



Data User Guide

RSS Monthly 1-deg Merged Wind Climatology netCDF V7R01

Introduction

The Remote Sensing Systems (RSS) Monthly 1-degree Merged Wind Climatology netCDF dataset V7R01 provides global gridded 10 meter wind speed data over ocean areas. This dataset contains a 12-month climatology made using 1988 to 2007 data, monthly anomaly maps, a trend map with associated global and tropical wind speed time series and trends, and a time-latitude plot. The wind climatology dataset is a merged ocean product constructed using the version-7 (V7) passive microwave geophysical ocean products made publicly available by Remote Sensing Systems (www.remss.com). Ocean wind measurements used to create this dataset were acquired from the following satellite microwave radiometers: SSM/I F08 through F15, SSMIS F16 and F17, AMSR-E, AMSR-2, and WindSat. The radiometers used to construct this dataset were inter-calibrated at the brightness temperature level, while the V7 ocean products were produced using a consistent processing methodology across sensors.

Note:

The high quality ocean data is made available thanks to funding from the NASA MEaSUREs (Making Earth System Data Records for Use in Research Environments) project. The Global Hydrology Resource Center (GHRC), processes the cumulative TPW files from RSS into monthly files, and provides the cumulative 20 year climatology file and the cumulative trend files.

Citation

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Keywords:

Wind, wind speed, wind direction, microwave, ocean, climatology

Project Mission

NASA MEaSURES (Making Earth System Data Records for Use in Research Environments) project

Instrument Description

The RSS Monthly 1-degree Microwave Total Precipitable Water (TPW) netCDF V7R01 data product was constructed using data collected from the following instruments: all SSM/I, SSMIS F16 and F17, AMSR-E, AMSR-2 and WindSat. The Special Sensor Microwave/Imager (SSM/I) is a seven channel passive microwave radiometer operating at four frequencies and dual-polarization. The Special Sensor Microwave Imager Sounder (SSMIS) is also a microwave radiometer that includes a sounder. SSM/I and SSMIS are instruments carried onboard the Defense Meteorological Satellite Program (DMSP) series of polar orbiting satellites. Additional information on the SSM/I and the SSMIS instruments can be found at <http://www.ssmi.com/ssmi/>. The Advanced Microwave Scanning Radiometer – Earth Observing System (AMSR-E), one of six sensors aboard the Aqua satellite, is a twelve-channel, six-frequency, total power passive-microwave radiometer. More information on AMSR-E can be found at <http://www.ghcc.msfc.nasa.gov/AMSR/>. The Advanced Microwave Scanning Radiometer 2 (AMSR2) onboard the GCOM-W satellite is a remote sensing instrument measuring weak microwave emission from the surface and the atmosphere of the Earth. AMSR2 provides measurements of the intensity of microwave emission and scattering. More information on AMSR2 can be found at http://suzaku.eorc.jaxa.jp/GCOM_W/w_amsr2/whats_amsr2.html. WindSat is a polarimetric microwave radiometer aboard the Coriolis satellite which measures ocean surface wind vectors. More information on WindSat can be found at http://weather.msfc.nasa.gov/sport/survey/windSat/WindSat_Reference_Guide.pdf.

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File Naming Convention

This data collection consists of three files containing monthly, cumulative, and a full climatology of the wind. Each file uses the following naming conventions listed below. Please refer to Table 1 for the monthly and Table 2 for the cumulative and climatology file naming convention variable information.

Monthly file: ws_v07r00_[YYYYMM].ncV.nc

Cumulative: ws_v07r00_198801_[YYYYMM]_cumulative.ncV.nc

Climatology: ws_v07r00_1988_[YYYY]_climatology.ncV.nc

Table 1: Monthly file naming convention variables

Variable	Description
ws	Wind speed/ wind direction
v07	Data made from version-7 RSS data
r01	Algorithm revision 01
YYYY	Four-digit year of the file
MM	Two-digit month of the file
ncV	nc3 = netCDF-3 format nc4 = netCDF-4 format
nc	netCDF file format

Table 2: Cumulative and climatology naming convention variables

Variable	Description
ws	Wind speed/ wind direction
v07	data made from version-7 RSS data
r01	algorithm revision 01
198801	Starting year and month of the cumulative data
1988	Starting year of the climatology data
YYYY	Last four-digit year in the cumulative file
MM	Last two-digit month in the cumulative file
YYYY	Ending year of the climatology data
ncV	nc3 = netCDF-3 format nc4 = netCDF-4 format
nc	netCDF file format

Data Format Description

Data are stored in netCDF-3 and netCDF-4 file format. Each data file contains the dataset characteristics outlined in Table 3.

