



CGMS-35 EUM-WP-24  
v1, 16 October 2007  
Prepared by EUMETSAT  
Agenda Item: II/5  
Discussed in WGII

**REPORT ON USE OF STANDARD CGMS AMV STATISTICS**  
In response to CGMS action 34.22

Summary of the Working Paper:

The CGMS statistics are derived routinely at Eumetsat and are occasionally used as an independent tool for product validation.

## **Report on use of standard CGMS AMV statistics**

### **1 INTRODUCTION**

At the 34 CGMS, all CGMS members producing Atmospheric Motion Vector (AMV) products were requested to report on the use of the standard CGMS AMV statistics with a paper to CGMS 35. The paper should also present the co-location criteria currently in use.

This paper summarises the situation at EUMETSAT.

### **2 Current status of the derivation of CGMS statistics at EUMETSAT**

The CGMS Statistics derived at EUMETSAT follow the collocation criteria as agreed by CGMS:

- all collocations of a hs
- horizontal distance < 150 km
- vertical distance < 25 (hPa)
- speed difference < 30 M/s
- direction difference < 60°
- AMV speed > 2.5 m/s

The following quantities are reported: mean speeds, mean speed difference (bias), mean vector difference, root mean square (RMS) difference, normalised RMS, number of collocations.

As a further refinement to the above criteria it should be noted that the statistics are derived at EUMETSAT only for AMVs with a Quality Indicator greater than 0.80. In addition only the nearest radiosonde observation is used, if more than one present for an AMV. Finally, for Meteosat First Generation AMVs only the best AMV in the collocation area is used.

Annex I gives as an example the derived statistics for Meteosat-9 for August 2007.

### **3 Current use of CGMS statistics at EUMETSAT**

The statistics are made available routinely to the key users and developers at EUMETSAT. They are used occasionally to confirm that there are no expected deviations and to verify the performance of the operational near real time statistics derived at Eumetsat on a weekly and monthly basis.

### **4 CONCLUSIONS**

The CGMS statistics are derived routinely at Eumetsat and are occasionally used as an independent tool for product validation.

ANNEX I  
CGMS statistics for Meteosat-9 for August 2007.

CGMS STATISTICS

- MSG OPE B -

.....

PERIOD (>=) 01-Aug-2007 00:00 - (<) 01-Sep-2007 00:00

FILTERS: HOR. DIST. < 150 (Km) - VERT. DIST. < 25 (hPa)  
NEAREST FLAG: 1 - QUALITY >= 80%  
SPEED DIFF. < 30 (m/s) - DIRECTION DIFF. < 60 (deg)  
AMV SPEED > 2.5 (m/s)

BAND: HRV TARGET TYPE: CLOUDY

AMVLEVEL	STATISTIC	GLOBAL	NORTH	SOUTH	TROPICS
LOW	MEAN OBS. SPEED	8.43	8.40	10.35	7.37
	MEAN VECT. DIFF.	3.31	3.29	3.98	3.16
	NRMS	0.48	0.47	0.48	0.67
	NUMBER OF CO-LOC.	3888.00	3514.00	168.00	206.00
	RMS	4.04	3.93	5.01	4.95
	SPD. BIAS	0.09	0.14	0.66	-1.20

Derivation of statistics are as outlined in Report from the  
Working Group on Verification Statistics,  
Proc. Conf. 3rd Int. Winds Workshop, p.17, Ascona, Switzerland, 10-12 June  
1996.

EUMETSAT, Darmstadt

CGMS STATISTICS

- MSG OPE B -

.....

PERIOD (>=) 01-Aug-2007 00:00 - (<) 01-Sep-2007 00:00

FILTERS: HOR. DIST. < 150 (Km) - VERT. DIST. < 25 (hPa)  
NEAREST FLAG: 1 - QUALITY >= 80%  
SPEED DIFF. < 30 (m/s) - DIRECTION DIFF. < 60 (deg)  
AMV SPEED > 2.5 (m/s)



