OPERATIONAL RETRIEVAL OF MSG AMVS USING THE NEW CCC METHOD FOR HEIGHT ASSIGNMENT.

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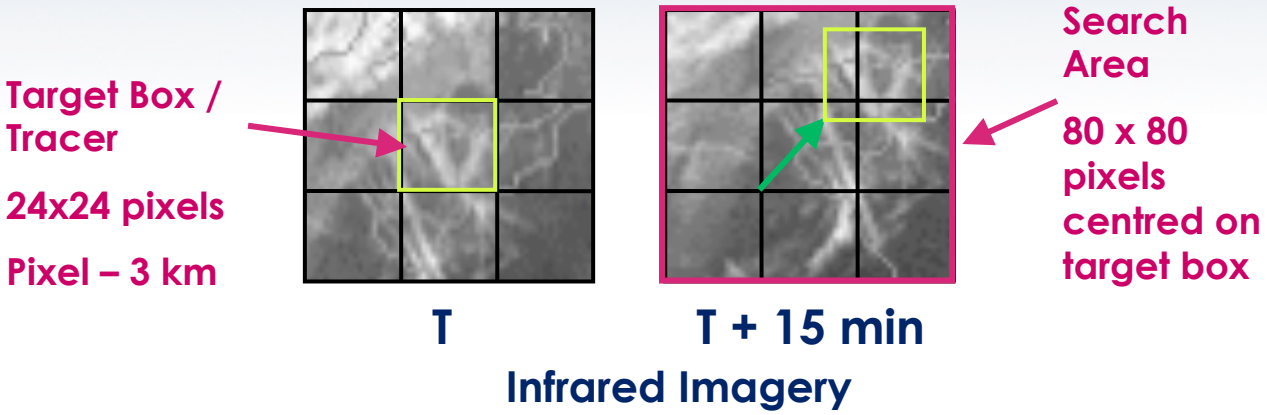
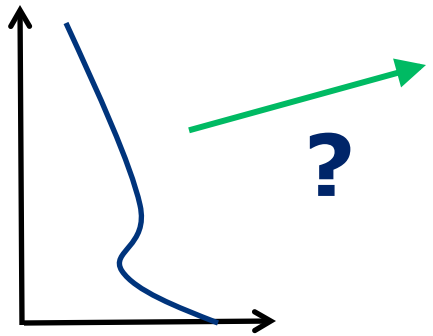
Present AMV retrieval

1- AMV tracking = determination of the wind corresponding to the displacement of a cloud/clear atmospheric parcel



2- AMV height assignment



3- Quality control

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Height assignment

The height assignment is the most difficult part, with room for improvements.

After the 9th IWW in 2008, decision was made to possibly implement the Cross Correlation Contribution method to improve height assignment.

• For the current AMV algorithm the height assignment is done independently of the tracking. The height assignment is based on the histogram analysis of the CTH of the pixels presents in the target, generally leading to select the coldest pixels of the target. It does its own height assignment for the vector.

• For the 'new' CCC algorithm the height assignment used the pixels that contribute the most to the tracking. It used the pixel height from the MPEF CLA product.

CLA gives a CTH for each cloudy pixel.

The **CLA CTH quality will impact the AMV product**!

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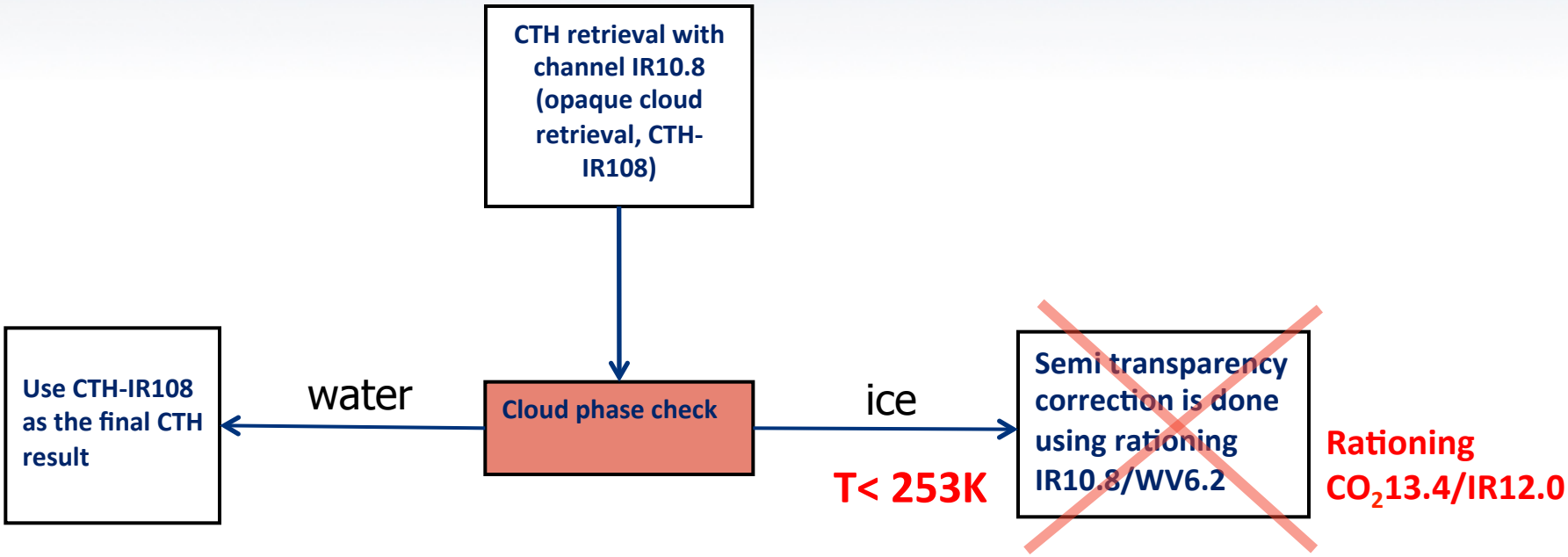
CLoud Analysis (CLA) – current and new –

