

# OPERATIONAL WIND PRODUCTS AT NOAA/NESDIS: A STATUS REPORT

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## ABSTRACT

This paper summarizes the status of the operational wind products at NOAA/NESDIS. Recent improvements, new additions, processing changes and monitors, future plans and product quality assessment of the Atmospheric Motion Vector (AMV) product suite will be discussed. The current satellite constellation for operational AMV winds processing includes GOES-12 as the eastern operational geostationary satellite and GOES-11 serving as the western operational geostationary satellite. GOES-13 (GOES-N), the first in the new GOES-NOP series of satellites, was still placed in standby mode. GOES-O, the second one, was successfully launched in June 27, 2009. The following GOES-O extensive science post-launch checkout of radiances and derived products including AMVs is being implemented. NOAA/NESDIS began to generate operationally MTSAT-1R Wind products and distribute them to NOAA/NWS AWIPS in February, 2009. AVHRR Polar wind products (NOAA N15-19 and METOP) have been available in the operational NOAA/NESDIS wind processing system. In addition, several new enhancements in the NOAA/NESDIS winds operational processing are implemented and being implemented. These enhancements include but are not limited to, introduction of the Expected Error parameter in an effort to improve the quality of all AMVs, Parallax corrected MODIS AMVs, combined MODIS AMVs. Updates on the status of these enhancements and other future plans will be presented. Besides AMV product suite, NOAA/NESDIS acquires, processes, and distributes QuikSCAT and ASCAT (working collaboratively with EUMETSAT and KNMI) products. An overview of the NOAA/NESDIS NRT processing and distribution of QuikSCAT and ASCAT wind products are also presented.

## 1. INTRODUCTION

NOAA/NESDIS and the Cooperative Institute for Meteorological Satellite Studies (CIMSS) continue to increase the product suite of Atmospheric Motion Vectors (AMVs), improve the quality of all operational AMVs products and enhance the operational monitoring tools. NOAA/NESDIS has implemented AVHRR polar winds into operation. The AVHRR polar wind products supplement existing MODIS winds products by providing additional spatial and temporal coverage. Based on NOAA/NWS's request, NOAA/NESDIS generated own MTSAT-1R wind products and incorporated MTSAT-1R wind products into AWIPS system in 2009. With new GOES satellite launch and operational plan, NOAA/NESDIS implemented the series of science and readiness tests for GOES wind process. These new products and improvement have resulted in improved wind products. These geostationary and polar wind products have been serving as critical input to numerous applications such as prediction system and real-time forecasting.

NOAA and EUMETSAT have a partnership to cooperate in providing meteorological data from their polar-orbiting satellites. Near real time ocean surface wind field measurements from METOP-A which was launched in October 2006 are being provided by the Advanced SCATterometer (ASCAT). NOAA/NESDIS

is processing and distributing ASCAT data in near real time for NOAA's operational users. The ASCAT products were operational in July 2008. Due to the age-related failure of spinning antenna, QuikSCAT process at NOAA/NESDIS had to be stopped in November 2009. To some extent operational ASCAT products continue the partial product types currently unavailable from QuikSCAT for operational users.

## 2. NOAA/NESDIS WINDS OPERATION STATUS REPORT

### 2.1 Status of GOES satellites

NOAA/NESDIS currently maintains a continuous stream of data from two operational geostationary satellites. These two satellites are GOES-12 at 75W and GOES-11 at 135W. GOES-10 was decommissioned on December 1, 2009. GOES-14 launched on Jun 27, 2009 is spare at 105W now. GOES-13 will replace GOES-12 on April 14, 2010. The transition plan is similar to GOES-8 to GOES-12 transition. After this transition, GOES-12 will be drifted to 60W for South America. The launch of GOES-P is expected in March 2010.

### 2.2 Operational GOES and Polar Wind Products and data Distribution

NOAA/NESDIS continues to distribute GOES wind products and MODIS wind products through GTS. No change of WMO headers is in these wind products. With AVHRR Polar winds operation, NOAA/NESDIS has been distributing these new wind products through GTS. These cloud track AVHRR Polar winds are derived from NOAA-15, NOAA-16, NOAA-17, NOAA-18, NOAA-19 and METOP. The AVHRR Polar wind products cover Arctic and Antarctic (Poleward 65 degree of latitude). Table 1 shows the WMO headers for all AVHRR Polar wind products available from GTS.

Product	WMO Header
NOAA-15 Polar Winds	JCVX91 KNES YYGGgg
NOAA-16 Polar Winds	JCVX92 KNES YYGGgg
NOAA-17 Polar Winds	JCVX93 KNES YYGGgg
NOAA-18 Polar Winds	JCVX94 KNES YYGGgg
NOAA-19 Polar Winds	JCVX95 KNES YYGGgg
METOP Polar Winds	JCVX97 KNES YYGGgg

Table 1: AVHRR Polar Wind Products and WMO headers

### 2.3 Web-based operational Monitoring Tool

In order to strengthen the real-time monitoring for Winds processing, NOAA/NESDIS implemented a web-based monitoring tool. The tool uses the different colors to represent the different status of processing and data distribution. Also it is able to display the important part of process log files. It is easier for operator to check and report the process status and also it is convenient for programmer to realize the potential issue of process and solve it in time.

