



Report from WG II (Satellite data and products)

Stephan Bojinski and Dohyeong Kim
(Co-Chairs)

Ken Holmlund and Mitch Goldberg (Rapporteurs)

Presented to CGMS-45 Plenary session, agenda item E.1.4

**Coordination Group for
Meteorological Satellites**

Add CGMS agency logo
here (in the slide master)



CGMS

Overview of Session

WGII/1: Objectives

WGII/2: Review of Actions and Recommendations

WGII/3: Terms of Reference – Interaction with ISWGs **1WP**

WGII/4: International Science Working Groups and initiatives

(IWWG, IPWG, ITWG, ICWG, IROWG, GSICS, SCOPE-CM, SCOPE-Nowcasting)

7 WPs

WGII/5: Other international science community reports (Oceans, CEOS VCs, ...)

Focus: “Non-met” applications, Polar Space Task Group **3 WPs**

WGII/6: High priority topics to Agencies **5 WPs**

WGII/7: Agency reports **11 WPs**

WGII/8: WPs responding to, or raising, CGMS Actions **4 WPs**

WG II/9: Space Weather matters

WGII/10: Review and updating HLPP **2 WPs**

WGII/III Joint Session on Carbon **3 WPs - Report under G.6**

Σ = **36 WPs** (2016: 37; 2015: 64; 2014: 50)

~40 participants

Monday 9.00-18.00

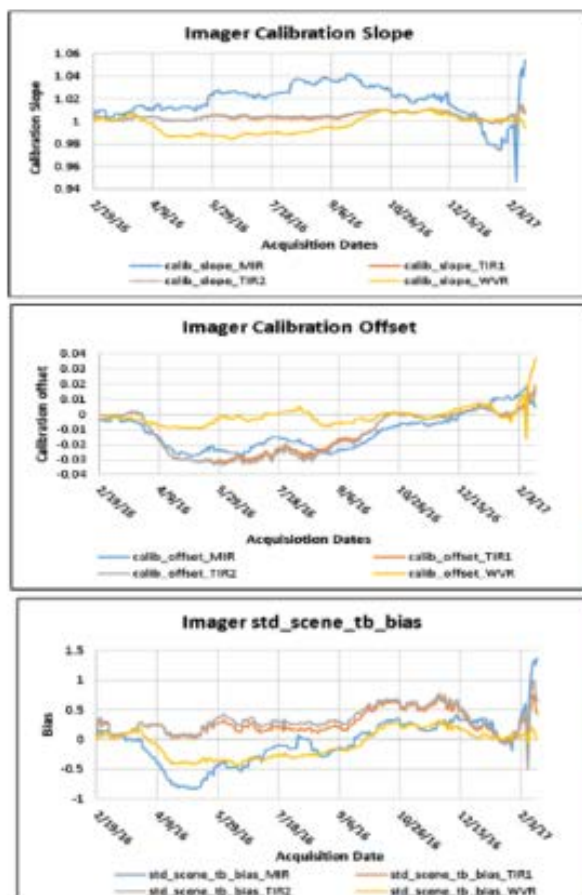
Tuesday 9.00-15.15

Success story: GSICS and Improved Instrumentation.

- Reference to HLPP 3.1 Establish within GSICS a fully consistent calibration of relevant satellite instruments across CGMS agencies, recognising the importance of collaboration between operational and research CGMS agencies.
- GSICS instrument intercalibration and monitoring tools are now providing comprehensive monitoring capabilities at most operational satellite agencies.
- As a result, GSICS will provide to satellite stakeholders an annual assessment of the State of the Observing System with respect to instrument performance.
- The GSICS Data Working Group has develop protocols for data management of instrument-to-instrument (intercalibration) and GSICS will produce official Guidelines on how to implement for Satellite Agencies.

Success story: GSICS and Improved Instrumentation.