BAND: IR 10.8 TARGET TYPE: CLOUDY

AMVLEVEL	STATISTIC	GLOBAL	NORTH	SOUTH	TROPICS
-					
ALL LEVELS	MEAN OBS. SPEED	17.84	17.88	29.49	13.21
	MEAN VECT. DIFF.	4.92	5.16	5.72	4.14
	NRMS	0.34	0.35	0.23	0.38
	NUMBER OF CO-LOC.	3932.00	2294.00	459.00	1179.00
	RMS	6.04	6.32	6.87	5.06
	SPD. BIAS	-0.47	-0.39	-1.52	-0.23
HGH	MEAN OBS. SPEED	21.66	22.10	35.54	14.73
	MEAN VECT. DIFF.	5.69	6.00	6.26	4.87
	NRMS	0.31	0.32	0.21	0.40
	NUMBER OF CO-LOC.	2431.00	1368.00	325.00	738.00
	RMS	6.82	7.16	7.39	5.82
	SPD. BIAS	-0.52	-0.62	-1.35	0.02
LOW	MEAN OBS. SPEED	9.74	9.58	9.84	10.00
	MEAN VECT. DIFF.	3.12	3.37	2.90	2.74
	NRMS	0.38	0.43	0.35	0.32
	NUMBER OF CO-LOC.	975.00	570.00	88.00	317.00
	RMS	3.75	4.07	3.40	3.18
	SPD. BIAS	-0.01	0.43	-0.73	-0.60
MED	MEAN OBS. SPEED	15.18	14.97	24.33	12.40
	MEAN VECT. DIFF.	4.70	4.82	7.29	3.38
	NRMS	0.37	0.39	0.32	0.32
	NUMBER OF CO-LOC.	526.00	356.00	46.00	124.00
	RMS	5.63	5.77	7.90	3.97
	SPD. BIAS	-1.11	-0.81	-4.20	-0.81

Derivation of statistics are as outlined in Report from the Working Group on Verification Statistics, Proc. Conf. 3rd Int. Winds Workshop, p.17, Ascona, Switzerland, 10-12 June 1996.

EUMETSAT, Darmstadt

CGMS STATISTICS

- MSG OPE B -

.....

PERIOD (>=) 01-Aug-2007 00:00 - (<) 01-Sep-2007 00:00

FILTERS: HOR. DIST. < 150 (Km) - VERT. DIST. < 25 (hPa)  
NEAREST FLAG: 1 - QUALITY >= 80%  
SPEED DIFF. < 30 (m/s) - DIRECTION DIFF. < 60 (deg)  
AMV SPEED > 2.5 (m/s)



BAND: VIS 0.8 TARGET TYPE: CLOUDY

AMVLEVEL	STATISTIC	GLOBAL	NORTH	SOUTH	TROPICS
-					
LOW	MEAN OBS. SPEED	9.04	8.53	9.61	9.56
	MEAN VECT. DIFF.	3.07	3.40	2.98	2.67
	NRMS	0.41	0.48	0.38	0.33
	NUMBER OF CO-LOC.	1043.00	536.00	98.00	409.00
	RMS	3.72	4.13	3.62	3.14
	SPD. BIAS	-0.12	0.41	-1.08	-0.58

Derivation of statistics are as outlined in Report from the Working Group on Verification Statistics, Proc. Conf. 3rd Int. Winds Workshop, p.17, Ascona, Switzerland, 10-12 June 1996.

EUMETSAT, Darmstadt

CGMS STATISTICS

- MSG OPE B -  
.....

PERIOD (>=) 01-Aug-2007 00:00 - (<) 01-Sep-2007 00:00

FILTERS: HOR. DIST. < 150 (Km) - VERT. DIST. < 25 (hPa)  
NEAREST FLAG: 1 - QUALITY >= 80%  
SPEED DIFF. < 30 (m/s) - DIRECTION DIFF. < 60 (deg)  
AMV SPEED > 2.5 (m/s)

