

IMPROVEMENTS TO EUMETSAT AMVS

Régis Borde, Greg Dew, Arthur de Smet
and Jörgen Bertil Gustaffson

BACKGROUND

Create a direct link between feature tracked
and Height Assignment of AMV.

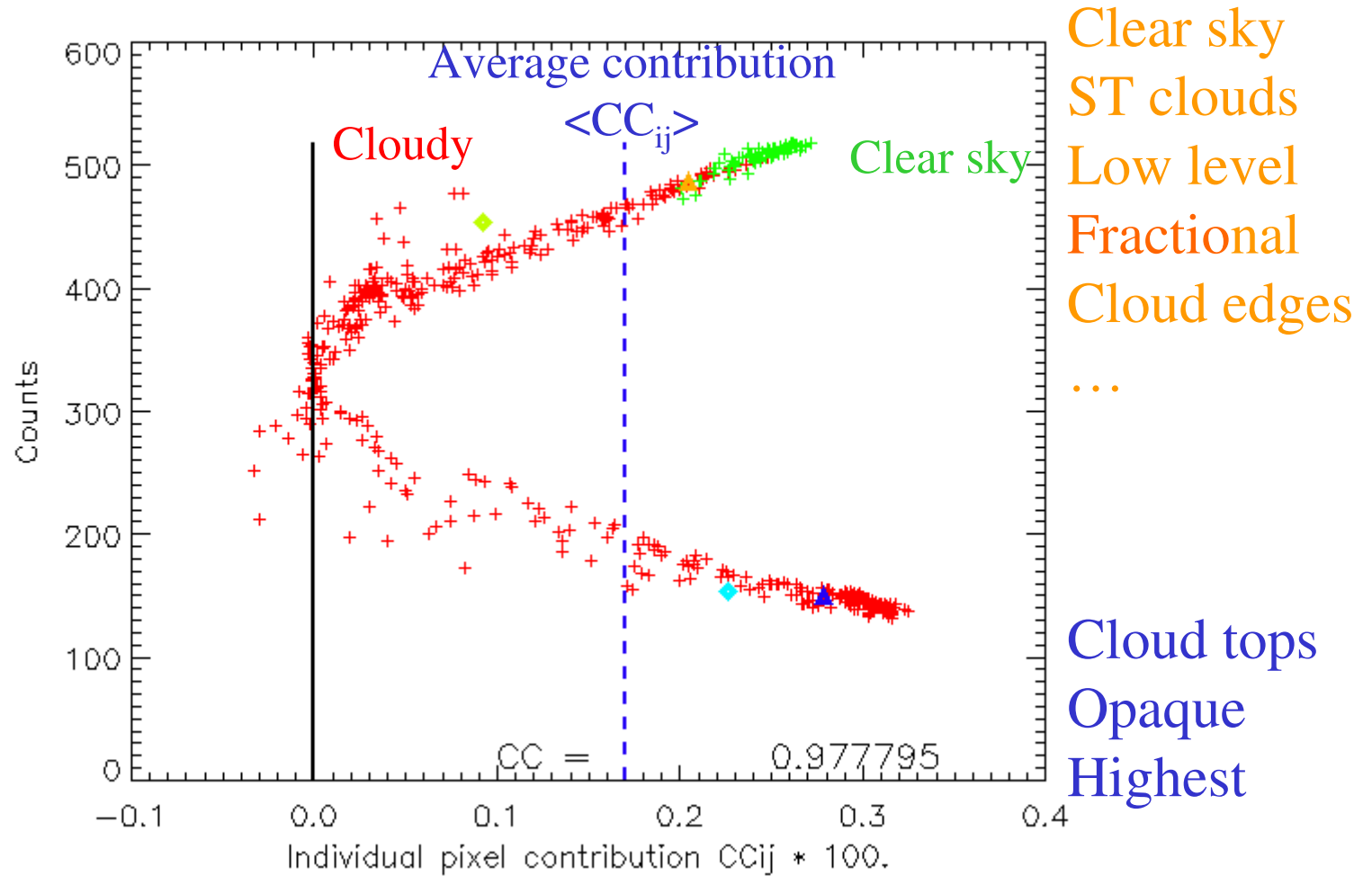
References:

Borde R., and R. Oyama, (2008), 'A Direct Link between Feature Tracking and Height Assignment of Operational Atmospheric Motion Vectors', Ninth Int. Winds Workshop, Annapolis, USA.

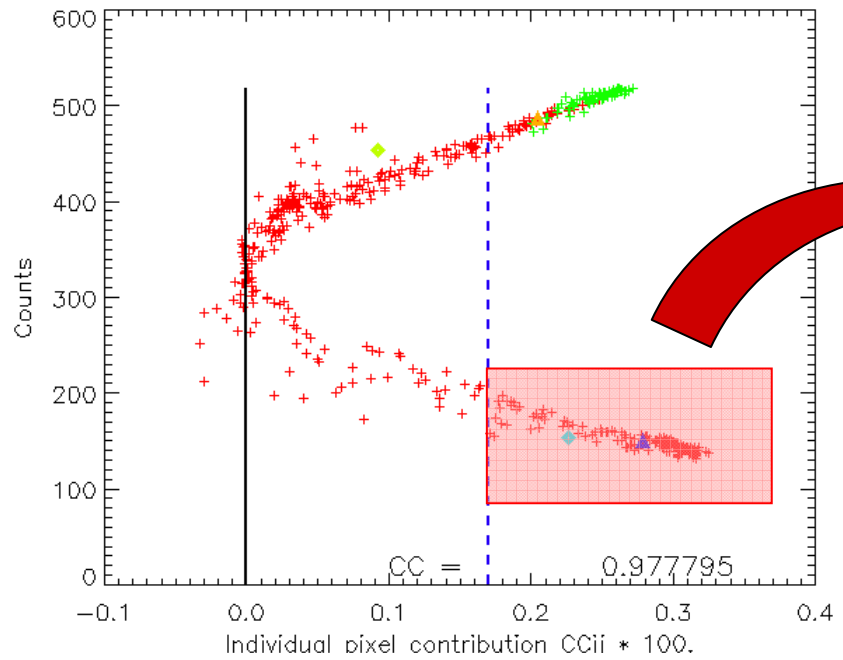
Oyama, R., R. Borde J. Schmetz and T. Kurino (2008), 'Development of AMV height assignment directly linked to feature tracking at JMA', Ninth Int. Winds Workshop, Annapolis, USA.

Borde R., A., De Smet and G. Dew, (2008), 'Better use of correlation information in AMV extraction scheme', EUMETSAT conference, Darmstadt, Germany

