Geosci. Model Dev. Discuss.,
doi:10.5194/gmd-2016-179-RC1, 2016

Geoscientific
Model Development
Discussions
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Interactive comment on "A JavaScript API for the Ice Sheet System Model: towards on online interactive model for the Cryosphere Community" *by* Eric Larour et al.

Anonymous Referee #1

Received and published: 7 October 2016

General comments: This paper works to integrate the Ice Sheet System Model (ISSM) into an interactive online model that can be accessed by a larger community. It transforms a series of existing MATLAB and Python classes, currently used by ISSM users to generate model runs, into equivalent JavaScript classes, enabling direct deployment in a web environment. It leverages commercial cloud virtual machine and web service technologies to enable rapid generation of ISSM results via user adjustments of model parameters within a web browser.

This work represents an important step forward in bringing the powerful capabilities of Earth System Models to a larger community. Conventionally, a researcher interested in exploring such a model must invest considerable time to learn FORTRAN or C++

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codes, or if they are lucky, there are MATLAB or Python scripts that are provided as wrappers around the lower level codes. Nevertheless, users must still invest much time to handle protocols surrounding input data formatting, methods for parameter adjustment, and other methods for controlling the model. Deploying such a model in a web environment will enable a wide new range of model exploration to take place.

Specific comments:

Para beginning line 132: This paragraph is unclear. Is "savemodel" unique because it occurs only in the MATLAB implementation? Is this a mechanism for visualizing local simulations set up using MATLAB? Please clarify.

Lines 139-150: Until this section, I understood that existing MATLAB and Python preconfiguration wrappers were being converted to JavaScript, but not the main ISSM code. However, this section discusses converting everything to JavaScript. Later, it becomes clearer that the core ISSM code is used in a parallel configuration on EC2 for the larger, continental scale model runs (presumably the C++ version?). I suggest setting this up more clearly earlier in the manuscript, explaining the two primary implementations and the reasons for each approach. Presumably the EC2 simulations would involve a user setting a simulation to run and the results being returned after some time? How would that be handled in the web environment (e.g. the user is emailed when results are ready?).

Line 217: on the assumption that the audience may not know a lot of glaciology, I suggest explaining SMB, transient ice flow, etc in more general terms (e.g. surface climate forcings, etc).

Line 222: this is providing a bit more clarity on the savemodel component, but I am still not discovering the "breakthrough" it enables. Is there some kind of caching of initial output being done here to speed up the implementation in the web browser?

Fig 3 caption: fix: "…shows the Columbia Glacier webpage is, …". Again, quite a bit of glaciology jargon here.

Fig 2: It is good to see a conceptual map like this, but some additional detail could help. The labeling has considerable amount of acronyms. A few simple terms identifying that the client is on the left, the server on the right, and the flow of input/output through the diagram, would help, especially for those not immediately aware of all the different terms.

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