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Monitoring and Assessment of AMV's from Multiple Platforms Using the Global Forecast System at NCMRWF

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Objective:

- *For optimal use of resources and betterment of NWP model forecasts, assimilated dataset needs regular monitoring and evaluation.*
- *This presentation summarizes the assimilation of 'Atmospheric Wind Vector' (AMV) in GFS system at NCMRWF.*
- *This includes observation from both existing and new platforms.*
- *GSI-4dEnVar is used as the assimilation scheme with Global Forecast System (GFS) at NCMRWF.*



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AMV Platforms Assimilated on Routine Basis in GFS system at NCMRWF

Sl. No.	Platforms	Channel		
		Infrared	Water Vapour	Visible
1.	GOES – 16, 17 (USA)	✓	✓	✓
2.	INSAT – 3D, 3DR (INDIA)	✓	✓	✓
3.	HIMAWARI-8 (JAPAN)	✓	✓	✓
4.	METEOSAT – 8, 11 (EUMETSAT)	✓	✓	✓
5.	AVHRR (NOAA – USA & METOP - EUMETSAT)	✓		
6.	MODIS (AQUA & TERRA - USA)	✓		✓
7.	VIIRS – NPP (USA)	✓		



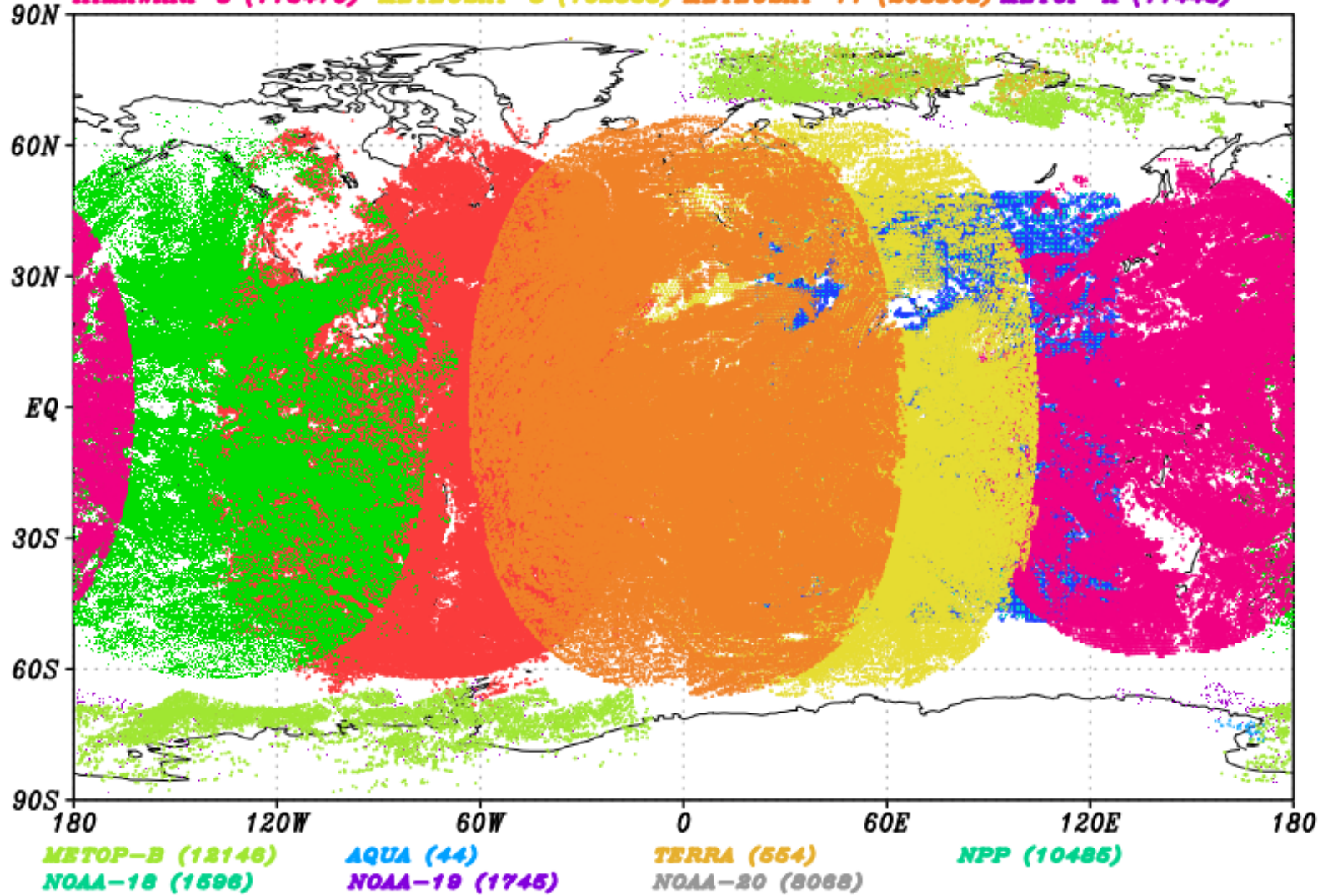
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AMV Global Coverage (Received at NCMRWF) 2021030112 (+/- 03hrs)

GOES-16 (912973) **GOES-17 (443290)** **INSAT-3D (77718)** **INSAT-3DR (126721)**
HIMAWARI-8 (113470) **METEOSAT-8 (192838)** **METEOSAT-11 (208808)** **METOP-A (11449)**