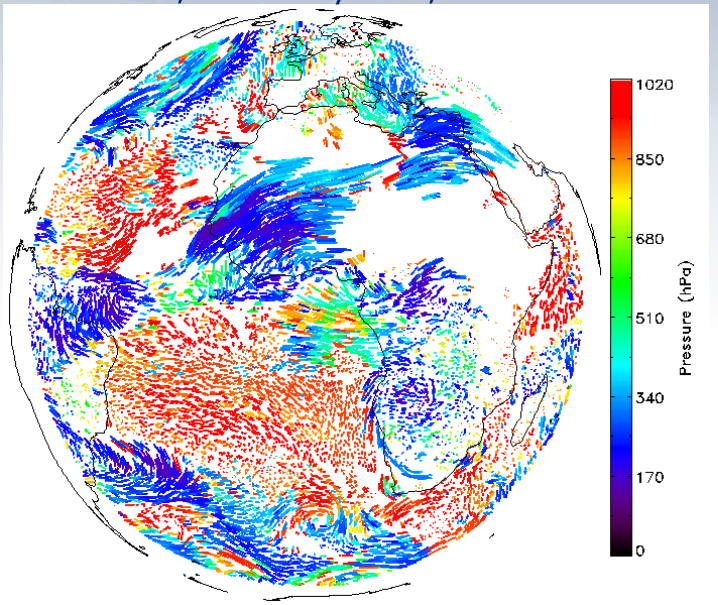
- ECMWF forecast fields (6-hourly, 0.25°Grid, interpolated in time and space)
- For all cloudy pixels apply opaque cloud top retrieval using channel IR10.8
- In addition for clouds in ice phase apply semi-transparency correction

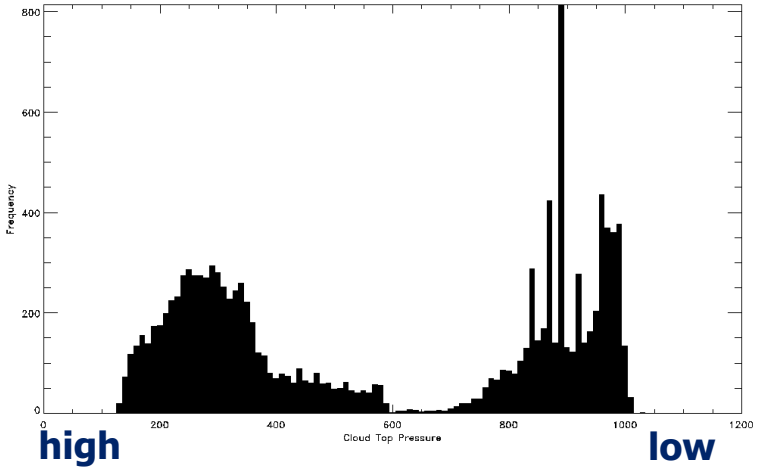


- An inversion is applied to low level clouds (P>600hPa)
  -> cloud 1/3rd above the bottom of the inversion.

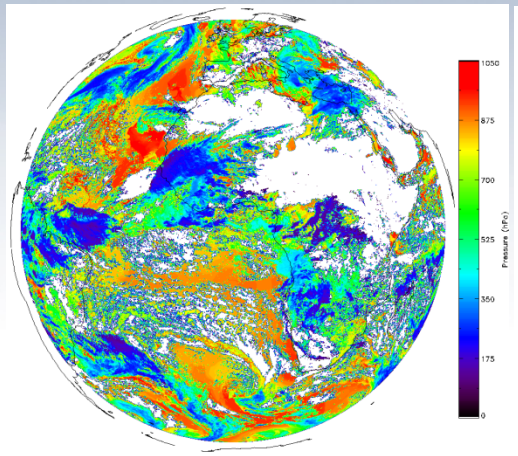
Example of AMVs height retrieval – IR10.8

Current AMV, 6 February 2012, 9:45UTC



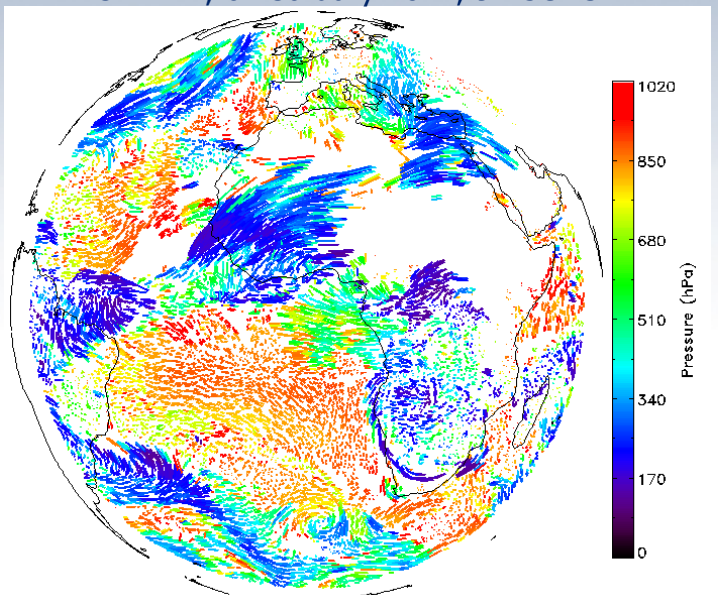


high low

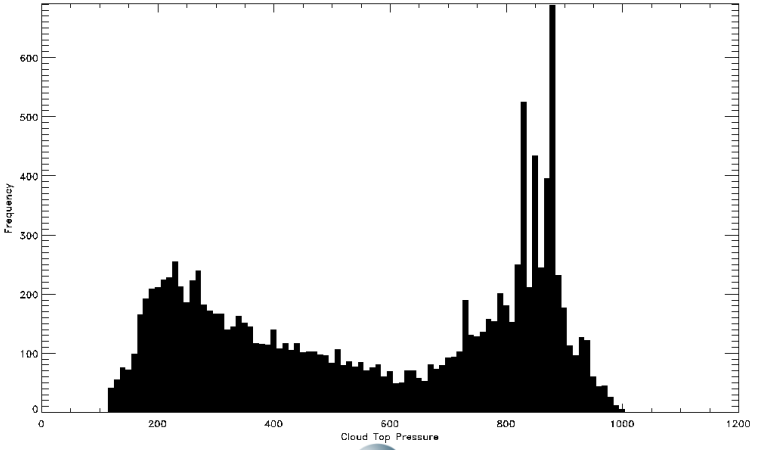


CLA intermediate product

New AMV, 6 February 2012, 9:45UTC



Using a more coherent approach for height assignment will lead to more mid level clouds.



