Real-Time MODIS and AVHRR Polar Winds Data Description

GENERAL INFORMATION

Data Source and Processing

MODIS: The nature of each polar wind product depends on the data source. The primary MODIS wind products are based on 1 km MODIS Level 1B (MOD021KM) HDF files are obtained through the NOAA Real-Time System, or *bent pipe*, located at NASA Goddard Space Flight Center. This dataset is used to produce single-satellite (Terra and Aqua separately) and mixed-satellite (Terra and Aqua combined) wind products. Two to four 5-minute granules from each orbit are remapped into a polar stereographic projection at 2 km resolution and composited using the McIDAS software. The resulting images are 2800x2800 pixels. The figure on the right shows the coverage from 3 granules.

MODIS winds are also generated at a number of direct broadcast (DB) sites. For those products, the MOD021KM MODIS product is used, with the coverage depending on the position of the satellite relative to the receiving station in each overpass. There are no 5-minute granules to piece together for the DB products. As with the bent-pipe winds, 1 km data are remapped to 2 km pixels. Cloud-track winds are generated using the 11 micron channel. Using the 6.7 micron water vapor channel, winds are produced in both clear and cloudy areas.

AVHRR: Polar wind products are generated using AVHRR Global Area Coverage (GAC) data, High Resolution Picture Transmission (HRPT) direct readout data, and MetOP AVHRR data. The GAC pixel size is 4 km; HRPT and MetOP AVHRR data are 1 km but remapped to 2 km as is done for the MODIS winds. AVHRR does not have a water vapor channel, so only cloud-track (IR) wind data are produced. The information below applies to all products.

Period and Coverage

Real-time, with new data available as frequently as every 100 minutes. There are 13-15 bent-pipe MODIS, AVHRR GAC, and MetOP AVHRR datasets per day per satellite. The number of direct broadcast MODIS and HRPT AVHRR datasets depends on the receiving station schedule, usually 6-10 per day per satellite.

All products generally cover the area poleward of +/-60 degrees latitude. Bent pipe, GAC, and MetOP AVHRR winds cover both polar regions over the course of a day. Direct broadcast and HRPT products cover only part of the Arctic or Antarctic, depending on the location of the receiving station.

OBTAINING THE DATA

Wind data files are available at CIMSS and at NOAA NESDIS, depending on the product. For most purposes we recommend obtaining the data files from the NESDIS server, as that is an operational, 24/7 system. There are three file formats for the wind data: plain text, McIDAS MD,

and BUFR. Not all products are available in all formats. NESDIS data are BUFR only. The availability of products and file formats is given in the table below.

Product/Source	**CIMSS**	**NESDIS**	**Server**
MODIS single-satellite, bent-pipe	text, MD	BUFR, text, MD	1, 2, GTS
MODIS mixed-satellite, bent-pipe	text (experimental)	- (expected late 2011)	3
MODIS direct broadcast	text, MD, BUFR	-	4, 5, EUMETCast
AVHRR GAC	text, MD, BUFR	BUFR, text, MD	6, GTS
AVHRR HRPT	text, MD, BUFR	-	7
AVHRR MetOp	text, MD, BUFR	-	6, GTS
Historical AVHRR	text, MD, BUFR	-	8

Servers referenced in table above (all anonymous FTP):

1. MODIS Bent-pipe from CIMSS: **ftp.ssec.wisc.edu** in **velden/winds/terra** and **velden/winds/aqua**. Mirrored on stratus.ssec.wisc.edu in pub/winds/rts/terra and pub/winds/rts/aqua.
2. MODIS Bent-pipe from NESDIS operations: The BUFR files are on **satepsanone.nesdis.noaa.gov** in **pub/bufr/modis_winds**. The text and MD files are on ftp.ssec.wisc.edu in velden/winds/terra/NOAA and velden/winds/aqua/NOAA, as well as on stratus.ssec.wisc.edu in pub/winds/rts/terra/NOAA and pub/winds/rts/aqua/NOAA.
3. MODIS mixed-satellite: (available on request)
4. MODIS DB BUFR: **stratus.ssec.wisc.edu** in **pub/winds/bufr**. The file name extensions are: PBRW - Barrow (AVHRR), PAFA – Fairbanks, ENTC - Tromso, EFSO - Sodankyla, MCMR – McMurdo, EGAR - Rothera.
5. MODIS and AVHRR DB plain text and MD: **stratus.ssec.wisc.edu** in **pub/winds/mcmurdo, pub/winds/tromso, pub/winds/sodanklya, pub/winds/fairbanks, pub/winds/barrow, pub/winds/rothera.**
6. AVHRR GAC and MetOP from NESDIS operations and CIMSS: The NESDIS operational BUFR files are on **satepsanone.nesdis.noaa.gov** in **pub/bufr/avhrr_winds**. The CIMSS winds are on **ftp.ssec.wisc.edu** in **velden/winds/avhrr/<sat>**, where <sat> is N15, N16, N17, N18, or METOP. Mirrored on **stratus.ssec.wisc.edu** in **pub/winds/avhrr/<sat>.**
7. AVHRR HRPT: **stratus.ssec.wisc.edu** in **pub/winds/barrow, pub/winds/rothera** (text and MD), and **pub/winds/bufr** (BUFR).
8. Historical AVHRR: **stratus.ssec.wisc.edu** in **pub/winds/histavhrr/<sat>/MD|asci|bufr.**

Direct broadcast MODIS winds from Tromso and McMurdo are also available on EUMETCast. NESDIS MODIS and AVHRR winds are broadcast over the GTS.