ISRO has implemented the GSICS instrument monitoring toolkit and generating GSICS correction coefficients for INSAT-3D



GSICS Calibration results for INSAT-3D imager for Feb-2016-Feb2017

Channel	MIR	TIR-1	TIR-2	Water Vapor
Minimum Bias	-0.83	-0.07	-0.13	-0.43
Maximum Bias	0.41	0.72	0.78	0.32
Bias Range	1.24	0.79	0.91	0.75
Standard Scene BT (K)	286.09	286.38	285.54	240.67

GSICS

- Mitch Goldberg (NOAA) nominated as new EP Chair, Ken Holmlund (EUMETSAT) – vice chair
- ACTION: GSICS to review the GDWG Terms of Reference and associated indicated levels of effort of the members - **COMPLETE**
- ACTION: GRWG to discuss with ISCCP a detailed project proposal for the use of GSICS methodologies to produce a GSICS-compliant ISCCP dataset for evaluation - **COMPLETE** - Within SCOPE-CM, ISCCP is evaluating the impact of GSICS correction in a case study.
- ACTION: CGMS agencies should employ the GSICS Correction as part of their operational procedures. - **On-going, and completed by some**
 - Rationale - by adding a few small parameters as ancillary data – all users of geostationary imager data can apply an adjustment which will provide bias consistency of all geo imagers enabling improved applications.
- NEW ACTION: GSICS to produce annual state of the observing system report to be delivered at CGMS.

GSICS: USING THE MOON AS VIS REFERENCE TARGET

- New version of the GIRO implemented Q4 2016 → no issue anymore with licenses
- Preparation of the License Agreement for distributing the GIRO and the GLOD
 - ✓ First two agreements sent out in February 2017 to USGS and JMA
 - ✓ Once signed by all parties, the license will be provided to the Lunar Calibration Community members
- Several requests for access received in 2016
 - ✓ ESA (working on Moon measurements with CIMEL photometers) and private companies → Only ESA was granted access.
- Study funded by EUMETSAT on the validation of SBAFs using hyperspectral measurements allowed in depth analysis of SCIAMACHY lunar observations → follow-on studies are already planned, with potential improvement of the ROLO/GIRO
- **Second joint GSICS/IVOS Lunar Workshop in China, 6-10 November 2017**



Action from CGMS-43 - EVENT LOGGING – INTEGRATED INTO GSICS

[CGMS-43 WGII/3 43.01]

Task Team on Calibration Events Logging to prepare a white paper outlining the set of parameters, the nomenclature, and the standards to be used for reporting on instrument calibration across space agencies.

- The White Paper was prepared by the Task Team on Calibration Events Logging (referred to as Task Team) and reviewed by the GSICS Research and Data Working Groups (GRWG & GDWG). The paper provides Satellite Operators with guidelines to:
 - Standardise *Satellite/Instrument Calibration Landing Pages* accessed via WMO-OSCAR;
 - Use common Nomenclature and Standards for reporting on calibration events
- ACTION: CGMS Agencies to implement Landing Pages accessed via WMO-OSCAR

METEOSAT-9
INSTRUMENT SPECIFICATIONS
<ul style="list-style-type: none">• ▶ WMO OSCAR (Satellite Instrument Specifications)• Spectral Response Function<ul style="list-style-type: none">Spectral responses are derived for all 12 channels of the SEVIRI instrument.▶ Spectral responses for Meteosat Second Generation (MSG) (ZIP, 226 KB).
CALIBRATION EVENTS
<ul style="list-style-type: none">• ▶ Meteosat-9 SEVIRI (User Notification Service)• ▶ Meteosat-9 GERB (User Notification Service)• Monthly Operations Report
DATA OUTAGES
<ul style="list-style-type: none">• Described in the Monthly Operations Report
INSTRUMENT MONITORING
<ul style="list-style-type: none">• Navigation Monitoring• ▶ GSICS Calibration Monitoring
RELEVANT DOCUMENTS
<ul style="list-style-type: none">• ▶ MSG Ground Segment LRIT/HRIT Mission Specific Implementation• ▶ CGMS LRIT/HRIT Global Specification• ▶ MSG Level 1.5 Image Data Format Description• ▶ MSG Level 1.5 Image Product - Quality Indicators

