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MINISTERIO
DE AGRICULTURA, ALIMENTACIÓN
Y MEDIO AMBIENTE



EUMETSAT

Monitoring weather and climate from space
Surveiller le temps et le climat depuis l'espace



NWC SAF/High Resolution Winds Current status (Oct 2017) and beyond

10th October 2017

2017 European AMV Meeting

Eumetsat, Darmstadt, Germany

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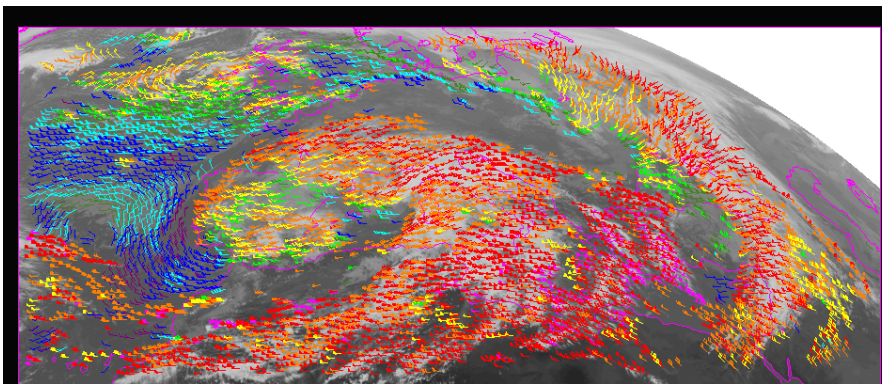
I. Update on High Resolution Winds v2016

II. Status of High Resolution Winds v2018

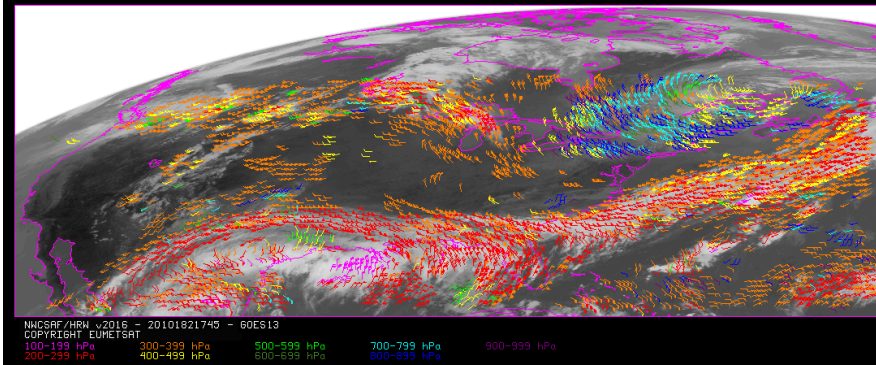
III. Other activities involving NWC SAF

NWC/GEO v2016 Software package with latest version of High Resolution Winds AMV algorithm released in November 2016.

This version (presented in “2016 Winds Workshop”) calculates AMVs with:



MSG satellite series

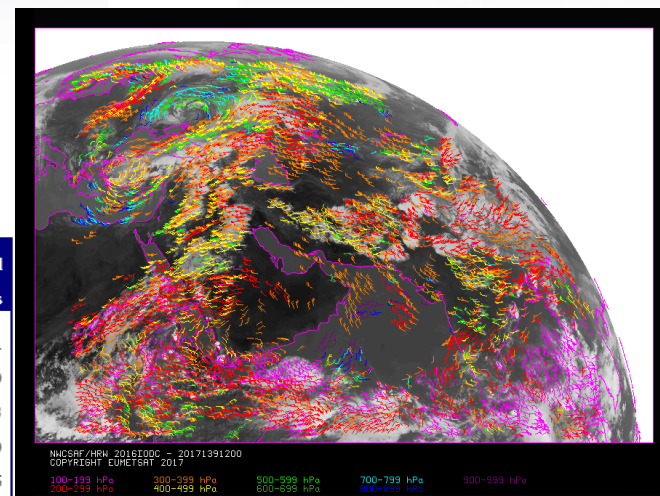


GOES-13/14/15 satellite series

Update on High Resolution Winds v2016

HRW v2016 has lately been validated in the new regions covered by **MSG1/IODC service** (Russia, Middle East, India, May-Aug'17):