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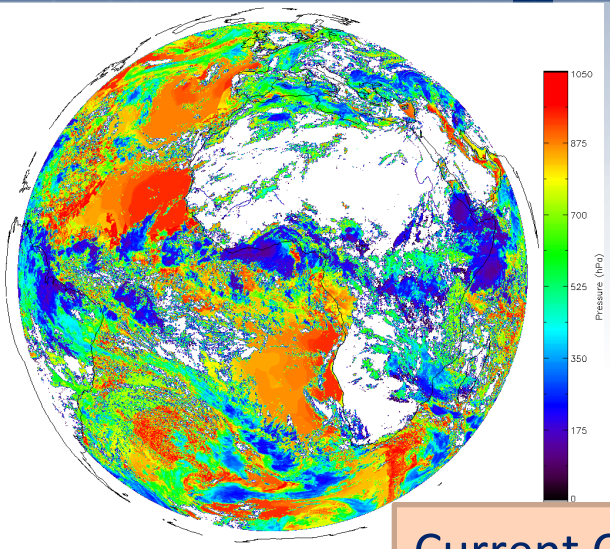
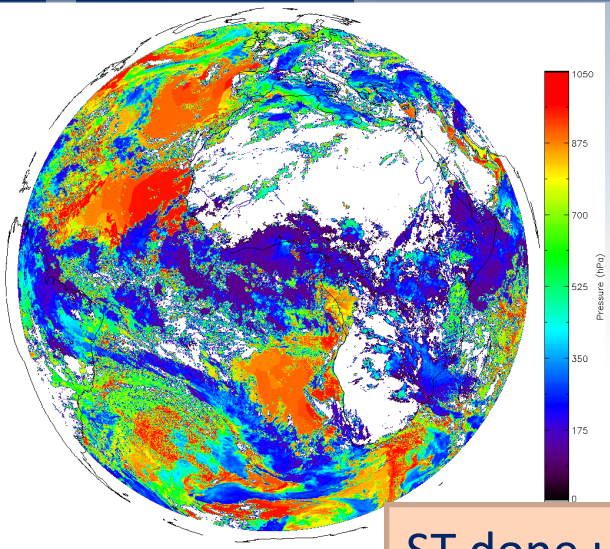
Improving CLA ? semi transparency correction impact

Impact of CLA changes In ST correction on the retrieved cloud top pressure

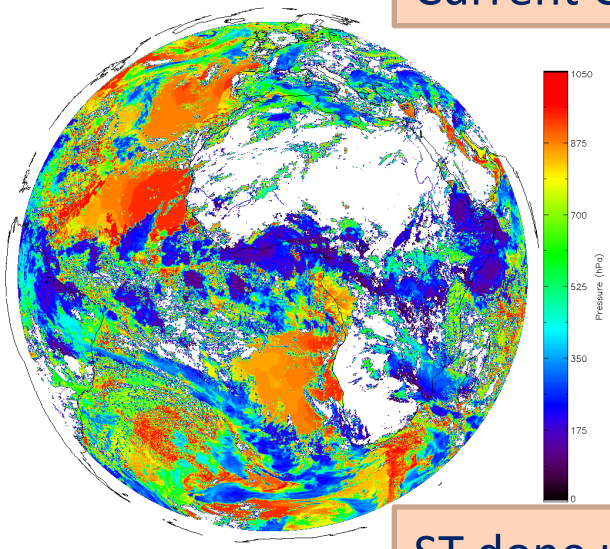


Current CLA

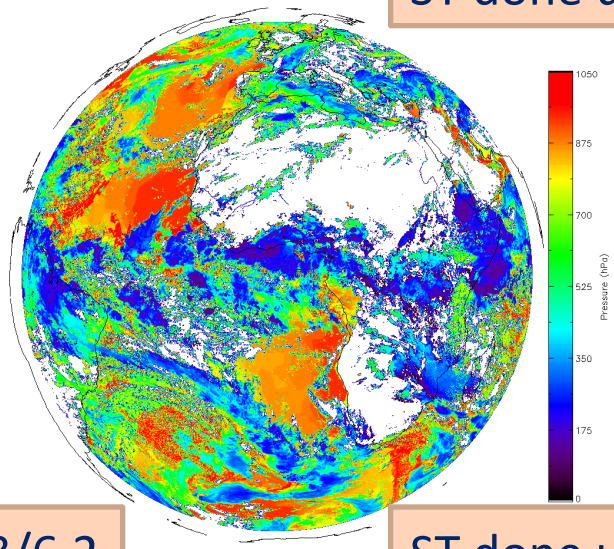


ST done using 13.4/12.0

Higher clouds using CO_2 channel, even less higher clouds because the ST puts clouds higher than 600hPa in some areas disabling inversion correction.



ST done using 10.8/6.2



ST done using 10.8/7.3

Experimental framework

Experiment	Design	Pixel height assignment	Length	Image enhancement	Cloud base
1	Current AMV	From AMV algorithm	60 days	YES	YES
2	CCC + CLA	OPE CLA ST: IR10/WV62	14 days	NO	NO
3	CCC + new CLA	CLA ST: CO_2/IR12 T<253K	60 days	NO	NO

- **Same input images**
- **Tracking remains the same (but no image enhancement for 2 and 3)**