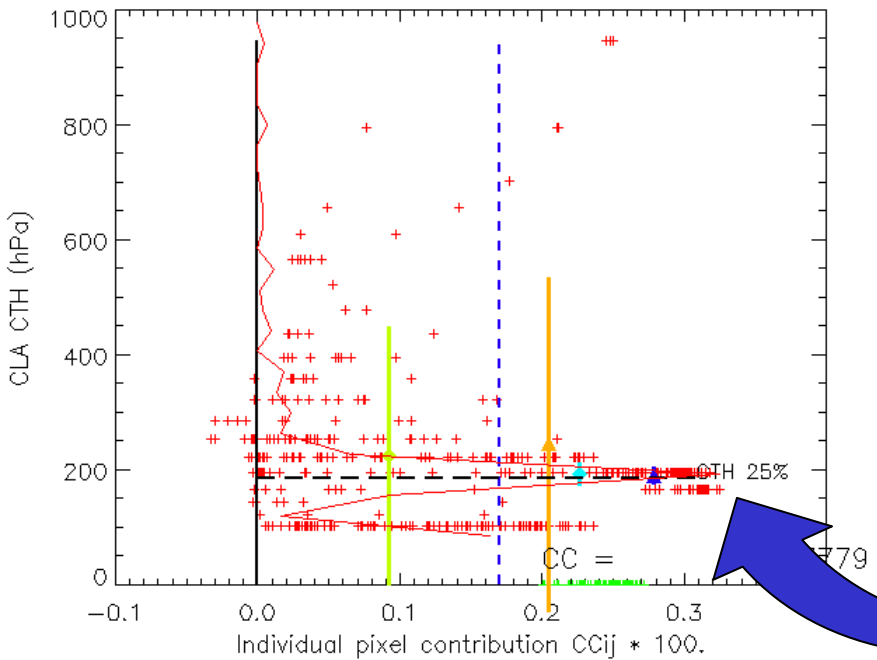
Description of CCij graphs



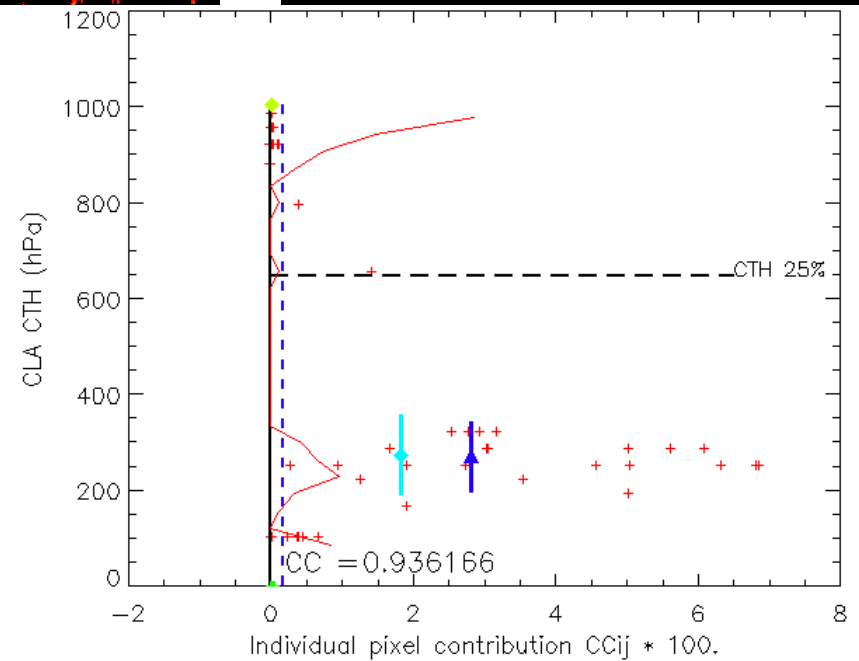
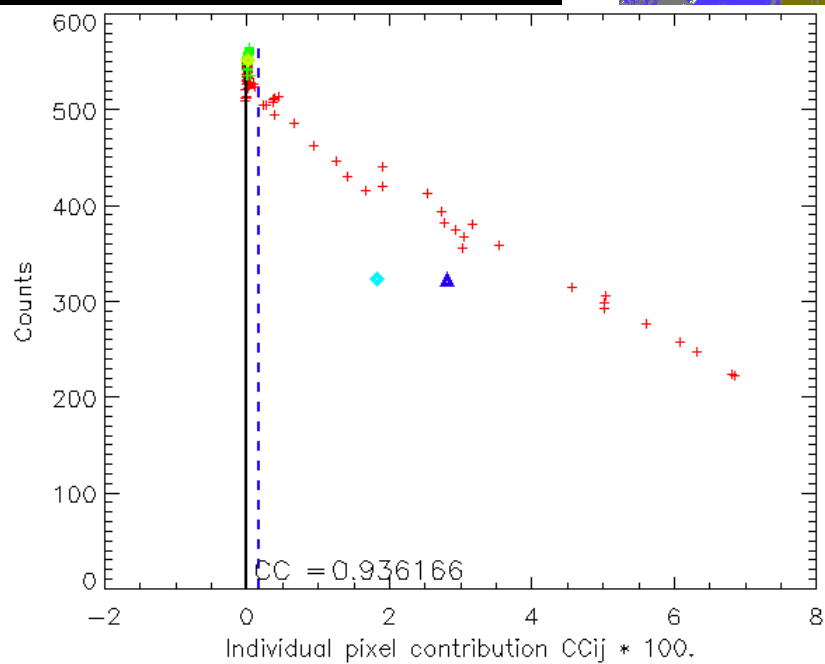
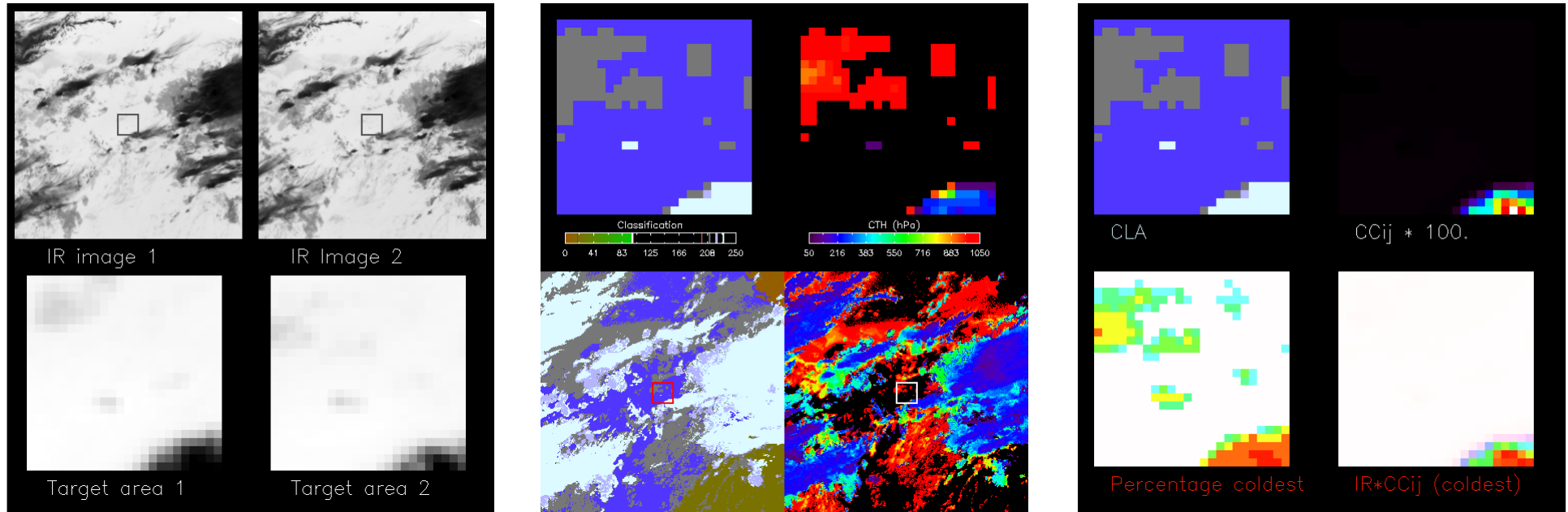
Calculation of CCij weighted pressure and STD from CLA-CTH



$$P = \frac{\sum_{\substack{\text{cold_branch} \\ CC_{i,j} > CC_{i,j}}} CC_{i,j} \cdot CLA_CTH_{i,j}}{\sum_{\substack{\text{cold_branch} \\ CC_{i,j} > CC_{i,j}}} CC_{i,j}}$$



Example: Few coldest pixels contribute



Operational Tests Configuration

- Period 1 from 24 December 2008 00:00 UTC to 21 January 2009 00:00 UTC
- Period 2 from 22 January 2009 00:00 UTC to 18 February 2009 00:00 UTC

