Current status of the EUMETSAT MTG-FCI AMV prototype

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Outline

The MTG-FCI AMV prototype

Comparison with MSG

Comparison with GEO-KOMPSAT-2A

Comparison with L2PF

Conclusions

The MTG-FCI AMV prototype

- Largely based on the MSG AMV processor, with important differences:
  - three images instead of four;
  - centre image used as reference, with backward and forward tracking;
  - no intermediate product averaging; second component used as final product instead.
- CCC method used for tracking, with final AMV coordinates set to the position of the tracked feature, not the centre of the target box.
- OCA or CTTH may be used as main height assignment method.
- AMVs derived from channels VIS0.8, IR3.8, WV6.3, WV7.3 and IR10.5.
- Prototype adapted to MSG, Himawari-8, GEO-Kompsat-2A and GOES-R (next).

Comparison with MSG

Average number of AMVs per channel (QI > 80) – 14th May to 14th June 2016

	VIS 0.8 µm		
	MTG 24	MSG 24	MTG – MSG
all	3,832	3,426	+11.9%
high	829	830	–0.1%
mid	713	596	+19.6%
low	2,290	2,000	+14.6%

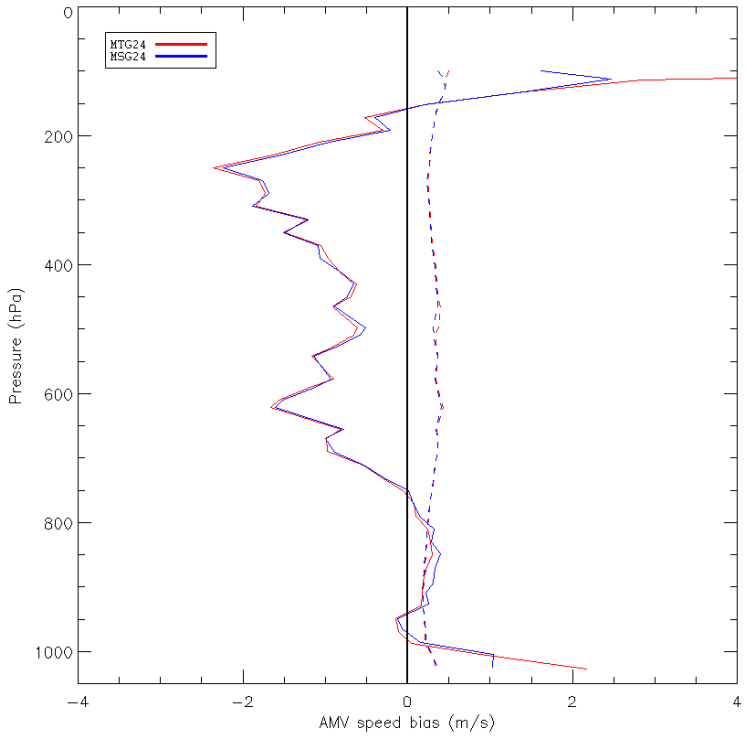
	WV 6.2 µm (cloudy)		
	MTG 24	MSG 24	MTG – MSG
all	4,077	4,057	+0.5%
high	3,858	3,897	–1.0%
mid	219	160	+37.7%
low	–	–	–

	WV 7.3 µm (cloudy)		
	MTG 24	MSG 24	MTG – MSG
all	5,138	5,175	–0.7%
high	4,028	4,091	–1.5%
mid	1,110	1,084	+2.5%
low	–	–	–

