

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: "PSAS Data Assimilation for the Adriatic Sea using Regional Ocean Modelling System (ROMS)"

Computer Project Account: SPCRJANE

Principal Investigator(s): Ivica Janekovic

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

Start date of the project: Jan 2018

Expected end date: Jan 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)			900000	94932
Data storage capacity	(Gbytes)				

Summary of project objectives

(10 lines max)

Using advanced 4DVar - PSAS ocean ROMS model aims to estimate optimal state by using all existing available observation data covering the Adriatic Sea. Observations are formed from many different observation platforms (HF radars, Acoustic Doppler Current Profiler - ADCP data, Temperature and Salinity profiles, Surface temperature of the sea based on Satellite measurements, ARGO buoys, Sea level anomaly from Altimeter Satellites). Method combines observations along with dynamics from solving the model equations at the same time. Using atmospheric forcing from ECMWF/or ALADIN along with boundary conditions from oceanographic Med. model we make incremental corrections to get closer to observations within dynamically consistent solution.

Summary of problems encountered (if any)

(20 lines max)

At the beginning of the project I had problem with token for authentication which was resolved by mid of February. After that I started to setup the system and use HPC facility and discovered problem (bug) with ROMS ocean model. Formulation of the river inflow effects inside the latest version of the model was wrong (I have 48 river inputs), so my testing results were terribly wrong as well. Recently, I managed to fix the problem in the source of the ROMS code and now I have to re-run model to get statistical representation model error covariance matrix. Fortunately, I figured that early not wasting CPU time. Bug: <https://www.myroms.org/forum/viewtopic.php?f=19&t=4864>

Within ROMS PSAS 4DVar there is as well inefficient memory allocation scheme in a sense that every MPI tile is allocating memory for all (!) observations used in assimilation whether they belong to that specific tile or not. That memory allocation is posing burden when having big amount of observation data and fitting it in the memory of each individual node. In contrast, strong variational assimilation (IS4DVar) is allocating memory observations efficiently. In that sense additional modifications of ROMS source code will be necessary or I will have to switch to IS4DVar.

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

The project is in early phase, during the first 4 months from the start of the project I have setup test case, got familiar with HPC CRAY infrastructure and started with simulations. As I am using the latest ROMS model version which includes the latest developments in data assimilation at the same time it had introduced bug related to fresh water sources (river inputs). This was setting the project behind the plan as Adriatic Sea is extremely sensitive to fresh water fluxes.

List of publications/reports from the project with complete references

None, as project just started.

Summary of plans for the continuation of the project

(10 lines max)

In the next period I will re-compute non-linear ROMS model trajectory using bug fixed model kernel and start using data assimilation capabilities. In addition, I would like to compare sensitivity of the ocean system response on using different (a) high resolution LAM model (ALADIN) at 2km resolution winds and 8km resolution bulk variables and (b) equivalent the best resolution estimates from IFS model. Increments due to data assimilation to the atmospheric forcing in the first (a) and former (b) case could point into benefits or weaknesses of using mentioned systems in data assimilation systems.

I do hope that all problems from the start of the project are resolved and that I will use HPC facility more efficiently. Looking at the recent usage shows that I just started testing the latest fixed code (used the most of SBU during the last week).