BAND: WV 6.2 TARGET TYPE: CLEAR

AMVLEVEL	STATISTIC	GLOBAL	NORTH	SOUTH	TROPICS
-					
ALL LEVELS	MEAN OBS. SPEED	15.84	15.19	27.71	12.90
	MEAN VECT. DIFF.	5.63	5.45	6.37	5.96
	NRMS	0.44	0.45	0.28	0.55
	NUMBER OF CO-LOC.	316.00	225.00	28.00	63.00
	RMS	6.96	6.84	7.66	7.11
	SPD. BIAS	-0.60	-0.49	-2.25	-0.27
HGH	MEAN OBS. SPEED	16.40	15.71	33.05	12.72
	MEAN VECT. DIFF.	5.54	5.44	7.27	5.29
	NRMS	0.42	0.43	0.26	0.50
	NUMBER OF CO-LOC.	259.00	190.00	19.00	50.00
	RMS	6.83	6.79	8.44	6.33
	SPD. BIAS	-0.49	-0.37	-3.58	0.23
LOW	MEAN OBS. SPEED				
	MEAN VECT. DIFF.				
	NRMS				
	NUMBER OF CO-LOC.				
	RMS				
	SPD. BIAS				



MED	MEAN OBS. SPEED	13.30	12.37	16.44	13.62
	MEAN VECT. DIFF.	6.04	5.52	4.49	8.52
	NRMS	0.57	0.58	0.35	0.70
	NUMBER OF CO-LOC.	57.00	35.00	9.00	13.00
	RMS	7.55	7.13	5.81	9.59
	SPD. BIAS	-1.11	-1.15	0.57	-2.18

Derivation of statistics are as outlined in Report from the Working Group on Verification Statistics, Proc. Conf. 3rd Int. Winds Workshop, p.17, Ascona, Switzerland, 10-12 June 1996.

EUMETSAT, Darmstadt

CGMS STATISTICS

- MSG OPE B -

.....

PERIOD (>=) 01-Aug-2007 00:00 - (<) 01-Sep-2007 00:00

FILTERS: HOR. DIST. < 150 (Km) - VERT. DIST. < 25 (hPa)  
NEAREST FLAG: 1 - QUALITY >= 80%  
SPEED DIFF. < 30 (m/s) - DIRECTION DIFF. < 60 (deg)  
AMV SPEED > 2.5 (m/s)

BAND: WV 6.2 TARGET TYPE: CLOUDY

AMVLEVEL	STATISTIC	GLOBAL	NORTH	SOUTH	TROPICS
-					
ALL LEVELS	MEAN OBS. SPEED	22.12	23.86	36.09	15.43
	MEAN VECT. DIFF.	5.79	6.23	6.09	4.99
	NRMS	0.32	0.32	0.21	0.39
	NUMBER OF CO-LOC.	3869.00	2170.00	368.00	1331.00
	RMS	7.10	7.64	7.46	6.00
	SPD. BIAS	-0.29	-0.60	-1.55	0.58
HGH	MEAN OBS. SPEED	22.20	24.02	36.15	15.45
	MEAN VECT. DIFF.	5.80	6.26	6.11	4.99
	NRMS	0.32	0.32	0.21	0.39
	NUMBER OF CO-LOC.	3815.00	2124.00	365.00	1326.00
	RMS	7.12	7.69	7.47	6.01
	SPD. BIAS	-0.28	-0.60	-1.56	0.58
LOW	MEAN OBS. SPEED				
	MEAN VECT. DIFF.				
	NRMS				
	NUMBER OF CO-LOC.				
	RMS				
	SPD. BIAS				
MED	MEAN OBS. SPEED	16.69	16.54	28.00	11.20
	MEAN VECT. DIFF.	4.84	4.91	4.65	4.27
	NRMS	0.32	0.33	0.17	0.41



NUMBER OF CO-LOC.	54.00	46.00	3.00	5.00
RMS	5.27	5.38	4.73	4.58
SPD. BIAS	-0.69	-0.84	-0.41	0.51

Derivation of statistics are as outlined in Report from the Working Group on Verification Statistics, Proc. Conf. 3rd Int. Winds Workshop, p.17, Ascona, Switzerland, 10-12 June 1996.

EUMETSAT, Darmstadt

C G M S S T A T I S T I C S

- MSG OPE B -  
.....