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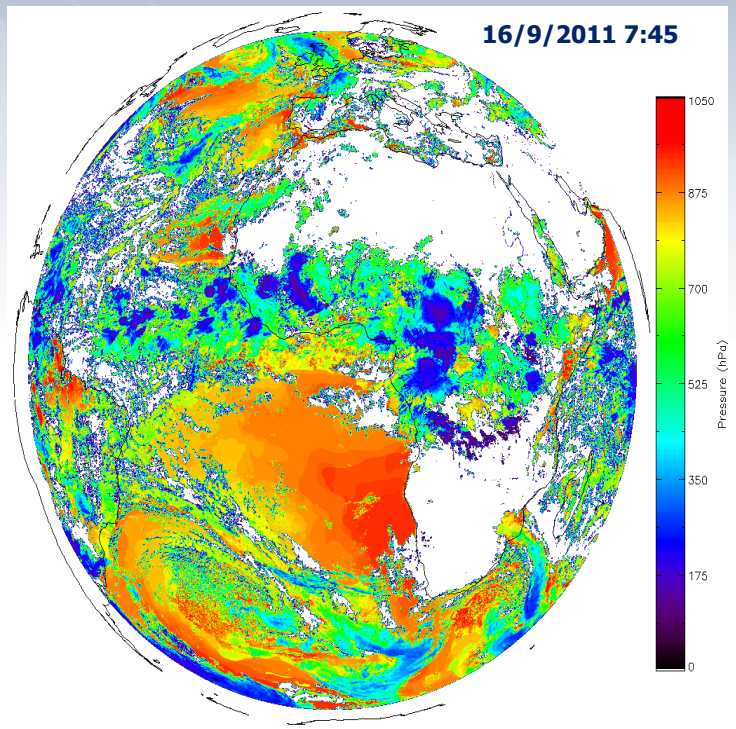
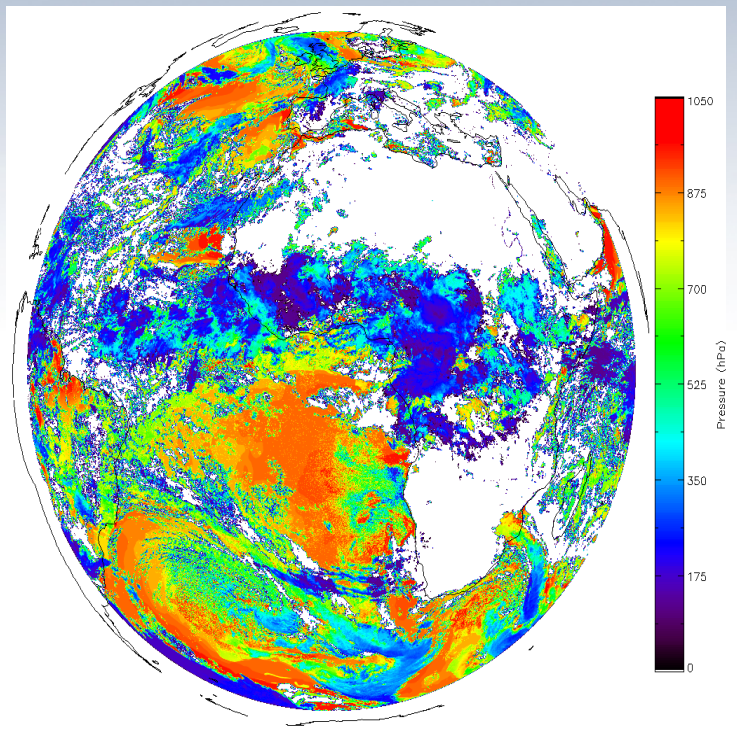
CLA versus new CLA



Current CLA



New CLA

Change in areas covered by cirrus which are assigned higher with new CLA

Change in the inversion area as the ST put clouds higher disabling the test on inversion.

