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 2015……..……

Project Title: Integrated Simulations of the Terrestrial System over the European CORDEX Domain……..……

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Computer Project Account: spdekoll ……..……

Principal Investigator(s): Stefan Kollet……..……

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Affiliation: Forschungszentrum Jülich, Agrosphere (IBG-3).……

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

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Start date of the project: 29. January 2015……..……

Expected end date: 2017……..……

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)			500000	7600
Data storage capacity	(Gbytes)			4000	<1000

Summary of project objectives
(10 lines max)
The objective of this study is to perform high-resolution fully coupled aquifer-to-atmosphere simulations over the European CORDEX domain. The simulations will be performed with the integrated Terrestrial Systems Modeling Platform, TerrSysMP, consisting of the three-dimensional surface-subsurface model ParFlow, the Community Land Model CLM3.5 and the numerical weather prediction model COSMO of the German Weather Service (Shrestha et al., 2014, Gasper et al., 2014). At the ECMWF, the system will be set up with an initial spatial resolution of 0.11° (12.5km), which will be increased to 3km over the course of the project. The simulations will be used to interrogate the two-way feedbacks of groundwater and soil moisture dynamics with essential climate variables, such as air temperature and precipitation, at continental scales.

Summary of problems encountered (if any)
(20 lines max)
No significant problems were encountered.

Summary of results of the current year (from February of current year to June of current year)
The Terrestrial Systems Modeling Platform (TerrSysMP) based on the MPMD paradigm was ported onto the cluster including the entire input deck, and boundary and initial condition data sets. The build environment was adapted to the specific machine configuration etc.

After successful compilation, first test simulations were performed and juxtaposed with existing results to check for consistency and get a better estimate on the required compute time. Because event-based long-term simulations are planned for the second half of 2015, a workflow was implemented in ecFlow in order to restart and resubmit ensuing simulations efficiently. The workflow is currently finalized and will be tested further. Thus, at this point no results from the simulation and analyses can be presented, because the production simulations are planned for the second half of 2015, which is also reflected in the low usage of compute time to date.
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List of publications/reports from the project with complete references

Since the beginning of the project no reports/papers have been published.....…...

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Summary of plans for the continuation of the project

(10 lines max)

The following simulations will be performed during the continuation of the project: event based simulations and long-term sensitivity simulations. The former will focus on the heat wave of 2013 in order to interrogate the impact of subsurface dynamics on air temperature predictions including uncertainty estimation. The hypothesis will be tested that groundwater has a detectable impact on surface temperatures during heat waves. The second event is the central European flood of 2013, which will be used to demonstrate the ability of TerrSysMP to provide flood predictions in a physically consistent modeling framework without additional offline hydrologic simulations. In the latter, we plan to perform long-term fully coupled simulations with varying hydrologic model complexity to further evaluate the feedback of the atmos- and hydrosphere.

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