OPE : Usual operational code

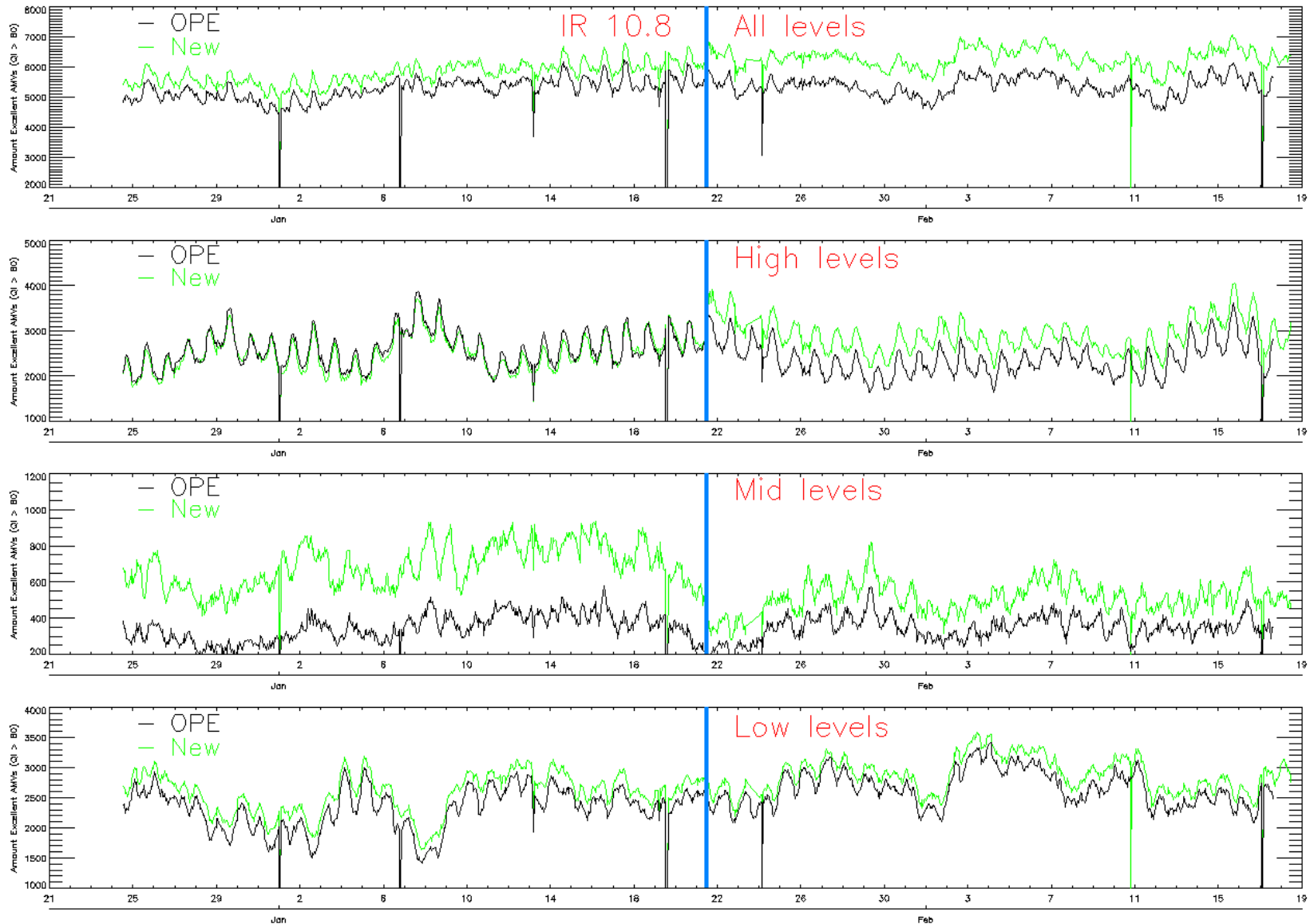
- Image enhancement switched on
- Operational CLA-CTH (period 1) ; CO2 slicing method (period 2)
- Use of histogram analysis as pixel selection method for HA

New : Test new scheme

- Image enhancement switched off
- Use of CCij weighted pressure

Test	Image Enhancement	Pixel selection scheme	CLA-CTH Parameter	
			Period 1	Period 2
OPE	On	Current	Current OPE	Current OPE
OPE_noIE	Off	Current	Current OPE	CO2 slicing
New	Off	New	Current OPE	CO2 slicing

AMVs (QI > 80) with FC test; IR10.8



AMVs (QI > 80) with FC test; IR10.8

Relative increase of AMVs with QI with FC-consistency > 80 (New – OPE) / OPE (in %)		Period 1	Period 2
IR-10.8	All levels	10	17
	High levels	-3	23
	Mid Levels	102	48
	Low levels	11	8
VIS-0.8		4	4
HRV		5	3

Relative increase of good AMVs (QI with FC-consistency > 80) using IE (in %)		(OPE_noIE – OPE) / OPE		(OPE_noIE - New) / New	
		Period 1	Period 2	Period 1	Period 2
IR-10.8	All levels	14	8	3	- 8
	High levels	15	6	18	-13
	Mid Levels	24	30	-38	-12
	Low levels	12	7	1	-1

Comparison against Radiosonde Observations

CGMS Reference

HOR. DIST. < 150 (Km) - VERT. DIST. < 25 (hPa)

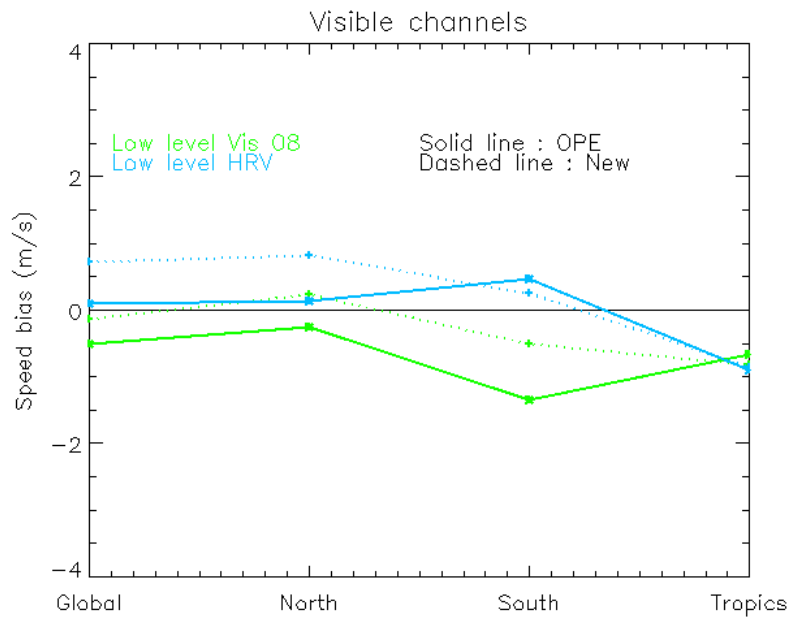
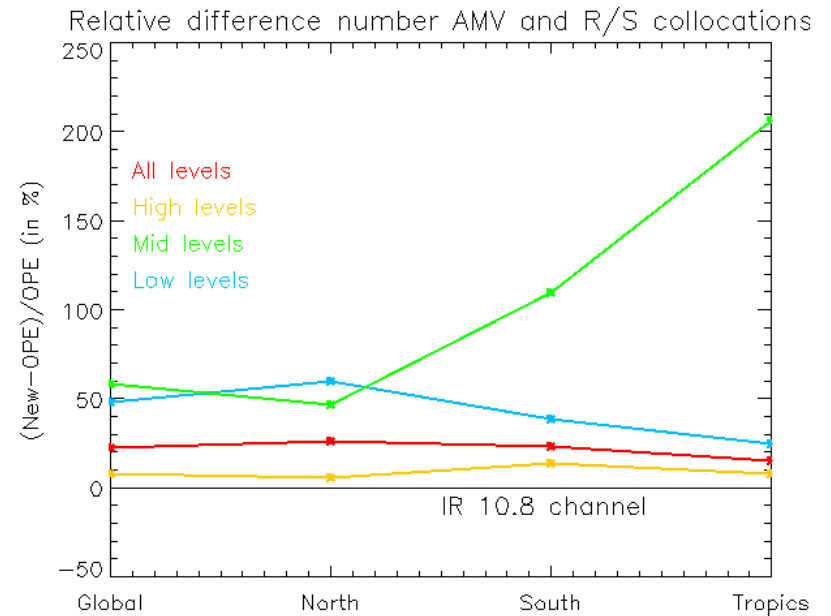
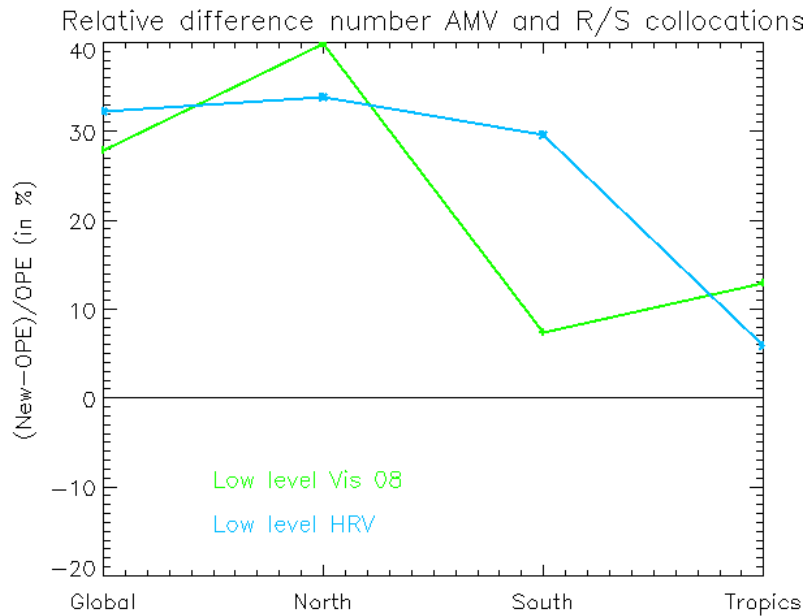
QUALITY (**Without FC test**) \geq 80