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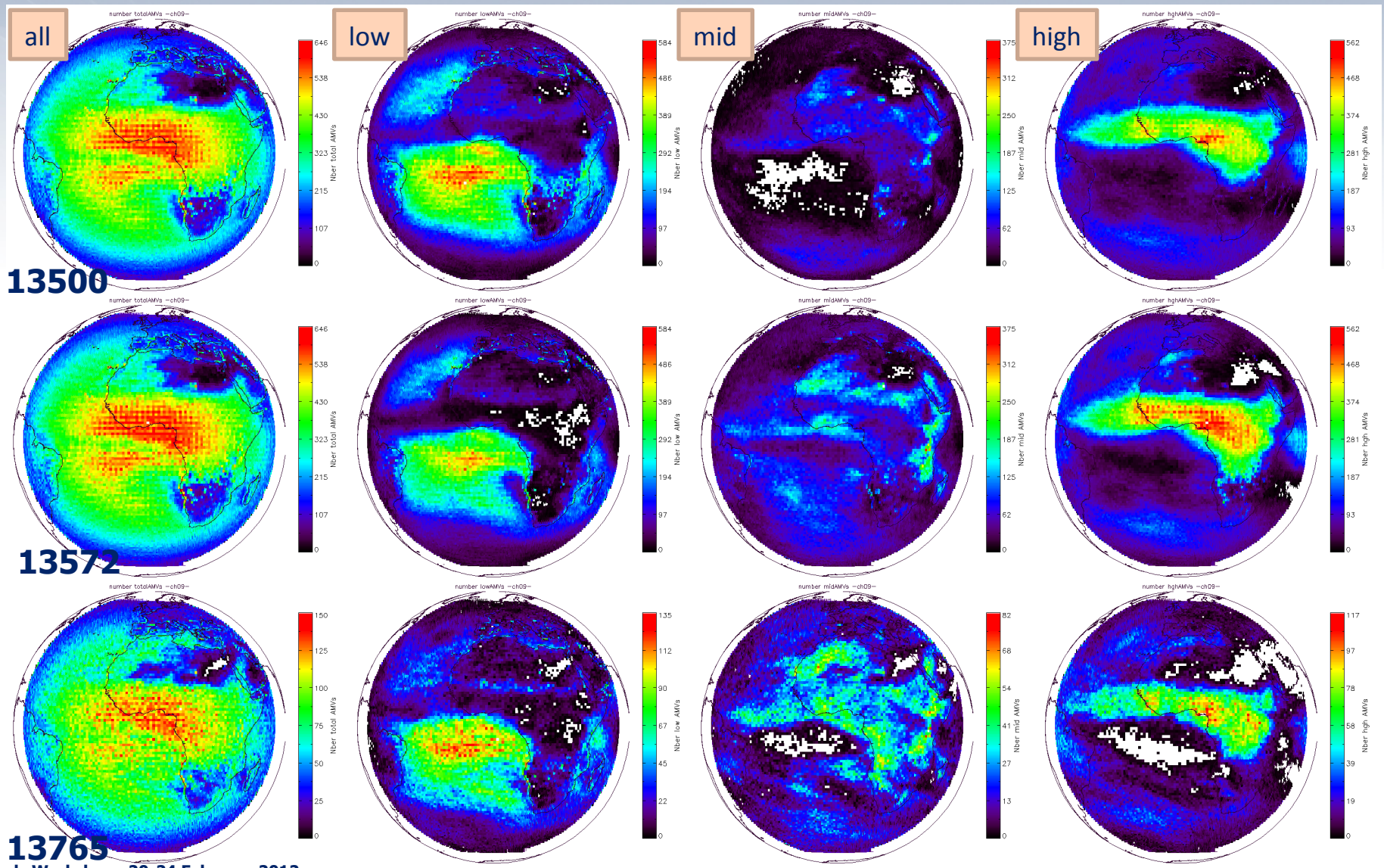
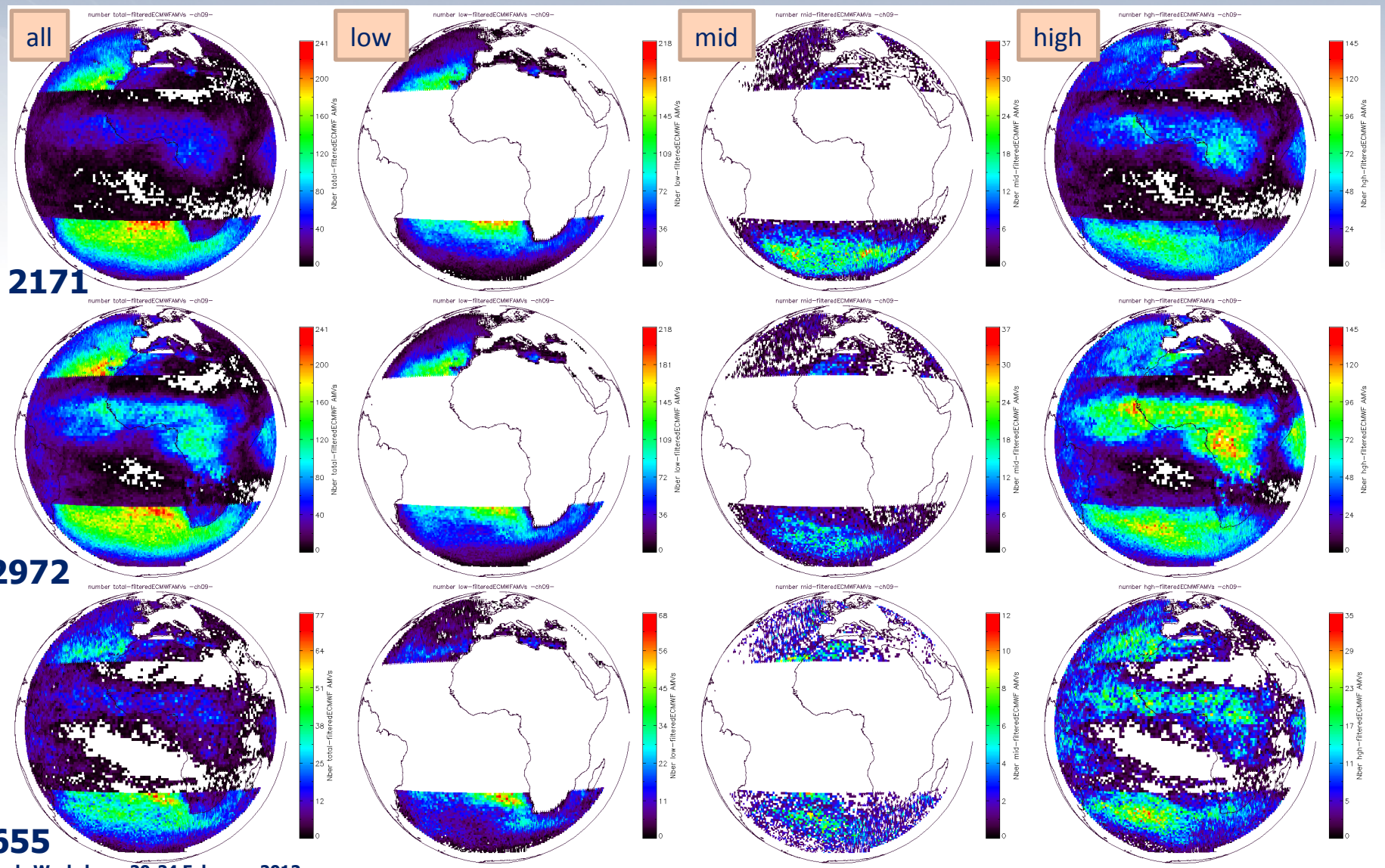
Geographical distribution IR10.8

