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 2017 (Jan-Jun)

Project Title: Mineral Aerosol Impacts to Sub-seasonal to Seasonal Predictability (MASP)

Computer Project Account: SPRSNICK

Principal Investigator(s): Slobodan Nickovic

Affiliation: RHMSS, Serbia

Name of ECMWF scientist(s) collaborating to the project (if applicable) N/A

Start date of the project: 01/01/2017

Expected end date: 31/12/2019

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)	N/A	N/A	5.000.000	34.607
Data storage capacity	(Gbytes)	N/A	N/A	12.000	0

Summary of project objectives
(10 lines max)

The main objective of this special project is to investigate the impact of aerosol direct and indirect effects on the predictability of a prognostic model at sub-seasonal and seasonal (S2S) scales using the global NMMB model integrated with the dust aerosol model DREAM and with an ocean model. The major focus of the project will be examining effects of the aerosol within the period from 3 weeks and longer.

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

This project has started in January of this year. We have spent first months on transiting the global NMMB atmospheric modelling system to the ECMWF facilities. The problems we have encounteredwere mainly addressed to resolving difficulties in launching the paralleled model in the ECMWF multiprocessing environment, including jobs submitting and distribution of jobs to CPUs for rationalizing the use of CPUs. Although these problems were solved meanwhile, it took a bit more time than planned. and thus it slowed down the initial phase of the project plan. To save time, we have tested at the same time the integration of the two modelling components - the atmospheric NMMB driver and the dust module - in an off-line basis.

Summary of results of the current year (from January to June of current year)

Because of mentioned problems above and the fact that we report on only 6-month period of the project, we report mainly on preparation and preliminary work which represents the input for the next phase of the work.

Soil wetness issue. Since our project is based on S2S scales forecasts, one of the most important input parameter for the model is soil wetness (SW). Therefore, we made an effort to compare several available SW inputs (from the operational ECMWF, ERA-INTERIM and from the NCEP) with the soil wetness observed data at 5 Serbian stations in the 2011-2014period. The final conclusion, from this testing, is that SW used in the operational ECMWF system fits the best to the observations (see Figure 1), and it will be therefore used in our project experiments.

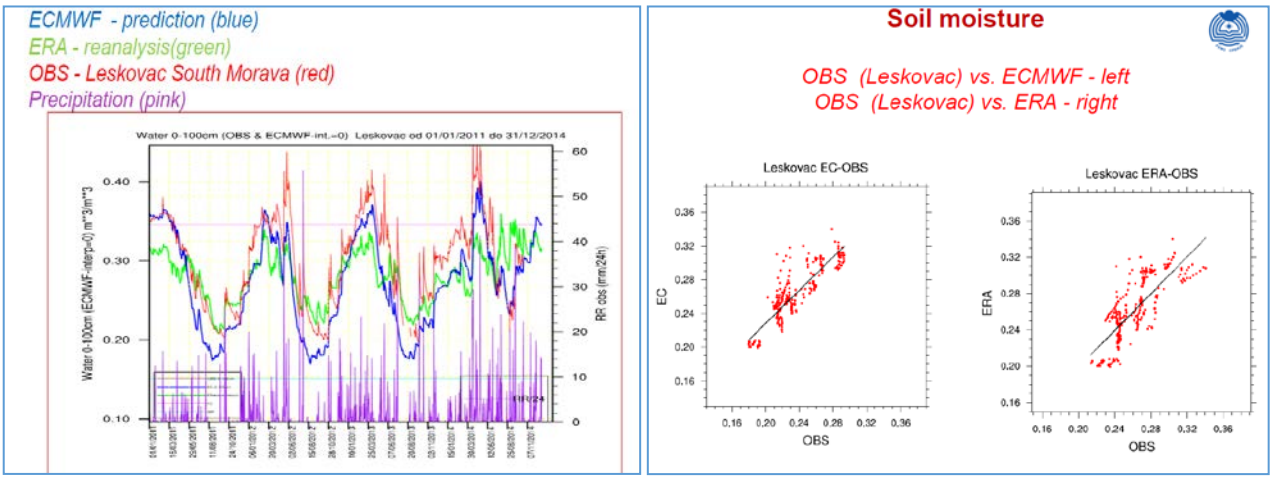

Figure 1. LEFT: Top soil wetness at the measurement site Leskovac (Serbia) [red] in the period 2011 - 2014 compared against ERA reanalysis [green] and ECMWF prediction [blue]. RIGHT: Scatter diagrams Leskovac OBS vs. ECMWF prediction (left panel) and Leskovac OBS vs. ERA prediction (right panel)

