Recent Status and Development of Atmospheric Motion Vector at JMA

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Today's talk

- **Operation Updates on JMA AMVs since 10th IWW**
  - **MTSAT-2 AMVs Dissemination started (Jul. 2010)**
  - **Hourly AMV Dissemination started (Mar. 2011)**
- **Developments achieved**
  - **MTSAT-1R Rapid-Scan Operation and Rapid-Scan AMVs**
  - **AMV Climate Dataset**
- **On going activities and plans**
  - **Development of Height Assignment Method for Low-Level Wind**
  - **Development of High Res. Land/Sea Table for Wider Generation of Low Level Winds**
  - **Future Development and NWC SAF Software**
- **Summary**

JMA AMVs Outline after 10th IWW

Past operation

Switchover MTSAT-1R to MTSAT-2 (1 Jul. AMV: 11 Jul.)

Hourly AMV dissemination Start (3 Mar.)

Rapid-Scan (RS) operation from Jun. to Sep.

2010 2011 2012

MTSAT-1R: Operational | Standby | RS | Standby

MTSAT-2: Standby | Operational

MTSAT-1R: RS | Standby | RS | Standby | RS | Standby

MTSAT-2: Operational | Standby

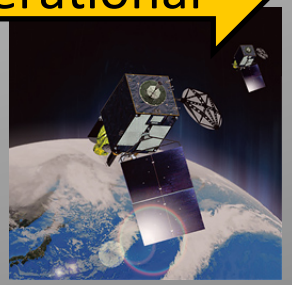
Himawari-8: Operational

2012 2013 2014 2015

Future operation plan

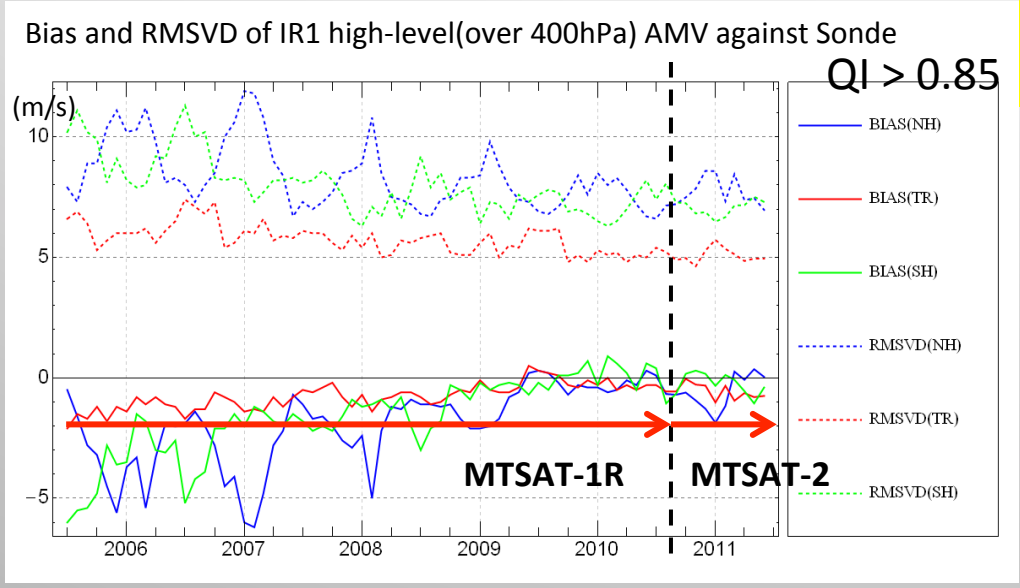
Himawari-8 launched

Switchover MTSAT-2 to Himawari-8

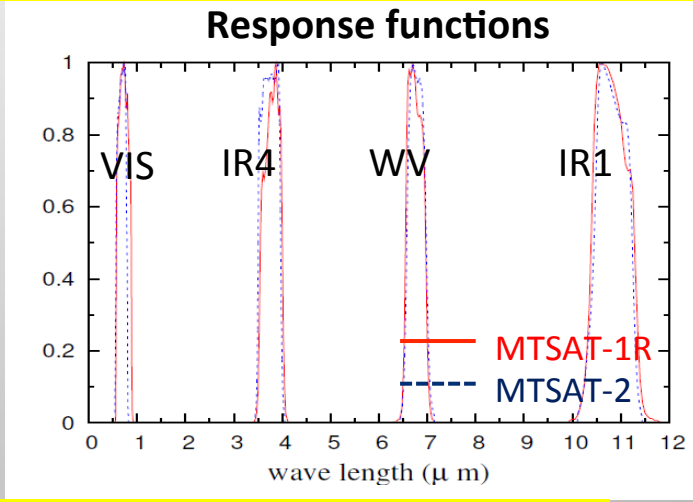


MTSAT-2 AMV Provision Started July 2010

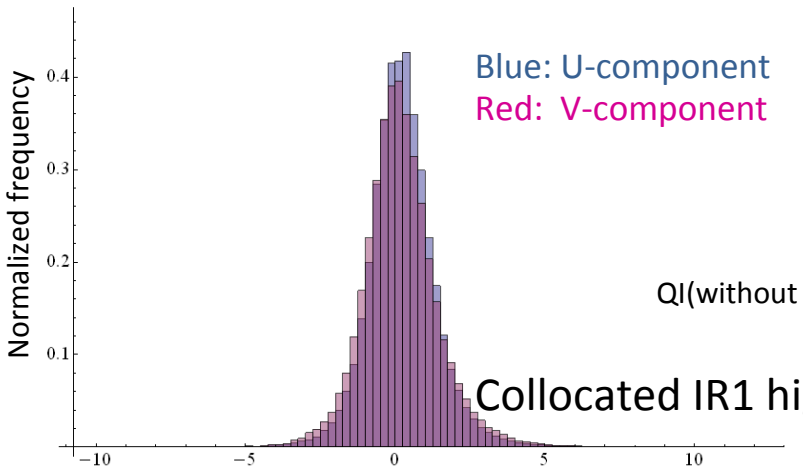
In place of MTSAT-1R AMVs, MTSAT-2 AMVs are disseminated from 00 UTC 11 July 2010