Table 3: Dataset Characteristics

Characteristic	Description
Platforms	AQUA, Coriolis, DMSP 5D-2/F10, DMSP 5D-2/F11, DMSP 5D-2/F13, DMSP 5D-2/F14, DMSP 5D-2/F15, DMSP 5D-2/F8, DMSP 5D-3/F16, DMSP 5D-3/F17, GCOM-W1
Instruments	SSM/I, SSMIS, WindSat, AMSR-E, AMSR-2
Spatial Coverage	N: 60, S: -60, E: 180, W: -180 (Global oceans)
Spatial Resolution	1 degree
Temporal Coverage	Start date: 01-01-1988 Stop date: Ongoing *Note the climatology file extends from 1988-2007
Temporal Resolution	Monthly
Parameter	Wind speed, wind direction
Processing Level	Level 3
Data Format	NetCDF-3, NetCDF-4

Data Parameters

Each of the three data files contains a set of data fields. Please refer to Table 4 to access the monthly data field information, Tables 5 for cumulative, and Table 6 for the climatology.

Please note that comparisons with anemometer wind measurements on moored buoys found this wind speed data to have a root-mean-squared error of approximately 1.0 ms^{-1} .

Table 4: Monthly data fields

Field Name	Description	Unit
global_mean_wind_speed_anomaly	Monthly average 10m wind speed anomaly over ice-free oceans, 60S to 60N	m s^{-1}
latitude	Latitude	degrees north
latitude_bounds	Latitude bounds	degrees north
longitude	Longitude	degrees east
longitude_bounds	Longitude bounds	degrees east
platform_names	Names of microwave radiometers who data were used in calculating wind speed by month	N/A
wind_speed	Monthly average 10m wind speed over ice-free oceans	m s^{-1}
wind_speed_anomaly	Monthly average 10m wind speed anomaly over ice-free oceans	m s^{-1}

satellites_used	Satellites used per month for calculating the mean TPW Array dimension: # months x 10 satellites, where 1= used, 0=not used		N/A
	Value	Satellite	
	1	SSMI F08	
	2	SSMI F10	
	3	SSMI F11	
	4	SSMI F13	
	6	SSMI F14	
	5	SSMI F15	
	7	SSMI F16	
	8	SSMI F17	
	9	AMSRE on AQUA	
10	WindSat on Coriolis		
11	AMSR2 on GCOM-W1		
time	Time	days	
time_bounds	Time bounds	days	
tropical_mean_wind_speed_anomaly	Monthly average tropical mean 10m wind speed anomaly over ice-free oceans, 20S to 20N	m s ⁻¹	

Table 5: Cumulative data fields

Field Name	Description	Unit
latitude	Latitude	degrees north
latitude_bounds	Latitude bounds	degrees north
longitude	Longitude	degrees east
longitude_bounds	Longitude bounds	degrees east
Linear_trend_in_wind_speed_anomaly	Linear trend in monthly average 10m wind speed anomaly over ice-free oceans	m s ⁻¹ decade ⁻¹
time	Time	day
time_bounds	Time bounds	day
time_lat_wind_speed_anomaly	Monthly average 10m wind speed anomaly over ice-free oceans	m s ⁻¹
tropical_mean_wind_speed_anomaly	Monthly average 10m tropical mean wind speed Anomaly over Ice-Free Oceans, 20S to 20N	m s ⁻¹

Table 6: Climatology data fields

Field Name	Description	Unit
climatology_time	Climatology time	day
climatology_time_bounds	Climatology time bounds (days since 1988-01-01 00:00:00)	day
latitude	Latitude	degrees north
latitude_bounds	Latitude bounds	degrees north
longitude	Longitude	degrees east
longitude_bounds	Longitude bounds	degrees east
wind_speed_climatology	Climatology of monthly average 10m wind speed over ice-free oceans	m s ⁻¹

Algorithm

The Special Sensor Microwave/Imager (SSM/I) and Special Sensor Microwave Imager Sounder (SSMIS) data are produced as part of NASA's MEaSUREs Program. Remote Sensing Systems generates SSM/I and SSMIS data products using a unified, physically based algorithm to simultaneously retrieve ocean wind speed (at 10 meters), atmospheric water vapor, cloud liquid water, and rain rate. This algorithm is a product of 20 years of refinements, improvements, and verifications. While the algorithms have evolved over time, a substantial background to the radiative transfer function used to derive the geophysical parameters is described in the following papers:

- [A well-calibrated ocean algorithm for SSM/I](#)
- [SSM/I Rain Retrievals within a Unified All-Weather Ocean Algorithm:](#)
- [AMSR Ocean Algorithm, Version 2](#)
- [Supplement 1 Algorithm Theoretical Basis Document for AMSR-E Ocean Algorithms](#)
- [SSM/I Version-7 Calibration Report](#)

References

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Description of Remote Sensing Systems Version-7 Geophysical Retrievals by Hilburn et al., 2010.

Contact Information

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

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