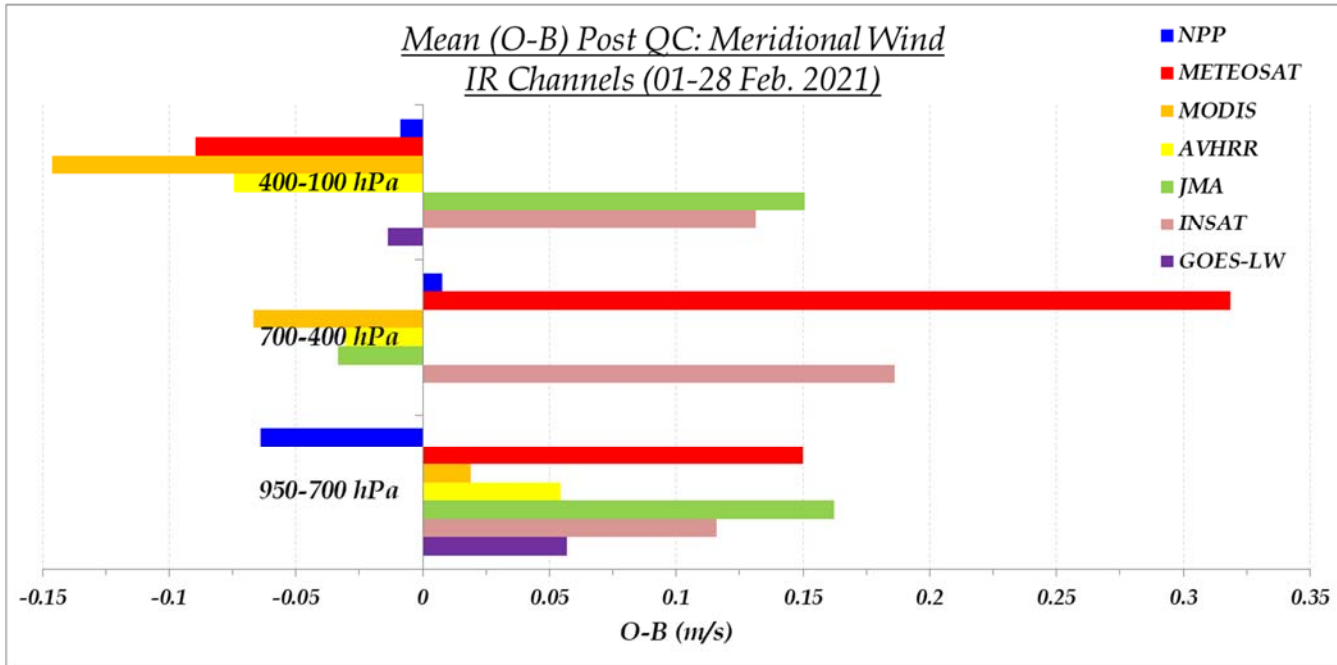
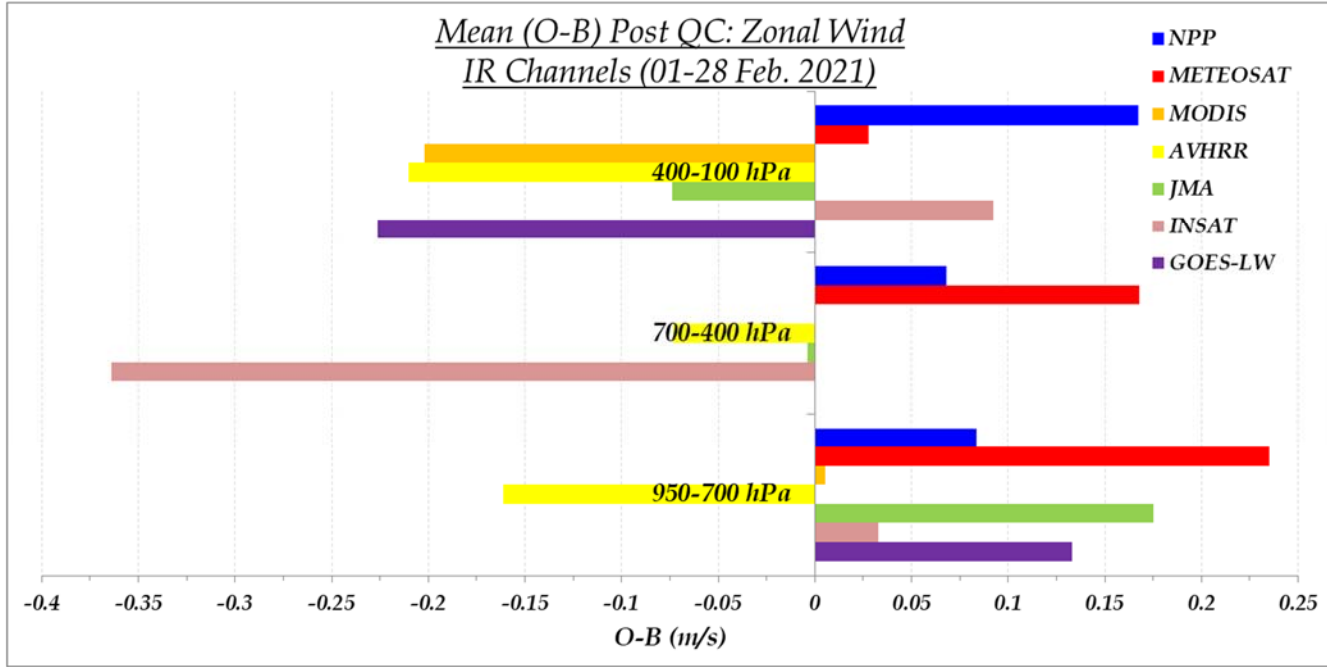




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Infrared Channels Assimilated