### 2.4 New Wind Products

The following new products are expected to be implemented into the NESDIS operations.

#### 2.4.1 Mixed Mode Modis Winds

NOAA/NESDIS has worked with CIMSS to derive AMVs by utilizing mixed Terra and Aqua MODIS imageries. The same cloud and water vapor products will be generated from mixed-mode process. Parallax corrected Terra and Aqua imageries are required to generate mixed mode Modis wind products. NOAA/NESDIS is also working on the parallax corrected wind products separately for the Terra and Aqua satellite by replacing the regular imagery with the parallax corrected imagery.

### **2.4.2 NPP VIIRS Polar Winds**

NOAA/NESDIS and CIMSS are developing NPP VIIRS Polar wind products. Similar to current AVHRR Polar wind products, NPP VIIRS Polar winds only include cloud track wind products because no water vapor channel will be available on VIIRS. NPP is expected to be launched in January, 2011. NPP VIIRS Polar winds will be operational in January 2012.

## **3. ASCAT NRT DATA PROCESSING AND DISTRIBUTION AT NOAA/NESDIS**

Working collaboratively with EUMETSAT and KNMI, NOAA/NESDIS has established the infrastructure to acquire, process, and distribute ASCAT products for NOAA's operational users from EUMETSAT METOP satellites. Three flavors of LIB data (full resolution, 25km resolution and 50km resolution) are pushed from NOAA's server in Darmstadt, Germany to NOAA ASCAT ingest server through Trans-Atlantic network link. Then NOAA ASCAT ingest server pushes the data to the operational processing system at Suitland. The NOAA ASCAT NRT operational processing system consists of a set of IBM p5/570 systems for processing and data distribution. The two IBM systems allow one machine to function as the primary processing server and the other functions as a backup processing server. In case of the failure of the primary server, the backup server will be switched as the primary server to support the operational processing and data distribution.

Near surface ocean wind vector fields are retrieved from level1b files, using the KNMI ASCAT processing software that relates measured backscatter to near surface ocean wind field via a geophysical model function (GMF). ASCAT processing software has been modified at NOAA/NESDIS to ingest NCEP/GFS forecast fields for ambiguity removal initialization. In the last processing step, sea ice screening will be applied, based on the scatterometer data itself and on sea ice history information.

The NOAA NRT ASCAT wind processing produces Level 2 (wind vector) data in both BUFR format and PFS binary format. Besides the orbital BUFR and PFS files, reduced ASCAT-lite binary products are extracted from the full orbital files. These files contain only the selected wind vector solutions along with selected quality flags, the date/time stamp, and the location information for easier input into AWIPS (BUFR format) and N-AWIPS (binary format) systems. The AWIPS BUFR products are generated in 10 specified AWIPS areas. All ASCAT product files have been available to users upon request since ASCAT ocean surface wind products were operation in June, 2008. Current major users include NOAA/NCEP, NOAA/TPC, NOAA/OPC, NOAA/NHC etc.

Besides the operational ASCAT ocean surface wind products, NOAA/NESDIS is working on daily ice product, normalized radar cross-section images, and high spatial resolution wind speed products. These new ASCAT products will be operational in 2011.

## **4. QUIKSCAT NRT DATA PROCESSING and DISTRIBUTION AT NOAA/NESDIS**

The QuikSCAT scatterometer antenna stopped spinning on November 23, 2009. It is the age-related failure of a mechanism. QuikScat is unable to continue its primary science mission, as the antenna spin is necessary to estimate wind speed and direction and form the wide data swath necessary to obtain nearly global sampling. Unfortunately so far engineers have been unable to restart the antenna. The QuikSCAT processing at NOAA/NESDIS has to be stopped.

## **5. SUMMARY**

NOAA/NESDIS, together with CIMSS, continues to improve the operational wind product suite at NOAA/NESDIS. New AVHRR Polar wind products in BUFR format are being generated and distributed as GOES and MODIS winds through GTS. GOES-13 will replace GOES-12 as GOES East satellite in April

2010 and GOES wind process is ready for this transition. New web-based monitoring tool enhances the real-time process monitoring. NOAA/NESDIS is going to implement mixed mode MODIS wind and NPP VIIRS Polar wind products. Due to the age-related failure of spinning antenna, NOAA/NESDIS had to stop QuikSCAT process. Current operational ASCAT products continue partial product types currently unavailable from QuikSCAT for NOAA operational users. Other new ASCAT products such as daily ice product, high-spatial resolution wind speed product will be operational in 2011.

## **6. REFERENCES**

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