Geoscientific Model Development Discussions

Geosci. Model Dev. Discuss., referee comment RC2
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Comment on gmd-2022-248

Robert Oehmke (Referee)

Referee comment on "Strategies for Conservative and Non-Conservative Monotone Remapping on the Sphere" by David H. Marsico and Paul A. Ullrich, Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2022-248-RC2, 2022

+ General comments:

This was an interesting paper and I thought that overall the ideas were good and potentially useful. (There are definitely some things in this paper that I'm interested in trying in our code.) However, I thought that some of the sections could be expanded a bit to make the overall algorithm clearer (e.g. 4.1.2). The one thing that I saw that should be changed is under "Requested minor revisions" below. The comments below that in the "Questions and comments" section are just suggestions.

+ Requested minor revisions:

- The one thing that I saw that should probably be changed is that you make a general statement about how it was shown that the integrated versions are capable of maintaining accuracy across arbitrary source mesh resolutions (line 318). However, in section 4.4 test 2 you only show the bilinear results for integrated vs. non-integrated for a source refined beyond the resolution of the target mesh. Given this, I think that you should either add graphs for the other 2 non-conservative methods in that second test or just mention the bilinear in that conclusion sentence. It could be that I'm misunderstanding what's being shown in that section (4.4.), if so a bit more explanation in there about why just bilinear is being shown in the second test would be useful. Also, I think "arbitrary" is a bit strong for that sentence, maybe something like "wide range" would be better to describe what you show.

+ Questions and comments:

- Line 26: I wondered if you meant "non-conservative" at the end of this line, since you

talk about conservative in the next part.

- Line 191: ESMF also supports regridding where the data values are on the nodes, so dual conversion isn't always necessary.

- Section 4.1.1. It would be useful to have a diagram showing how this algorithm works (e.g. with the 6 panels on the sphere showing a coarse triangulation and destination point.)

- Line 220: What happens if a set of source point spans two panels? (e.g. do you have an overlap region so that a destination point can't land between two panels)

- Line 221: You could add a sentence or two about how you find the triangle that contains the point (e.g. do you just loop or is there a search structure involved)

- Section 4.1.2: I thought that the broader algorithm could be fleshed out a bit more so that the description was at a similar level to other sections. Even a few sentences describing how you find the polygon that would contain the point (or a pointer if you're doing it the same as in another section)

- Line 245: Does this scheme for calculating the weights work if the polygon is concave?

- Line 318 it says " second accuracy" should it be "second order accuracy"?