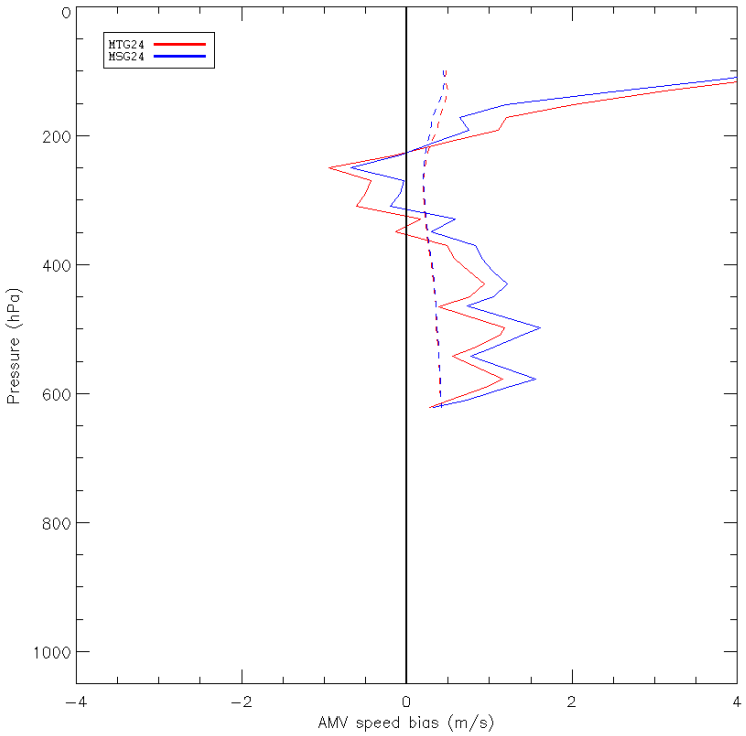
	IR 10.8 µm		
	MTG 24	MSG 24	MTG – MSG
all	8,231	7,614	+8.1%
high	3,317	3,358	–1.2%
mid	1,363	1,199	+13.7%
low	3,551	3,057	+16.2%

Comparison with MSG

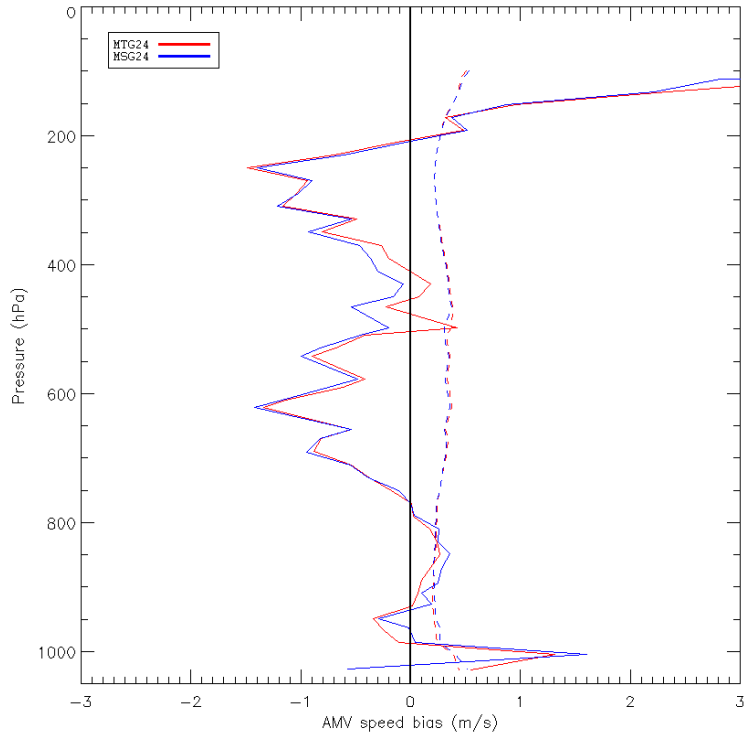
Vertical distribution of AMV speed bias and NRMS (QI > 80) – 14th May to 14th June 2016



