

Interactive comment on “Integration of Geographic Information System frameworks into domain discretisation and meshing processes for geophysical models” by A. S. Candy et al.

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I would like to begin by mentioning that I can only review this article from the perspective of a user of unstructured grid models. I do not have a comprehensive overview on all literature mentioned in the article.

General comments

In my opinion, the approach presented here is valuable and useful. I completely agree with the author’s statement that integrating meshing into GIS is the best way to go forward when discretizing complex domains. There are many open source models out there which lack an easy-to-use tool for creating unstructured meshes.

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Therefore I think that publishing this work in a journal concerned with geoscientific model development makes sense, as it makes the approach and the developed routines more known to users of unstructured grid models.

The presented example is very convincing and supports the usefulness of the approach. In my experience, it would be difficult and connected to a lot of manual work to achieve this quality in the discretization with existing tools.

Despite my general appreciation of the work presented in the article, unfortunately, the article itself should be improved further. The structure is not very clear. Also, the article does not provide enough transparency and details on the developed routines (please see the specific comments in the next session on this).

Side comment

Unfortunately, I was not able to test the QGIS extensions which were made available. After successful installation, QGIS (version 2.6) indicated that the provided extensions are only supported by an earlier QGIS version. Sourcefiles of version 1.8 are available, but it cannot be expected from users to install 1.8 from source to make use of the developed routines. Therefore, to make them not only available but useable, I would suggest that the routines should be updated.

Specific Comments

Although I support to publish this work, the article itself, in my opinion, should be improved. This concerns mainly two main points:

(1) Structure

The structure of the article is not very clear and the headings often do not fit the content of the sections. Throughout the article, there are subsections, subsubsections and paragraphs which do not seem to fit in where they are. This makes the article difficult to read, because it is hard to find specific information and because the reader does not know beforehand what to expect in the sections he is reading. I understand that this is

partly due to the difficult task to integrate very general information, technical specifics and an example into a meaningful structure.

As this applies to almost the whole article, I found it difficult to come up with specific suggestions on how to improve this. The following points may serve as examples with suggestions:

- Section 6 is called “Materials: assimilation of source datasets”. This is very un-specific. As I understand it, the section is about the third out of the three steps in the mesh generation, which are (i): generating the boundary, (ii): generating inner geometric constraints, (iii): meshing itself. In this case, the meshing is done by a combination of different criteria or metrics. This third point is what Section 6 is about. Therefore I think the heading “Materials: assimilation of source datasets” doesn’t really capture this very well.
- Section 4 is also a mixture of very different subsections. Generally, the first paragraphs of Section 4 are nice to read and follow an understandable structure. The heading “Integration in GIS” is very general, but it fits at least this part of the Section. But then, the example is introduced in Section 4.1 and after the introduction to the study area, the description becomes very specific (starting 613/25) and deals generation of the boundary, which is step (i) of the mesh generation (see above). I therefore think that it would improve the structure if this latter part was excluded from Section 4. Instead, I think it may be a good idea to integrate it into Section 5, which is about the inner constraints. Section 5 begins by (6016/5 ff) giving an introduction on why it is important to have a good boundary representation. So why not make Section 5 about both boundary and inner constraint representation?
- Generally, to understand the work-flow better, it would be useful to add a flow chart indicating which routines are used at which point of the meshing procedure (and which were contributed by the authors, see point (2) below).

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(2) Scientific contribution

For me, it was difficult to figure out from the article, which routines were developed by the authors (6011/09 says “several plugins”) and what the basis for those routines are. There is a table which indicates which routines were written. But his table is never referenced in the article. Also, there is a lot of discussion about existing packages and technical aspects (such as 3.1.1). But it is not clear which of the existing approaches were used directly in which of the developed extensions mentioned in Table 1. (Saying this, I assume that the algorithms of the routines which were developed are not novel, but have been used elsewhere before. Please correct me if I am mistaken here.) The information on existing work is probably there, but it has to be linked more clearly to the developed extensions or the suggested work-flow.

To stress it again, I am very convinced that it is an important step to integrate those routines into GIS for better, easier and more reproducible meshing. Also, to regard the developed extensions alone as the the scientific contribution here, is too narrow. In my opinion, the whole concept to integrate this into a geographic information system is part of the contribution. Nevertheless, it should be documented more clearly, in which way this was done.

Technical Comments

Language in the paper is generally good with few mistakes, so I do not have a lot of technical comments, except the following:

- 5994/11
This sentence does not make sense to me. It has too many substantives or too less verbs.
- 5997/6
Et al. are several authors so please use plural in the verb. This happened several times in the paper, so please check with Strg. F.

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- 5996/1
Please find a better expression for "help too".
- 6003/2–6004/21
The relevance of those two paragraphs with all the technical details did not become clear to me.
- 6013/5–6013/24
This is a bit long for my taste, especially the last bit from line 18.
- 6028/6,10
"more of a challenge" used repeatedly.

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