Ozone input data. In the initial NMMB global model runs, we have noticed an unrealistic increase of the stratospheric temperatures in the area close to the top model (10 hPa). We made a sensitivity experiment, testing the NMMB with its original NCEP climatological ozone, with the same parameter from the ECMWF. Although NCEP and ECMWF products have only marginal differences, in both cases we encountered the same problem with the temperature increase. There is an ongoing work to fix the problem.

Land-sea mask input data In this project, we will use fully ocean-atmospheric-dust coupled system. This system is an upgrade of our previous NMMB-POM coupled model on one degree resolution for both modules. During testing this system, simulating “Sandy” hurricane case in 2012. (figure 2.), we have experienced a lot of issues regarding land-sea mask on various horizontal resolution setups. In addition, for long-term integrations, which we will conduct, sea-ice is also very important parameter and has to be taken into consideration. Since our aim is at least to double this resolution, previous 6 months period was used to test above-mentioned parameters. Right now, we are in process of testing the atmospheric component of the system (NMMB) with ECMWF SST and sea-ice analysis in order to finalize the land-sea and sea-ice mask for the higher resolution setup.

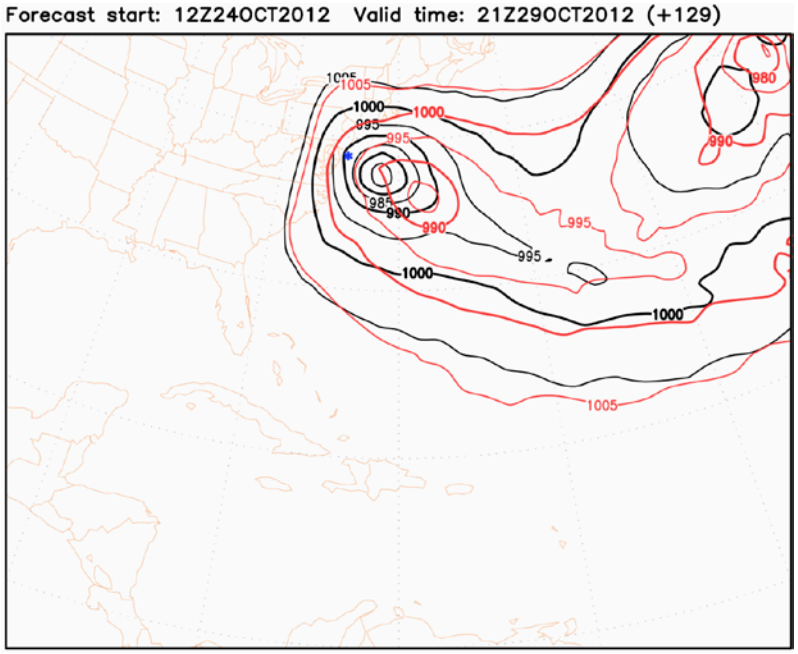

Figure 2. 2012 "Sandy" hurricane used in the project for ongoing testing of the functioning sea and ice masks at different NMMB resolutions

List of publications/reports from the project with complete references

N/A

Summary of plans for the continuation of the project

(10 lines max)

By the end of this year we plan to transit the DREAM dust module into the NMMB model and to check consistency of global dust concentration runs with our operational regional DREAM dust prediction products. The geographical focus will be The Mediterranean affected by Saharan and Mid-East dust sources. This comparison will be augmented with the NMMB-DREAM validation against available aerosol optical depth observations in the region. In parallel, part of our research group will work on 2-way coupling NMMB with the POM ocean model, accompanied with validation of this coupling component.