Highlights of the 14th IWW and the CGMS-46

IWWG Co-Chairs: Régis Borde (EUMETSAT)
Steve Wanzong (UW-Madison/CIMSS)

CGMS Rapporteur: Jaime Daniels (NOAA/NESDIS)

History of IWWG

Years	Co-Chair	Co-Chair
1991 – 1995	Gerard Szejwach, EUMETSAT	
1996 – 1999	Johannes Schmetz, EUMETSAT	
1999 – 2008	Ken Holmlund, EUMETSAT	Chris Velden (UW-Madison/CIMSS)
2008 – 2016	Mary Forsythe, Met Office	Jaime Daniels (NOAA/NESDIS)
2016 – present	Régis Borde, EUMETSAT	Steve Wanzong (UW-Madison/CIMSS)

Became a formal working group of CGMS in 1994

History of IWWG (cont)

Meeting Number	Date	Location
IWW14	April 2018	Jeju City, South Korea
IWW13	July 2016	Monterey, California
IWW12	June 2014	Copenhagen, Denmark
IWW11	February 2012	Auckland, New Zealand
IWW10	February 2010	Tokyo, Japan
IWW09	April 2008	Annapolis, Maryland
IWW08	April 2006	Beijing, China
IWW07	June 2004	Helsinki, Finland
IWW06	May 2002	Madison, Wisconsin
IWW05	March 2000	Lorne, Australia
IWW04	October 1998	Saanenmoser, Switzerland
IWW03	June 1996	Ascona, Switzerland
IWW02	December 1993	Tokyo, Japan
IWW01	September 1991	Washington, DC

14th International Winds Workshop

- Maison Glad Jeju Hotel, Jeju, Korea (23 April - 27 April 2018)

  Local Coordinator: Sung-Rae Chung (NMSC/KMA), Byung-il Lee (NMSC/KMA)

- **Sponsored by:** KMA, EUMETSAT, WMO, BAE Systems
- **Co-chaired by:** Régis Borde (EUMETSAT) and Steve Wanzong (UW-Madison/CIMSS)
- 40-45 participants
- **Sessions Covered:**
  - Status of operational AMV production
  - AMV derivation
  - AMV quality and impact
  - Use of satellite derived winds in NWP
  - Reprocessing and climate applications
  - Wind Profiles

- **Plenary Discussions**
  - 3rd AMV Inter-comparison study results
  - Which AMVs for which model
- **Working Groups**
  - Wind extraction methods
  - Data assimilation

14th International Winds Workshop, main outcomes (1/3)

Plenary 1: Which AMVs for which model

- Improved spatial and temporal capabilities of satellites allow us to generate winds more often so that we may capture wind motion at smaller scales.
- Main motivation was to discuss if AMV requirements are similar for assimilation into high resolution NWP and/or global forecast systems.
- It became apparent that different AMV requirements are needed for producing AMVs that would meet the needs of Global NWP, Regional NWP and Nowcasting.
- Such requirements needs concrete studies which test different configurations of AMVs in the models.

IWW14 Action 3: NWP community to define the best configuration to be used by the AMV producers, for use in global and regional NWP models. Due date: before IWW15.

14^{th} International Winds Workshop, main outcomes (2/3)

Third AMV Intercomparison results

- Six agencies participated : CPTEC/INPE, EUMETSAT, JMA, KMA, NOAA/NESDIS, and the NWCSAF
- Funded via NWCSAF VSA; Analysis done by NWCSAF and UW-Madison/CIMSS.
- 3 tests performed using Himawari-8/AHI data on 21 July 2016 **:**
  - **Test 1:** Prescribed configuration using the 10.4 μm channel with the 12 UTC triplet.
  - **Test 2:** Own configuration using the 10.4 μm channel with the 12 UTC triplet.
  - **Test 3:** Own configuration using the 10.4 μm channel with the 0530 UTC triplet. (against CALIPSO).

Main outcomes:

- JMA had the best overall performance using a new HA method (1DVAR plus differential evolution).
- Differences between centres is greater in the height assignment.
- Common QI has real skill in filtering collocated AMVs for an improved statistical agreement.

14th International Winds Workshop, main outcomes (4/4)

AMV BUFR sequence

- New AMV BUFR sequence is now officially referenced on the WMO website (Nov 2017).

IWW14 Action 2: AMV producers to adopt the new AMV BUFR template. Due date: end 2019.