SPEED DIFF. < 30 (m/s) - DIRECTION DIFF. < 60 (deg)

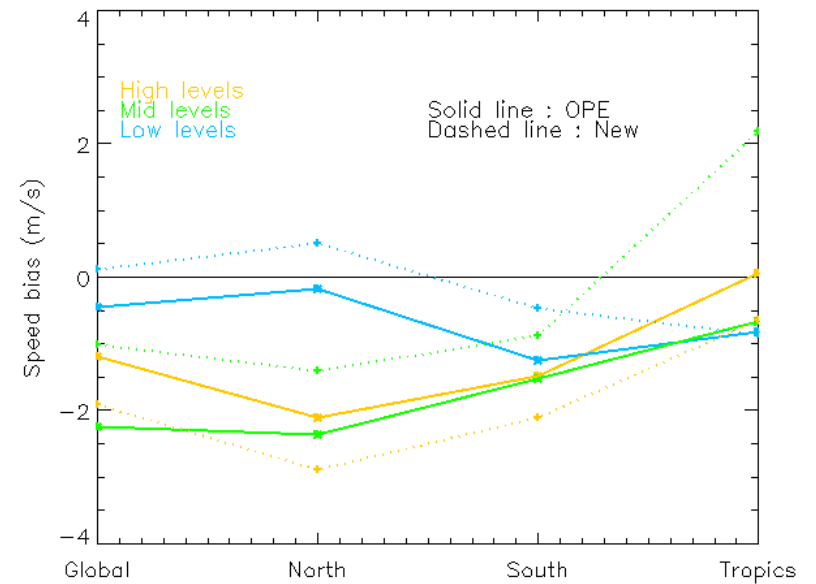
AMV SPEED > 2.5 (m/s)

NEW versus OPE

Period 1

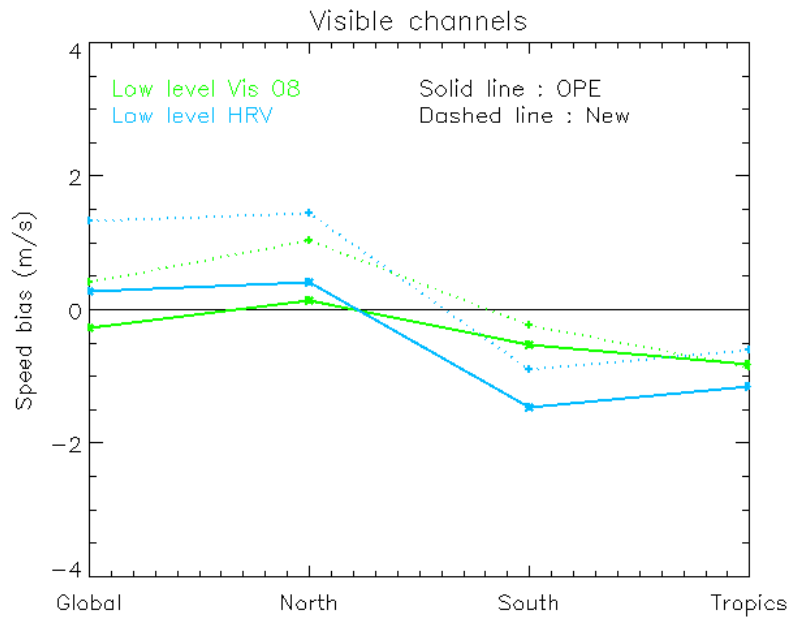
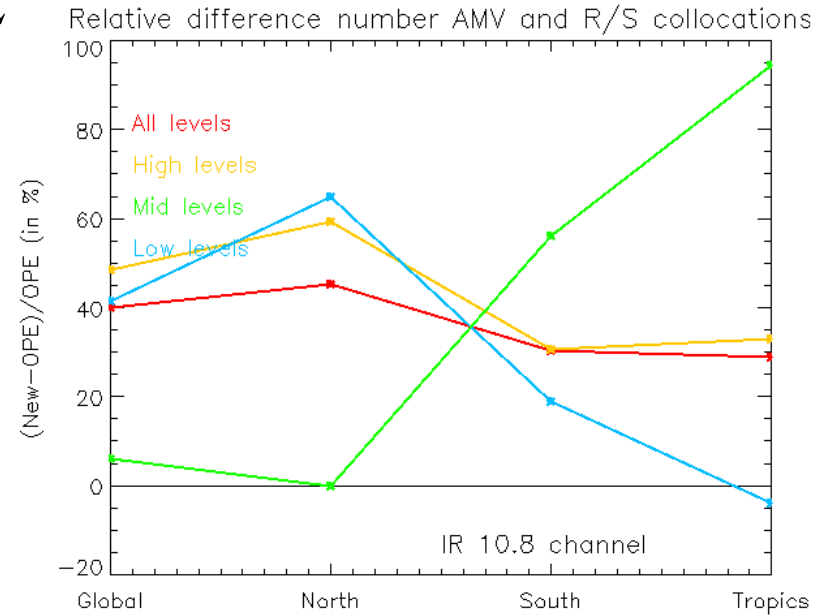
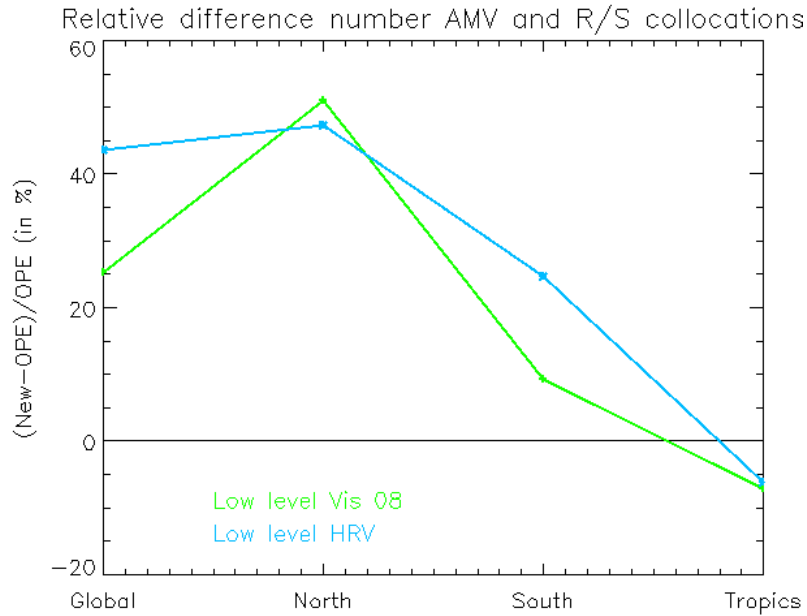