IR 10.8µm



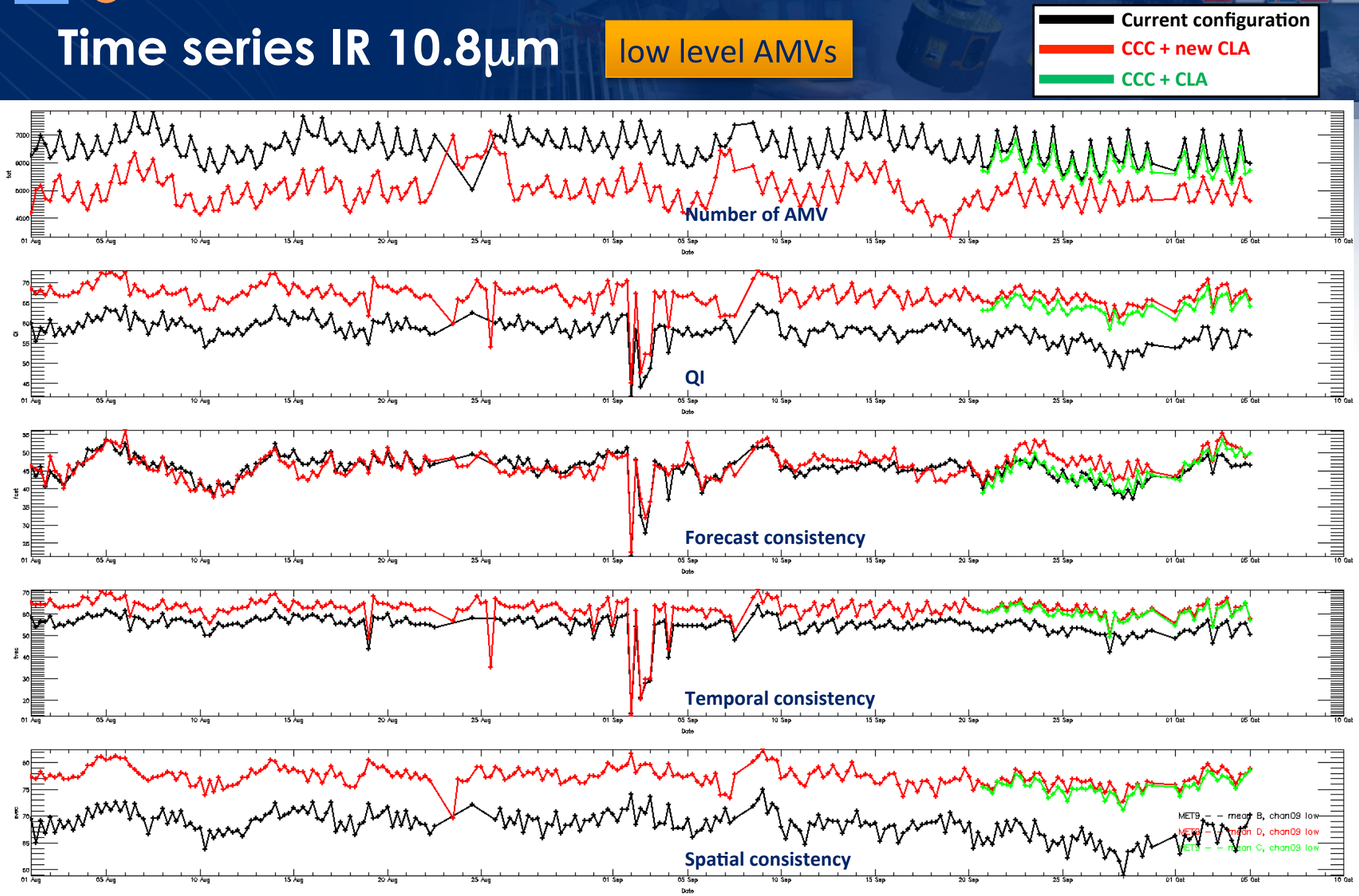
the users filter AMVs: ECMWF-like filtered