Common QI procedure

- Common Quality Indicator (QI) module (Fortran 90) was developed and supplied to the AMV producing centers.
- Common QI found useful during 3rd AMV Intercomparison.

IWW14 Action 1: All AMV producers to implement the "Common QI module" in their algorithms. Due date: before IWW15

Status of CGMS-45 Recommendations

HLPP.3.2.1 - Establish commonality in the derivation of AMVs for global users where appropriate (e.g., through sharing of prototype algorithms) and consider backwards compatibility when designing AMV algorithms for the 16-channel imagers, so that present state-of-the-art algorithms can be applied to old imagery.

- 3rd AMV Intercomparison study completed
- Design and adoption of new AMV BUFR sequence
- NOAA/NESDIS Forecast Independent QI becomes the Common QI

Status of CGMS-45 Recommendations

HLPP.3.2.2 - Continue research into improved derivation and assimilation of high resolution winds for use in high resolution data assimilation and nowcasting. ICWG and IWWG to liaise as appropriate on the provision of further information characterising the AMV derivation for enhanced QC and error characterisation .

- Many advanced imagers available with more to come.

- Plenary discussion organized at IWW14 on this topic. The following Action was produced.

IWW14 Action 3: NWP community to define the best configuration to be used by the AMV producers, for use in global and regional NWP models. Due date: before IWW15.

- NWP to define best configuration for global and regional models and potentially nowcasting.

Other items of relevance to CGMS

A44.06: To enhance coordination, ISWGs to discuss with ICWG co-chairs key items for collaboration.

- There are several logical linkages between the CGMS International Science Working Groups and the IWWG continues to cultivate its interactions/collaborations with **the ICWG**.

A44.19: CGMS agencies to explore possibilites to derive winds from new upcoming satellites and opportunities.

- Wind profiles with AIRS, IASI, CrIS, preparation for MTG-IRS. AMVs to be developed with Sentinel 3...etc

IWW15 to be hosted by ESA/KNMI in Utrecht, the Netherlands, April 2020.

3rd AMV Intercomparison

The main goal of this study was to:

Update the previous AMV intercomparison studies
(Genkova 2008/2010, Santek et al. 2014)

Assess how the cloudy AMVs from each unique wind producer compare,
using the JMA's Himawari-8/AHI satellite data:
- Verifying the advantages of calculation of AMVs with the newer generation of geostationary satellites.
- Determining the best options for calculation of AMVs.

Compute a Common QI for all centers to verify if there is a better agreement.

Participants

BRZ: Brazilian Weather Forecast and Climatic Studies Centre (CPTEC/INPE)

EUM: EUMETSAT

JMA: Japan Meteorological Agency

KMA: Korea Meteorological Administration

NOA: National Oceanic and Atmospheric Administration (NOAA)

NWC: Satellite Application Facility on Support to Nowcasting and Very Short Range Forecasting (NWC SAF)

Missing CMA, BoM, and ISRO.

