Read-me for Data Users

MEMORANDUM FOR:	The JPSS Program Record
SUBMITTED BY:	JPSS VIIRS Polar Winds Team Lead, Jeff Key and Jaime Daniels
CONCURRED BY:	JPSS Algorithm Management Project Lead Arron Layns
	JPSS STAR Program Manager Lihang Zhou
APPROVED BY:	JPSS Program Scientist Mitch Goldberg
SUBJECT:	NOAA-20 VIIRS Polar Winds Validated maturity status and public release
DATE:	05/16/2019

Validated maturity status declaration for NOAA-20 VIIRS Polar Winds

Maturity Review Date:	**05/16/2019**
Effective Date:	**05/16/2019**
Operational System:	**NDE, Version 2.0**

The JPSS Algorithm Maturity Readiness Review Board approved the release of the NOAA-20 VIIRS Polar Winds to the public with a Provisional maturity level quality as of 05/16/2019 (effective date), based on JPSS Validation Maturity Review held on 05/16/2019.

Validated Maturity Definition

For a product to be declared Validated Maturity the following criteria must be met: (1) Product performance has been demonstrated over a large and wide range of representative conditions (i.e., global, seasonal). (2) Comprehensive documentation of product performance exists that includes all known product anomalies and their recommended remediation strategies for a full range of retrieval conditions and severity level. (3) Product analyses are sufficient for full qualitative and quantitative determination of product fitness-for-purpose. (4) Product is ready for operational use based on documented validation findings and user feedback. (5) Product validation, quality assurance, and algorithm stewardship continue through the lifetime of the instrument. (http://www.star.nesdis.noaa.gov/jpss/AlgorithmMaturity.php)

Algorithm and Product Information

The VIIRS Polar Winds (VPW) product is created in the overlap region of a sequence of orbits to arrive at an estimate of atmospheric motion for a set of targeted tracers viewed in the longwave window region. The targeted tracers are well-defined cloud edges. The wind product consists of the speed, direction, and height of these identified tracers. The product is generated approximately every 101 minutes in both the northern and southern polar regions (i.e., Arctic and Antarctic) and is available poleward of about 65º latitude. Additional information is available in the VIIRS Polar Winds algorithm theoretical basis document (ATBD) at: http://www.star.nesdis.noaa.gov/jpss/Docs.php.

Product Output:

ID	Description
1	Time of wind from the middle image in image triplet (secs since 1970-01-01 00:00:00) Time
2	Latitude (degrees north) Latitude
3	Longitude (degrees east) Longitude
4	Speed of wind vector (m/s) Wind_Speed
5	Direction of wind vector (degrees) Wind_Dir
6	Pressure assignment of tracer (hPa) MedianPress (hPa)
7	Temperature associated with the pressure assignment of tracer (K) MedianBT
8	Local Zenith Angle (degrees) SatZen
9	Time interval between image pairs (minutes) TimeInterval

Diagnostic information is also included in the output. See the ATBD.

Product requirements/Exclusions (L1RDS):
Requirements given below are from the document *Joint Polar Satellite System (JPSS) National Environmental Satellite, Data, and Information Service (NESDIS) Environmental Satellite Processing Center (ESPC) Requirements Document (JERD) Volume 2: Science Requirements.*

Polar (Tropospheric) winds are derived by tracking cloud features in VIIRS infrared channel imagery. Wind speed, direction, and height are measured throughout the troposphere, pole-ward of approximately 70 degrees latitude, in cloudy areas only. Vertical and horizontal coverage is not uniform. For quality control, winds are derived using three consecutive orbits. Wind vectors are assigned the time of the middle image of the orbit triplet, thereby adding 101 minutes to the latency.

JERD-2139 The algorithm shall produce a polar winds product that has vertical coverage from the surface to the tropopause.

JERD-2140 The algorithm shall produce a polar winds product that has a horizontal resolution of 10 km.

JERD-2141 The algorithm shall produce a polar winds product that has a vertical reporting interval at cloud tops.

JERD-2142 The algorithm shall produce a polar winds product that has a mapping uncertainty (3 sigma) of 5 km.

JERD-2143 The algorithm shall produce a polar winds product that has a measurement range of:

3 to 100 m/sec for speed and
0 to 360 degrees for direction.

JERD-2144 The algorithm shall produce a polar winds product that has a measurement precision mean vector difference of 3.8 m/sec.

JERD-2145 The algorithm shall produce a polar winds product that has a measurement accuracy mean vector difference of 7.5 m/sec.

Quality flags:

Quality metrics contained in the VPW output are the Quality Indicator (QI) and the Expected Error (EE).

ID	Description
1	Product Quality Flag (0=DMW product passes all quality tests; > 0 DMW product fails quality tests. *(See Table 2-2 in Section 2.3.2.1.1 for description of DMW failure codes)* Flag
2	Expected Error estimate of derived wind (m/s) ExpectedErr
3	Quality Indicator (QI) of derived wind (0-100, with 100 being the best) QI
4	QI Test 1 value (speed consistency) QISpdFlag
5	QI Test 2 value (direction consistency) QIDirFlag
6	QI Test 3 value (vector consistency) QIVecFlag
7	QI Test 4 value (local consistency) QILocConsistencyFlg
8	QI Test 5 value (forecast consistency) QIFcstFlag
9	Representative height error (hPa) CombinedMedianHgtErr
10	Representative temperature error (K) CombinedMedianTempErr

Product Evaluation, Availability, and Known issues

- Product evaluation/validation: Validation information is provided in the JPSS Validation Maturity Review presentation on VPW, 05/16/2019.
- Product availability/reliability: VIIRS polar winds from S-NPP have been produced since 05/08/2014, when the product became operational in NESDIS. Operational NOAA-20 VIIRS winds are not yet available.
- Algorithm performance dependence: The performance of the winds algorithm is dependent in part on the accuracy of the cloud mask and cloud height products.
- Known errors/issues/limitations: None

Changes Since Last Maturity Stage

None

Review board recommendations

Validated Maturity

Path Forward/Future Plan

No significant algorithm or product changes are anticipated in the near future.

Additional Items to Note

None

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