GEO-HRW-v2016 AMVs (Jul 2009-Jun 2010 Europe)	Cloudy HRVIS	Cloudy VIS06	Cloudy VIS08	Cloudy WV62	Cloudy WV73	Cloudy IR108	Cloudy IR120	Clear Air	All AMVs
N	31630	97221	87177	256951	331831	313072	317120	48509	1483511
SPD [m/s]	16.64	10.51	10.48	22.78	20.80	18.53	18.67	16.64	18.70
NBIAS (ALL LAYERS)	-0.04	-0.14	-0.15	-0.04	-0.07	-0.09	-0.08	-0.00	-0.08
NMVD (100-1000 hPa)	0.29	0.41	0.42	0.26	0.28	0.29	0.29	0.32	0.30
NRMSVD	0.35	0.49	0.49	0.32	0.35	0.35	0.35	0.39	0.36



Comparing with the validation in the European region (MSG2, Jul'09-Jun'10):

GEO-HRW-v2016 AMVs (May - Aug 2017 IODC)	Cloudy HRVIS	Cloudy VIS06	Cloudy VIS08	Cloudy WV62	Cloudy WV73	Cloudy IR108	Cloudy IR120	Clear Air	All AMVs
N	5672	32404	26558	99237	124270	113839	115579	41587	559146
SPD [m/s]	16.52	10.59	10.62	19.68	17.64	15.64	15.79	15.92	16.33
NBIAS (ALL LAYERS)	-0.00	-0.14	-0.14	-0.03	-0.09	-0.09	-0.08	-0.08	-0.07
NMVD (100-1000 hPa)	0.27	0.36	0.36	0.29	0.31	0.32	0.32	0.36	0.32
NRMSVD	0.33	0.45	0.44	0.35	0.38	0.39	0.39	0.45	0.39

- Differences in error parameters smaller than a 15%.
- Sometimes with decreases (VIS), sometimes with increases (IR/WV).

Considering a Survey on the use of NWC/GEO software package:

- Around **half of NWC SAF users** are using operationally High Resolution Winds.
(Although only half of them with latest version v2016).

Main use:

- **Nowcasting** of: General flow and singularities of the wind.
Watch and warning of dangerous wind situations.

At least **next institutions have confirmed they are assimilating HRW AMVs** in the AMV processing:

- **UK MetOffice** (with work by G.Kelly)
- **Norway, Sweden, Finland** (with work by R.Randriamampianina)
➔ Netherlands and Denmark also in process of this.

Considering the work at MetOffice with HRW AMVs:

1. Graeme Kelly **complained** in a presentation last week at the Eumetsat Conference **about the “spatial/temporal correlation of AMVs”**, which seems not to be able to solve smaller scales than those provided by MPEF AMVs.
 - ➔ Because of this, **MetOffice has reduced the density of HRW AMV data without degrading the forecast.**

Reasons for this:

- ➔ The **use of NWP forecast in the “Quality Index” calculation.**
- ➔ The **numerical parameters used for the “Quality Index” calculation.**
 - As default option, they are similar to those for MPEF AMVs (including a “distance factor” and a “pressure difference factor” defining up to where AMVs are compared to each other).

I can test and provide a modified version of “HRW Quality control” which reduces this “spatial/temporal correlation of AMVs” to smaller values!

Considering the work at MetOffice with HRW AMVs:

2. Mary Forsythe wanted to **test the aspect of the correlation field for the different positions of the tracer inside the “tracking area”**,
to test its implications in the calculation of AMVs.

→ A **modified version of HRW v2016 was provided** to her
with this output parameter for this study in September.

Any other suggestions/studies by NWC SAF users
for a better understanding and use of AMV data
will be attended as soon as possible **in a best effort basis**.

→ But **please notify me directly about them!**

Status of High Resolution Winds v2018

Next HRW version (in NWC/GEO v2018 package) expected to be released in **Autumn 2018**.

HRW code is in process of update.

Most of new elements have already been written, but the process of testing will still go on for some weeks before any validation.