Archived Winds: Most of the wind files are archived. They are available on **stratus.ssec.wisc.edu** in **pub/winds/archive/<product>**. Unfortunately, the subdirectory structures are not internally consistent at this time.

FILE FORMATS AND NAMES

Text Files

At CIMSS/SSEC, the text and MD files are organized by wind set number. Since there are 14-15 orbits/day, we get 12-13 wind sets/day (overlapping triplets, but not crossing the day boundary). If wind sets are reprocessed, the files are overwritten.

The text files are named:

QIyyyyddd.nn.pp.gz

where

yyyy = year
ddd = day of year
nn = 01 to 13 indicating wind set of the day
pp = NP or SP indicating north or south pole

For example:

QI2002183.01.NP.gz

is the first wind set from day 2002183 over the North Pole.

The data contained in the text file are of the form:

```
type sat day hms lat lon pre spd dir rff qi temp
WV MODIS 20021113 1530 82.78 -101.92 450 19.8 164 59.25 .83 234.6
WV MODIS 20021113 1530 86.73 -127.92 450 24.0 220 73.81 .71 235.7
WV MODIS 20021113 1530 82.24 -98.92 462 14.9 153 54.79 .83 234.6
```

where

type: WV - water vapor (6.7 μm); IR - infrared (11 μm)
sat: MODIS [all from MODIS instrument]
day: yyyymmdd: yyyy - year, mm - month of year; dd - day of month
hms: hhmm: hour and minute of the middle image [GMT]
lat: latitude (positive North)
lon: longitude (positive **West**) ***Note: East longitudes are negative.***
pre: pressure level of wind [hPa]
spd: wind speed in m/s
dir: wind direction
rff: CIMSS recursive filter quality control value
qi: EUMETSAT control value
temp: IR or WV brightness temperature

McIDAS MD Files

The MD files are named:

MDXXxxnn.yyyyddd.pp.gz

where:

xxnn = 2001 to 2013 [NP]
xxnn = 2101 to 2113 [SP]
and the last 2 digits are the wind set number as above.

For example: MDXX2001.2002183.NP.gz is the first wind set from day 2002183 over the North Pole.

BUFR Files

The MODIS direct broadcast and AVHRR winds are also available in BUFR format. The MODIS bent pipe winds are not available in BUFR. Standard BUFR decoders may work. Our BUFR decoder is available via anonymous FTP from

stratus.ssec.wisc.edu

in the **/pub/winds/bufr_software** directory. Pre-compiled versions for Linux, Mac OS X, and Windows are available.

The NESDIS BUFR file naming convention is:

Aqua Files: **satwnd.bufrxxxx.aqua.Dyyddd.Thh:mm:ssZ**
Terra Files: **satwnd.bufrxxxx.terra.Dyyddd.Thh:mm:ssZ**

where:
xxxx = cdft for IR cloud-drift winds
xxxx = wvap for water vapor winds
yy = year
ddd = julian day
hh,mm,ss = hour, minute, second (system time)

The CIMSS BUFR file naming convention is similar:

satwnd.bufrxxxx.<*sat*>.Dyyddd.ThhmmZ.<site>

where:
xxxx = cdft for IR cloud-drift winds
xxxx = wvap for water vapor winds
<sat> = the satellite: aqua, terra, N18, etc.
yy = year
ddd = julian day
hhmm = hour, minute

<site> = optional (including the period) direct broadcast site indicator: PBRW - Barrow (AVHRR), PAFA – Fairbanks, ENTC - Tromso, EFSO - Sodankyla, MCMR – McMurdo, EGAR – Rothera.

GTS

As indicated in the table above, some data are available on the GTS. Here is the WMO header list of MODIS and AVHRR GAC winds:

AQUA_IR: JICX01 KNES YYGGgg
TERRA_IR: JBCX01 KNES YYGGgg
AQUA_WV: JLCX01 KNES YYGGgg
TERRA_WV: JFCX01 KNES YYGGgg

NOAA-15: JCVX91 KNES YYGGgg
NOAA-16: JCVX92 KNES YYGGgg
NOAA-17: JCVX93 KNES YYGGgg
NOAA-18: JCVX94 KNES YYGGgg
NOAA-19: JCVX95 KNES YYGGgg
METOP: JCVX97 KNES YYGGgg

USAGE POLICY

The data are free, where "free" means that they are available at no cost. "Free" does not mean unconditional use. In order to ensure that they are being used as intended, please send us a note with a brief description of your application. While we have tried to make clear their limitations, there will almost certainly be some applications that we have not addressed, and for which the data or programs are not well-suited. Additionally, **if these data will play a significant role in a journal publication, please consider including the developers as co-authors**.

CONTACTS

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