CLIMATE Activities

- SCOPE-CM:
 - Multi-agency generation of CDRs; 9 ongoing successful projects
 - All projects have progressed the maturity of their CDRs (Maturity Matrix)
 - New Chair of Executive Panel: Jeff Privette (NOAA/NCEI)
 - New confirmed members: KMA, ISRO
- **ACTION: SCOPE-CM Chair to inform ISRO about the maturity matrix model used, to enable its application to ISRO datasets**
- Currently drafting IP for Phase 2+ starting in 2018
 - Continue focus on maturing CDR production
 - Emphasize transitions to sustained production
 - Focus on coordination and sustainment (leverage ECV inventory)
 - Explicitly support Climate Monitoring communities
 - Session at EUMETSAT User Conference 2017
- ESA, NASA, KMA presentations on satellite CDR generation programmes

Success story: SCOPE-CM Implementation

Phase 1 – Establish international collaborations

→ completed

Phase 2 – Mature CDR Production Capabilities

→ continuing – entering 4th year

- Identify connections to User Requirements
- Seek efficiencies in CDR production through collaborations

Phase 2+ – Transition Research to Sustained Production

→ starting

- Seek efficiencies using global coordination
- Leverage GCOS IP and WG-Climate ECV Inventory

SCOPE-CM Projects

1. Upper tropospheric humidity CDRs (GEO and LEO)
2. Surface albedo demonstrator from LEO
3. Land surface albedo from GEO
4. AVHRR Fundamental CDR
5. Inter-calibration of GEO imagery
6. Liquid Water Path and Rain Water Path Climatologies in the GPM era
7. RO-based gridded climate data sets
8. ISCCP cloud products
9. AMV and CSR/ASR from GEO and LEO



“Non-meteorological Applications” Study

- Discussed CGMS contribution and way forward on the “Non-Meteorological Applications Study”
- Covered under item J.2

Summary slide on Int'l Science WGs

- Since CGMS-44, IPWG, IWWG, and IROWG organized their workshops
- Two Workshops (ICWG and ITWG) Workshops planned before CGMS-46
- Excellent progress and collaboration by and among Science Working Groups, following WG II guidance
- WG II discussed proposals by ISWGs for Actions and Recommendations, and endorses those presented to Plenary
- ISWGs need CGMS agency commitments to ensure that funding is adequate to allow collaboration in ISWGs, for:
 - Intercomparison studies
 - OSSEs (e.g., LEO-LEO MW RO, GNSS-RO & reflectometry)
 - Limited travel (for ISWG interaction etc.)
 - These activities should be consider as a core part of the Satellite Programs – because it does improve services.
 - Discuss more on final slide.



