SPECIAL PROJECT PROGRESS REPORT

Progress Reports should be 2 to 10 pages in length, depending on importance of the project. All the following mandatory information needs to be provided.

Reporting year …**2018**……..……

Project Title: …**Testing and developing the HARMONIE data assimilation system at MET Norway**…

Computer Project Account: ……**spnorand**……..……

Principal Investigator(s): …**Roger Randriamampianina**……..……

……..……

Affiliation: **Norwegian Meteorological Institute (MET Norway)**…

Name of ECMWF scientist(s) collaborating to the project (if applicable) ……..……

……..……

Start date of the project: …**01.01.2018**……..……

Expected end date: …**31.12.2020**……..……

Computer resources allocated/used for the current year and the previous one

(if applicable)
Please answer for all project resources

		Previous year		Current year	
		Allocated	Used	Allocated	Used
High Performance Computing Facility	(units)			8000000	1950528.68
Data storage capacity	(Gbytes)			20000	

Summary of project objectives
(10 lines max)

The objective of this special project is to support all data assimilation (DA) related activities at MET Norway. The tasks in the application involve five activities: 5-years hindcast, refinement of background error statistics, improvement of sea ice modelling, use of more satellite observations, and participation in OOPS development. These were the dominating DA topics at application time, while from 2018, we are also engaged in other external projects involving more topics like assimilation of Aeolus HLOS data (PRODEX), observation operator refinement and all-sky radiance assimilation (Alertness) and Copernicus regional reanalysis projects (C3S_322_Lot1 – European and C3S_D322_Lot2 – Arctic).

Summary of problems encountered (if any)
(20 lines max)

A relatively low priority queuing issue was reported to Carsten Maas (20th of March), but no follow up was done from our side. So, all in all, no other specific problem was observed.

Summary of results of the current year (from July of previous year to June of current year)
This section should comprise 1 to 8 pages and can be replaced by a short summary plus an existing scientific report on the project

This time we are happy to report about the work done with topics from the above described tasks. This can be summarised the following way:

1- Improvement of assimilation of microwave radiances:
As part of the short development related to the Arctic regional reanalysis project, we are doing this in cooperation with Sigurdur Thorsteinsson from the Icelandic Meteorological Office (IMO). The work consists of implementation of the use dynamical emissivity and Atlases, available in the IFS and ARPEGE/AROME system, with the microwave radiance assimilation in the Harmonie system. With help from Philippe Chambon and Florian Suzat from Meteo France, we succeed to test this approach with very promising results. For example Figure 1 shows that activating the dynamical emissivity and use of Atlases allows the assimilation of more low peaking channels over sea ice and Greenland. More tests are needed for more firm conclusion. See Thorsteinsson and Randriamampianina (2018) for more details.