PERIOD (>=) 01-Aug-2007 00:00 - (<) 01-Sep-2007 00:00

FILTERS: HOR. DIST. < 150 (Km) - VERT. DIST. < 25 (hPa)  
NEAREST FLAG: 1 - QUALITY >= 80%  
SPEED DIFF. < 30 (m/s) - DIRECTION DIFF. < 60 (deg)  
AMV SPEED > 2.5 (m/s)

BAND: WV 7.3 TARGET TYPE: CLEAR

AMVLEVEL	STATISTIC	GLOBAL	NORTH	SOUTH	TROPICS
-					
ALL LEVELS	MEAN OBS. SPEED	11.10	10.85	12.03	11.65
	MEAN VECT. DIFF.	4.44	4.28	6.01	4.57
	NRMS	0.47	0.46	0.64	0.46
	NUMBER OF CO-LOC.	574.00	412.00	30.00	132.00
	RMS	5.25	4.99	7.68	5.39
	SPD. BIAS	-0.48	-0.48	-1.54	-0.24
HGH	MEAN OBS. SPEED				
	MEAN VECT. DIFF.				
	NRMS				
	NUMBER OF CO-LOC.				
	RMS				
	SPD. BIAS				
LOW	MEAN OBS. SPEED	8.67	9.00	10.24	7.38
	MEAN VECT. DIFF.	4.38	5.43	5.11	3.75
	NRMS	0.62	0.60	0.65	0.55
	NUMBER OF CO-LOC.	39.00	1.00	17.00	21.00
	RMS	5.35	5.43	6.63	4.09
	SPD. BIAS	0.03	5.43	-2.47	1.81
MED	MEAN OBS. SPEED	11.27	10.86	14.38	12.46
	MEAN VECT. DIFF.	4.44	4.28	7.19	4.73
	NRMS	0.47	0.46	0.62	0.45
	NUMBER OF CO-LOC.	535.00	411.00	13.00	111.00
	RMS	5.25	4.99	8.98	5.60
	SPD. BIAS	-0.52	-0.50	-0.31	0.63

Derivation of statistics are as outlined in Report from the Working Group on Verification Statistics,



EUMETSAT, Darmstadt

CGMS STATISTICS

- MSG OPE B -  
.....

PERIOD (>=) 01-Aug-2007 00:00 - (<) 01-Sep-2007 00:00

FILTERS: HOR. DIST. < 150 (Km) - VERT. DIST. < 25 (hPa)  
NEAREST FLAG: 1 - QUALITY >= 80%  
SPEED DIFF. < 30 (m/s) - DIRECTION DIFF. < 60 (deg)  
AMV SPEED > 2.5 (m/s)

BAND: WV 7.3 TARGET TYPE: CLOUDY

AMVLEVEL	STATISTIC	GLOBAL	NORTH	SOUTH	
TROPICS					
-					
ALL LEVELS	MEAN OBS. SPEED	20.46	21.36	34.68	14.65
	MEAN VECT. DIFF.	5.67	5.92	6.41	5.02
	NRMS	0.33	0.34	0.22	0.41
	NUMBER OF CO-LOC.	4102.00	2319.00	414.00	1369.00
	RMS	6.85	7.18	7.64	5.98
	SPD. BIAS	-0.46	-0.42	-2.07	-0.05
HGH	MEAN OBS. SPEED	21.24	22.52	35.92	14.92
	MEAN VECT. DIFF.	5.78	6.16	6.24	5.04
	NRMS	0.33	0.33	0.21	0.40
	NUMBER OF CO-LOC.	3556.00	1940.00	368.00	1248.00
	RMS	6.99	7.47	7.52	6.00
	SPD. BIAS	-0.38	-0.36	-1.67	-0.03
LOW	MEAN OBS. SPEED				
	MEAN VECT. DIFF.				
	NRMS				
	NUMBER OF CO-LOC.				
	RMS				
	SPD. BIAS				
MED	MEAN OBS. SPEED	15.40	15.38	24.76	11.90
	MEAN VECT. DIFF.	4.99	4.71	7.70	4.84
	NRMS	0.38	0.36	0.35	0.48
	NUMBER OF CO-LOC.	546.00	379.00	46.00	121.00
	RMS	5.85	5.47	8.58	5.74
	SPD. BIAS	-1.04	-0.77	-5.20	-0.29

Derivation of statistics are as outlined in Report from the Working Group on Verification Statistics,