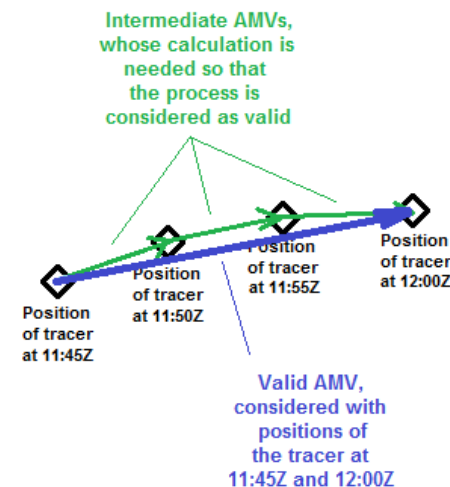
Main changes in this release:

01 – Option for more spatial density for “Very low and low cloud” AMVs

- ➔ Considering suggestions by several users who expected to have more information at the lower levels.

02 – Option for “Mixed scanning process” considering “short and long time intervals”:

- ➔ **Small intervals of time**
between the initial and final image
increase the amount of AMVs and the quality of the tracking process,
due to the smaller changes in the tracers.
- ➔ But this way, **problems occur with the calculation of the displacement**,
due to the spatial resolution of the images
(often, displacement smaller than a pixel).
- ➔ **The situation is much better:**
 - Verifying the tracking process with “short time intervals” (f.ex. 5 min.)
 - Calculating the AMVs with “long time intervals” (f.ex. 15 min.)



Main changes in this release:

03 – AMV calculation with Himawari satellite series

04 – Option for parallax correction of AMV initial and final horizontal location (slight change in speed/direction).

05 – Inclusion of “Common QI module” provided by IWWG (as additional parameter).

06 – Inclusion of an “Autovalidation process” by HRW algorithm with **”NWP forecast” (in real time)** and/or **”NWP analysis” (in reprocessing)**, using “AMV level” and “Best fit level” as references.

07 – Update of HRW outputs (including new BUFR defined this year by IWWG).

08 – Parallelization of HRW code, for a quicker running of the algorithm with multiprocessor systems.

A. New Intercomparison Study

- As in 2014, the **"New Intercomparison study with Himawari data"** is going to be paid through a **"NWC SAF Visiting Scientific Activity (VSA)"**.
- A **public announcement of the VSA was made on 13 July 2017** at **"NWC SAF Helpdesk"** and the **"IWWG Mail List"**.
- The **period for the reception of proposals was open until 15 September 2017**.
 - ➔ **Only one proposal** was received to do the activity, from **University of Wisconsin/CIMSS (Dave Santek & Richard Dworak)**.
- This has been notified to the NWC SAF Steering Group, and no objections are expected for the realization of the VSA by UW/CIMSS.
 - ➔ **Contract expected to be signed throughout October/November.**
 - ➔ **Start of the activity on 1st December.**

A. New Intercomparison Study

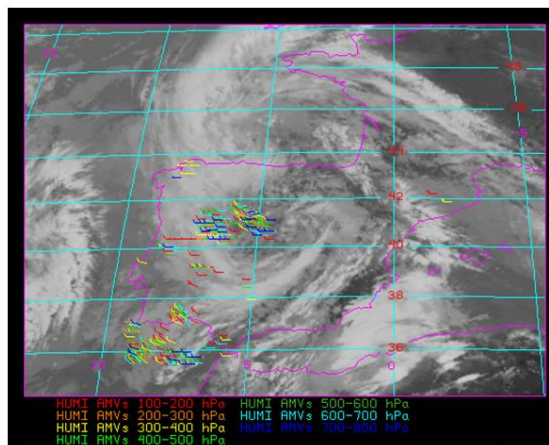
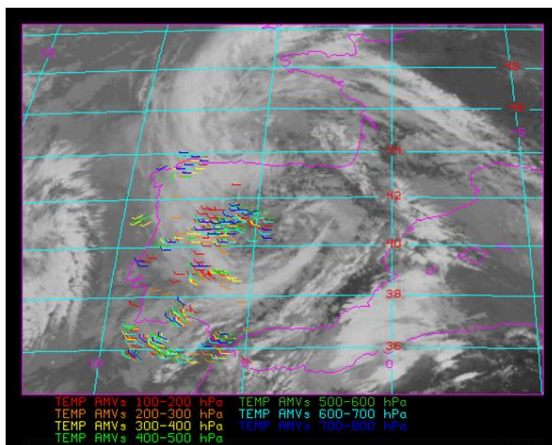
- All previous steps are inside the expected time frame,
but **NWC SAF has to receive the AMV Himawari outputs for the study from all AMV producers** throughout October/November.
- For the moment we have received none,
and **we fear about a delay in the delivery of data by everybody**.
 - ➔ Any delay (due to the small time available)
could cause that the study would not be ready
for the next “International Winds Workshop”!
 - ➔ It would be good to remind everybody about this!