Speed
Biases

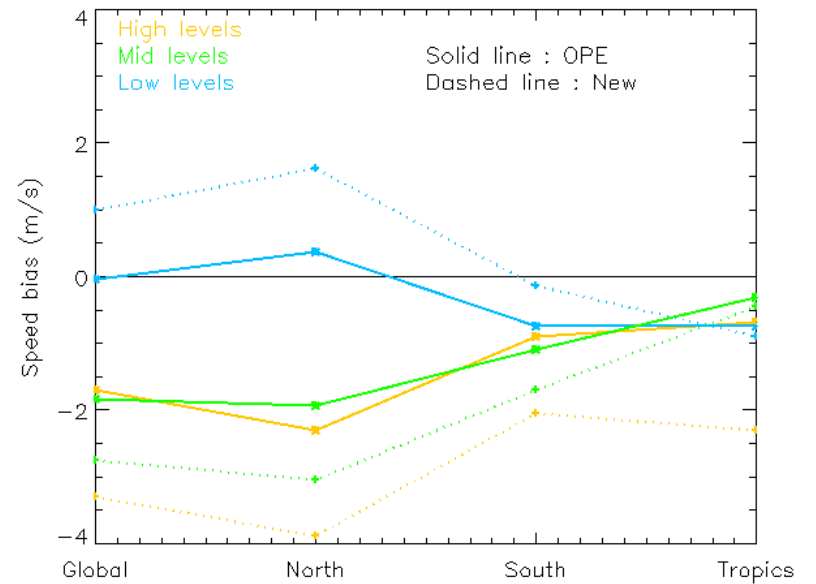


NEW versus OPE

Period 2

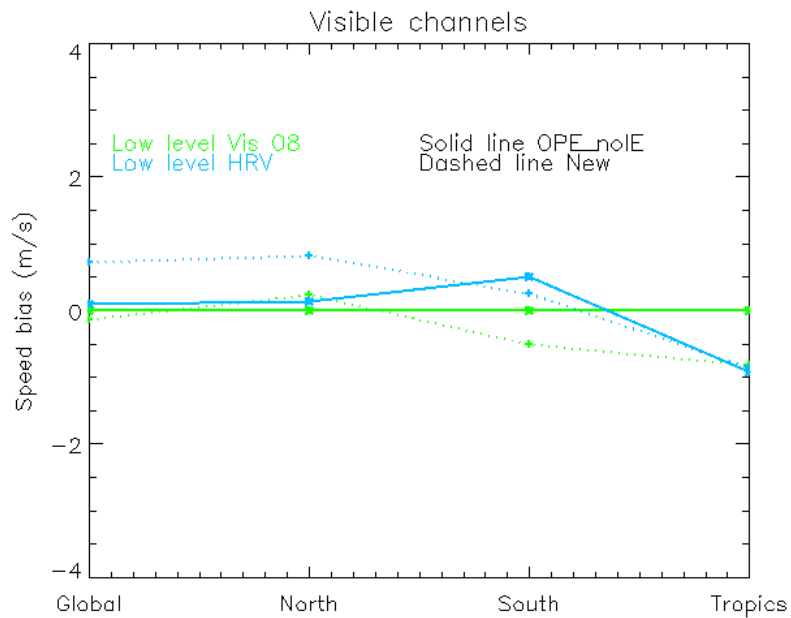
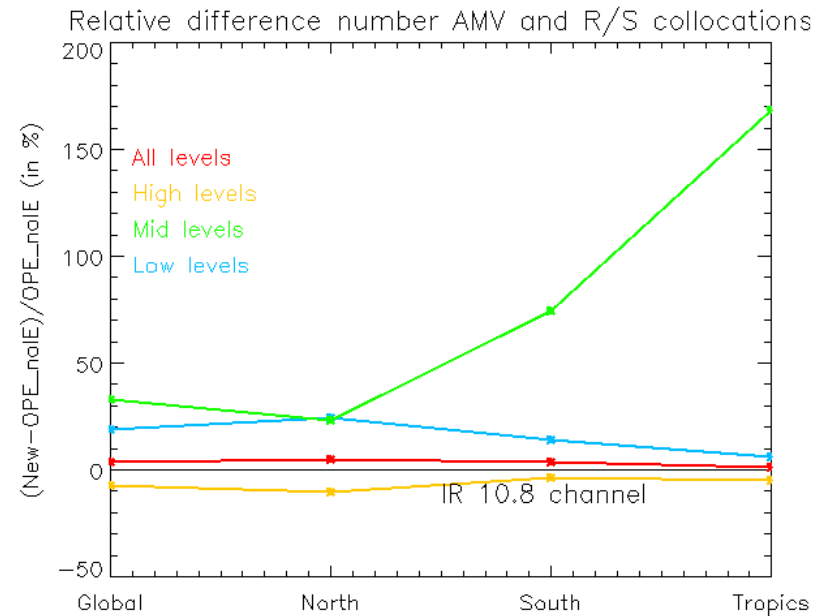
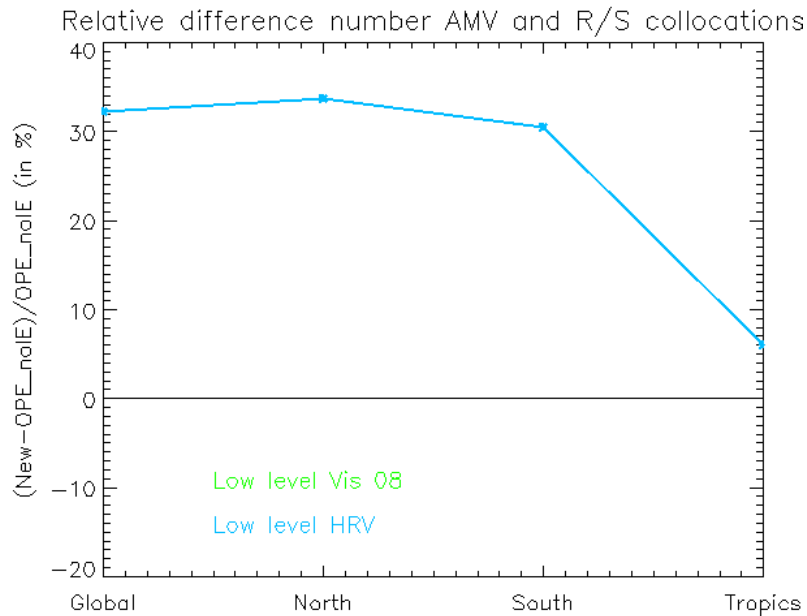