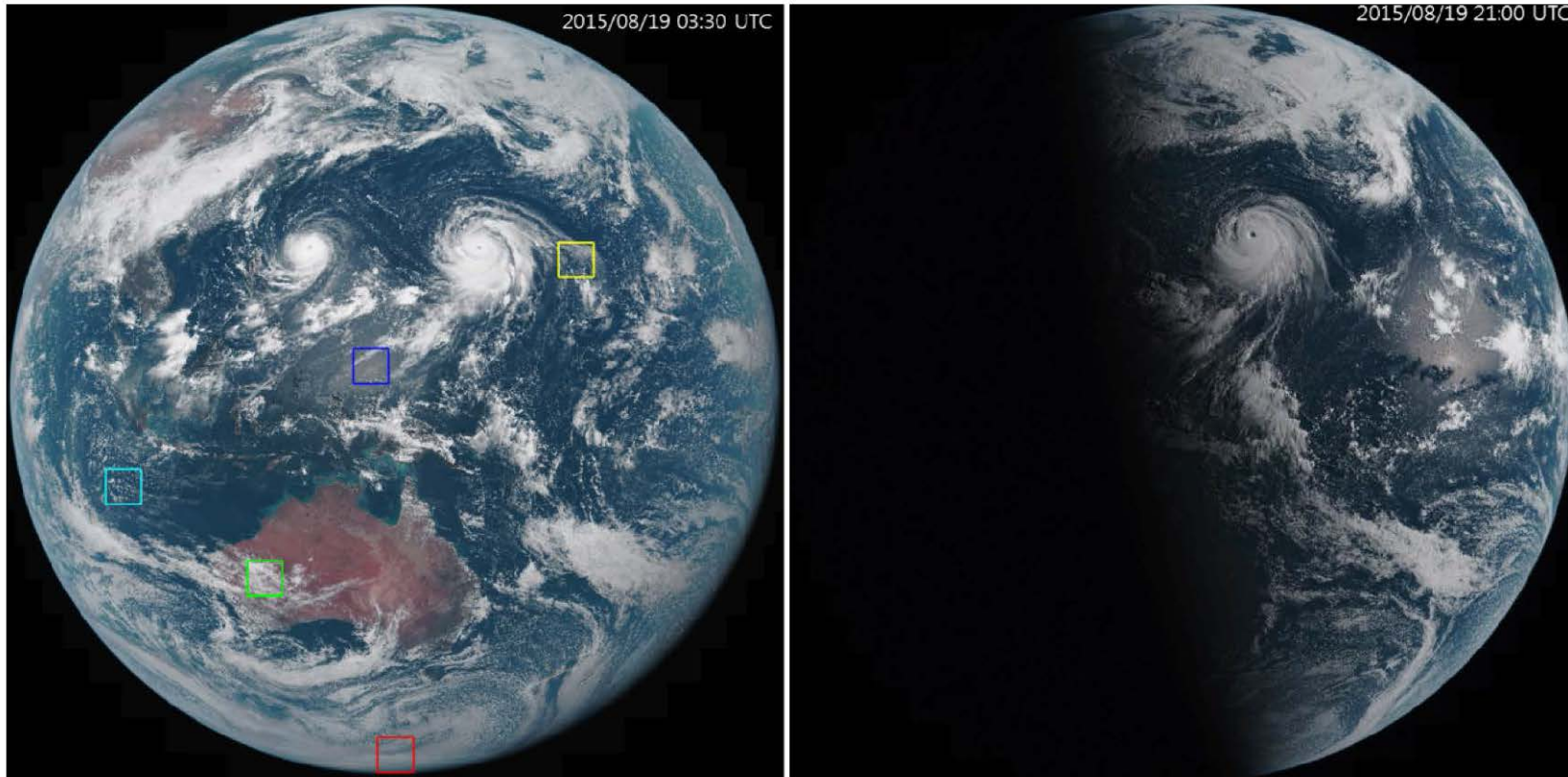
ICWG

Cloud information very important to the work of other ISWGs, especially for severe weather analysis, height assignments of winds, improved cloud detection in hyperspectral sounding

- There are strong links to IWWG
 - IPWG links could be strengthened in the area of cloud microphysics and scattering libraries of hydrometeors (liquid, ice).
- RECOMMENDATION: ICWG to liaise with IPWG to explore common interests in the area of cloud microphysics and scattering libraries of hydrometeors (liquid, ice)
- HLPP 3.7.1, 3.7.2 (enhance RT capabilities)

ICWG

Assessments of Level-2 Cloud Parameters (2)



Intercomparisons focus on unfavorable conditions in cloud retrieval: (a) slant view, (b) cirrus clouds (with low-level cumulus) (b) clouds over desert, (c) fractional clouds, (d) sun glint, and (e) day/night transition.

Assessments of Level-2 Cloud Parameters (3)

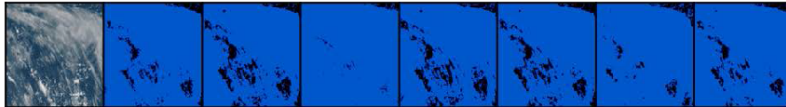
cloud mask (CLD)

RGB	CMA	CIMSS	JMA	KMA	NASA/ GSFC	NASA/ LaRC	NOAA/ NESDIS
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(a) Slant view