B. Promotion of NWC SAF/High Resolution Winds.

- Several forums have been attended throughout this year for the promotion of NWC SAF Software and HRW product:
 - ➔ **European Nowcasting Conference, Offenbach, May'17**
 - ➔ **European Severe Storm Laboratory Testbed, Wiener Neustadt, Jun'17**
 - > HRW product was very welcome,
for the nowcasting of Severe Convection.
 - ➔ **Eumetsat Meteorological Satellite Conference, Rome, Oct'17**
 - > Specifically for the promotion of use in new MSG1/IODC regions
(Russia, Middle East, Indian Subcontinent)

C. About the retrieval of Winds with MTG-Sounder data

- A small study was done considering proxy data (from IASI) for MTG-Sounder L2 vertical temperature and moisture profiles
 - ➔ It is **possible to extract AMVs from these Temperature/Humidity fields, at medium and low levels (400-1000 hPa).**
 - ➔ It is **much more difficult to obtain representative AMVs at high levels** due to the low values of specific humidity, and difficulties to define good gradients and trackable features at those levels.

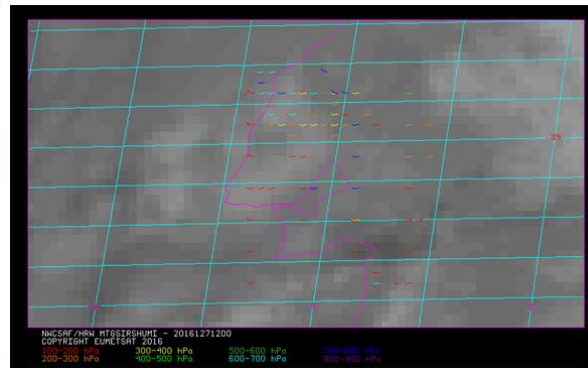
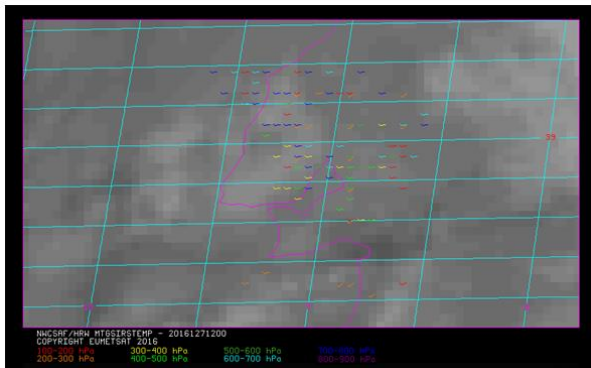


Example for the
Iberian Peninsula
(6 May 2016, 12:00Z)

- Left: Temp.field
- Right: Hum.field

C. About the retrieval of Winds with MTG-Sounder data

- ➔ There is **a real option to obtain AMV profiles in some locations** (i.e., AMVs at all high, medium and low layers), giving the option to calculate wind shear in these locations.
- ➔ But the **horizontal density of AMV profiles is clearly not homogeneous** (but **this is a general property of AMVs which never denied their usability!**)



Example for the
vicinity of Lisbon
(6 May 2016, 12:00Z)
- Left: Temp.field
- Right: Hum.field

C. About the retrieval of Winds with MTG-Sounder data

- ➔ These data **would provide additional meteorological information**, useful for analysis and forecasting, beyond the one provided by AMVs calculated with satellite images.
- ➔ But **they would be complementary information**, and **would not substitute AMVs calculated with satellite images** (or **wind data/profiles obtained with other schemes like “Optical flow”** by O.Hautecouer/EUMETSAT or M.Á.Martínez/NWCSAF).

Thank you for your attention
Questions? Suggestions?

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