Speed Biases

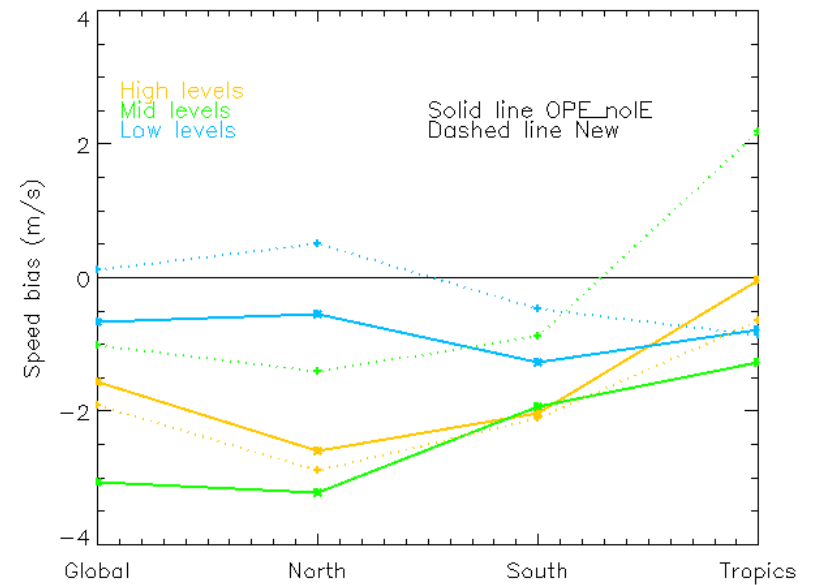


NEW versus OPE_noIE

Period 1

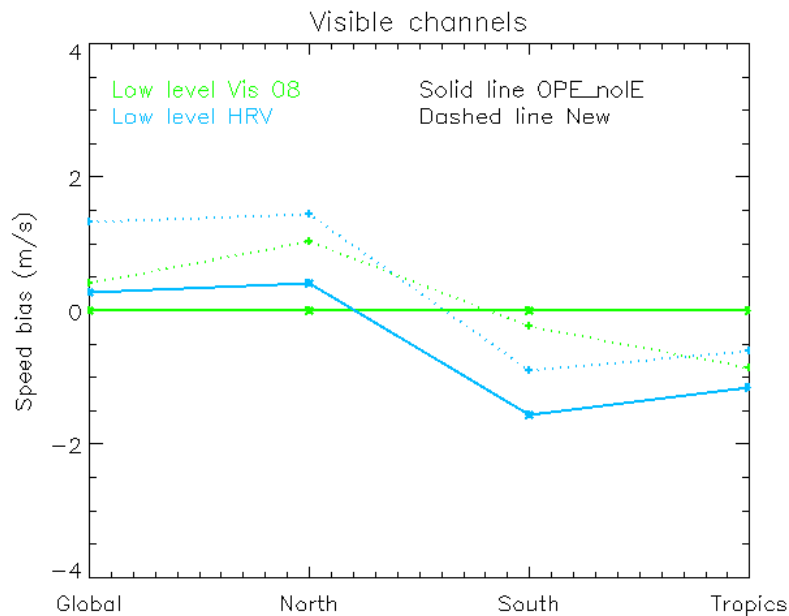
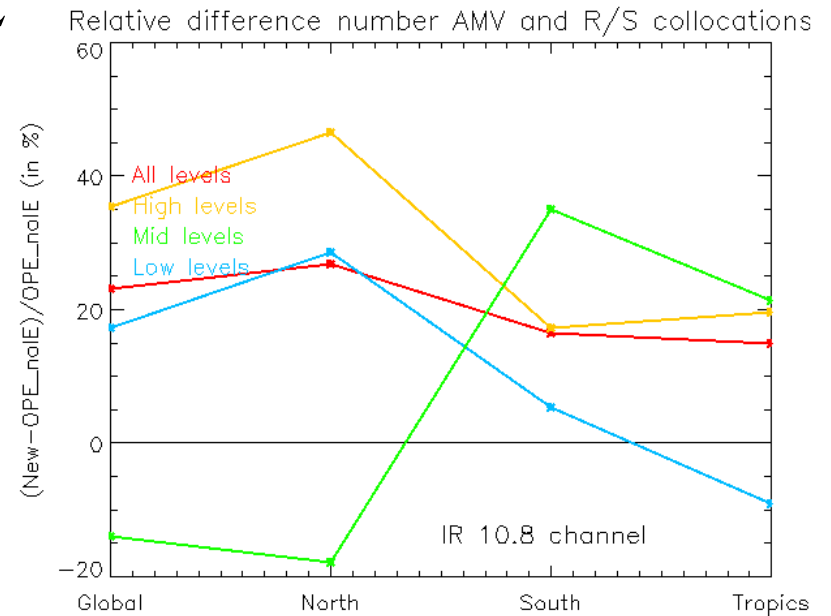
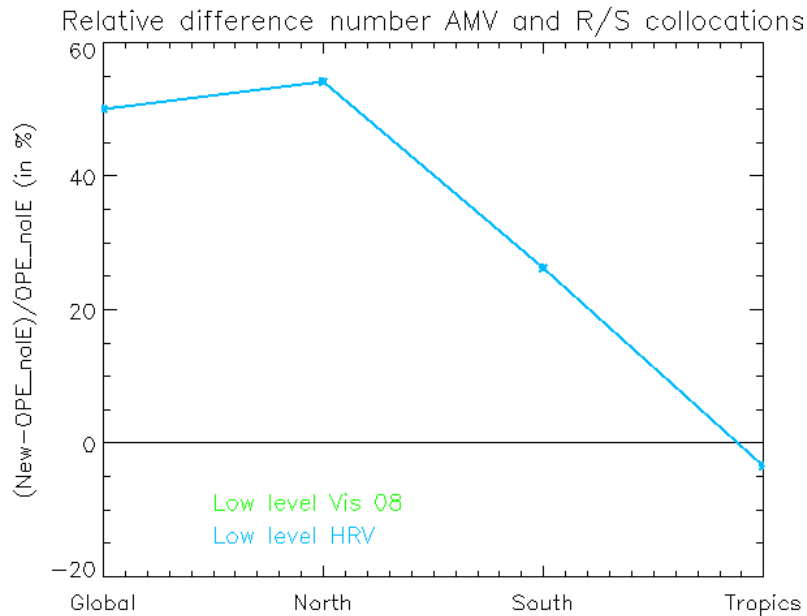


Speed Biases

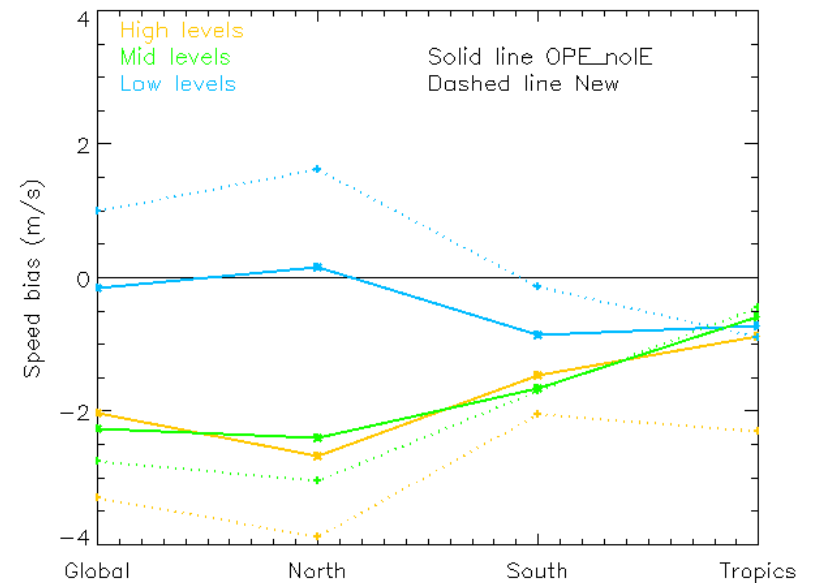


NEW versus OPE_noIE

Period 2



Speed Biases



NEW versus OPE AMV / RS RMS

AMV / RS RMS New (OPE) (in m/s)		Period 1				Period 2			
		Global	NH	SH	TR	Global	NH	SH	TR
IR-10.8	All levels	7.75 (7.58)	7.99 (7.87)	8.05 (7.44)	7.13 (7.09)	8.31 (7.74)	8.90 (8.33)	7.23 (6.61)	6.61 (6.31)
	High levels	8.47 (8.12)	9.16 (8.57)	8.52 (7.89)	7.52 (7.61)	8.75 (8.16)	9.55 (8.91)	7.36 (6.89)	6.86 (6.83)
	Mid Levels	7.83 (7.80)	7.76 (8.03)	7.41 (6.03)	8.68 (4.47)	8.44 (7.96)	8.44 (8.12)	8.34 (5.50)	8.43 (5.71)
	Low levels	4.99 (4.57)	5.36 (4.97)	5.49 (4.52)	3.36 (3.42)	5.49 (4.92)	5.93 (5.47)	5.49 (4.89)	3.21 (3.37)
VIS 0.8		4.65 (4.21)	5.22 (4.64)	3.84 (3.98)	3.40 (3.43)	5.13 (4.40)	5.80 (5.02)	4.67 (3.98)	3.29 (3.44)
HRV		5.12 (4.58)	5.20 (4.68)	4.74 (3.39)	3.29 (-3.12)	5.54 (5.00)	5.65 (5.10)	4.69 (5.44)	2.56 (2.89)

Conclusions on Operational Tests

- Results very dependant on CLA-CTH.
- New scheme gives more good AMVs (QI >80).
- Slow bias and RMS at high levels a bit degraded but estimated on a larger data set of good collocations AMVs / RS dataset with new scheme.
- Assimilation test at ECMWF gave mainly a neutral impact on FC (See Iliana Genkova's talk).