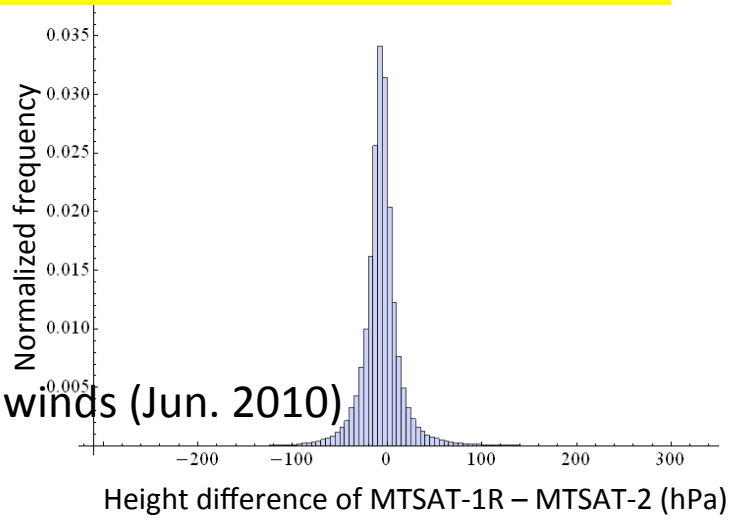


SRFs of MTSAT-2 and MTSAT-1R are comparable



Accuracy of AMVs are also comparable between the two satellites





Collocated IR1 high-level winds (Jun. 2010)

MTSAT Hourly AMVs Dissemination

JMA started to disseminate hourly-derived AMVs via GTS since 02 UTC 3 Mar. 2011

AMV type	Level of height *	Time (UTC)	Image sector	Image interval (minutes)	Distribution
IR1 Infrared: IR (10.8 micrometers)	High, middle, low	00, 06, 12, 18	Full disk	15	BUFR via GTS
	High, middle, low	03, 09, 15, 21	Northern Hemisphere	30	BUFR via GTS
	High, middle, low	02, 04, 05, 08, 10, 11, 14, 16, 17, 20, 22, 23	Northern Hemisphere	30	BUFR via GTS
	High, middle, low	01, 07, 13, 19	Northern Hemisphere	60	BUFR via GTS
	High, middle, low	01, 02, 03, 04, 05, 07, 08, 09, 10, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23	Southern Hemisphere	60	BUFR via GTS
WV Water Vapor: WV (6.8 micrometers)	High, middle	00 , 06 , 12 , 18	Full disk	15	BUFR via GTS
	High, middle	03 , 09 , 15 , 21	Northern Hemisphere	30	BUFR via GTS
	High, middle	02, 04, 05, 08, 10, 11, 14, 16, 17, 20, 22, 23	Northern Hemisphere	30	BUFR via GTS
	High, middle	01, 07, 13, 19	Northern Hemisphere	60	BUFR via GTS
	High, middle	01, 02, 03, 04, 05, 07, 08, 09, 10, 11, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23	Southern Hemisphere	60	BUFR via GTS
VIS Visible: VIS (0.63 micrometers)	Low	00, 06	Full disk	15	BUFR via GTS
	Low	03, 09, 21	Northern Hemisphere	30	BUFR via GTS
	Low	02, 04, 05, 08, 22, 23	Northern Hemisphere	30	BUFR via GTS
	Low	01, 07	Northern Hemisphere	60	BUFR via GTS
	Low	01, 02, 03, 04, 05, 07, 08, 21, 22, 23	Southern Hemisphere	60	BUFR via GTS
IR4 Short-wave Infrared: IR4 (3.8 micrometers)	Low	12,18	Full disk	15	Internal use only
	Low	08-11, 14-17, 20-23	Northern Hemisphere	30	Internal use only
	Low	07, 13, 19	Northern Hemisphere	60	Internal use only
	Low	09, 10, 11, 13, 14, 15, 16, 17, 19, 20	Southern Hemisphere	60	Internal use only

* High: above 400hPa
Middle: 400-700hPa
Low: 700-1000hPa

Before hourly AMVs dissemination start

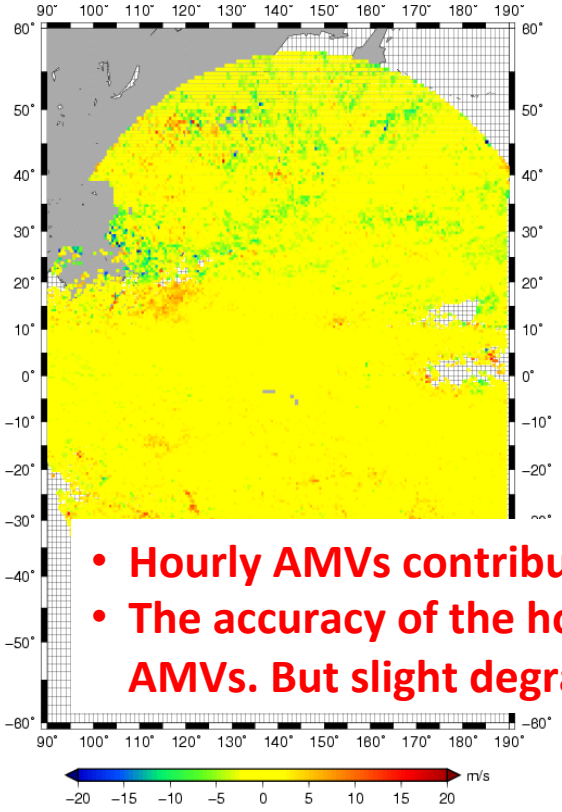
\+ After hourly AMVs dissemination start

