



Data User Guide

GOES-R PLT ER-2 Flight Navigation Data

Introduction

The GOES-R PLT ER-2 Flight Navigation Data dataset consists of multiple altitude, pressure, temperature parameters, airspeed, and ground speed measurements collected by the NASA ER-2 high-altitude aircraft for flights that occurred during the GOES-R Post Launch Test (PLT) field campaign. The GOES-R PLT airborne science field campaign took place between March 21 and May 17, 2017 in support of the post-launch product validation of the Advanced Baseline Imager (ABI) and the Geostationary Lightning Mapper (GLM). ER-2 navigation data files in ASCII-IWG1 format are available for March 21, 2017 through May 17, 2017.

Notice:

There is one file per NASA ER-2 aircraft flight. Since flights do not occur on a regular basis during the field campaign, there are missing days between March 21, 2017 and May 17, 2017.

Citation

Goodman, Steven. 2019. GOES-R PLT ER-2 Flight Navigation Data [indicate subset used]. Dataset available online from the NASA EOSDIS Global Hydrology Resource Center Distributed Active Archive Center, Huntsville, Alabama, U.S.A. doi: <http://dx.doi.org/10.5067/GOESRPLT/INS/DATA101>

Keywords:

NASA, GHRC, GOES-R PLT, ER-2, aircraft, navigation, aircraft characteristics, flight times and locations

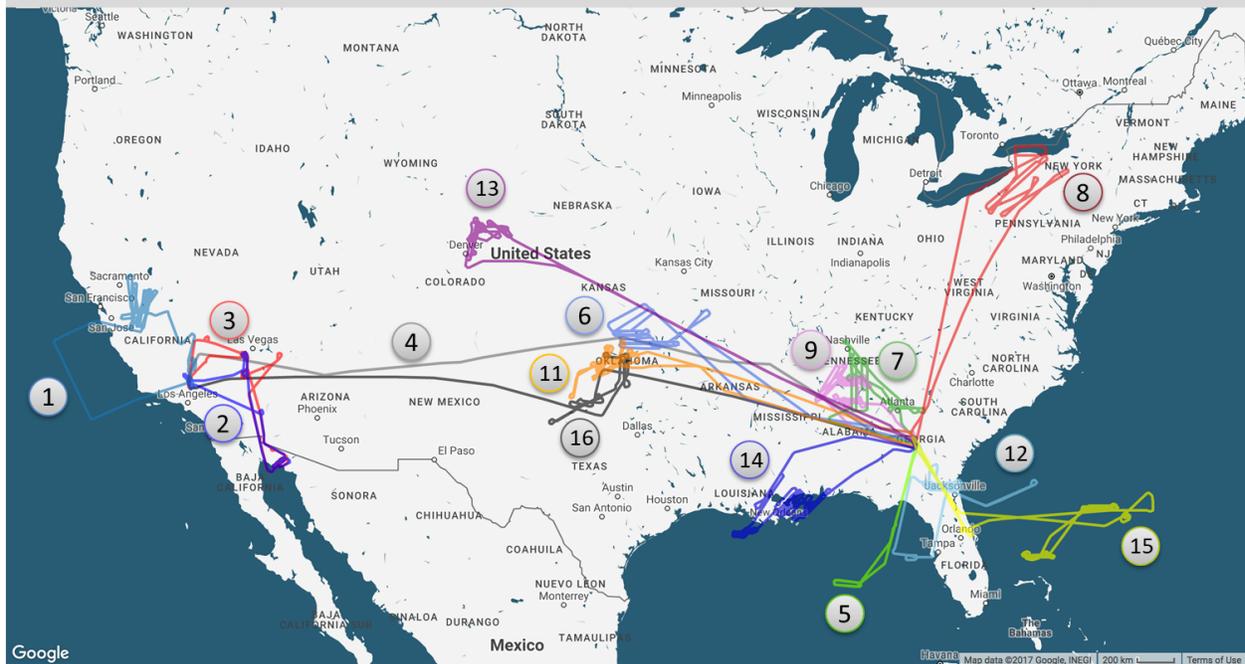
Campaign

The Geostationary Operational Environmental Satellite-R (GOES-R) series is a four-satellite program including GOES-R, GOES-S, GOES-T, and GOES-U. The GOES-R Series Program is a collaborative development and acquisition effort between the National Oceanic and