Prospectives

- Use this method together with the future OCA product (Watts et al, 1998).
- Estimate and test the potential use of weighted pressure STD (in hPa) in assimilation. It gives an information on the variability within the group of pixels used for HA.
- OCA product also allows to get an information about the reliability of the HA retrieval.
- Opportunity to estimate quality information for HA based on these two informations

Preliminary results using OCA

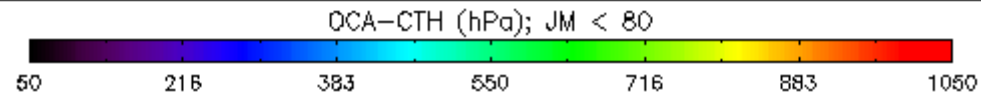
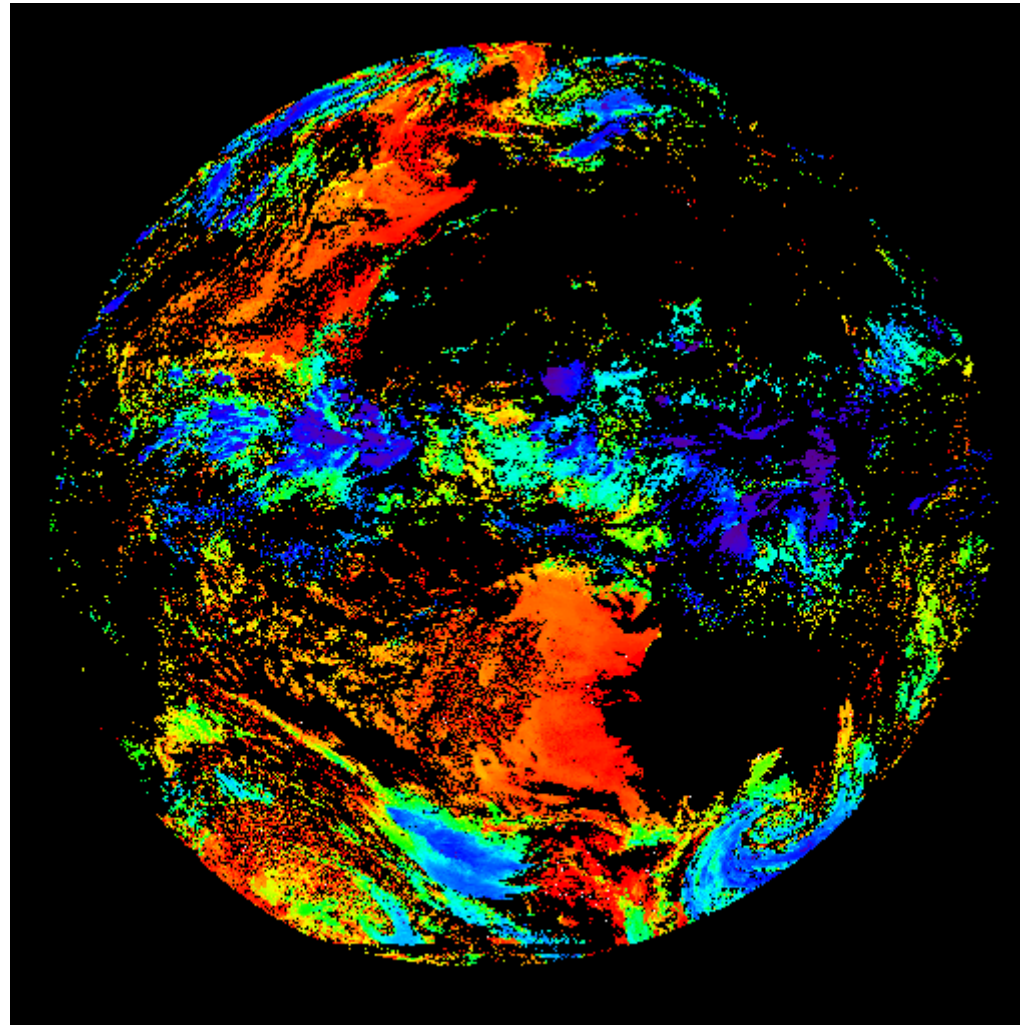
A way towards concrete AMV
Height Error

