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**Geoscientific
Model Development
Discussions**

Interactive comment on "Next generation framework for aquatic modeling of the Earth System" *by* B. M. Fekete et al.

Anonymous Referee #1

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General Comments

The paper presents NextFrames which proposes an XML Document Type Definition (DTD) to describe in a standard way a wide range of land surface models, and an API to interface C/C++ plugin modules modeling the physical processes or performing other tasks such as e.g. the model I/O. NextFrames represents certainly a novel and interesting IT approach to the problem raised by Earth System model (ESM) development which is and has always been a very complex task. However, it remains to be proven if this approach is applicable and relevant for ESMs or subparts of ESMs, and if so, what is the degree of complexity it can support and what are its limitations. The main defect of the paper is that it does not describe any implementation of the proposed XML approach and that the "run-time engine" that is supposed to execute the

model components as described in the modeling XML is not completed yet (even if the abstract suggests that it is already working!). The structure of the paper, while generally clearly written, reflects this lack of implementation: 6 pages of introduction, about 5 pages of text describing the XML concepts, no description of the module plugin API, only one paragraph about the "run-time engine", and 1 and 1/2 pages of conclusions, but no description of any applications. Therefore, I suggest to reject the paper in the current form. If an implementation of the run-time engine becomes available and is used for a concrete application validating the approach, the paper could be completed and re-submitted.

Specific Comments

1- Paragraph 1.1The statement "but the use of ESMF ... still requires the model developer to deal with low-level details (e.g. partitioning the model domains into computational subregions, managing the data distribution between compute nodes, etc.) " is wrong. ESMF can do default partitions, and once those partitions are set, has high-level calls (such as ArrayRedist) which manage the details of communication.

2- Paragraph 1.2 "Common Earth System model function" should certainly be modified. The first part of the paragraph states that "the most important common functions that Earth System models and model components share is the discretization of space and time, linkages between different computational domains that discretize space and time differently (coupling) and calculations on the discrete spatial objects at some computational frequency" which seems right to me. But the rest of the paragraph is about the numerical representation of the spatial features for which the author describes 3 approaches: Geographical Information Systems, remote sensing image processing systems and "tools supporting NetCDF". It looks like the Earth System model functions are reduced to the (graphical ?) representation of spatial features; of course, Earth System model functions, being mainly the numerical resolution of the underlying equations, are much wider than this!

3- A complete NextFRAMES XML description of a simple model could be provided in an Appendix to help the reader make the link between the different XML component illustrated in examples 1 to 8. Fig 3 provides some hints about this but a fuller picture is required.

4- Some details about the module plugin Application Programming Interface (API) should be provided.

Technical Corrections

Many typos are present in the paper which let me think that no careful reading of the paper was done before submission: -p.283: "the demands" not "them demands" -p.286: "but also" not "but the also" -p.288: "as vectors" not "as a vectors"; "between computational objects" and not "between computational object"; "that can" not "the can" -p.289: "components is to perform" not "components to perform" ; "value is outside" not "values is outside" -p.291: "sources to the vector" not "sources the vector"; "source or" not "source our" -p.292: "NextFRAMES design" not "NextFRAMES, design" -p.301: "landcover_percent" not "landcover_precent" -p. 305: "related" not "relatted"

Interactive comment on Geosci. Model Dev. Discuss., 2, 279, 2009.