VIS 0.8 µm



WV 7.3 µm



IR 10.8 µm

Comparison with MSG

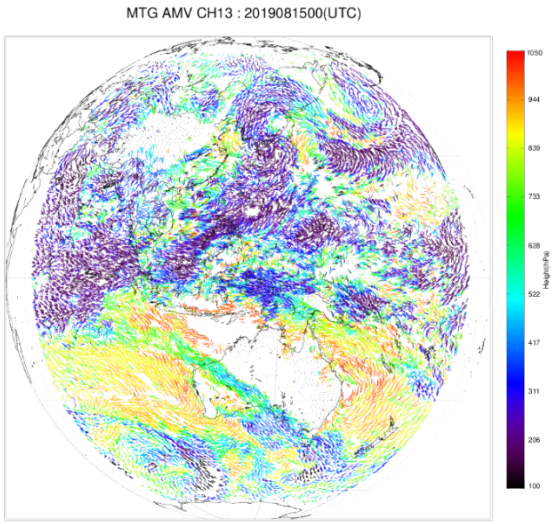
Summary

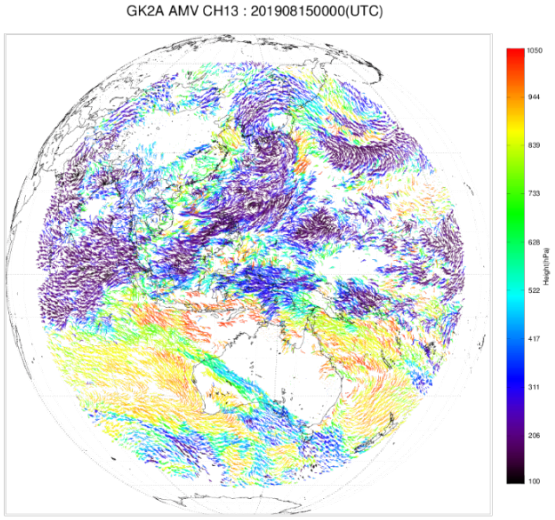
- More AMVs for MTG than MSG (especially for channels VIS 0.8 μm and IR 10.8 μm).
- Normalised AMV histograms very similar for all channels, with slightly faster and higher AMVs for MSG for channels VIS 0.8 μm and IR 10.8 μm.
- AMV speed bias and NRMS against forecast very similar for both algorithms, for all levels and geographical areas.
- For channel IR 10.8 μm, the larger the target box size, the slower the AMVs and, thus, the larger the speed bias (in absolute value).
- All in all, **there seems to be no significant advantage in the averaging of intermediate products**, as done for MSG.

Comparison with GEO-KOMPSAT-2A

Introduction

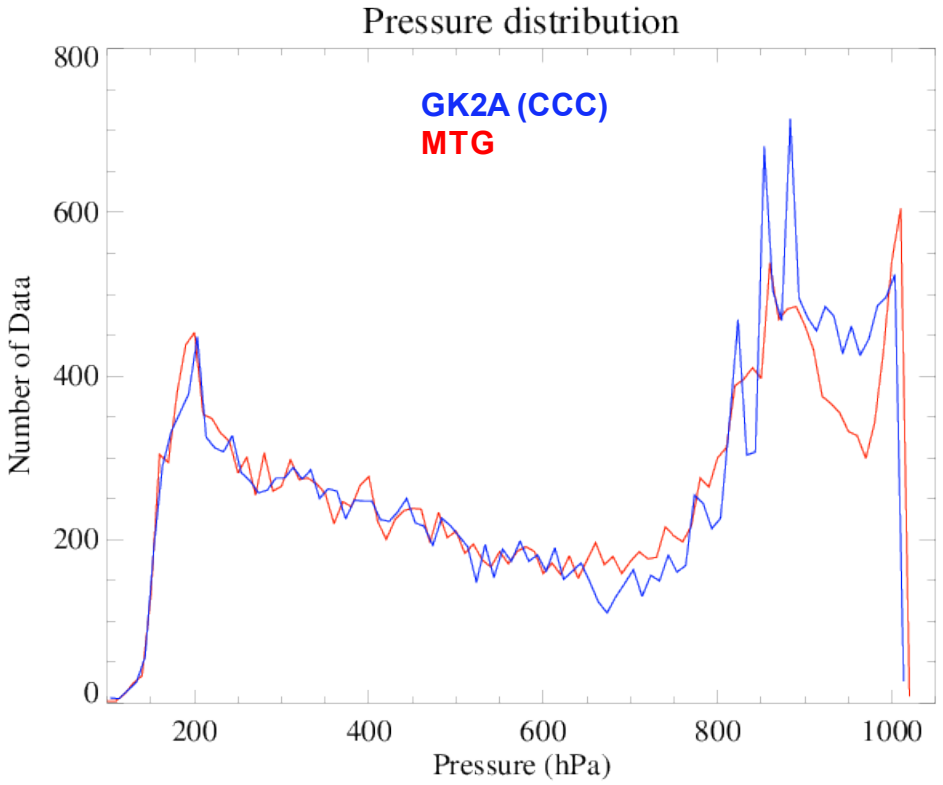
- Collaboration between EUMETSAT and KMA. Visit of Hee-Ae Kim and In-Chul Shin from 2nd to 12th 2019.
- Input data: triplet of images around 15th August 2019 at 0:00.
- Cloudy AMVs extracted from channels VIS 0.6 µm (GK2A) / VIS 0.8 µm (MTG), WV 6.2 µm, WV 7.3 µm and IR 10.5 µm.
- Two GK2A datasets generated using CCC and EBBT + IR/WV as height assignment methods. EUMETSAT dataset generated using CCC.

