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## ***Interactive comment on “Plate tectonic raster reconstruction in GPlates” by J. Cannon et al.***

**J. Cannon et al.**

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We thank the reviewers and the editor for taking time to critically evaluate our submission. The manuscript has been improved on the advice of the reviewers. Our responses to specific comments are below. The updated manuscript is attached as a supplement to the Reviewer 1 response for referral - all manuscript modifications are in bold typeface.

Reviewer comment:

My overall impression is that this manuscript would ideally belong to a technical journal on computer models and methods, although I recognize that the main target of GPlates is an audience in solid earth. One suggestion might be to turn to GMD (also from the EGU suite).

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Response:

Actually we previously submitted our paper to GMD but it was deemed "outside the scope of GMD". And yes, the Solid Earth community is the main community we are trying to reach.

Reviewer comment:

I have only one main comment. In the abstract (first sentence), the reader gets the impression that GPlates permits to render data sets at arbitrary resolution. I suggest making clear the distinction between computer and data resolution. I guess authors refer to the former, while the actual data resolution remains fixed. Instead, this seems to be clear throughout the rest of the manuscript.

Response:

Actually it's the latter (data resolution) that we are referring to. The data resolution of the raster can essentially be arbitrarily high (disk-space storage concerns aside) without compromising its interactive exploration in GPlates. The high-resolution raster detail then becomes visible when the user zooms into the raster far enough. So if a user wants to see small-scale details in a raster (without it just getting increasingly blurry as they zoom in) then they can import a high-resolution version of that raster (eg, they might import a 10,800 x 5,400 pixel version instead of a 3,600 x 1,800 pixel version). In most cases we assume the computer resolution is fixed to be that of the monitor (eg, 1,680 x 1,050 pixels) - for example, if you run GPlates in fullscreen mode - and so the only way to see the detail is to zoom in. However GPlates can export rasters to arbitrary user-specified resolutions (eg, a global 1-minute resolution exported raster is 21,600 x 10,800 pixels which is much higher than a typical computer monitor resolution). So, in this sense, you could say that the computer, or output, resolution is arbitrary too.

However to make it clear that we are referring to data resolution (and not computer resolution) we have added the following text near the middle of the Introduction...

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"Interactive exploration of raster data, at the fixed resolution of the computer monitor screen, requires the user to pan and zoom the view in order to expose desired raster regions and details. Since the imported raster data can have arbitrarily high resolution we must employ visibility culling and level-of-detail (LOD) techniques. These enable the raster to be efficiently rendered at the highest detail level permitted by the monitor resolution and the user's zoom level."

...we decided to change the Introduction instead of the Abstract since the Abstract has "interactively reconstruct arbitrarily high-resolution raster data" which associates 'high-resolution' with 'raster data'. And later in the Abstract there's "visually explore essentially unlimited resolution geophysical raster data" which associates 'unlimited' with 'raster data'. So we weren't sure the best way to modify it to make it clearer, and so decided to edit the Introduction instead.

Reviewer comment:

Sentence at 19-23, p.794 reads too long.

Response:

We have removed ", attached to moving plates" from "In the plate tectonics domain there is also the need to explore data in their spatial arrangement through geological time, attached to moving plates."

Reviewer comment:

So does 8-11 at 795.

Response:

This sentence is now three sentences...

"Interactive exploration of raster data, at the fixed resolution of the computer monitor screen, requires the user to pan and zoom the view in order to expose desired raster regions and details. Since the imported raster data can have arbitrarily high resolution

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we must employ visibility culling and level-of-detail (LOD) techniques. These enable the raster to be efficiently rendered at the highest detail level permitted by the monitor resolution and the user's zoom level."

Reviewer comment:

14 at 795. 'Secondly,...'.

Response:

This sentence has been split into the following two sentences...

"And secondly, visibility culling reduces the workload by spatially partitioning each LOD image into tiles."

...and...

"Only those tiles that are visible for a given view position and direction are then loaded and rendered."

Reviewer comment:

I suggest breaking Section 6 into Discussion (until 4 at 816) and Conclusions (from there on).

Response:

We have separated "Discussions and Conclusions" into two separate sections as you suggest.

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Interactive comment on Solid Earth Discuss., 6, 793, 2014.

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