Atmospheric Administration (NOAA) and the National Aeronautics and Space Administration (NASA) to develop, launch and operate the satellites. The first satellite in the GOES-R series, GOES-R, launched on November 19, 2016 and became GOES-16 when it reached geostationary orbit. GOES-16 replaced GOES-13 as NOAA's operational GOES East satellite at 75.2 degrees west longitude on December 18, 2017. GOES-16 observes North and South America, as well as the Atlantic Ocean all the way to the west coast of Africa. GOES-16 provides high spatial and temporal resolution imagery of the Earth using its Advanced Baseline Imager (ABI). GOES-16's Geostationary Lightning Mapper (GLM) is the first operational lightning mapper flown in geostationary orbit. GOES-16 also includes four other scientific instruments for monitoring space weather and the Sun.

The GOES-R Post Launch Test (PLT) airborne science field campaign took place between March 21 and May 17, 2017 in support of the post-launch validation of NOAA's new generation of geostationary Earth observing instruments: ABI and GLM (Figure 1). The validation effort included targeted data collections from a NASA ER-2 high-altitude aircraft integrated with nine payloads (both passive and active instruments) coordinated with ground based and low earth-orbit referenced data from several operational and research satellite missions. Sixteen ER-2 aircraft validation missions, totaling 105.1 flight hours, were conducted over ideal Earth validation targets, such as deserts and oceans, thunderstorms, active wildfires, and an expansive set of cloud and moisture phenomenology. Dedicated ABI 30-second mesoscale (MESO) imagery collections were conducted concurrent with the ER-2 high-altitude aircraft based sensors during each GLM mission. The GOES-R PLT field campaign provided critical reference data and new insights into the performance NOAA's new generation of geostationary Earth observing instrument products. More information about the GOES-R PLT field campaign is available at <https://www.goes-r.gov/mission/fieldCampaignBegins.html> and <https://www.goes-r.gov/multimedia/events/goes16FieldCampaign.html>.

GOES-R Post Launch Airborne Science Cal/Val Field Campaign (March 21 to May 17, 2017)



*Flight #10 - April 27, 2017 - Huntsville, AL not shown due to aircraft navigation not reporting

Figure 1: GOES-R PLT airborne science field campaign

(Image Source: Frank Padula)

Aircraft Description

The NASA ER-2 aircraft is a high-altitude aircraft capable of carrying a variety of instruments, such as AMPR, HIWRAP, EXRAD, CRS, AirMSPI, CPL, and eMAS. The NASA ER-2 aircraft has set a world altitude record for aircraft with a takeoff weight between 26,455 and 35,275 lbs reaching 68,700 feet on November 19, 1998. The NASA ER-2 aircraft is a versatile aircraft operating above 99% of the Earth's atmosphere. The ER-2 can fly into the lower stratosphere at subsonic speeds, and plays an important role in Earth science research. Instruments on the ER-2 can be used to simulate satellite observations.

The typical cruise speed of the ER-2 aircraft is about 410 knots, with a normal 8-hour mission range of 3,000 nautical miles. The aircraft can carry up to 2,600 lb of instruments and equipment distributed throughout the equipment bay, nose area, and wing pods. The modular design on the NASA ER-2 aircraft allows for rapid removal and installation of payloads to meet changing requirements of different missions. More information about the NASA ER-2 aircraft can be found on the [NASA Armstrong Fact Sheet](#) and on the [Armstrong Flight Research Center webpage](#).



Figure 2: NASA ER-2 Aircraft

(Image source:

<https://www.nasa.gov/centers/armstrong/news/FactSheets/FS-046-DFRC.html>)

Investigators

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Data Characteristics

The GOES-R PLT ER-2 Flight Navigation Data data files are available in ASCII, ASCII-IWG1, and XML formats at a Level 1A data processing level. More information about the NASA data processing levels are available on the [EOSDIS Data Processing Levels](#) webpage. Table 1 shows the characteristics of this dataset.