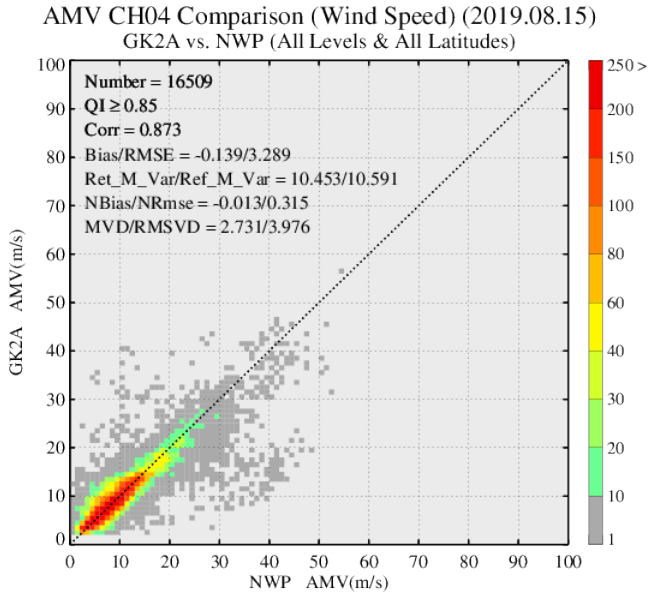




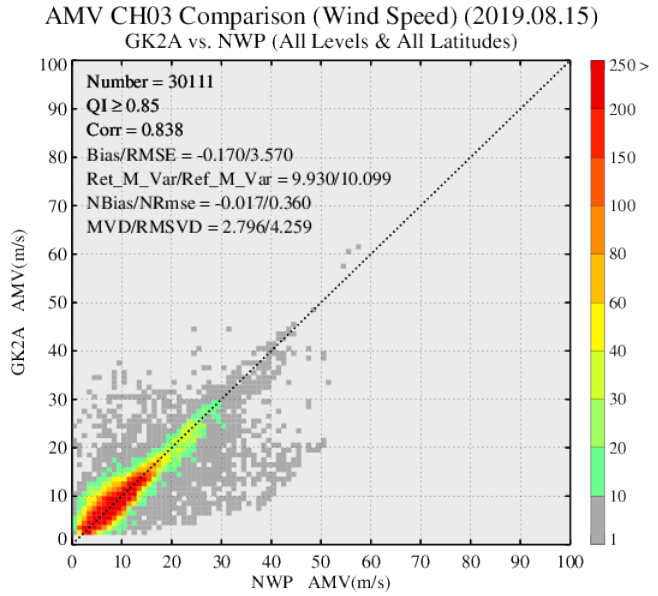
Comparison with GEO-KOMPSAT-2A

Pressure histograms and speed biases for channel VIS 0.8 µm





MTG



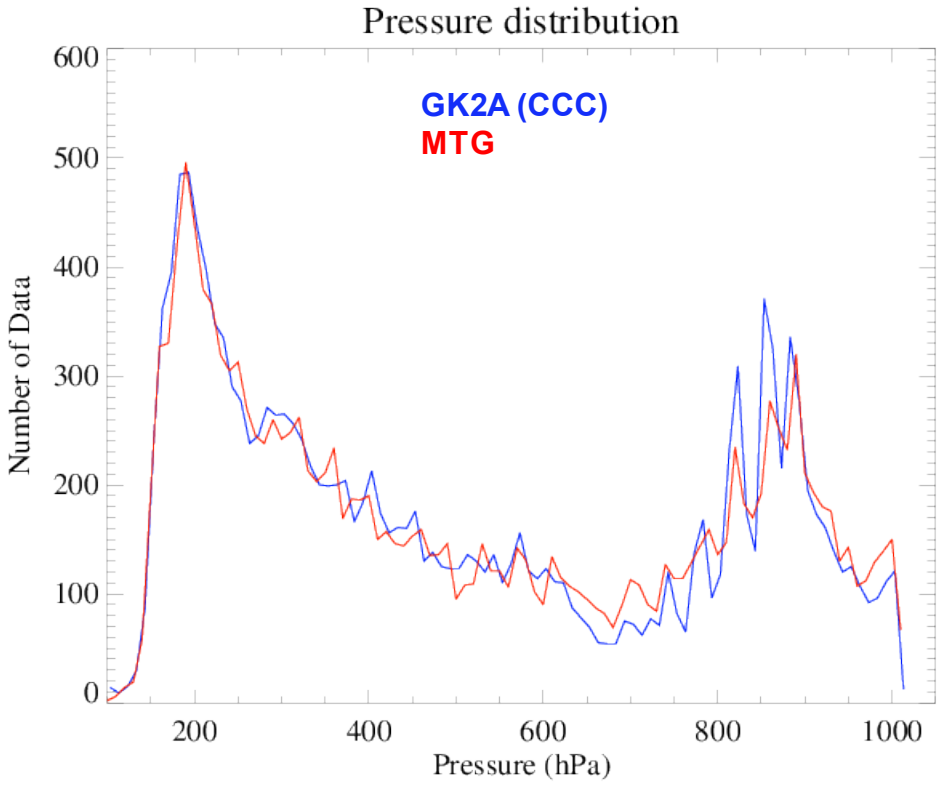
GK2A