Quality of Hourly AMVs

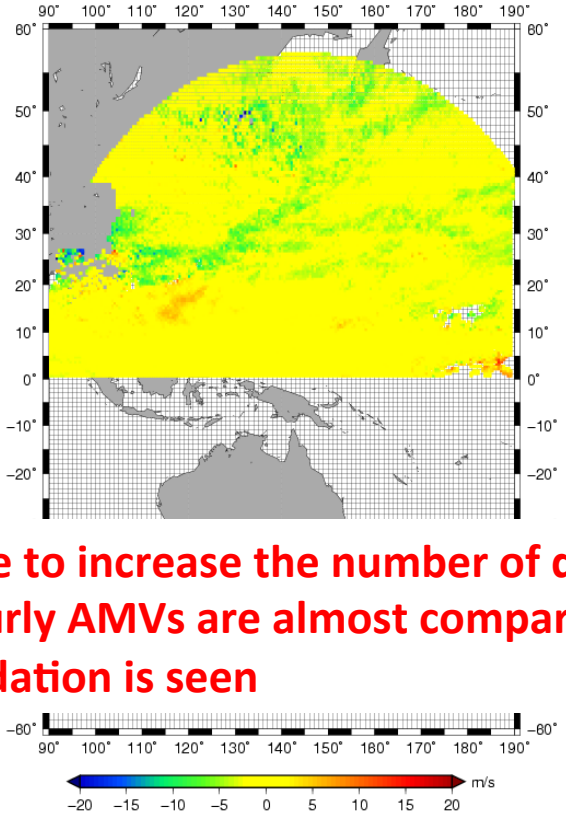
Monthly stats (Feb. 2011) for
MTSAT-2 IR1 high-level winds speed bias against JMA's global model FG

QI > 0.8

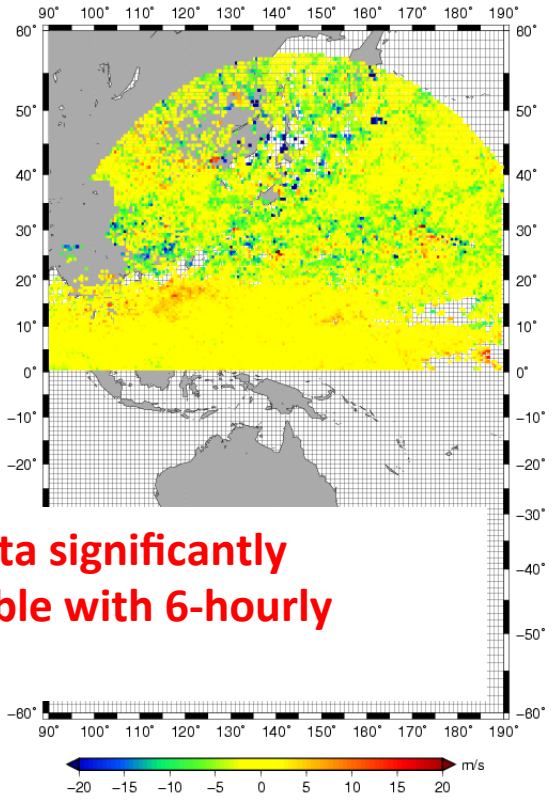
15-min intervals
(target box: 16 x 16 pix)



30-min intervals
(target box: 24 x 24 pix)



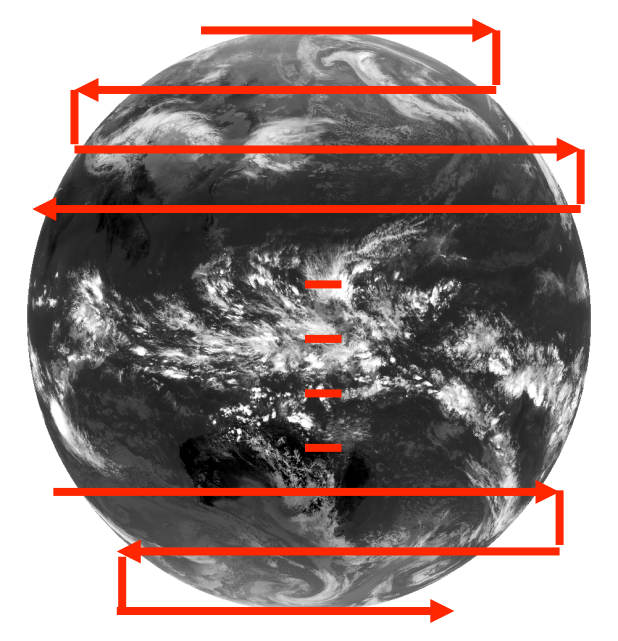
60-min intervals
(target box: 24 x 24 pix)



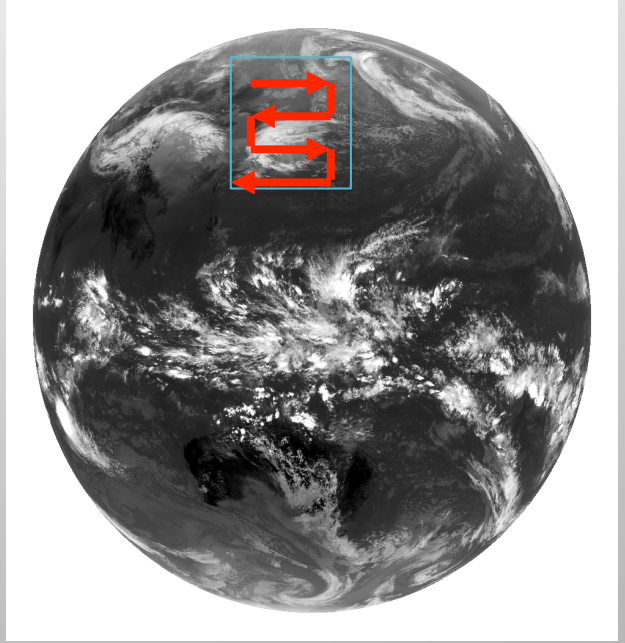
- **Hourly AMVs contribute to increase the number of data significantly**
- **The accuracy of the hourly AMVs are almost comparable with 6-hourly AMVs. But slight degradation is seen**

MTSAT-1R Rapid-Scan Operation

Normal Operation
(about 30 min for Full Disk)



Rapid-Scan Observation
(about 5 min)



Rapid-Scan operation	
Observation Period	Jun. – Sep.
Observation Time	00 UTC – 09 UTC
Observation Area	Around Japan
Time Interval	5 min.

