases of convective life cycle. 3) Improve model representation of convective and boundary layer processes over the tropical oceans using a cloud-resolving, fully coupled atmosphere-ocean model, and assimilate the wind, temperature and humidity profiles into the model. More information is available from NASA's Jet Propulsion Laboratory's CPEX field campaign webpage.

Figure 1: CPEX field campaign logo
(Image source: CPEX)

Product Description

The AAMH CPEX data derived from combined AMSU-A and MHS data on the MetOp and NOAA spacecraft. MetOp (Meteorological Operational) is Europe's first polar-orbiting operational meteorological satellite. It is the European contribution to the Initial Joint Polar System (IJPS), a co-operative agreement between Eumetsat and the US National Oceanic and Atmospheric Administration (NOAA) to provide data for climate and environmental monitoring and improved weather forecasting. The MetOp-A satellite was launched in 2006, with the MeTop-B following five years later. In total, the programmes will be operational for at least 14 years. NOAA 18, known before launch as NOAA-N, is a weather forecasting satellite run by NOAA. NOAA-N (18) was launched into a sun-synchronous orbit at an altitude of 854 km above the Earth, with an orbital period of 102 minutes. It hosts the AMSU-A, MHS, AVHRR, Space Environment Monitor SEM/2 instrument and High

Resolution Infrared Radiation Sounder (HIRS) instruments, as well as the SBUV/2 ozone-monitoring instrument. NOAA 19 is the fifth in a series of five Polar-orbiting Operational Environmental Satellites (POES) with advanced microwave sounding instruments that provide imaging and sounding capabilities. NOAA-N Prime is outfitted with instruments that provide imagery, atmospheric temperature and humidity profiles, and land and ocean surface temperature observations, all of which are key ingredients for weather forecasting. These MetOp and NOAA satellites collected global data on cloud cover, precipitation, surface conditions, atmospheric temperatures, and moisture.

Investigators

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Data Characteristics

The AAMH CPEX dataset consists of files in netCDF-4 format at Level 4 processing level. The MetOp-A, MetOp-B, NOAA-18, and NOAA-19 datafiles are available for all dates between May 26, 2017 to July 15, 2017.

Table 1: Data Characteristics

Characteristic	Description
Platform	MetOp-A, MetOp-B, NOAA-18, NOAA-19
Product	AAMH
Spatial Coverage	N: 48.969, S: 0.641, E: 154.716, W: -19.563 (North Atlantic, Gulf of Mexico, Caribbean)
Temporal Coverage	May 26, 2017 - July 15, 2017
Temporal Resolution	Hourly -> Daily
Parameter	Temperature, precipitation, water vapor, pressure levels
Version	1
Processing Level	4

File Naming Convention

The AAMH CPEX dataset files are named using the following convention:

Data files:
CPEX_<sat>_NPR_MIRS_V7_SND_AAMH_<##>_D<YYJJJ>_S<HHMM>_E<HHMM>_B<XXXXXX>_NS.nc

Table 2: File naming convention variables

Variable	Description
sat	Satellite platform (METOPA, METOPB, NOAA18, NOAA19)
##	Satellite ID (M2=MetOp-A, M1=MetOp-B, NN=NOAA-18, NP=NOAA-19)
YY	Two-digit year
JJJ	Three-digit Julian day
S<HHMM>	Start time UTC (HH=Two-digit hour, MM=two-digit minute)
E<HHMM>	Stop time UTC (HH=Two-digit hour, MM=two-digit minute)
XXXXXXX	Seven-digit processing-block ID delimiter, spacecraft revolution
.nc	netCDF-4 format

Data Format and Parameters

The AAMH CPEX data files are organized by different satellite platforms. The files consist of information based on time, positioning, precipitation profiles, and pressure levels recorded by MetOp-A, MetOp-b, NOAA-18, and NOAA-19. The data fields contained in each AAMH CPEX file are listed in Table 3.

Table 3: Data Fields

Variable	Description	Unit
Atm_type	Atm type	-
ChiSqr	Chi-squared	-
Freq	Central Frequency	-
Latitude	Latitude of view	Degrees North
Longitude	Longitude of view	Degrees East
LZ_angle	Local zenith angle	degrees
Orb_mode	Orb mode	-
PClw	Cloud liquid water profile	g/kg
PGraupel	Graupel mass profile	g/kg
PIce	Ice mass profile	g/kg
Player	Pressure for each layer	mb
Plevel	Pressure for each level	mb
Polo	Polarizations (Horizontal or Vertical)	-
PRain	Rain mass profile	g/kg
PSnow	Snow mass profile	g/kg
PTemp	Temperature profile	K
PVapor	Water vapor profile	g/kg
Qc	Qc	-
RAzi_angle	Relative azimuth angle (0-360)	degrees
ScanTime_dom	Calendar day of month (1-31)	day
ScanTime_doy	Julian day of year (1-366)	day
ScanTime_hour	Hour of the day (0-23)	hour

ScanTime_minute	Minute of the hour (0-59)	minute
ScanTime_month	Calendar month (1-12)	month
ScanTime_second	Second of the minute (0-59)	s
ScanTime_UTC	Number of seconds since 00:00:00 UTC	s
ScanTime_year	Calendar year (20XX)	year
Sfc_type	Type of surface	-
SurfP	Surface pressure	mb
SZ_angle	Solar zenith angle	degree

Software

No special software is needed to read these netCDF data files; however, Panoply is an easy-to-use free tool for reading and visualizing the data within these netCDF files.

Known Issues or Missing Data

There are no known issues with these data or any known gaps in the dataset.

References

NASA Space Science Data Coordinate Archive
https://nssdc.gsfc.nasa.gov/nmc/spacecraft/display.action?id=2005-018A

NOAA Microwave Integrated Retrieval System Orbital Data - MIRS_ORB
https://www.avl.class.noaa.gov/glossary/MIRS_ORB.htm

World Meteorological Organization (WMO) Satellites
https://space.oscar.wmo.int/satellites

Related Data

All other datasets collected as part of the CPEX campaign are considered related and can be located by searching the term "CPEX" in the Earthdata Search.

Contact Information

To order these data or for further information, please contact:

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