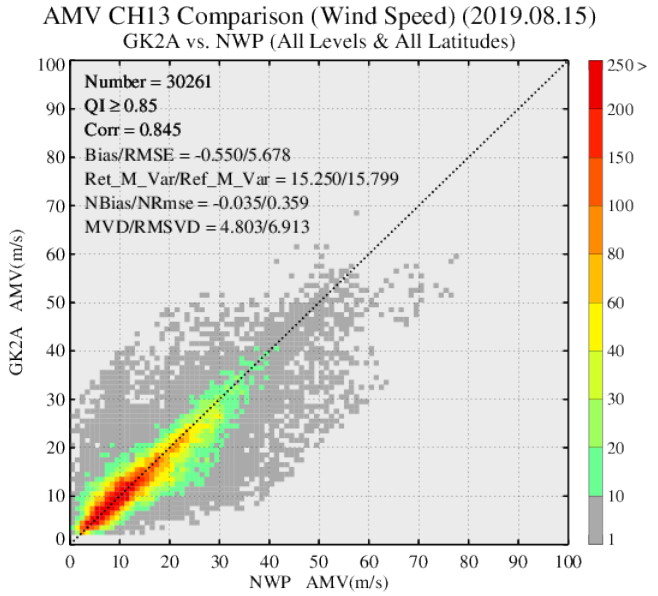
[Plots courtesy of KMA]

- See paper entitled "Development and Intercomparison Study of an Atmospheric Motion Vector Retrieval Algorithm for GEO-KOMPSAT-2A", Oh, S.M., R. Borde, M. Carranza, I.C. Shin, Remote Sens. 2019, 11, 2054.