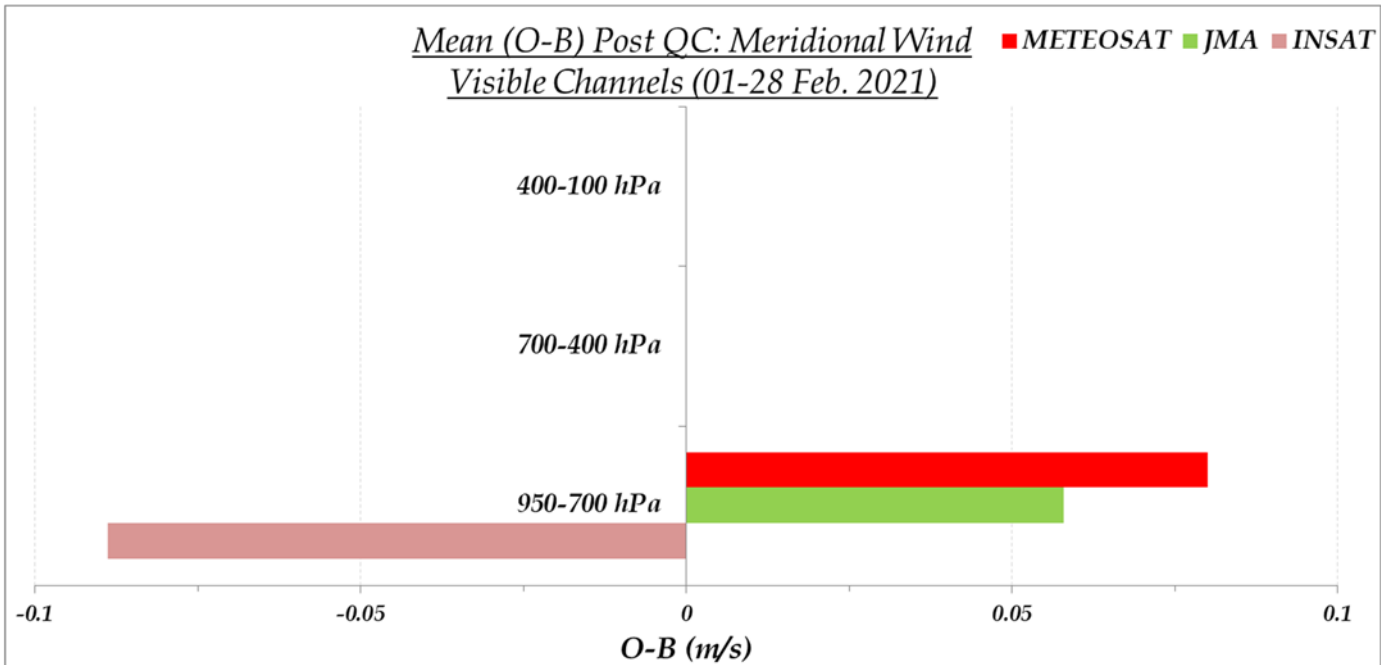
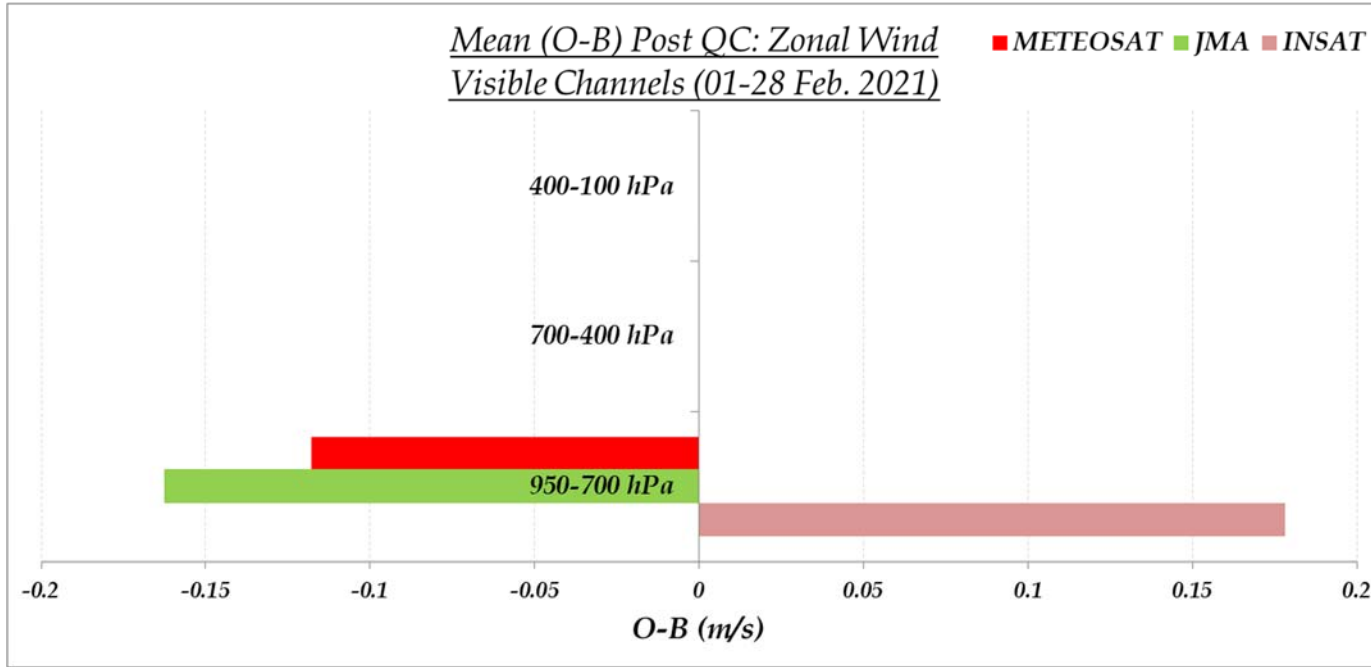




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Visible Channels Assimilated