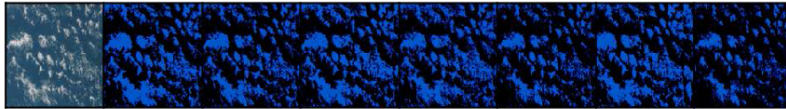
(b) Cirrus



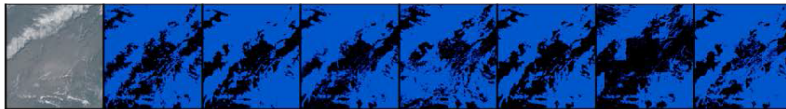
(c) Cloud over desert



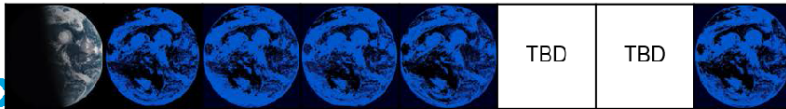
(d) Fractional cloud



(e) Sun glint



(f) Day/night transition



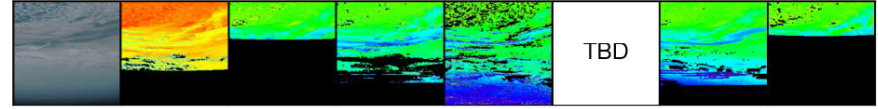
Coordination Group for Meteorological Satellites

● Cloud ● Clear sky

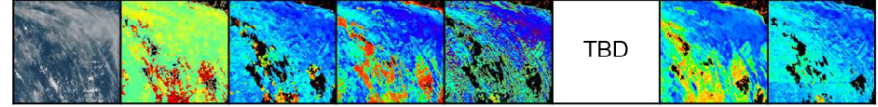
cloud top temperature (CTT)

RGB	CMA	CIMSS	JMA	KMA	NASA/ GSFC	NASA/ LaRC	NOAA/ NESDIS
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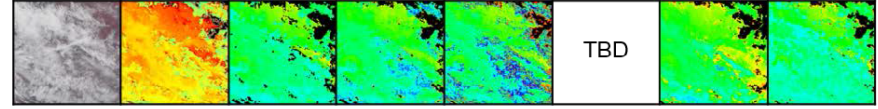
(a) Slant view



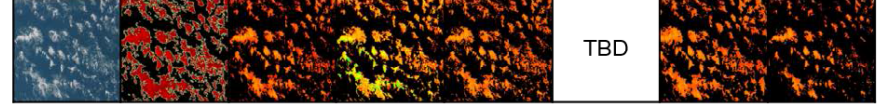
(b) Cirrus



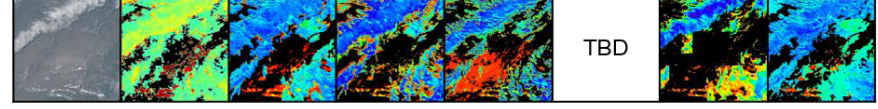
(c) Cloud over desert



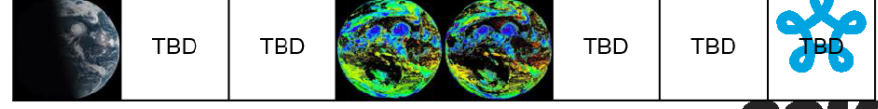
(d) Fractional cloud



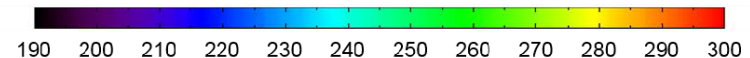
(e) Sun glint



(f) Day/night transition



Cloud Top Temperature [K]



CGMS

IWWG

The demonstration of 3D winds from AIRS over polar regions is of potential use for polar prediction / Year of Polar Prediction (YOPP); comparisons of MODIS and AIRS winds impact have been carried out.

- **ACTION:** IWWG to liaise with the NOAA representative on the Polar Space Task Group (Jeff Key, jeff.key@noaa.gov) regarding the potential use of 3D winds from AIRS for Year of Polar Prediction studies.

Achievement: Definition of new AMV BUFR format incorporating new wind variables based on new-generation GEO imagers, submitted to WMO

IPWG

An update is required on the status of precipitation CDR generation by groups worldwide. Furthermore, the linkage of IPWG to WCRP GEWEX should be strengthened since these are an important driver of science requirements.