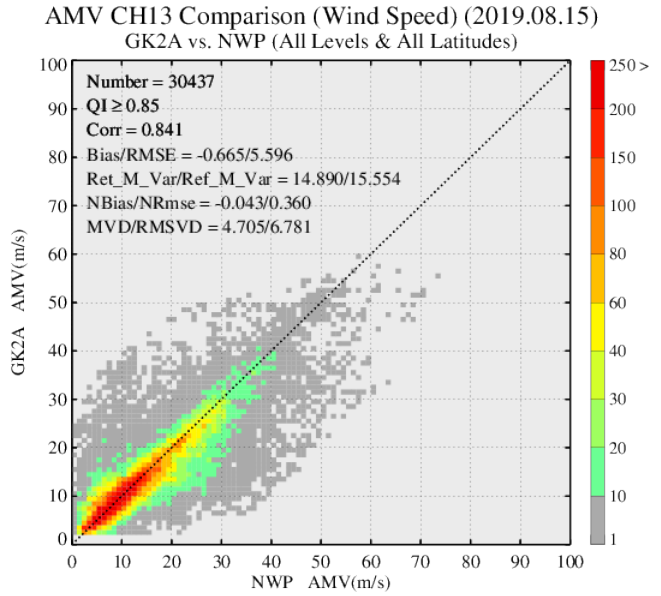
Comparison with GEO-KOMPSAT-2A

Pressure histograms and speed biases for channel IR 10.5 µm





MTG



GK2A

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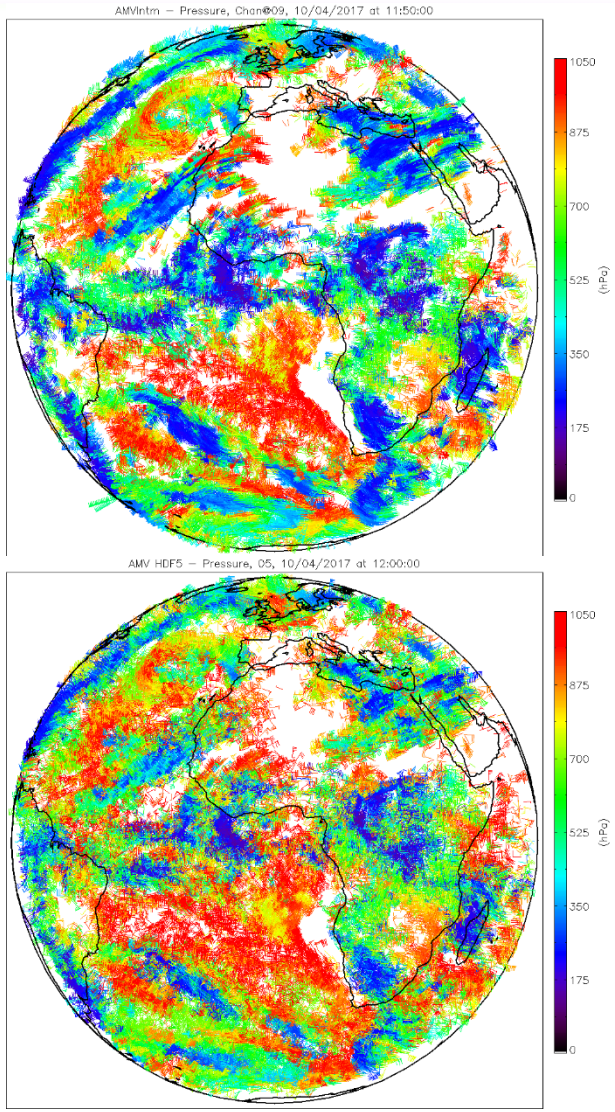
Comparison with L2PF

