



Data User Guide

GOES CPEX

Introduction

The GOES CPEX dataset contains products obtained from the Geostationary Operational Environmental Satellite 13. 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 31, 2017 through July 25, 2017 and are available in netCDF-3 format.

Citation

National Weather Service. 2023. GOES CPEX. Dataset available online from the NASA Global Hydrometeorology Resource Center DAAC, Huntsville, Alabama, U.S.A. doi: <http://dx.doi.org/10.5067/CPEX/GOES/DATA101>.

Keywords:

NASA, GHRC, NOAA, NWS, CPEX, GOES-13

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](#))

Instrument Description

GOES-13 launched on May 24, 2006 aboard a Delta IV Rocket to become the first of a new generation in the GOES family of Earth monitoring satellites. Geostationary Operational Environmental Satellites (GOES) provide the kind of continuous monitoring necessary for intensive data analysis. Geostationary describes an orbit in which a satellite is always in the same position with respect to the rotating Earth. This allows GOES to hover continuously over one position on the Earth's surface, appearing stationary. As a result, GOES provides a constant vigil for the atmospheric "triggers" for severe weather conditions such as tornadoes, flash floods, hail storms, and hurricanes. The multi-mission GOES N-Series (13 through 15) became vital contributors to weather, solar and space operations, and science. NASA and the National Oceanic and Atmospheric Administration (NOAA) are actively engaged in a cooperative program to expand the existing GOES system. The series

introduced several improvements over previous GOES spacecraft, including a highly advanced attitude control system fostering enhanced instrument performance for improved weather service quality. More information about GOES-13 can be found at the [NASA GOES-N Series webpage](#).

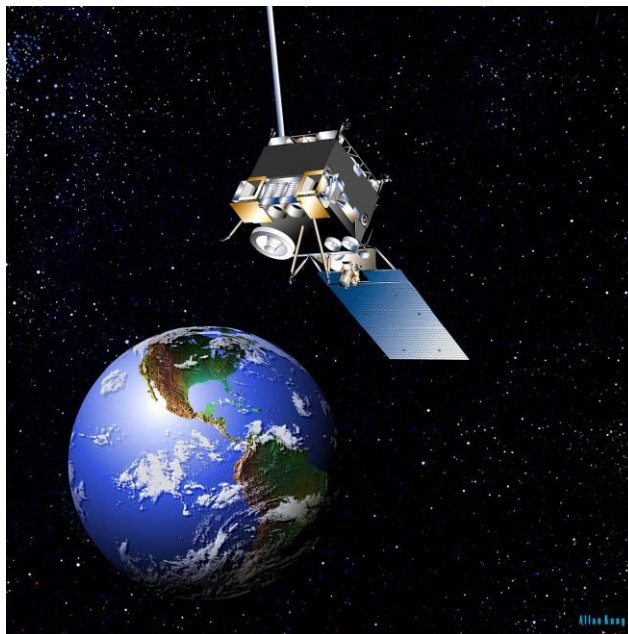


Figure 2: GOES-13 Satellite
(Image source: [NASA](#))

Investigators

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Data Characteristics

The GOES CPEX dataset consists of files in netCDF-3 format at Level 2 processing level. The GOES-13 datafiles are available at 15 minute intervals for all dates between May 31, 2017 to June 25, 2017.

Table 1: Data Characteristics

Characteristic	Description
Platform	GOES-13 Geostationary Satellite (GOES-13)
Spatial Coverage	N: 49.900, S: 8.029, E: -57.105, W: -130.924 (United States)
Spatial Resolution	4 km
Temporal Coverage	May 31, 2017 - June 25, 2017
Temporal Resolution	15 minutes
Parameter	Satellite positioning
Version	1

Processing Level	2
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File Naming Convention

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

Data files: CPEX_GOES_YYYYMMDD_hhmm_g13.nc

Table 2: File naming convention variables

Variable	Description
YYYY	Four-digit year
MM	Two-digit month
DD	Two-digit day
hh	Two-digit hour in UTC
mm	Two-digit minute in UTC
.nc	netCDF-3 format

Data Format and Parameters

The GOES CPEX data files are organized by different channels. The files consist of information based on GOES-13 positioning and channels 1, 2, 3, 4, and 6. The files are available every 15 minutes. The data fields contained in each GOES CPEX file are listed in Table 3.

Table 3: Data Fields

Variables	Description	Unit
gvar_ch1	Transmission format for channel 1	-
gvar_ch2	Transmission format for channel 2	-
gvar_ch3	Transmission format for channel 3	-
gvar_ch4	Transmission format for channel 4	-
gvar_ch6	Transmission format for channel 6	-
latitude_ch1	Latitude channel 1	Degrees North
latitude_ch4	Latitude channel 4	Degrees North
latitude_ch6	Latitude channel 6	Degrees North
longitude_ch1	Longitude channel 1	Degrees East
longitude_ch4	Longitude channel 4	Degrees East
longitude_ch6	Longitude channel 6	Degrees East
sat_zenith	Satellite zenith angle	degrees

et_affine	Calculates (x,y) and (lat,lon) coordinates	-
pass_date	Pass date	std_date
start_time	Start time	std_time
time_adjust	Adjusted time	std_time
attitude	Attitude angle	rad
sensor_tilt	Sensor tilt	rad
scan_samples	Scan samples recorded	-
scan_rates	Rate of scans recorded	-
miss_algn_mat	Misalignment	-
step_line_ang	Step angle line of satellite	rad
step_samp_ang	Step angle sample of satellite	rad
center_line	Satellite center line	-
center_samp	Satellite center sample	-
interp_points	Interpolation points of satellite	-
scan_time	Satellite scan time	s
x_pos	x-position (x, y, z)	m
y_pos	y-position (x, y, z)	m
z_pos	z-position (x, y, z)	m
sensor_tilt_arr	Sensor tilt adjustment	rad
sensor_twist	Sensor twist angle	rad
satellite_roll	Roll angle of satellite	rad
satelliet_pitch	Pitch angle of satellite	rad
satellite_yaw	Yaw angle of satellite	rad

Software

This dataset is in netCDF-3 format and does not require any specific software to read. However, the data are easily readable and viewed in [Panoply](#).

Known Issues or Missing Data

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

References

NASA Convective Processes Experiment. (2017).

<https://cpex.jpl.nasa.gov/cpex2017/>

NASA GOES-13. (2021).

<https://www.nasa.gov/directorates/heo/scan/services/missions/earth/GOES13.html>

NASA Satellite Network. (2021). GOES-N Series

https://www.nasa.gov/mission_pages/goes-n/index.html

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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