



Data User Guide

Hurricane and Severe Storm Sentinel (HS3) Global Modeling and Assimilation Office (GMAO) Dust Aerosol Optical Thickness Imagery

Introduction

The Hurricane and Severe Storm Sentinel (HS3) Global Modeling and Assimilation Office (GMAO) Dust Aerosol Optical Thickness Imagery dataset consists of browse only imagery showing dust aerosol optical thickness and wind speed/direction from the Goddard Earth Observing System Model, version 5 (GEOS-5). These data are used to see how the Saharan Air Layer (SAL) affects hurricane development during the Hurricane and Severe Storm Sentinel (HS3) field campaign. Goals for the HS3 field campaign included assessing the relative roles of large-scale environmental and storm-scale internal processes, addressing the controversial role of the SAL in tropical storm formation and intensification, and the role of deep convection in the inner-core region of storms. The browse only data files are available for dates between August 11, 2014 and October 5, 2014 at 3-hour intervals in PNG format.

Citation

Global Modeling and Assimilation Office. 2018. Hurricane and Severe Storm Sentinel (HS3) Global Modeling and Assimilation Office (GMAO) Dust Aerosol Optical Thickness Imagery [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/HS3/GMAO/DATA101>

Keywords:

NASA, GPM, HS3, GMAO, GEOS-5 model, dust aerosol optical thickness

Campaign

The Hurricane and Severe Storm Sentinel (HS3) was a five-year NASA field campaign mission targeted to investigate the processes that underlie hurricane formation and intensity change, including assessing the relative roles of the large-scale environment and the storm-scale internal processes. To achieve these goals, three 5-week campaigns were carried out during 2012 - 2014 which consisted of 21 flight missions over nine storms, two undeveloped systems, and several Saharan air layer outbreaks. The HS3 campaign utilized two Global Hawks, one with instruments geared toward measurement of the environment and the other with instruments suited to inner-core structure and processes. The environmental payload included the scanning High-resolution Interferometer Sounder (S-HIS) and the AVAPS dropsonde system; the over-storm payload included the HIWRAP conically scanning Doppler radar, the HIRAD multi-frequency interferometric radiometer, and the HAMSr microwave sounder. Information about instrument flights made during each campaign year are summarized in Table 2 of the [HS3 2016 BAMS](#) paper. More information about the HS3 campaign can be found at <https://ghrc.nsstc.nasa.gov/home/projects/hs3>.

Product Description

The Hurricane and Severe Storm Sentinel (HS3) Global Modeling and Assimilation Office (GMAO) Dust Aerosol Optical Thickness Imagery dataset contains dust aerosol optical thickness and 700 hPa wind speed/direction from the Goddard Earth Observing System Model, Version 5 (GEOS-5). The GEOS-5 is a state-of-the-art Earth system model ([Molod et al., 2012](#)). In its complete form, the GEOS-5 modeling system consists of coupled atmosphere, ocean, land, and sea ice models. The GEOS-5 is developed in the GMAO to support NASA's Earth science research in data analysis, observing system modeling and design, climate and weather prediction, and basic research. More information about the GEOS-5 model system can be found at the [GEOS-5 System webpage](#) and the [GEOS-5 Earth System Modeling and Data Assimilation webpage](#).

Investigators

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Data Characteristics

The Hurricane and Severe Storm Sentinel (HS3) Global Modeling and Assimilation Office (GMAO) Dust Aerosol Optical Thickness Imagery dataset contains browse only imagery showing dust aerosol optical thickness and 700 hPa wind speed/direction during the HS3 field campaign. These data are simulated from the GEOS-5 model and used to see how the Saharan Air Layer (SAL) affects hurricane development. These data are Level 4 processing level, and more information about the NASA data processing levels are available on the

[EOSDIS Data Processing Levels](#) webpage. Table 1 shows the characteristics of each browse file.

Table 1: Data Characteristics

Characteristic	Description
Platform	Computer
Instrument	Goddard Earth Observing System Model, Version 5 (GEOS-5)
Spatial Coverage	N: 50.0, S: -10.0 , E: 0.0, W: -111.0 (Atlantic Ocean)
Temporal Coverage	August 11, 2014 - October 5, 2014
Temporal Resolution	3 hours
Sampling Frequency	3 hours
Parameter	Dust aerosol optical thickness, wind
Version	1
Processing Level	4

File Naming Convention

The Hurricane and Severe Storm Sentinel (HS3) Global Modeling and Assimilation Office (GMAO) Dust Aerosol Optical Thickness Imagery dataset has the following file naming convention:

Browse files: hs3_GMAO_DustAOT_YYYYMMDDHH_###hr.png

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 when the GEOS-5 forecast is initialized on
###	Three-digit number of hours since the GEOS-5 initialization time
.png	Portable Network Graphics format

Data Format and Parameters

The data files are browse only imagery in PNG format showing dust aerosol optical thickness and 700 hPa wind speed/direction simulated from the GEOS-5 model. These data are used to see how the Saharan Air Layer (SAL) affects hurricane development during the HS3 field campaign.

Software

The Hurricane and Severe Storm Sentinel (HS3) Global Modeling and Assimilation Office (GMAO) Dust Aerosol Optical Thickness Imagery dataset contains browse only imagery in PNG format. No software is required to view these imagery files.

Known Issues or Missing Data

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

References

Molod, Andrea, Lawrence Takacs, Max Suarez, Julio Bacmeister, In-Sun Song, and Andrew Eichmann (2012). The GEOS-5 atmospheric general circulation model: Mean climate and development from MERRA to Fortuna, NASA/TM-2012-104606/Vol 28, 115 pp.

<https://gmao.gsfc.nasa.gov/pubs/docs/tm28.pdf>

Braun, Scott A., Paul A. Newman, and Gerald M. Heymsfield (2016). NASA's Hurricane and Severe Storm Sentinel (HS3) Investigation, *American Meteorological Society BAMS*,

November 2016, 2085-2102. doi: <https://doi.org/10.1175/BAMS-D-15-00186.1>

Related Data

All other data collected during the HS3 field campaign are considered related datasets.

Other HS3 data can be located using the [GHRC HyDRO 2.0 search tool](#) with the search term 'HS3'.

Contact Information

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

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