Filtered IR 10.8µm



Time series IR 10.8µm

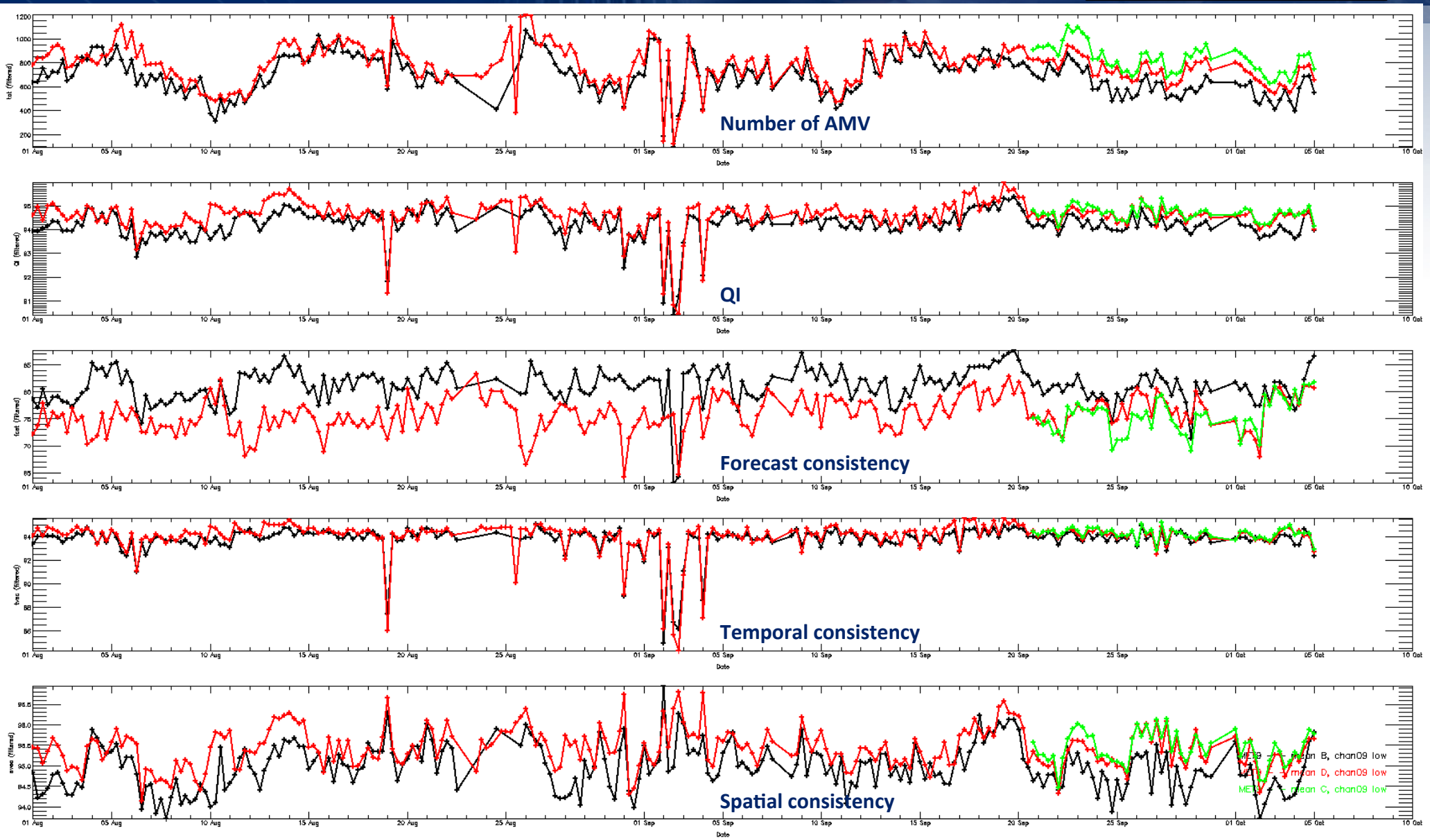
low level AMVs



Time series IR 10.8µm

FILTERED low level AMVs

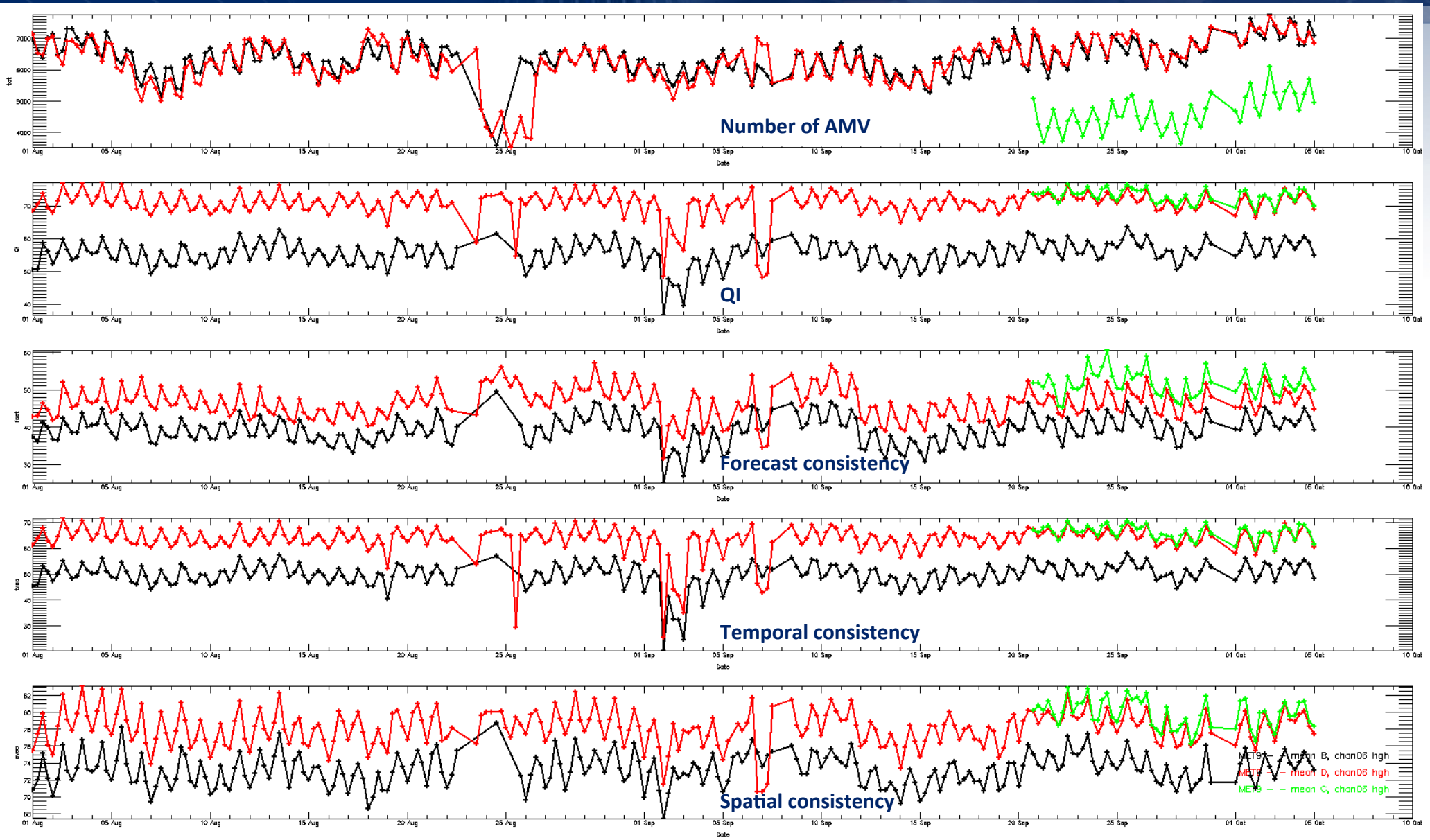
Current configuration
CCC + new CLA
CCC +CLA