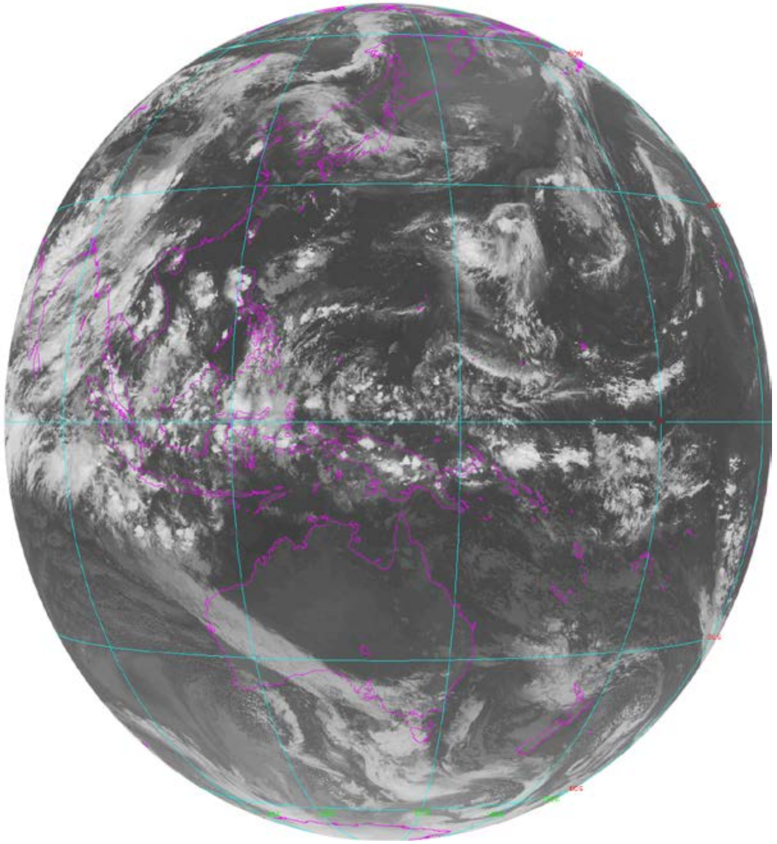
Input dataset

<u>Three different experiments</u> considered, using:

Two triplets of Himawari-8, full disk images
(21/July/2016 at 0530-0550Z, 1200-1220Z)

ECMWF ERA-INTERIM NWP Analysis
(for the given day – 37 levels – every 6 h.)

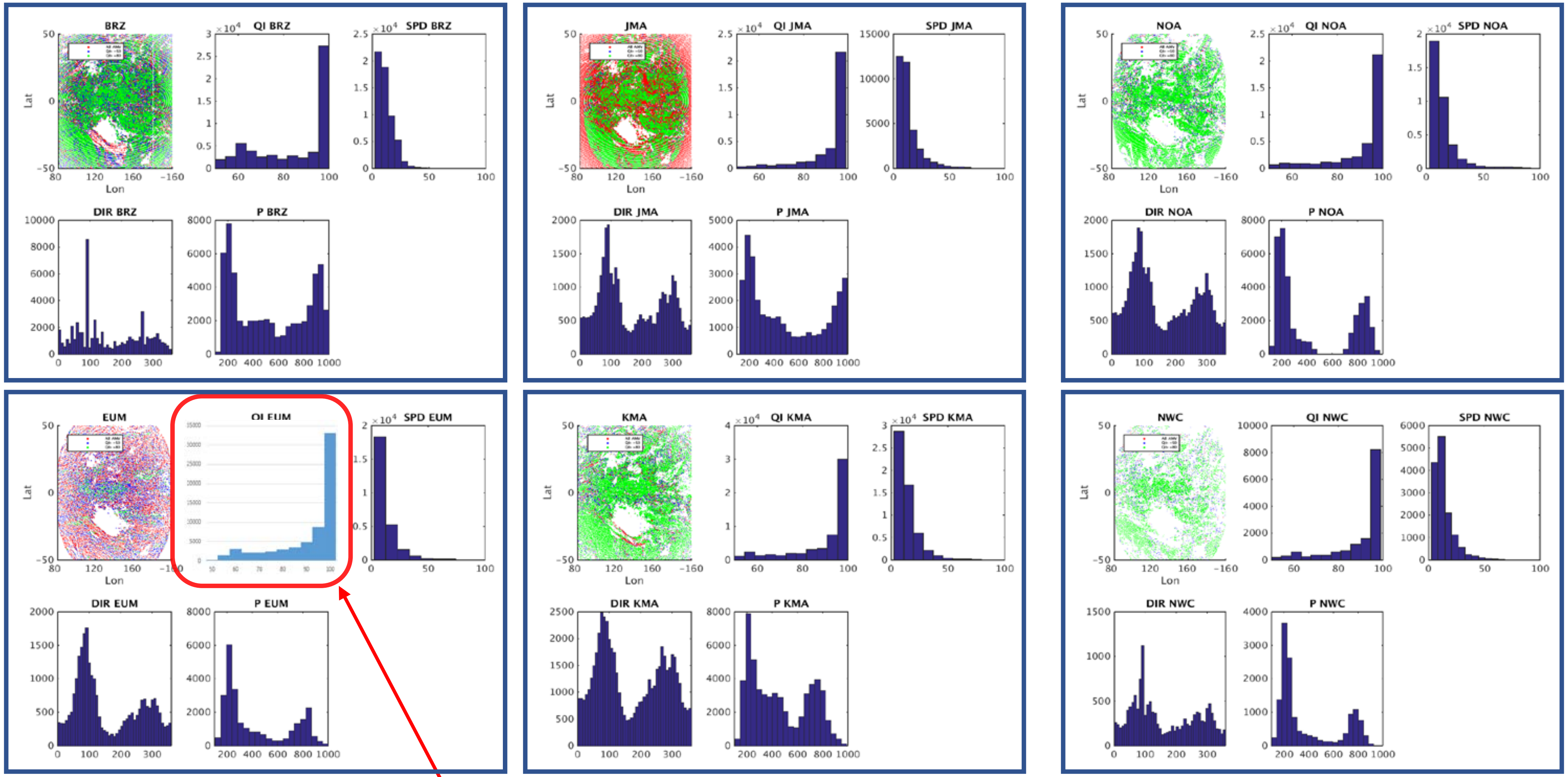
Corresponding cloud products
(derived by NOAA/NESDIS)