Table 1: Data Characteristics

Characteristic	Description
Platform	NASA ER-2
Projection	n/a
Spatial Coverage	N: 43.573 , S: 26.449, E: -72.202, W: -124.625 (Continental United States)
Temporal Coverage	March 21, 2017 to May 17, 2017
Temporal Resolution	One file per flight
Sampling Frequency	Varies: <10 minutes
Parameter	Aircraft and atmospheric conditions

Version	1
Processing Level	1A

File Naming Convention

The GOES-R PLT ER-2 Flight Navigation Data data files are available in ASCII-IWG1 format and have the file naming convention shown below.

Data files: goesrplt_naver2_IWG1_YYYYMMDD-hhmm.txt

Table 2: File naming convention variables

Variable	Description
IWG1	The IWG1 is a specific style of file used for aircraft navigation. Platform characteristics are provided over time of the flight.
YYYY	Four-digit year
MM	Two-digit month
DD	Two-digit day
hh	Two-digit hour in UTC
mm	Two-digit minute in UTC
.txt	ASCII-IWG1 format

Data Format and Parameters

The GOES-R PLT ER-2 Flight Navigation Data dataset consists of ASCII-IWG1 data files. The data files contain platform characteristics of the NASA ER-2 aircraft while in flight during the GOES-R PLT field campaign. There is 1 file per ER-2 flight. The IWG1 is a particular style of ASCII file often used for aircraft navigation data. For more information, see the [UCAR IWG1 specifications](#). Table 3 describes the platform characteristics of the GOES-R PLT ER-2 files.

Table 3: Data Fields

Field Name	Description	Unit
System_Timestamp	System timestamp (Unix epoch)	UTC
Latitude	Latitude of aircraft	Degrees N
Longitude	Longitude of aircraft	Degrees E
GPS_Altitude-MSL	Altitude of the aircraft above the mean sea level estimated by the GPS	m
GPS_Altitude	Altitude of the aircraft estimated by the GPS	m
Pressure_Altitude	Atmospheric pressure at current aircraft altitude	mbar
RADAR_Altitude	Altitude of aircraft calculated by the radar	ft
Ground_Speed	Ground speed below aircraft	m/s
True_Air_Speed	True air speed of the ER-2 aircraft	m/s
Indicated_Air_Speed	Indicated air speed of the aircraft	m/s

Mach_Number	ER-2 mach number	-
Vertical_Speed	Vertical speed - inertial +/- 32,768 ft/min	ft/min
True_Heading	True heading - Hybrid +/- 180 degrees	deg
Track_Angle	Track angle	deg
Drift_Angle	Drift angle +/- 180 degrees	deg
Pitch_Angle	Pitch angle +/- 180 degrees	deg
Roll_Angle	Roll angle +/- 180 degrees	deg
Slip_Angle	Slip angle	deg
Attack_Angle	Angle of attack	deg
Static_Air_Temp	Static air temperature of the ER-2 aircraft	Deg C
Dew_Point	Dew point temperature	Deg C
Total_Air_Temp	Total air temperature calculated	Deg C
Static_Pressure	ER-2 static air pressure	mbar
Dynamic_Pressure	ER-2 dynamic air pressure	mbar
Cabin_Pressure	Cabin pressure transducer	mbar
Wind_Speed	Wind speed, 0-132 m/s	m/s
Wind_Direction	Wind direction	-
Vert_Wind_Speed	Vertical wind speed	m/s
Solar_Zenith_Angle	Solar zenith angle	deg
Aircraft_Sun_Elevation	Sum elevation in aircraft reference frame	deg
Sun_Azimuth	Solar azimuth angle	deg
Aircraft_Sun_Azimuth	Sun azimuth in aircraft reference frame	deg

Software

These data are available in ASCII-IWG1 format; therefore, no software is required to view these data.

Known Issues or Missing Data

Since these data files are collected during each NASA ER-2 flight, there are missing days between March 21, 2017 and May 17, 2017 as flights did not occur on a regular basis.

References

Include both the key publications or resources used to write this dataset documentation and the references that users should refer to for more information on the instrument, the data products, the algorithm used, and the quality assessment.

Related Data

All datasets from GOES-R PLT field campaign can be considered related to this GOES-R PLT ER-2 Flight Navigation Data dataset. Other GOES-R PLT campaign data can be located using the [GHRC HyDRO 2.0 search tool](#), by entering the term 'GOES-R PLT'.

Contact Information

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

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User Services

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