Time series WV 7.3µm

high level AMVs

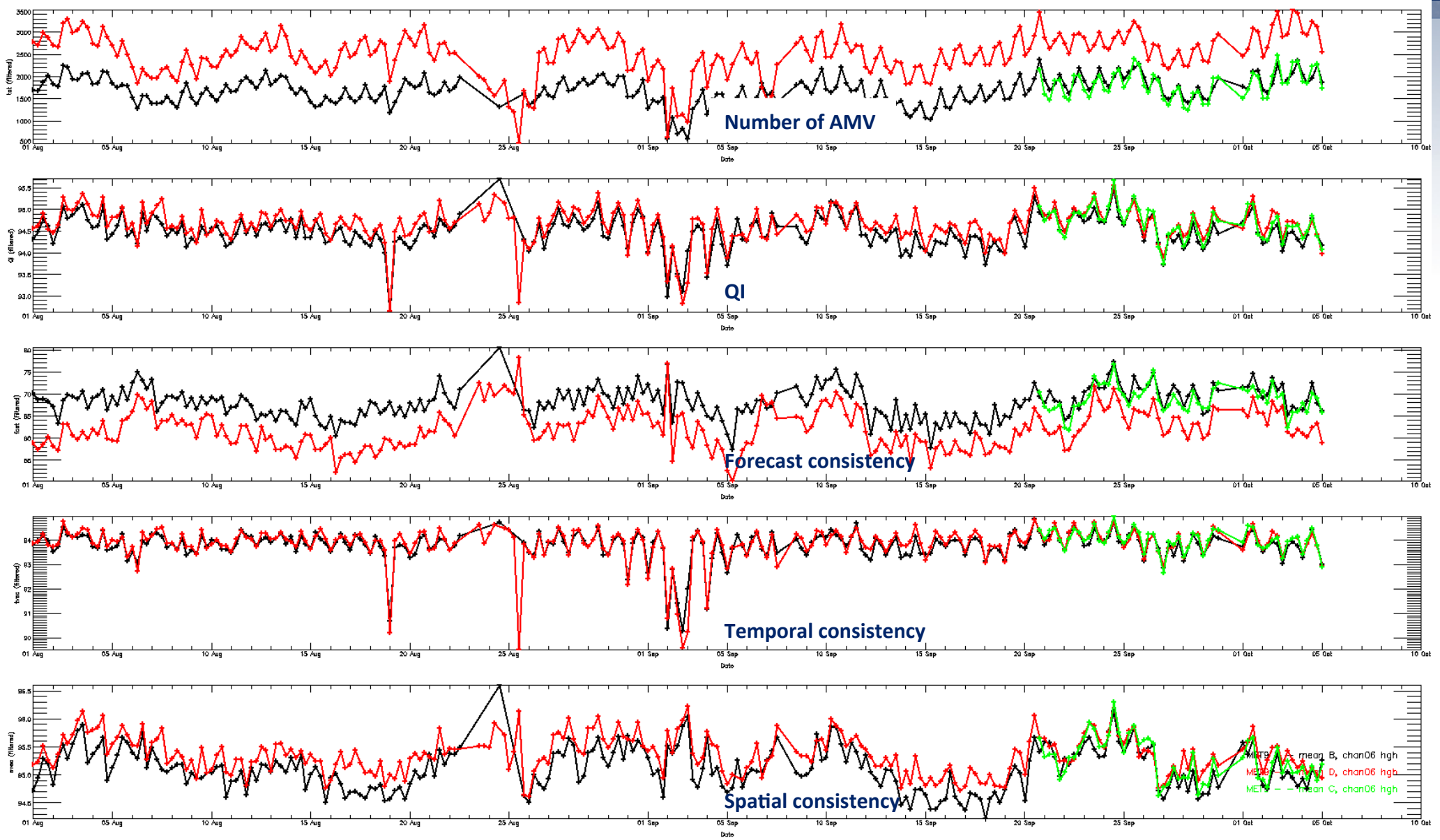
Current configuration
CCC and new CLA
CCC and current CLA



Time series WV 7.3µm

Filtered high level AMVs

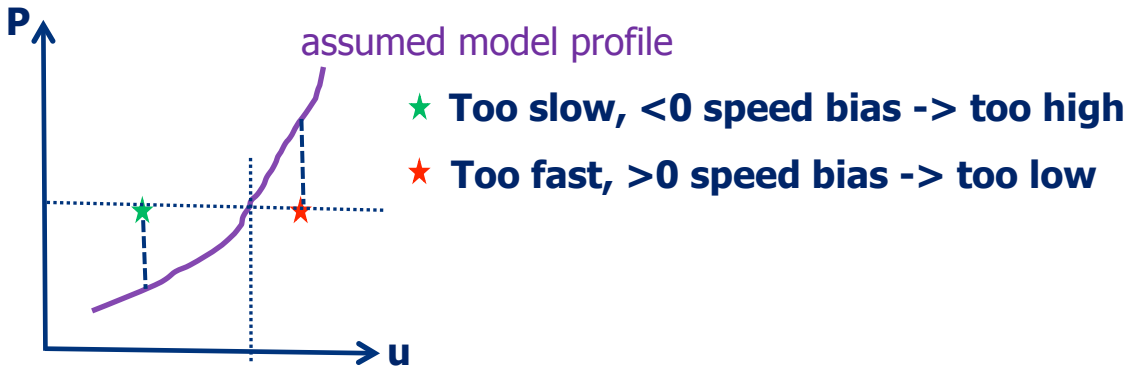
Current configuration
CCC and new CLA
CCC and current CLA



Comparison with radiosondes

	IR108				VIS08	WV62			WV73		
	Speed bias										
	ALL	HGH	LOW	MED	LOW	ALL	HGH	MED	ALL	HGH	MED
Current AMV	-1.3	-1.6	-0.44	-0.8	-0.26	-0.53	-0.55	~~0.54~~	-1.36	-1.47	-0.4
CCC + new CLA	-2.34	-2.72	-1.44	-1.29	-1.53	-1.34	-1.54	2.59	-1.91	-2.17	-0.39
CCC + CLA	-1.22	-1.49	-1.33	-0.5	-1.6	0.08	-0.38	2.86	-0.44	-0.94	0.75
	Number of collocated cloudy AMV and radiosondes observations										
Current AMV	3303	2332	638	333	607	3480	3418	62	3598	3236	362
CCC + new CLA	4681	3363	695	623	676	4010	3816	176	5036	4353	600
CCC + CLA	4218	2428	772	1018	695	3340	2873	450	4362	3075	1192

Statistics against radiosondes are done over a 14 days period from 22nd of September until 5th of October 2011.
- Negative speed bias is increased for low level clouds (AMV too high ???).



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Conclusion

- We have tested a more realistic winds height derivation method
- The quality of the AMV will depend on the quality of the CLA product used.
- No change in CTH CLA for the moment as the present CLA is operationally produced for a while, and more work should be done before changing it. OCA will soon be implemented and could help.
- Overall, CCC method to derive AMV should improve the winds (more winds of better quality)
- Introducing CCC should not degrade the forecast score.
- However the AMV users apply filtering and thinning prior to assimilate our winds, so even better AMVs could lead to minor impacts for our users.
- Criteria used by NWP centers for filtering should be revised as the AMVs are changed.

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What's next?

CCC should improve AMVs overall. However it could not be so clear to the users if they keep using the same filtering and thinning prior to assimilation of our new winds.

CCC using CLA is introduced on EUMETSAT validation environment since the 10th of February 2012 (release 1.5.3).

Data will soon be tested on a longer time period at EUMETSAT and in conjunction with interested users.

Thank you!

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