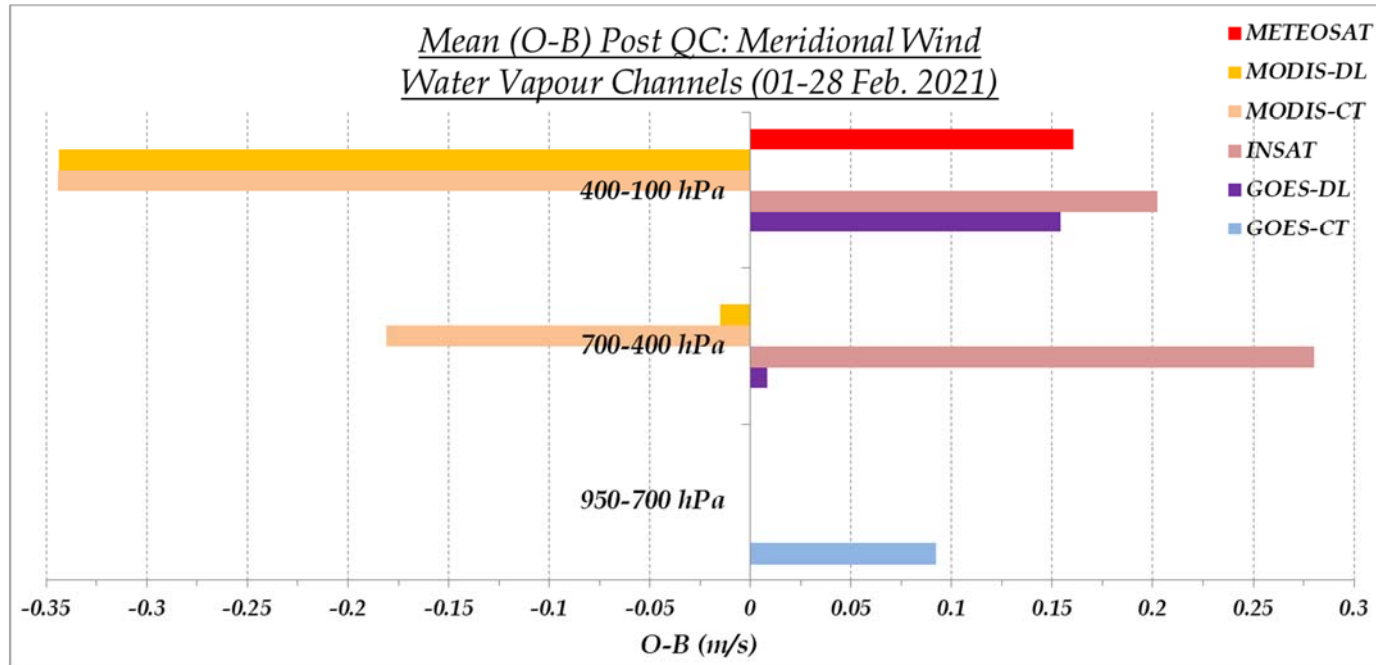
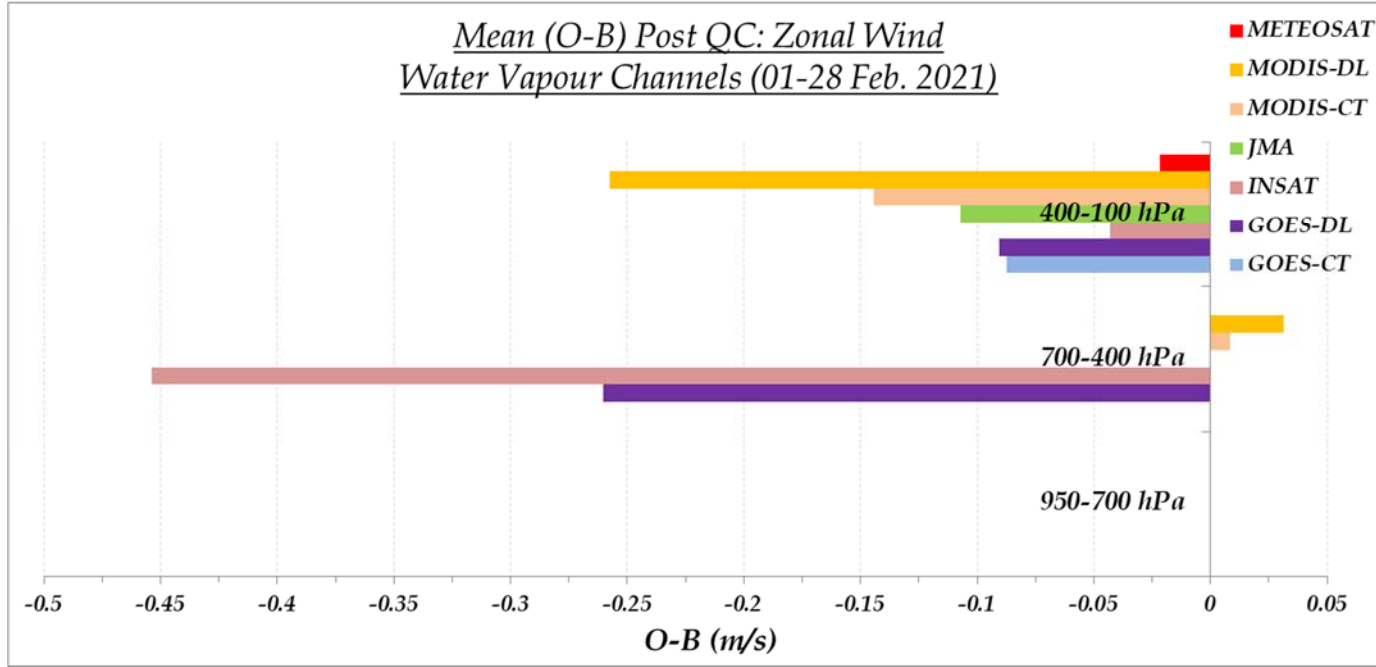




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Water Vapour Channels Assimilated





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New AMV platforms undergoing assessment and evaluation:

- ❖ KMA (Korea Meteorological Administration) : GK-2
- ❖ CMA (China Meteorological Administration) : FY-3G & FY-3H
- ❖ METOP Dual



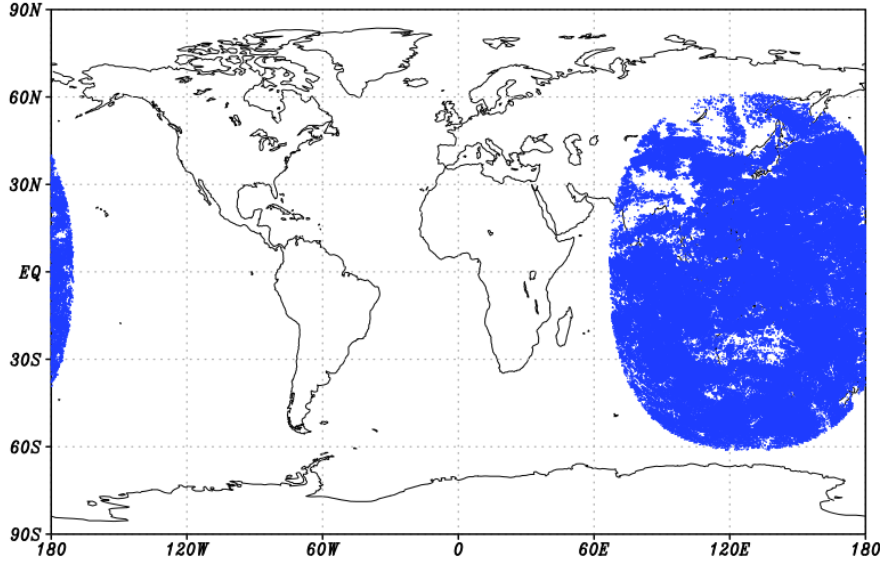
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New AMV Platforms under Evaluation

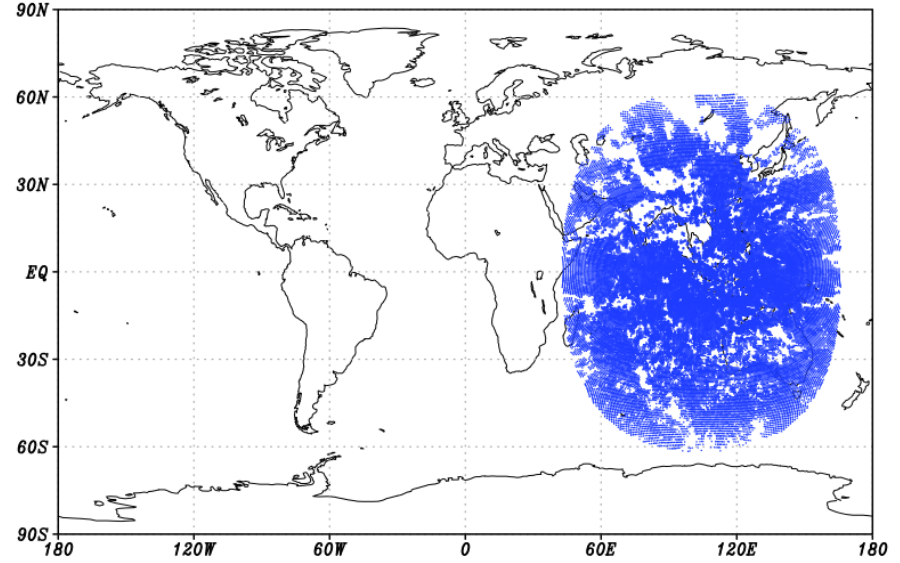


AMV-KMA Global Coverage (Received at NCMRWF)
2021022400 (+/- 03hrs)