3rd AMV Intercomparison

Experiment 1

Parameter distribution (for Common QI >=50%)



EUM after correction shows a distribution for the CQI similar to the rest of centers.

3rd AMV Intercomparison

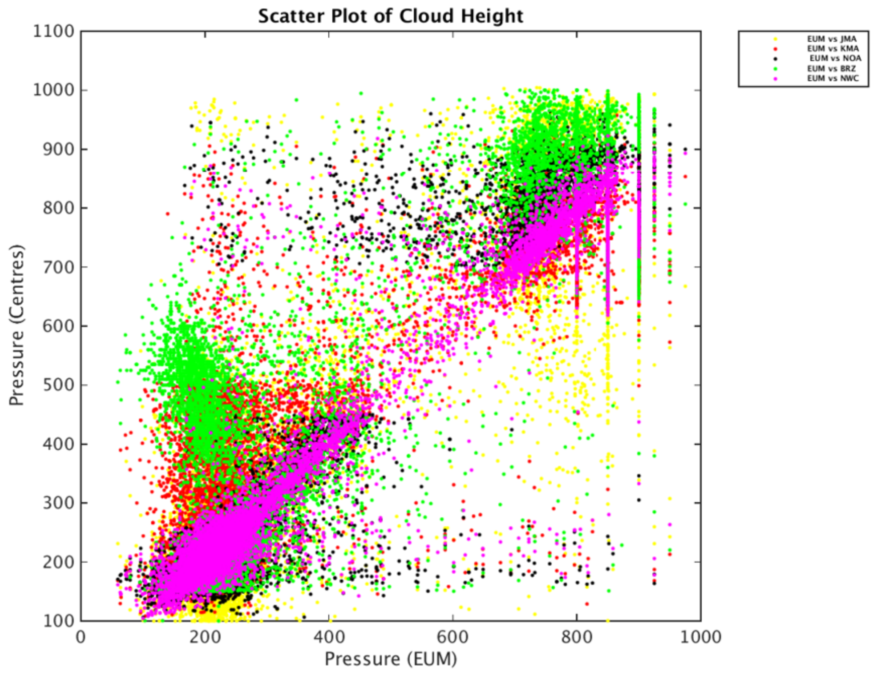
Experiment 1

The bulk distribution of AMV heights is highly variable between the different centers, for collocated AMVs

Each center using a different Height assignment method, and

only EUM/NWC/NOAA using “Cloud products” for this height assignment !

Most similarities for EUM/NWC, both using “CCC method”

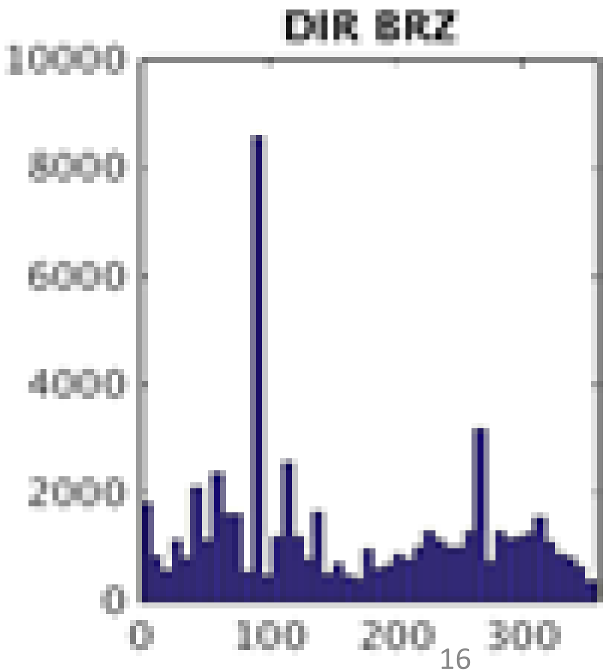


Scatter plot of AMV pressure for each centre vs EUM pressure (considering a QINF threshold of 50%).