The Rapid-scan (RS) operation is conducted every summer

Rapid-Scan AMV for NWP and TC Analysis

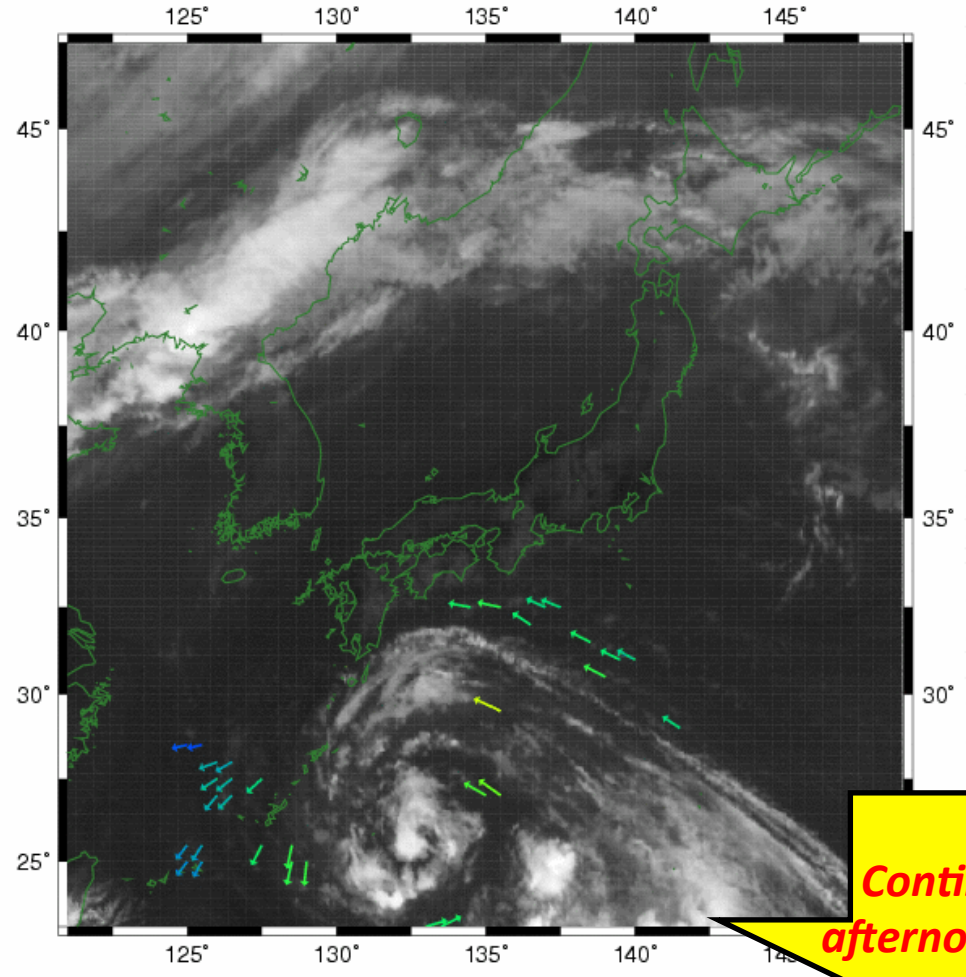
MTSAT-2 IR1 low-level winds

ROKE 2011/09/15/00

QI > 0.8

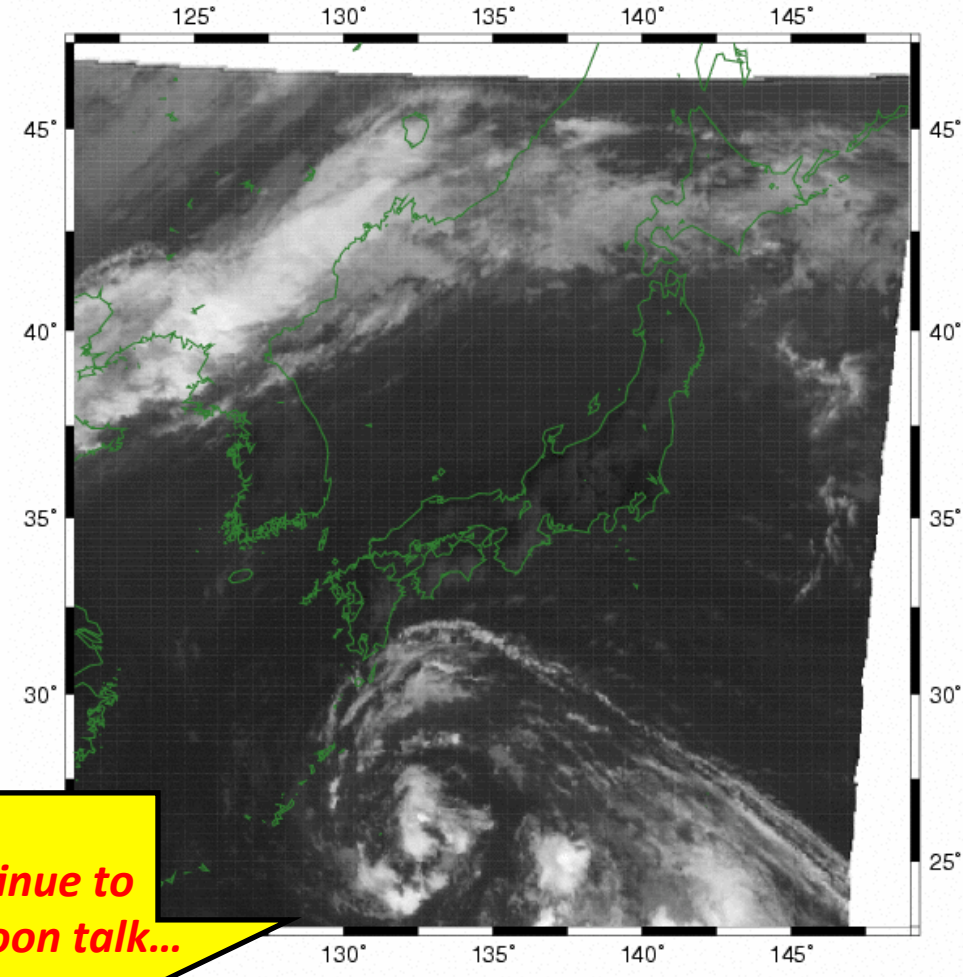
MTSAT-1R IR1 low-level winds

ROKE 2011/09/15/00/10



Hourly AMV

Continue to afternoon talk…



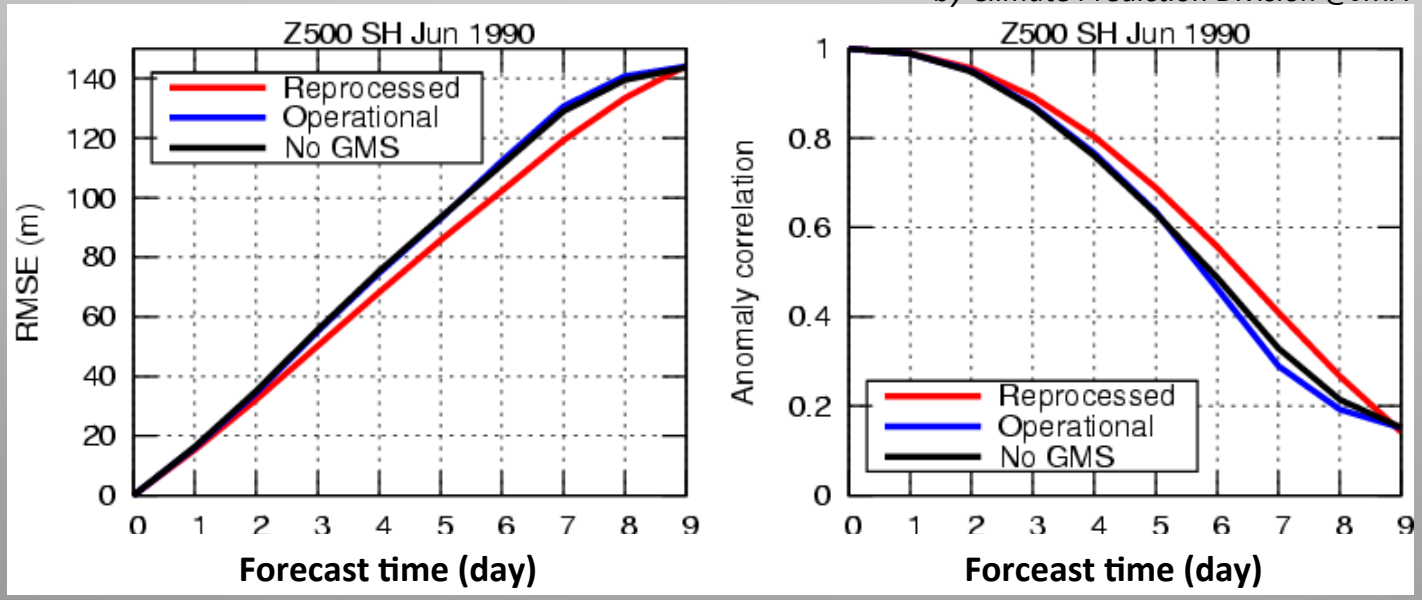
Rapid-Scan AMV

AMV Climate Dataset (Contribution to SCOPE-CM and Reanalysis)

- **Reprocess of historical AMVs using the latest algorithms has been completed**