- **ACTION:** IPWG to produce documentation on precipitation climate data record generation and related activities worldwide, including prospects for continuity.
- **RECOMMENDATION:** IPWG to maintain close relationship with GEWEX in its work, and at its next workshop (e.g., through a joint session).

Polar Space Task Group

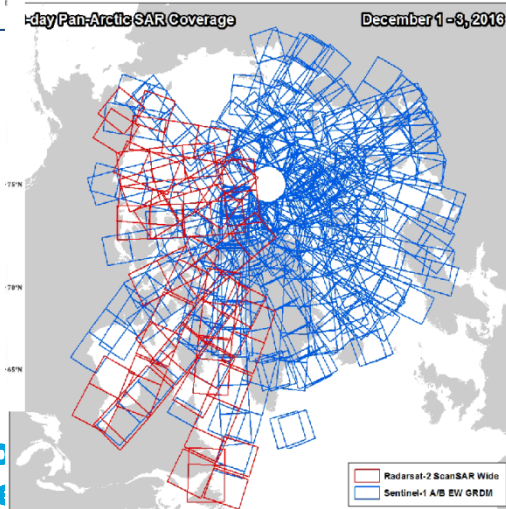
- Excellent collaboration by now 15 satellite agencies for generating datasets for polar and cryosphere
- Ice sheets, ice caps, glaciers, permafrost, sea ice, snow, Year of Polar Prediction
- New member agencies joined in 2016: ISRO, CONAE Argentina

Future snow missions concept workshop (Global Cryosphere Watch – PSTG, Q1/2018)

Greenland Sentinel-1 IV – Campaign 23.Dec.2016 – 27.Feb.2017
~ 1800 Scenes

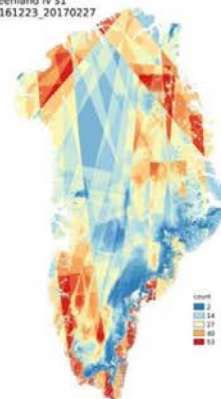


Ideas for gap-filling (e.g. YOPP SOPs)

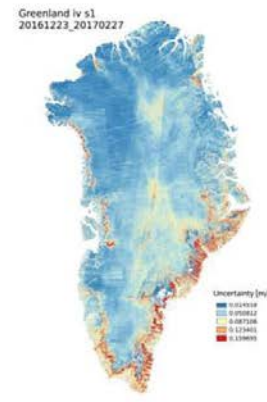


nl

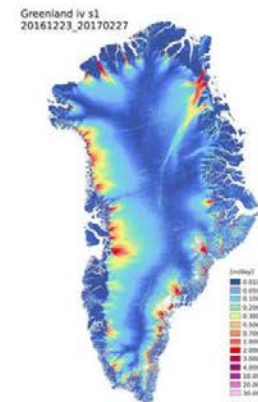
Number of Measurements
Greenland iv s1
20161223_20170227



Uncertainty of IV [m/d]