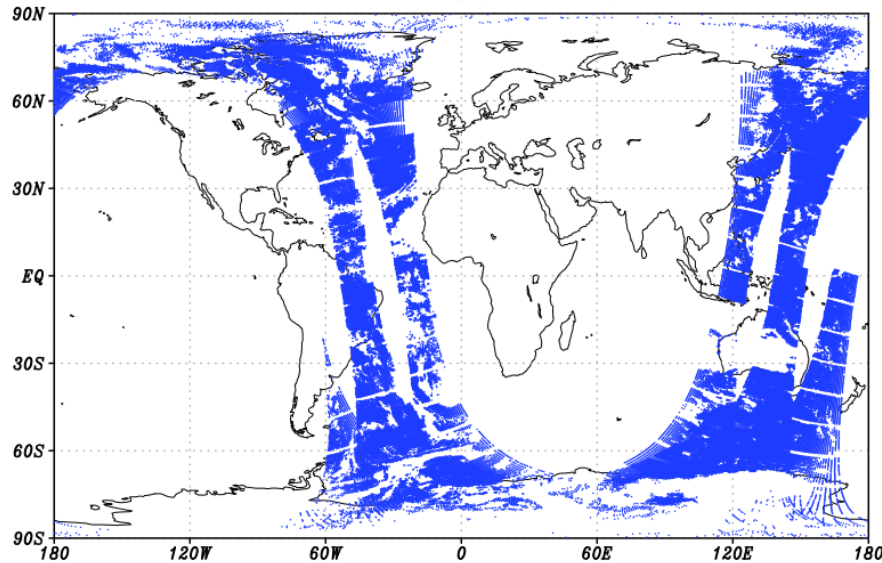
AMV-KMA (455596)

AMV-CMA Global Coverage (Received at NCMRWF)
2021022400 (+/- 03hrs)



AMV-CMA (55247)

AMV- METOPDual Global Coverage (Received at NCMRWF)
2021022400 (+/- 03hrs)



AMV-Metop Dual (131580)



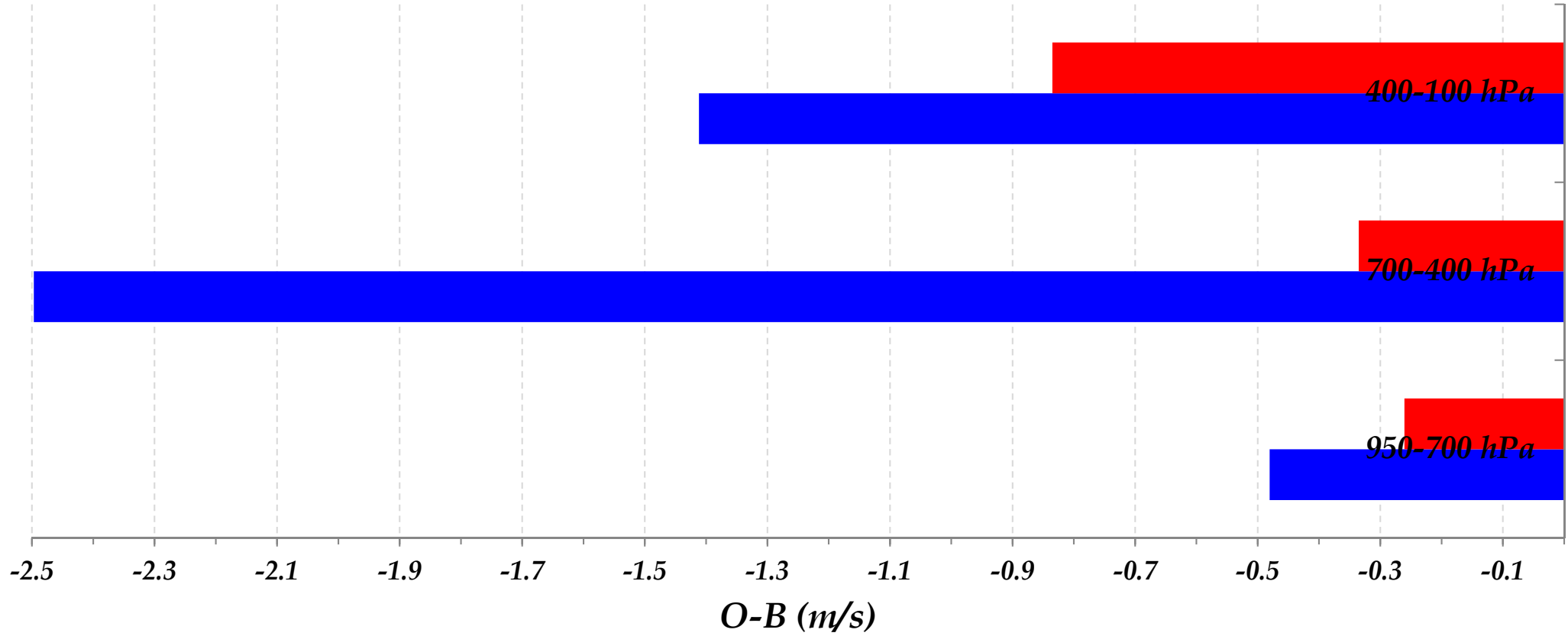
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Mean (O-B) Post QC: Zonal Wind
16-25 Feb. 2021