  - ✓Since 1979 for GMS series, GOES-9 (West Pacific) and MTSAT
  - ✓Contribution to SCOPE-CM Pilot Project
- **The AMVs are provided to re-analysis community**
  - ✓Positive impacts are recognized in JRA-55

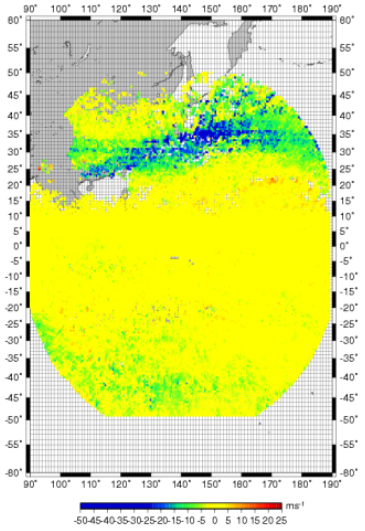
Observation System Experiment for GMS-3 AMVs (Jun. 1990)

by Climate Prediction Division @JMA

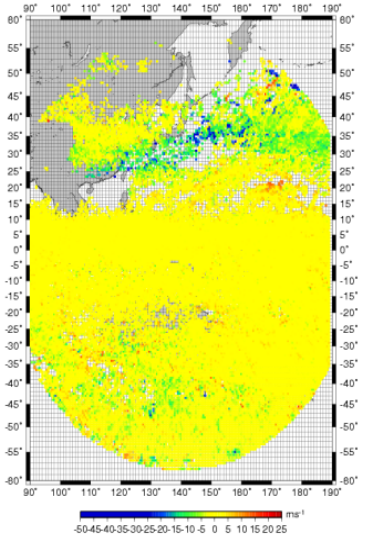


Reprocessed AMV shows strong contribution, particularly on southern hemisphere

for JRA-25 (Previous)



for JRA-55 (New)