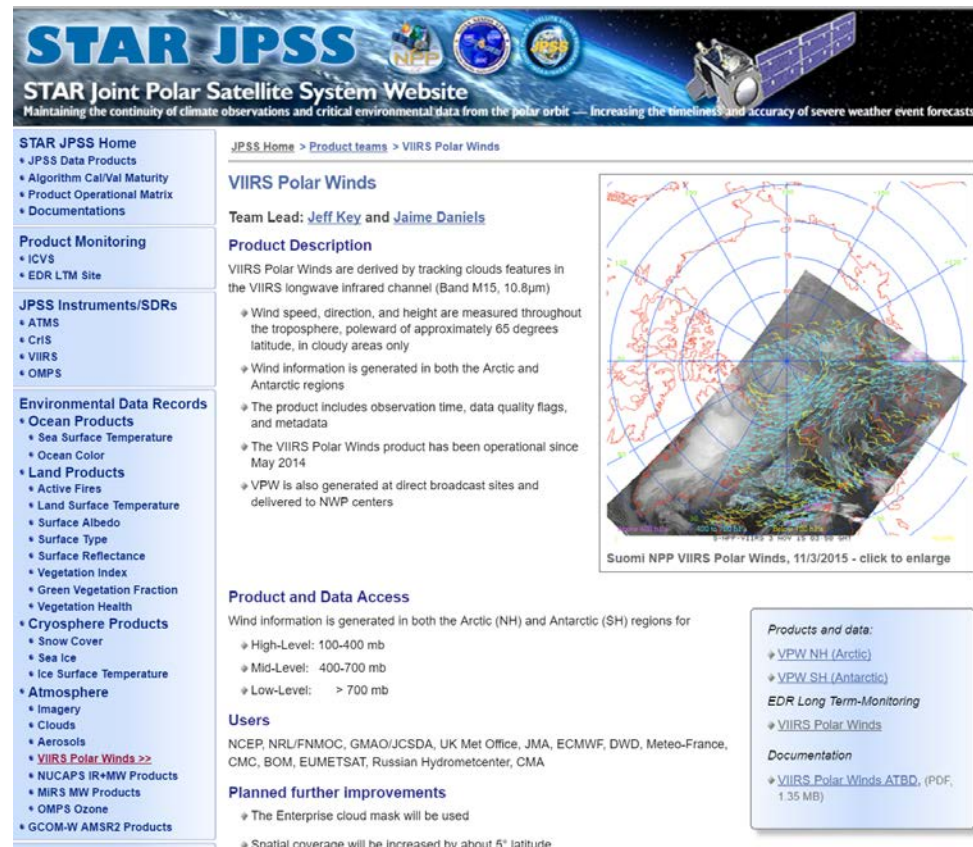
Ice Velocity [m/d]



Now possible with S-1 and Radarsat 2 and TerraSAR-X to do in one month what originally took several years to accomplish! Thanks to PSTG SAR Coordination Working Group planning routine coverage of ice sheet margins – and complete annual winter coverage!

BEST PRACTICES ON PRODUCT GENERATION AND VALIDATION

- Discussed importance of maintaining best practices for product generation
- Should include: ATBDs, cal/val plans, validation reports, quality indicators, engagement with CGMS ISWGs, other documentation
- **RECOMMENDATION:** CGMS agencies encouraged to document their products online – Mission Landing Pages, including ATBDs and validation reports, and link product page URLs to the WMO Product Access Guide following defined documentation criteria. (Current list of existing CGMS agency focal points to be added here)
- Reference to HLPP 3.5



STAR JPSS
STAR Joint Polar Satellite System Website
Maintaining the continuity of climate observations and critical environmental data from the polar orbit — Increasing the timelines and accuracy of severe weather event forecasts

JPSS Home > Product teams > VIIRS Polar Winds

VIIRS Polar Winds

Team Lead: [Jeff Key](#) and [Jaime Daniels](#)

Product Description

VIIRS Polar Winds are derived by tracking clouds features in the VIIRS longwave infrared channel (Band M15, 10.8µm)

- Wind speed, direction, and height are measured throughout the troposphere, poleward of approximately 65 degrees latitude, in cloudy areas only
- Wind information is generated in both the Arctic and Antarctic regions
- The product includes observation time, data quality flags, and metadata
- The VIIRS Polar Winds product has been operational since May 2014
- VPW is also generated at direct broadcast sites and delivered to NWP centers

Product and Data Access

Wind information is generated in both the Arctic (NH) and Antarctic (SH) regions for

- High-Level: 100-400 mb
- Mid-Level: 400-700 mb
- Low-Level: > 700 mb

Users

NCEP, NRL/FNMOC, GMAO/JCSDA, UK Met Office, JMA, ECMWF, DWD, Meteo-France, CMC, BOM, EUMETSAT, Russian Hydrometcenter, CMA

Planned further improvements

- The Enterprise cloud mask will be used
- Spatial coverage will be increased by about 5° latitude

Products and data:

- VPW NH (Arctic)
- VPW SH (Antarctic)
- EDR Long Term-Monitoring
- VIIRS Polar Winds