■ METOP-Dual ■ CMA





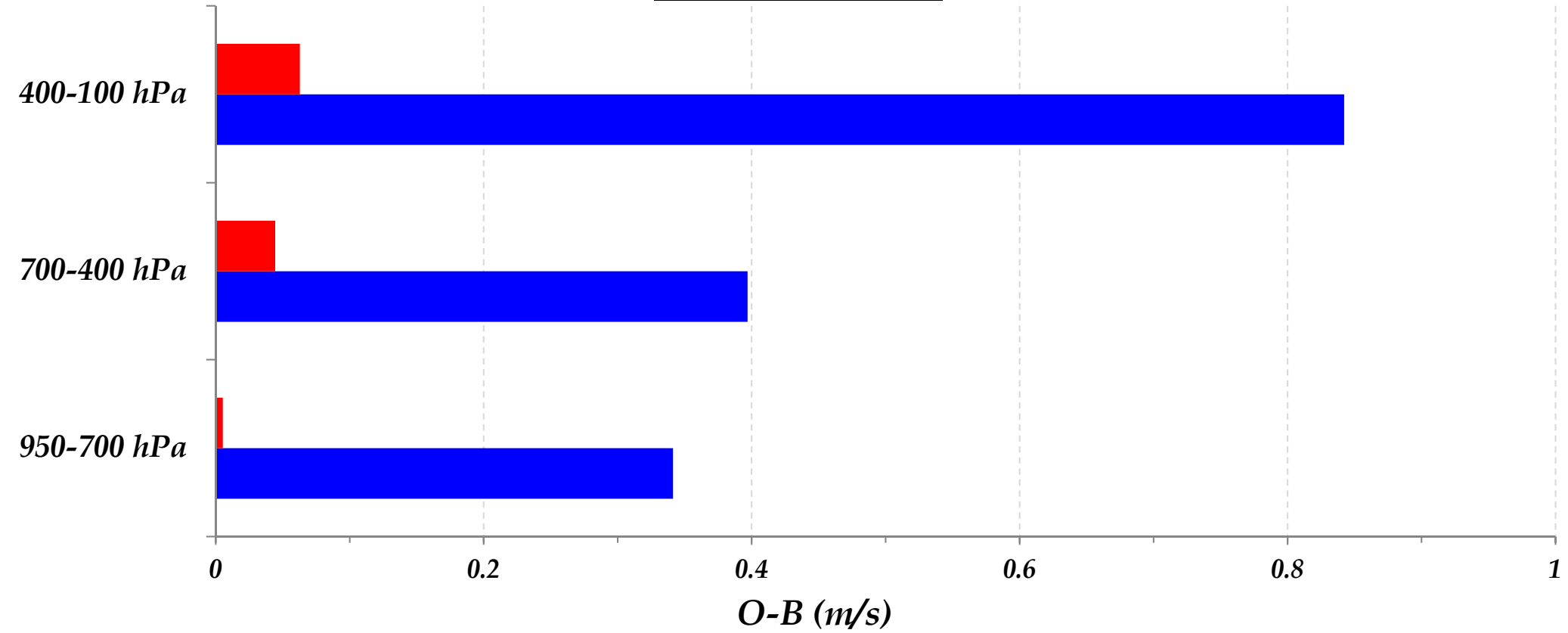
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Mean (O-B) Post QC: Meridional Wind
16-25 Feb. 2021

■ METOP-Dual ■ CMA





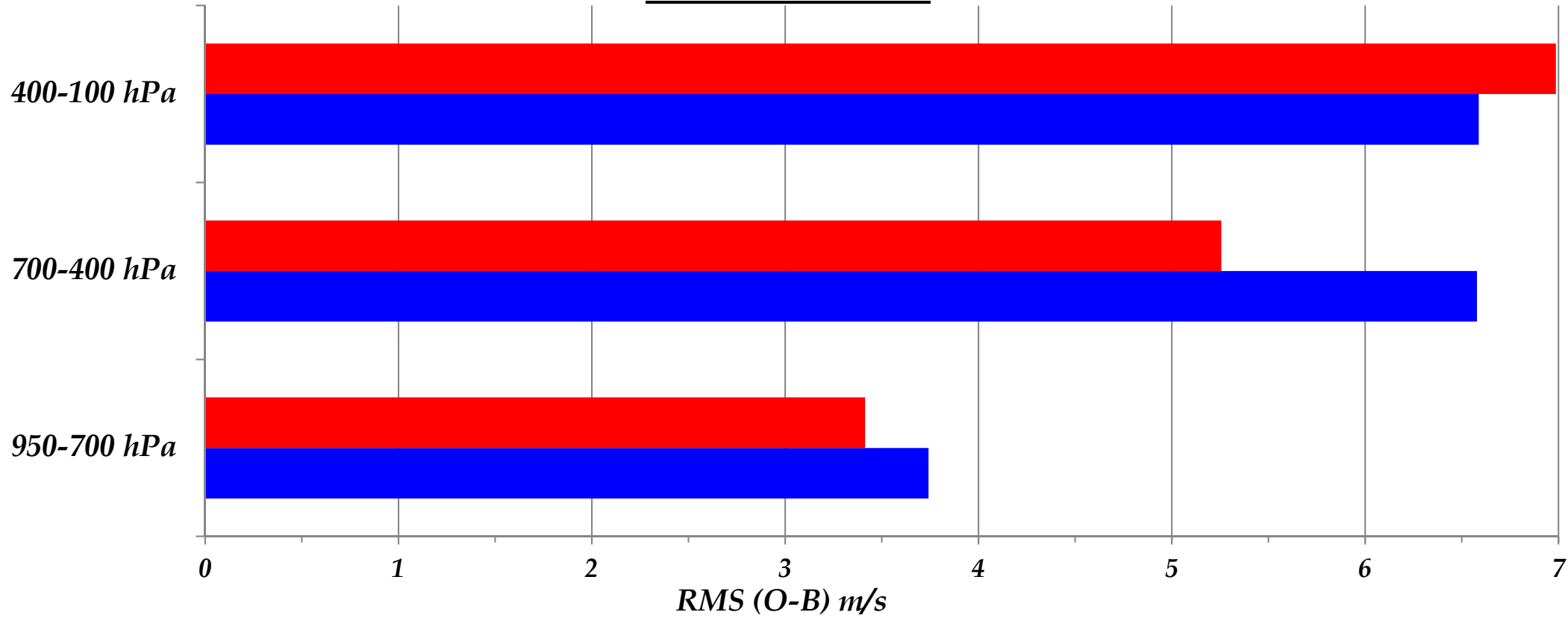
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RMS (O-B) Post QC: Zonal Wind
16-25 Feb. 2021