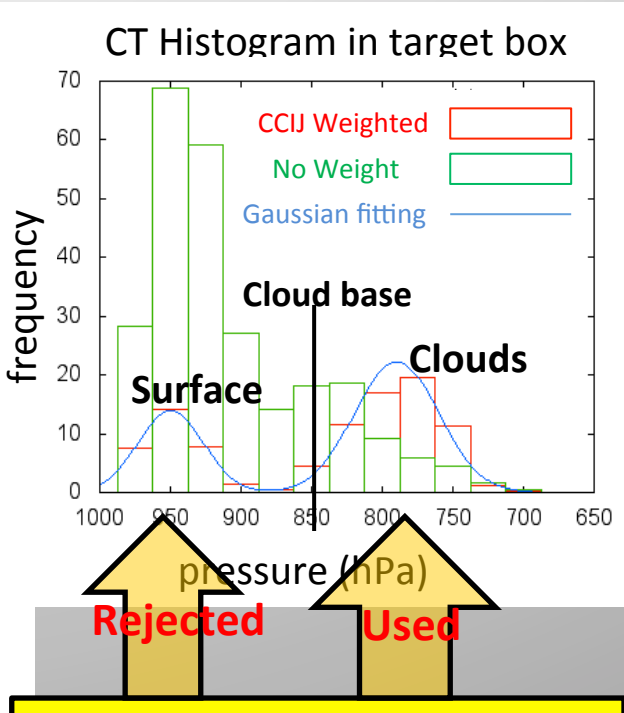


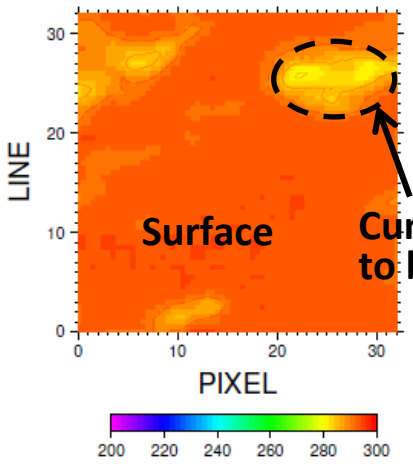
GMS-3 (Jan. 1990)
IR1 high-level wind
Speed bias against model

Development of HA for Low-Level Wind (on going)

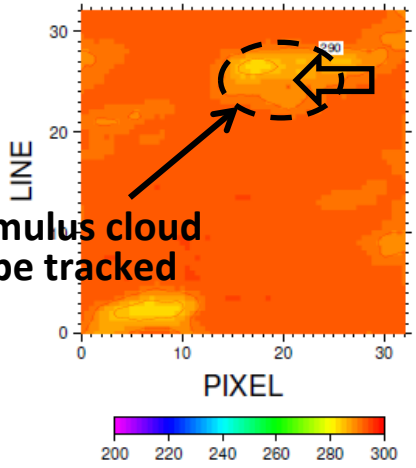
- Current Height Assignment (HA) method is based on cloud-base HA method (LeMarshall 1994, Tokuno 1998)

- **More development on**
  - ✓**Introduction of the CCC method to HA of low-level winds**
  - ✓**Introduction of multi-Gaussian function fitting to histogram of the cloud top heights**