Documentation

- VIIRS Polar Winds ATBD, (PDF, 1.35 MB)

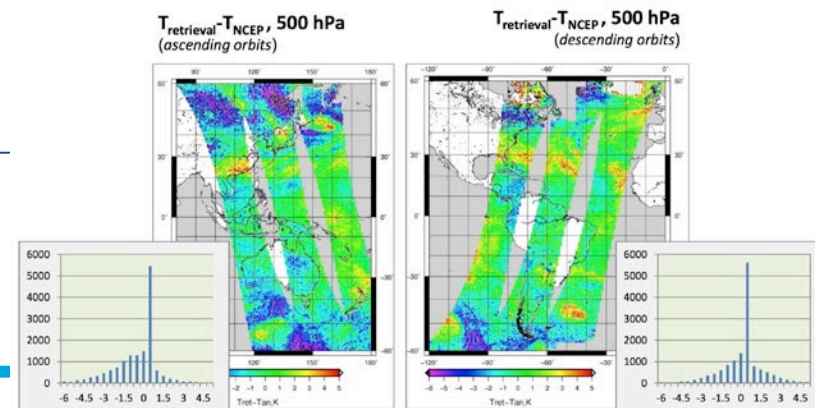
Suomi NPP VIIRS Polar Winds, 11/3/2015 - click to enlarge

Opportunities for Global Data Exchange

Session commended Roshydromet for promising results from Meteor-M N2 MTVZA-GY microwave sounder

- **RECOMMENDATION:** Roshydromet to explore steps with Working Group IV to enable global exchange of data from the MTVZA-GY instrument.
- **Retain RECOMMENDATION:** Roshydromet to develop and release a direct broadcast processing package for the Meteor-M N2 series, including level 1 processing for the MTVZA-GY microwave imager.

Temperature Error Statistics , 500 hPa, MTVZA-GY
(retrievals vs GFS NCEP analysis)



Direct Broadcast

- ISRO provided very good examples of INSAT-3D/3DR derived data and products (AMVs, SST),
 - Showed ISRO's GSICS activities in demonstration phase
 - ScatSat was launched to replace Oceansat-2 scatterometer, and validation of wind products is underway
 - Scatterometry has also been used to derive various R&D projects such as on sea ice, river water levels
- **RECOMMENDATION:** ISRO to consider adding a direct broadcast capability to its future satellites

Space Weather Discussions

- SWTT summarized the status of SWTT discussions related to WG II.
 - Space Weather Community is already performing satellite inter-calibration
 - Inter-calibration of high-energy particle sensors is of high priority, and the combination of data to get global particle flux distribution in GEO and MEO.
 - An international framework is needed to continue on inter-calibration activity, which should include other agencies and research institutions. Expertise from GSICS would be highly welcome.
- ACTION: SWTT members to review GSICS activities and discuss the framework for inter-calibration of high-energy particle flux measurements.
- ACTION: Invite a GSICS representative to the next SWTT inter-sessional meeting; and to a topical discussion meeting during the European Space Weather Week on 27 Nov – 1 Dec 2017 in Oostende, Belgium

Space Weather and Working Group II

- Working Group II considered potential interactions with Space Weather activities and concluded:
 - Currently, in general, there is very little overlap between WGII activities and Space Weather and the required expertise is disjoint
 - However, there are some specific activities where support to SW activities can be given namely:
 - Guidance and lessons learned from GSICS activities
 - Radio-occultations retrievals

Common issue - Funding of ISWGs, GSICS and other collaboration

- Agency members of international working groups need to clearly communicate resources needs to their agency leadership
- Agency should consider these collaboration as part of their funded activities.
 - For example the GSICS Data working group has voiced concern about agencies not funding GSICS data servers and activities associated for developing and maintaining. GSICS EP recommending that agencies should include these new capabilities into their satellite programs - if it is found to be important for meeting agency requirements then it should be funded.
 - Another example - funding to participate in ISWG's comparison studies. Participation should be funded by the agency algorithm program - so those costs should be accounted for. Agencies need to recognize that these intercomparisons improve their own product and services.