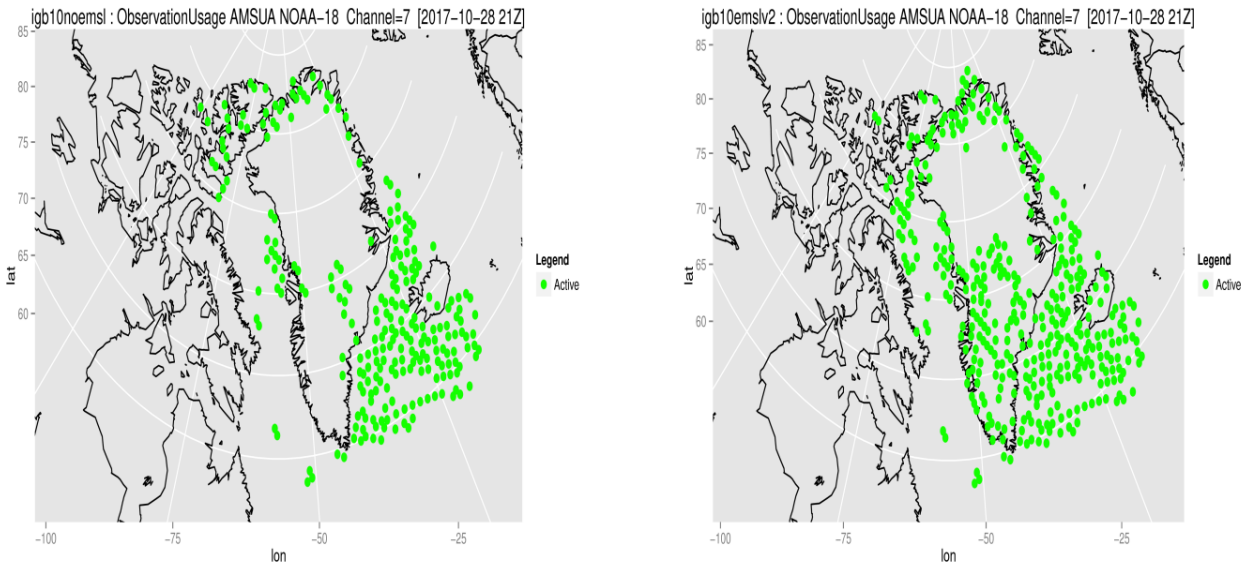

Figure 1. Active pixels from channel 7 (NOAA-18) without (left) and with (right) activating the dynamical emissivity and Atlases in Harmonie-Arome data assimilation.

2- Implementation of the Aeolus HLOS wind assimilation:

In frame of the PRODEX CAL/VAL project, we implemented the assimilation of the simulated HLOS wind data from ECMWF in the Harmonie-Arome DA. This consisted with adaptation of the reading and processing of the HLOS wind. We had to use the newest available cycle (CY43) for this task. Although, at the reporting time the CY43 is not yet fully validated for wider use in the Harmonie system, the assimilation of Aeolus data with conventional observations is working well. Figure 2 shows the simulated Aeolus data in BUFR format from ECMWF. Figure 3 shows the processing of the Aeolus data in the Harmonie-Arome DA.

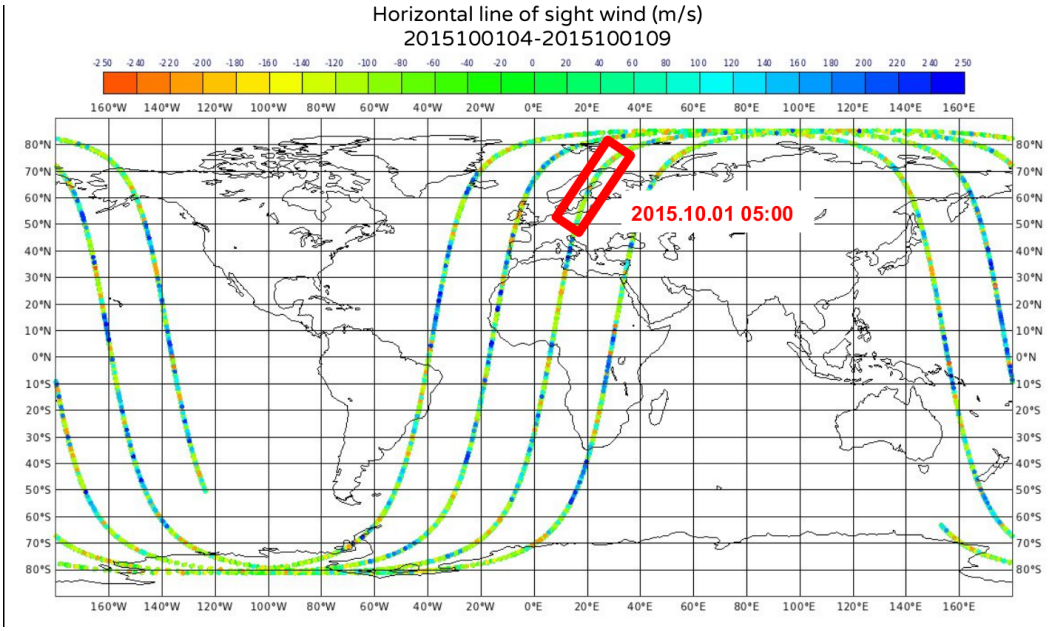

Figure 2. Sample of simulated HLOS wind data, where only the highlighted part is inside our domain (MetCoOp) of interest.