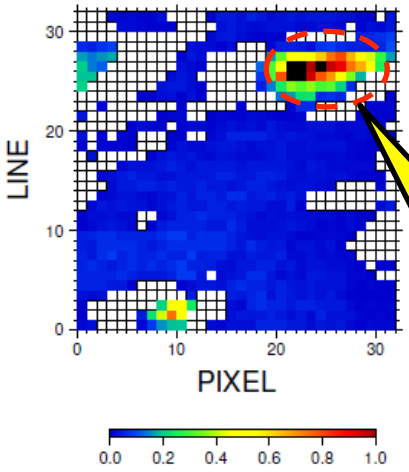




IR TBBs in a target box



15 minutes later



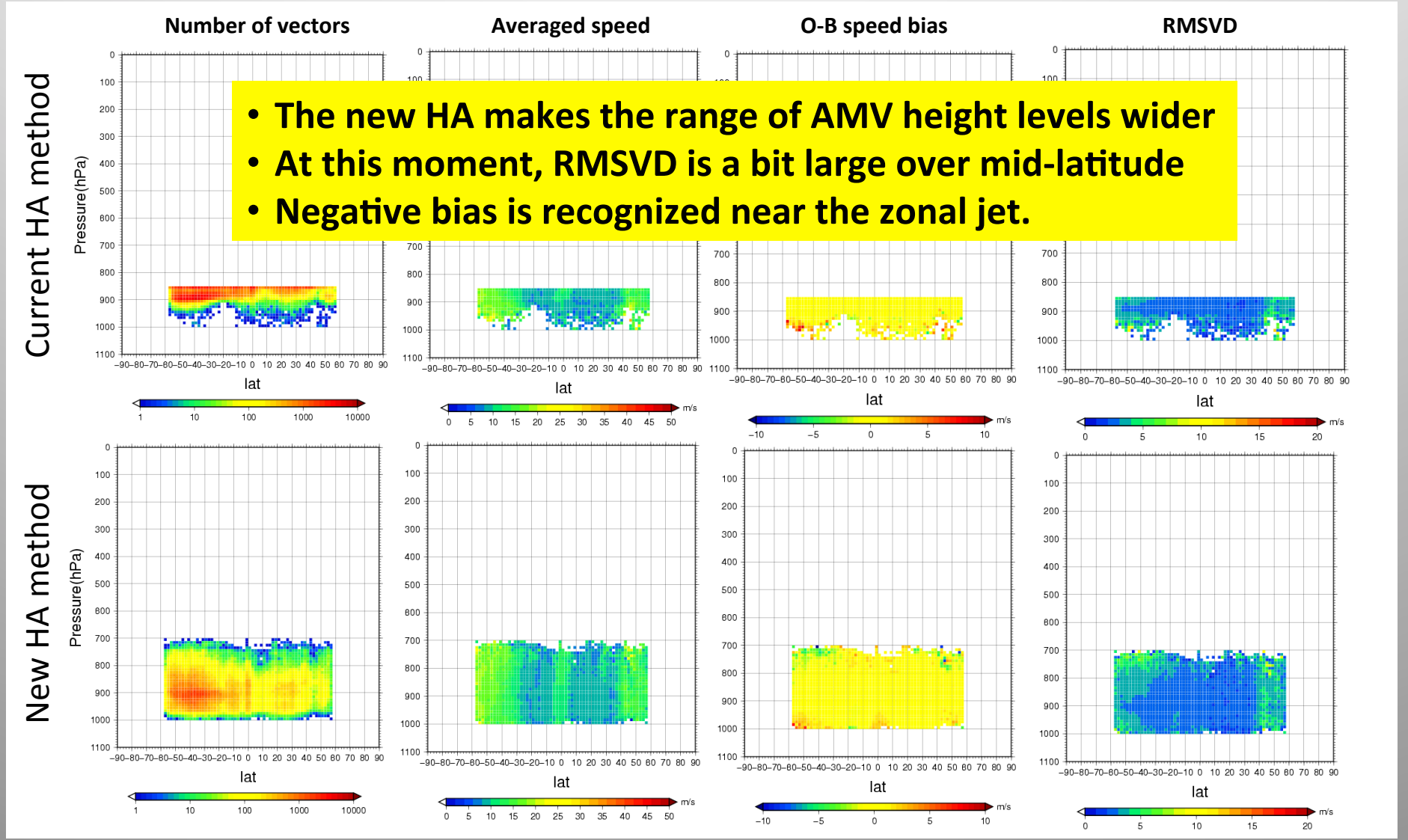
Weights (CCij) used in CCC

The new method will use only tracked clouds pixels rejecting surface pixels

New Height Assignment method for Low-Level Wind

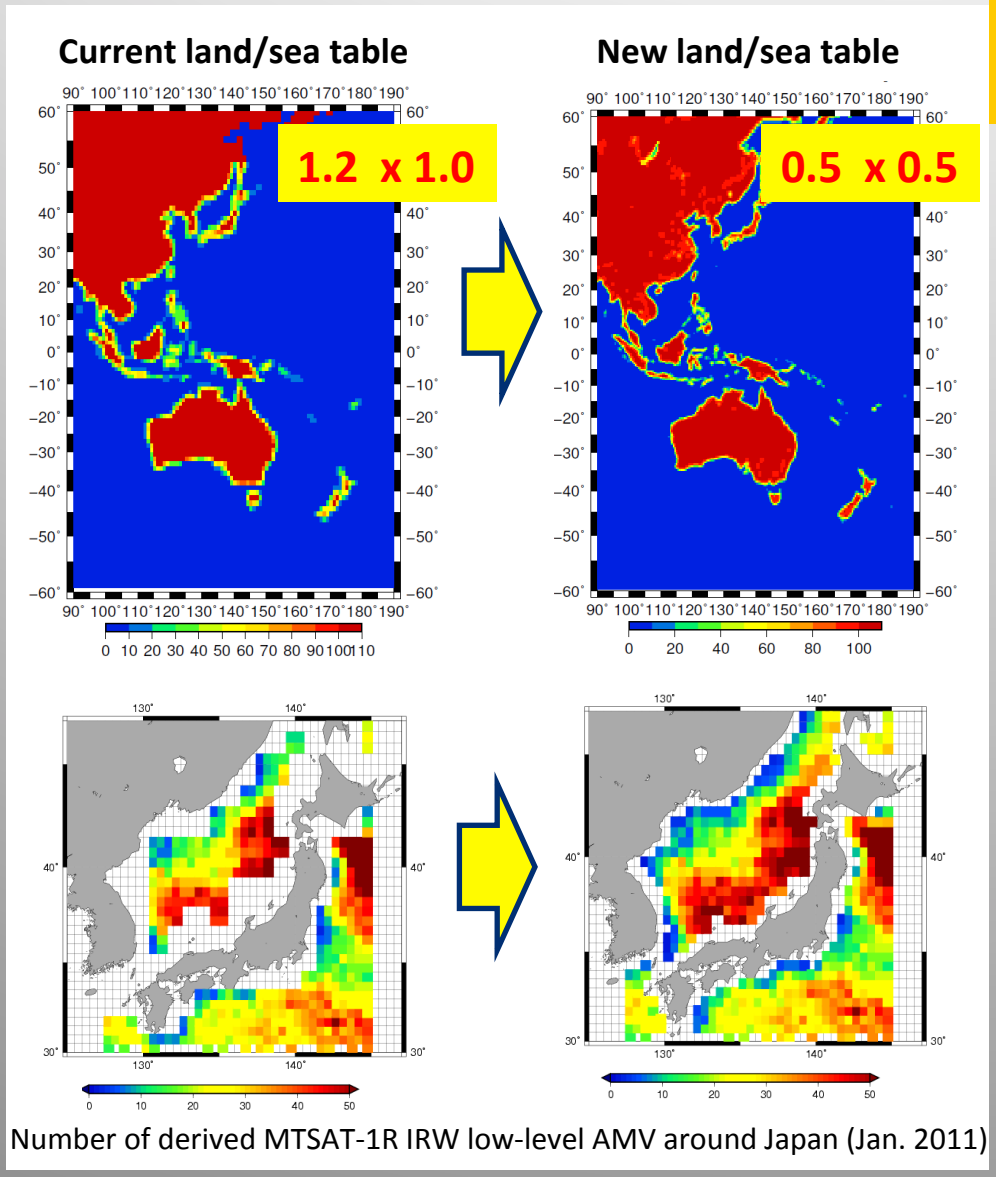
Zonal mean statistics against JMA's global model FG field for Sep. 2011 Qi > 0.85

