SPECIAL PROJECT PROGRESS REPORT

All the following mandatory information needs to be provided. The length should *reflect the complexity and duration* of the project.

Reporting year 2020/2021

Project Title: Development in HARMONIE model framework - adoption of new observational network (NetAtmo) in data-assimilation

Computer Project Account: spnolabo

Principal Investigator(s): Anette Lauen Borg

Affiliation: MET Norway

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

Start date of the project: 06.11.2020

Expected end date: 01.01.2022

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)	2M	1.44M	5M	3.3M
Data storage capacity	(Gbytes)	20’000	10’000	500’000	50’000

Summary of project objectives (10 lines max)

The objective of the iOBS (improved observation usage in NWP) project is to investigate the potential impact of high resolution crowd sourced observations on numerical weather prediction. In iOBS the focus has been on surface pressure from Netatmo stations in the Nordic countries. A large part of the project has been to develop quality control for which several methods, including machine learning methods, were tested. The quality controlled observations were then introduced to the NWP model. Several experiments were run to compare the different datasets, trying different observation errors, different bias correction methods among a few other things.

Summary of problems encountered (10 lines max)

In general the experiments run under the special project have been progressing fine. The only problem has been that the progress has been very slow. At times it has taken one day, or even more, to produce one day of forecasts. This is mostly related to access to MARS but also long times for jobs in the queue.

Summary of plans for the continuation of the project (10 lines max)

The iOBS project ends in June 2021 but an application for a continuation of the project in a second phase has been submitted. After examining the results from the runs using SBUs from this special project there are a number of experiments that could be run in order to understand how the usage of high resolution observations can be utilised better in NWP models. Given the limited resources during this project the experiment period was only one summer month. To better understand the impact of high resolution observations several different periods need to be tested.

List of publications/reports from the project with complete references

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Summary of results

In general the impact of using surface pressure from Netatmo observations was rather small. There was a bias introduced to the surface pressure. This highlights one of the problems that need to be considered when using high resolution crowd sourced observations. The bias can be due to the orographic effects since the model resolution is lower than that of the observations as well as the fact that the Netatmo stations can be placed very differently from site to site. In order to utilize the data, bias correction is necessary.

During this project two different bias correction spinup methods were tested, one starting with bias correction coefficients equal to zero and the other with already spun up coefficients. Results show that both methods need a spinup period of at least a few (3-4) weeks and even longer for the method with coefficients starting as zero.

By altering the prescribed observation errors different weight will be given to the observations compared to the background. In this project the observation error was decreased to see if there was an increased impact of the Netatmo observations. The main effect from this was that the bias in the surface pressure was increased.

Even though the impact on the general average scores were neutral, a small impact can be seen when studying specific cases. In this project there effect could be seen in the precipitation patterns

during intense convection. Even though the effect was small the Netatmo observations changed the structure and intensity of the convection.
In general the results from this project show that there is a big potential in using crowd sourced high resolution observations in NWP models but much work still remains.
Details of the results and conclusions can be found in the report "Study of forecast quality improvement (magnitude and duration), relative to using a reference set of observations, from assimilation of novel observations" by Ridal et al. (2021) available at:
https://drive.google.com/file/d/1y2F6uFmdvWQ_eVKPIXb_roinS-Dt4XJ5/view?usp=sharing