■ METOP-Dual ■ CMA





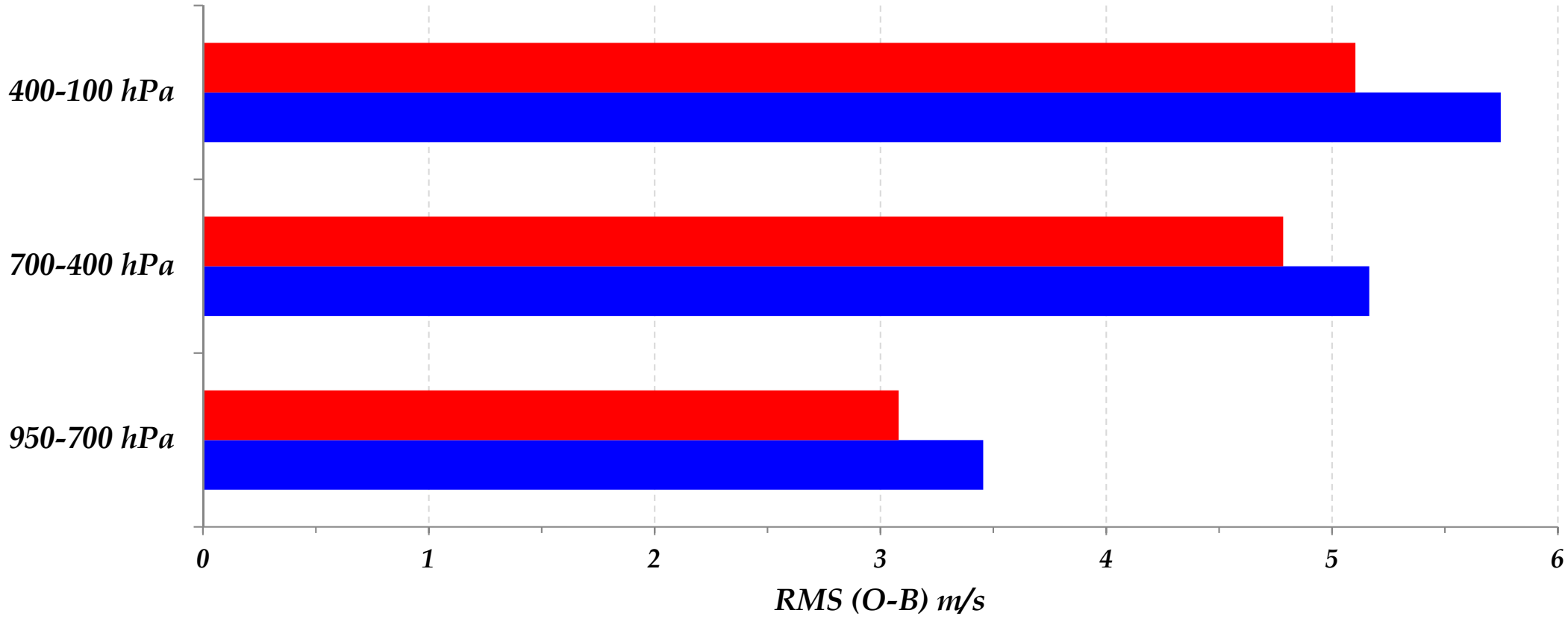
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RMS (O-B) Post QC: Meridional Wind
16-25 Feb. 2021

■ METOP-Dual ■ CMA





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			N. American			N. Hemisphere			S. Hemisphere			Tropics			
			Day 1	Day 3	Day 5	Day 1	Day 3	Day 5	Day 1	Day 3	Day 5	Day 1	Day 3	Day 5	
Anomaly Correlation	Heights	250hPa				▲	■	■	▲			■	■	■	
		500hPa	■			▲		▲				■	■	■	
		700hPa	▲			▲		▲				■	■	■	
		1000hPa	▲			▲		■				■	■	■	
	Vector Wind	250hPa	▲			▲			▲			■	■	■	
		500hPa	▲			▲	■		▲			■	■	■	
		850hPa	▲			▲		■	▲			■	■	■	
	Temp	250hPa	▲	■		▲	▲		▲	■		■	■	■	
		500hPa	■			▲			▲			■	■	■	
		850hPa	▲	▲	■	▲	▲	▲	▲			■	■	■	
	RMSE	Heights	100hPa				▲	▲	▲	▲	▲		■	▲	
			200hPa	■			▲	■	■	▲			▲	■	
500hPa			■			■			■			■		■	
700hPa			■			■		■	■			■		■	
850hPa			▲	■		▲		■	■			■		■	
1000hPa			▲	■		▲		■	■			■		■	
Vector Wind		100hPa	▲			▲			▲	▲		▲			
		200hPa	▲			▲			▲			▲	■	■	
		500hPa	▲			▲			▲			▲			
		700hPa	▲			▲			▲			▲			
		850hPa	▲			▲			▲			▲			
		1000hPa							▲			▲			
Temp		100hPa	▲			▲			▲	■		▲			
		200hPa	▲	■		▲	▲	■	▲			▲			
		500hPa	■			▲			■			▲	▲		
		700hPa	▲			▲		■	▲			▲	▲		
		850hPa	▲	■	■	▲	▲	▲	▲			▲	▲	▲	
		1000hPa	■	■		▲		■	■			▲			
Bias		Heights	100hPa	▼										■	
			200hPa	▼				■	■						
			500hPa	▼			▼				■				
			700hPa	▼	■		▲				■				
			850hPa	▲	■		▲				■		▲		
			1000hPa	▲	▲		▲				■		▲	▲	
	Wind Speed	100hPa				■				▲					
		200hPa							▲	■		▲	▲	▲	
		500hPa				■	▼	■							
		700hPa							▲						
		850hPa							■						
		1000hPa	▲	▲	▲	▲	▲	■				▲	▲	■	
	Temp	100hPa													
		200hPa								■					
		500hPa										■	■		
		700hPa										■	■		
		850hPa									■			▲	
		1000hPa									■				

FCST Verification Scorecard	
Symbol Legend	
▲	AMV is better than CTRL at the 99.9% significance level
▲	AMV is better than CTRL at the 99% significance level
■	AMV is better than CTRL at the 95% significance level
	No statistically significant difference between AMV and CTRL
■	AMV is worse than CTRL at the 95% significance level
▼	AMV is worse than CTRL at the 99% significance level
▼	AMV is worse than CTRL at the 99.9% significance level
■	Not statistically relevant
Start Date: 20210221	
End Date: 20210307	

Regions:

N. America:
180⁰-320⁰E, 20⁰-75⁰N

N. Hemisphere:
20⁰-80⁰N

S. Hemisphere:
20⁰-80⁰S

Tropics:
20⁰S-20⁰N

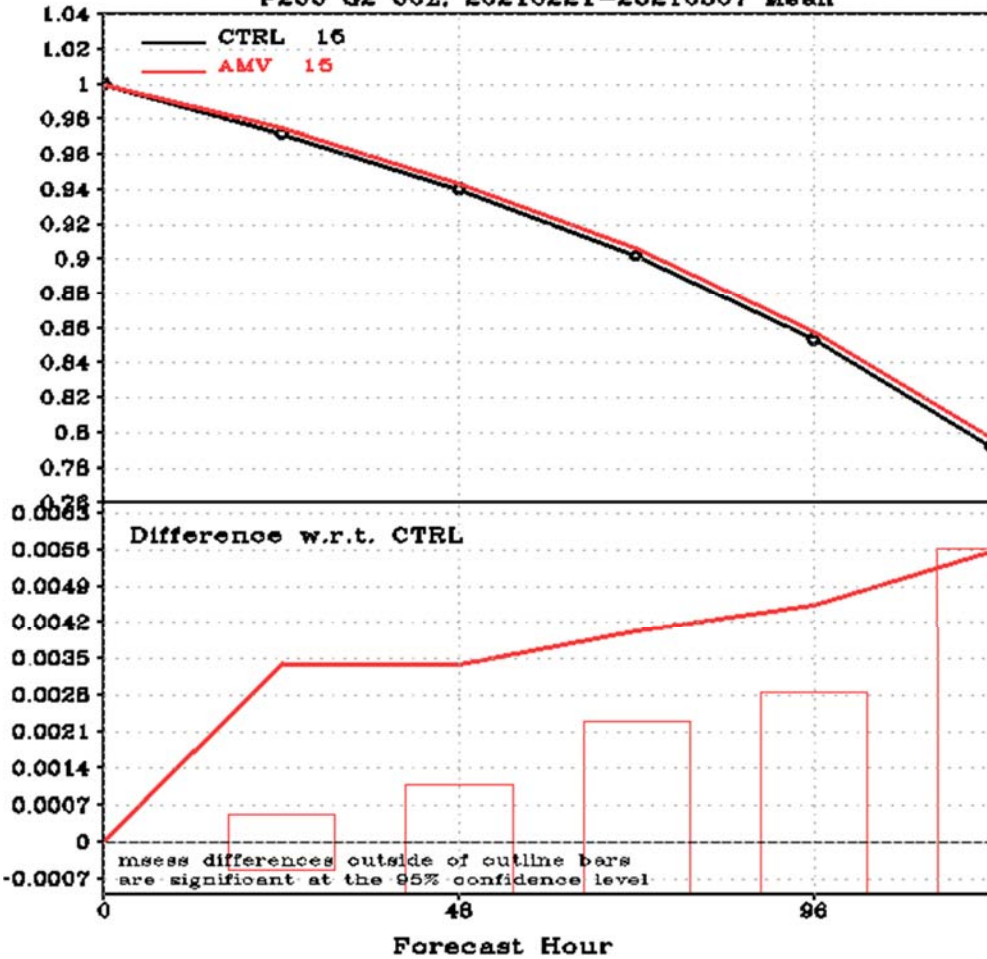


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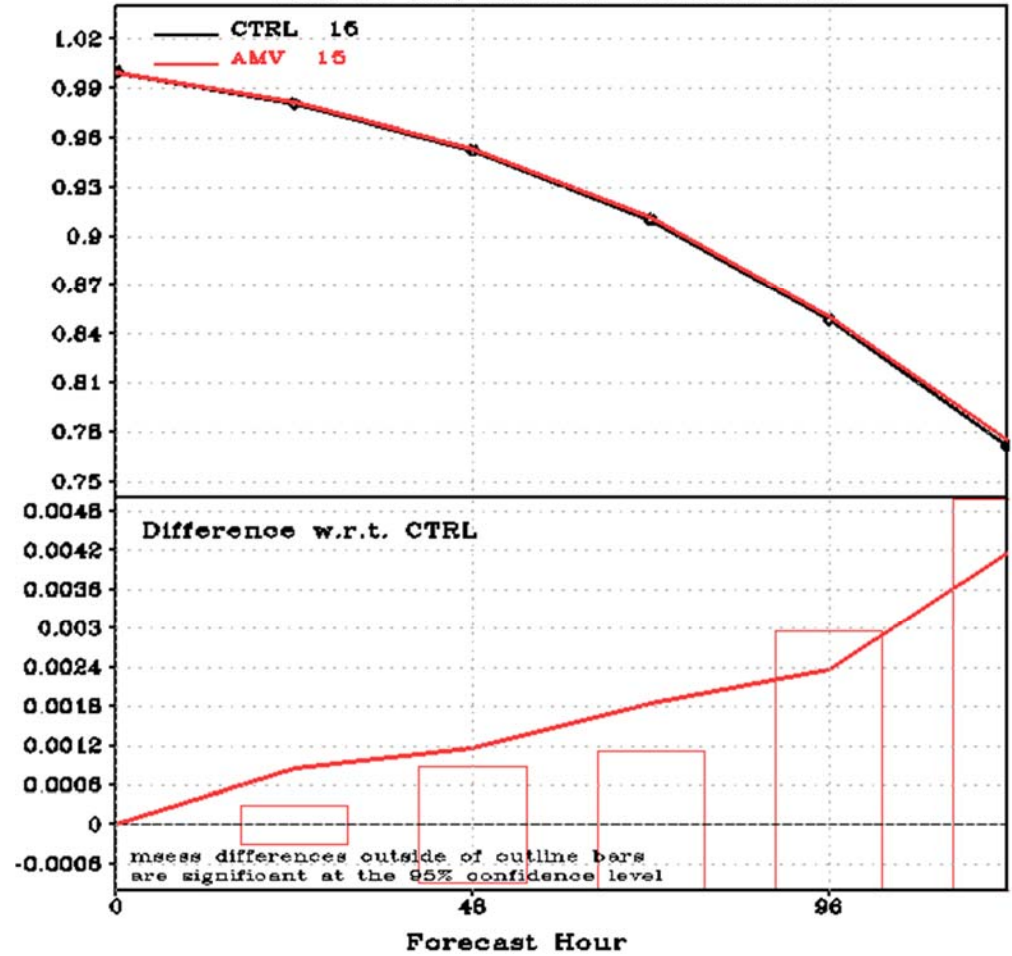
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WIND: Murphy MSE Skill Score
P200 G2 00Z, 20210221-20210307 Mean



T: Murphy MSE Skill Score
P200 G2 00Z, 20210221-20210307 Mean





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❖ Future Objectives

- Intensive testing and evaluation of the new platforms through Observing System Experiment.
- Application of stringent quality control criteria, especially for KMA to reduce the high (O-B) for the zonal winds over global domain.



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Thank You