Conclusions Brazil

Performance of BRZ algorithm improved with respect the previous AMV intercomparison, with better agreement with other centers (especially, for a high QI threshold and collocated AMV data).

There still exists room for improvement:
- Large differences in height assignment
- Need to verify direction histograms, with some directions much more frequent than others.



Conclusions KMA

AMV histograms do not show significant differences with respect to other centers.

A small check showed statistics with the new April AMV dataset improved a bit.

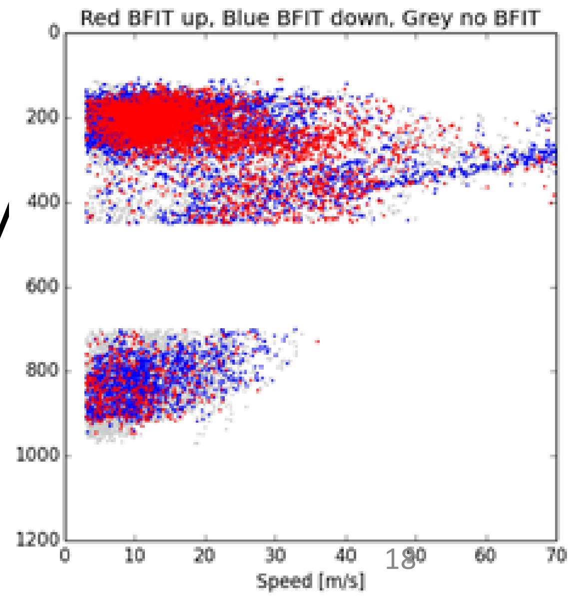
KMA algorithm is reasonably good, but it needs to define its final stable version.

Conclusions NOAA

NOAA agreement compared to other centers improved over previous study.

NOAA algorithm has now 2nd best statistics (along with NWCSAF).

Elements for analysis: vertical distribution of AMV with no AMVs present between 450-700 hPa (in contrast to other algorithms).

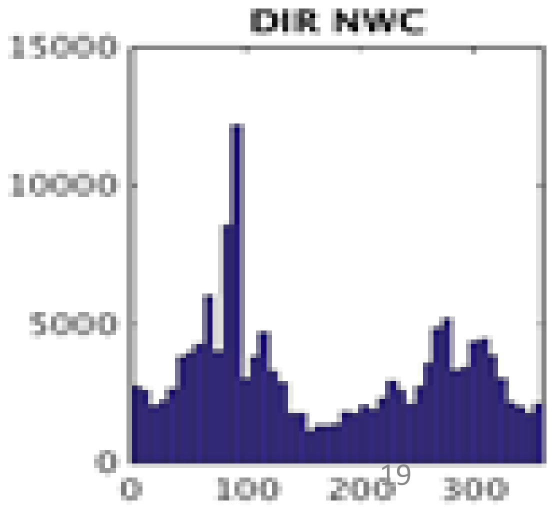


Conclusions NWCSAF

NWCSAF algorithm has 2nd best statistics (with NOAA).

Algorithm basically similar to the one in previous study.

Elements for analysis: some directions with Himawari
more frequent than others in the vicinity of 90º



Conclusions EUMETSAT

EUM algorithm much better when QI thresholds high (80%) and specific configuration used (with performance then similar to NOAA/NWC centers).

Similarity in the height assignment of EUM/NWC, both using “CCC method”.

After the correction of the EUM “Common QI”, distribution of CQI values very similar for all centers.

Conclusions JMA

JMA algorithm has the best overall performance considering all validation methods.

This is the most significant change in all AMV algorithms since latest Intercomparison !!

Most likely due to updated cloud height assignment: “optimal estimation method using observed radiance and NWP vertical profile”

However, to be studied if the small difference between AMVs and background NWP has a good impact in later applications, like NWP assimilation.

General Conclusions

Differences between Experiment 1 and 2 basically related to the number of AMVs.

Differences between centers much more related to the height assignment than to the use of a prescribed or a specific configuration.

The use of the Common QI has a real skill in filtering collocated AMVs for an improved statistical agreement.

Further Information

Please visit the IWWG Web page:

http://cimss.ssec.wisc.edu/iwwg/iwwg.html