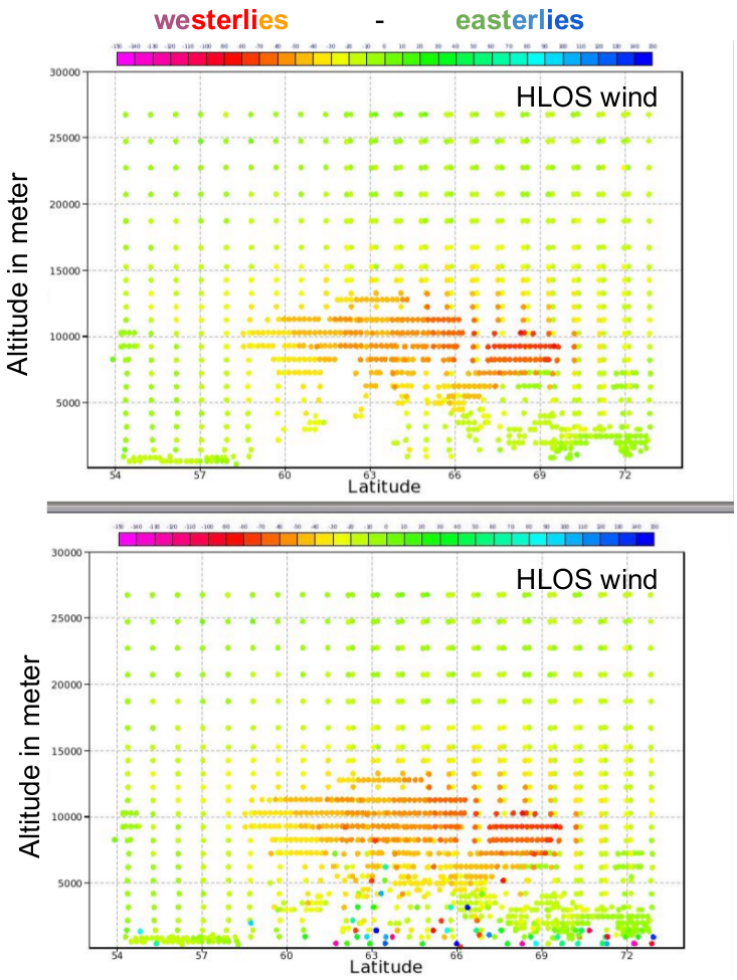

Figure 3. Processing of the simulated HLOS wind data in Harmonie-Arome DA before (bottom) and after (top) the data screening.

List of publications/reports from the project with complete references

Thorsteinsson S and R Randriamampianina, 2018, Use of low peaking channels from ATOVS in regional data assimilation, 28th ALADIN Wk & HIRLAM All Staff Meeting 2018, 16-20/04/2018, Toulouse, France, available from: http://www.umr-cnrm.fr/aladin/IMG/pdf/asm_20180416_sthrr_dynemisv4.pdf

Azad R, H Schyberg, R Randriamampianina, 2018, Aeolus Wind Data Assimilation and Cal/Val at MET Norway, Aeolus workshop, Darmstad, Germany.

Summary of plans for the continuation of the project

(10 lines max)

The implementation of the dynamical emissivity and use of Atlases in microwave radiance assimilation will be continued until we arrive to a firm conclusion. We are now ready to process the real Aeolus HLOS observations. Our goal in with this project is to prepare the Harmonie-Arome assimilation system to be ready for operational use at MET Norway. In this study related to backgroud error statistics, we would like to know how different are the techniques applied for lateral boundary conditions interpolation in Aladin (FULLPOS) compared to what is in use in Hirlam (GL). A PhD study has started in the beginning of June, which aims, among other goals, to tune the Harmonie-Arome observation operator to take into account the foot-print of the satellite (retrievals and radiance) observations. We also aim at implementing the all-sky radiance assimilation adapting the IFS approach, and improve the quality of sea ice surface temperature through data assimilation.