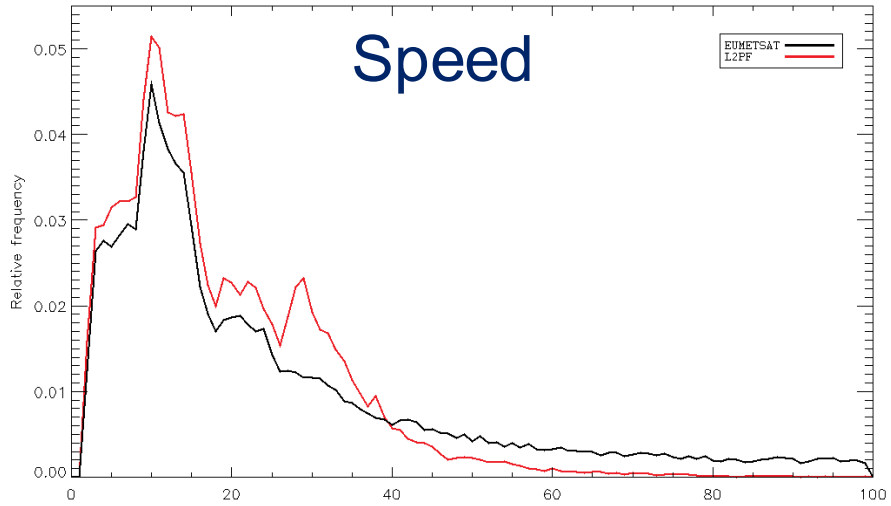
Introduction

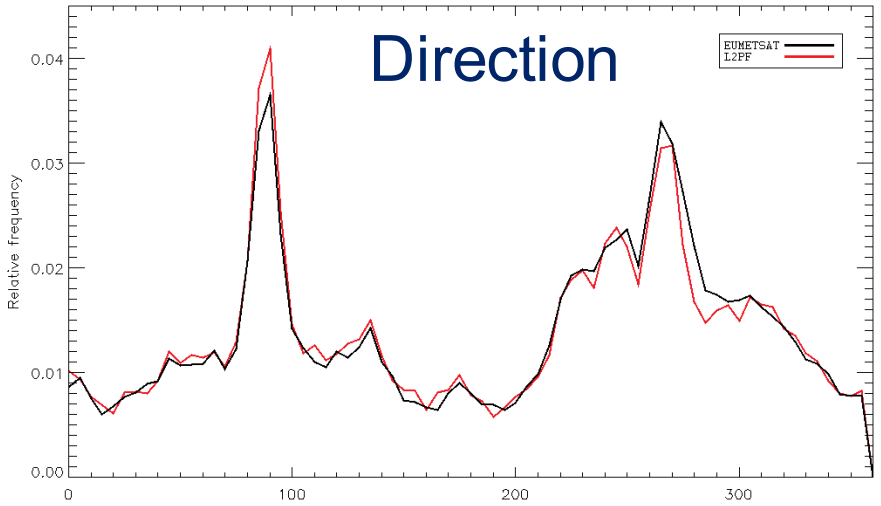
- Verification against operational processor from industry currently ongoing.
- Simulated images from MSG-SEVIRI.
- Input data: triplets of images around 10th April 2017 at 12:00 and 23:00.
- AMVs extracted from channels VIS 0.8 μm, IR 3.8 μm, WV 6.3 μm, WV 7.3 μm and IR 10.5 μm.

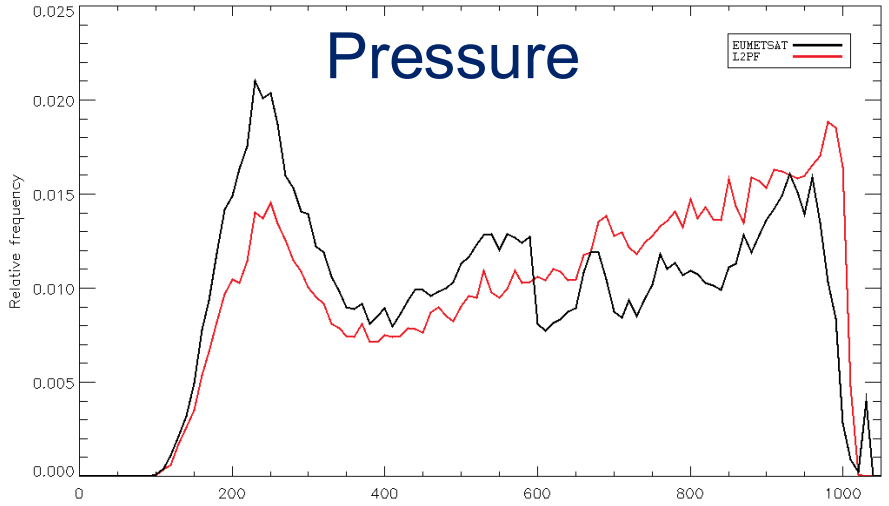


Comparison with L2PF

Normalised AMV histograms for channel IR 10.5 µm







- Speed histograms are similar, with EUMETSAT AMVs faster in general.
- Direction histograms are very similar.
- Pressure histograms are somewhat similar, but need further investigation.

Conclusions

- The MTG-FCI AMV prototype is in good shape.
- Comparison with the operational MSG processor yields very similar results, with a slight improvement for the MTG-FCI algorithm due to the lack of averaging.
- Comparison with the operational GEO-KOMPSAT-2A AMV products using the CCC method yields very similar results.
- Comparison with the operational MTG-FCI L2PF processor yields mixed results, with noticeable differences in wind speed and pressure. Investigations are ongoing in order to understand the origin of the differences and correct them.
- The MTG-FCI AMV prototype will be further adapted to GOES-R data in the frame of the upcoming 4th AMV Intercomparison Study.

Conclusions

Thank you!