MTSAT-2 IRW low-level winds



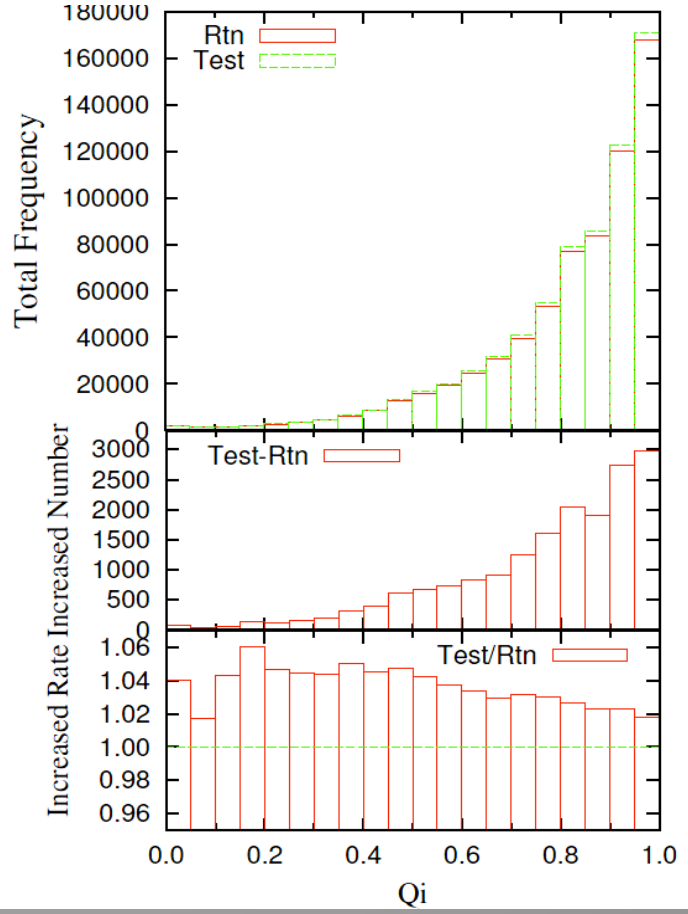
Development of high res. land/sea table for wider generation of low level winds (on going)

Number of AMV increases several % with almost same quality



Number of derived MTSAT-1R IRW low-level AMV around Japan (Jan. 2011)

Qi Histogram for MTSAT-1R IR1 low-level winds for Jan. 2011



Examining of NWC-SAF software for Himawari-8 AMV

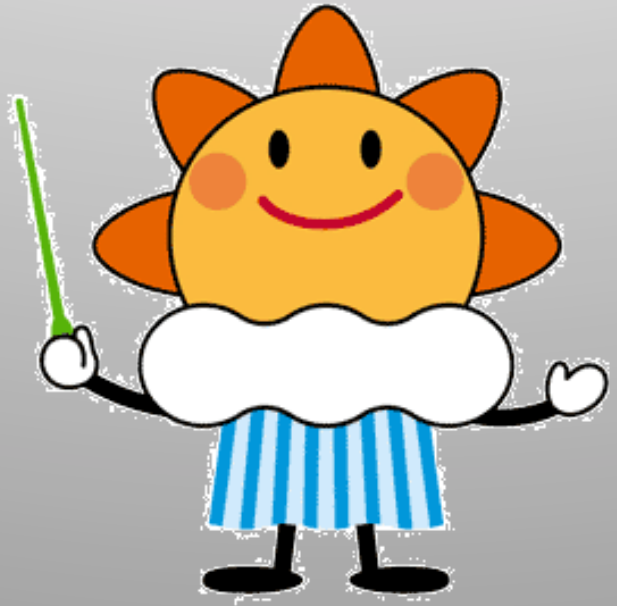
JMA is examining to use NWC SAF software for Himawari-8 AMV generating First for cloud detection and cloud type analysis using multiple channels

AMV derivation procedure	Method planed to be implemented to next AMV
Cloud type analysis Target selection	Trying • Multi-channel threshold method based on NWC-SAF software algorithm
Target tracking	Trying • Nested tracking method Trying • Advanced tracking method for the use of rapid scan images
Cloud height assignment	Trying • NWP profile correction associated with observation ✓WV channel ✓CO2 channel Trying • Examination of the use of NWC-SAF software algorithm
Quality control	Trying • New quality control for Himawari-8 AMV

Summary

- Operation Updates on MTSAT AMVs since 10th IWW
  - MTSAT-2 AMVs Dissemination from 11 Jul. 2010
  - Hourly AMV Dissemination from 3 Mar. 2011
- Development achieved
  - Rapid-scan operation conducted in every summer
  - Reprocess of historical AMVs using the latest algorithms has been completed
- Ongoing activities
  - New Low-level HA adapted the CCC method is under development
  - Planning to introduce high-resolution land/sea table
  - NWC SAF AMV derivation software is being examining for follow-on satellite AMV

Thank you!
Arigatou Gozai Masu!



Harerun the Mascot Character of JMA

Reference

- Le Marshall J., Pescod N., Seaman B., Mills G., and Stewart P., 1994: An Operational System for Generating Cloud Drift Winds in the Australian Region and Their Impact on Numerical Weather Prediction., J. Wea. Forecasting, 9, 361-370
- Tokuno M., 1998: Improvements in the method to extract operational cloud motion winds and water vapor motion winds of the GMS-5 system, Proc. of the Fourth Int. Winds Workshop, Switzerland, 61-68