R. Borde

Thanks to Phil Watts for help on OCA product

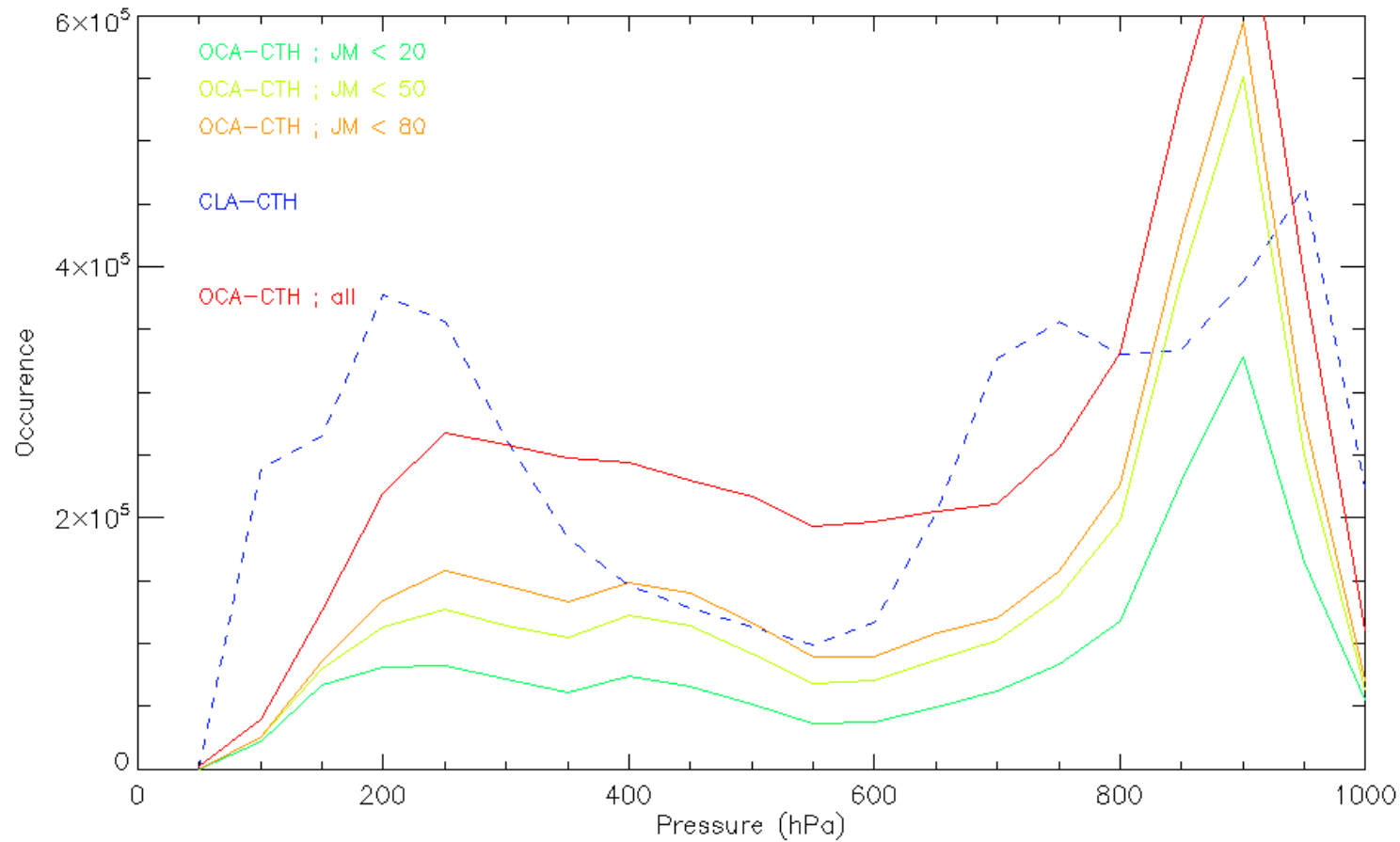
Comparisons OCA-CTH versus CLA-CTH

03/08/2006
12h45 UTC
Meteosat-8



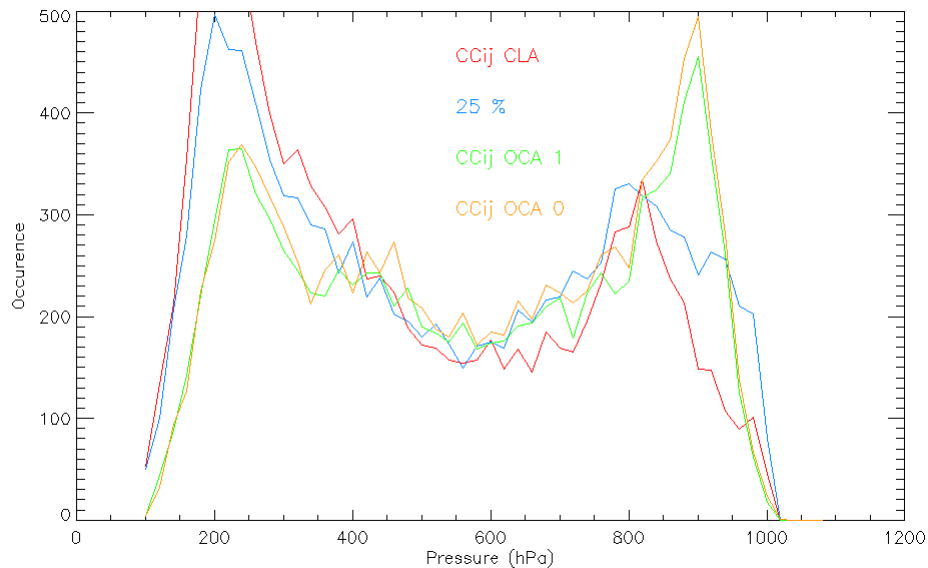
Comparisons OCA-CTH versus CLA-CTH

03/08/2006 ; 12h45 UTC ; Meteosat-8

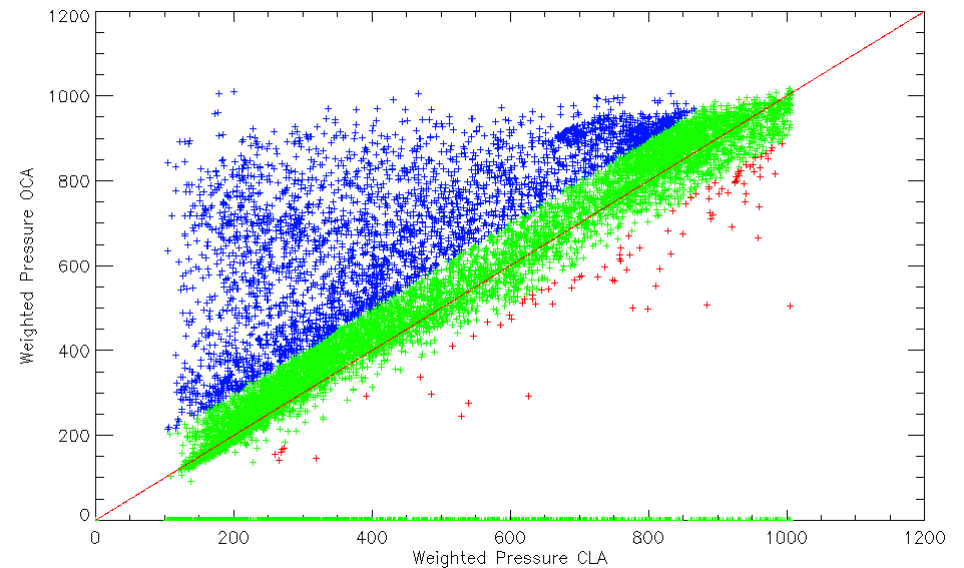


Comparisons AMV-OCA versus AMV-CLA

03/08/2006 ; 12h45 UTC ; Meteosat-8
JM < 80



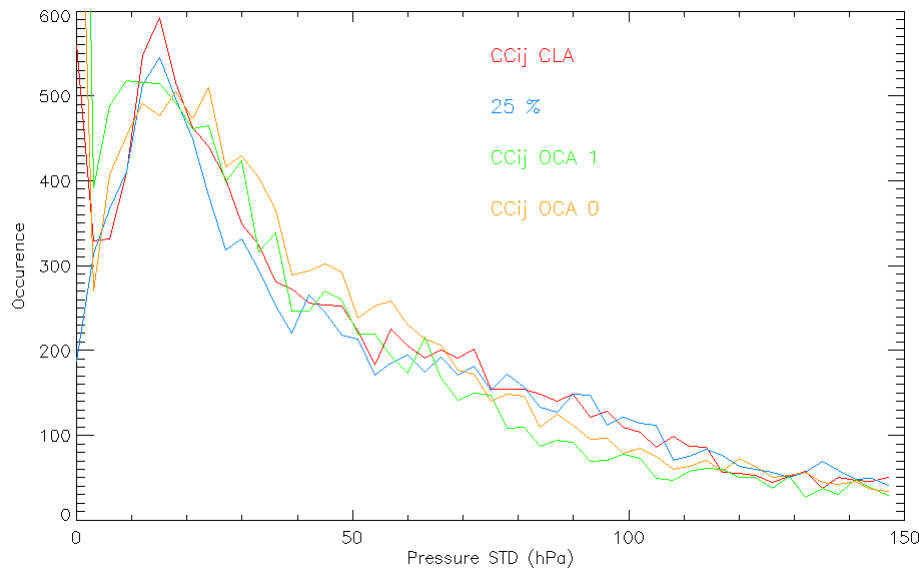
AMV Pressure histograms



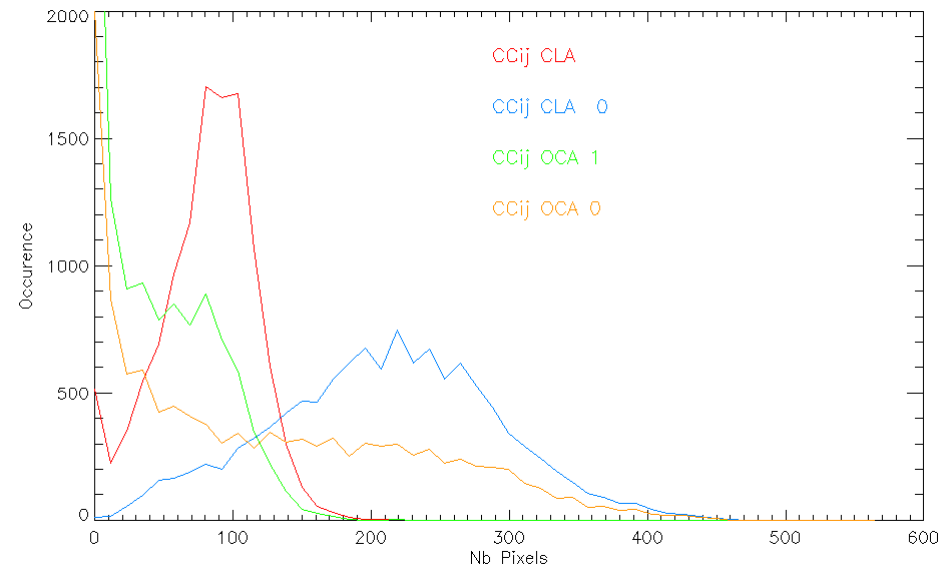
Scatter plot
 P_{oca} versus P_{cla}

Comparisons AMV-OCA versus AMV-CLA

03/08/2006 ; 12h45 UTC ; Meteosat-8
JM < 80



Pressure STD histograms



Nb pixels used for HA

THANKS