Biogeosciences Discuss., 9, C3463–C3466, 2012
www.biogeosciences-discuss.net/9/C3463/2012/

Biogeosciences Discussions

Interactive comment on "Towards adaptable, interactive and quantitative paleogeographic maps" *by* N. Wright et al.

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Received and published: 21 August 2012

General Comments:

Accurate paleogeographic reconstructions are a necessary and important starting point for testing a wide range of hypotheses in the Earth sciences. It is, therefore, critical that a transparent, open, and data-driven paleogeographic system be established as quickly as possible. Although this paper represents a very necessary and important step in this direction, it does, in my opinion, miss a key opportunity to go beyond what has been previously attempted in this domain.

Traditional approaches to paleogeography have been largely monolithic, but they have involved fundamentally similar approaches to what is taken here. Namely, geological

data of all types, including climate-sensitive sediments, paleomagnetic data, and fossil data, are compiled geospatially and geochronlogically and then maps are created in such a way as to be maximally consistent with these diverse data. With perhaps the exception of including rigorous geodynamic process-response models, this is essentially what this paper does, but with openly available fossil data. Thus, the approach seems, at first, little different from the work of Ziegler et al, Scotese, and Blakey.

However, the potential is really there to do something in a fundamentally different way. GPlates is an open, freely-accessible desktop application that has the capacity to make dynamic queries to distributed data resources (I know this because the most recent versions of GPlates do this with PaleoDB and Macrostrat, I think...or at least I've seen versions that do). This ability should be the technological focus, not the utility of the data in the Paleobiology Database to constrain paleogeography (we already know fossil data have that property). The ability to have paleogeographic reconstructions "tested" as new data accumulate in distributed geological datasets, in real time, without having to download, format into GPML, and import as a static dump all of the data, would be fantastic. The same is true in reverse. Distributed resources should be able to take advantage of the paleogeographic knowledge accumulating in GPlates and obtain rotations in real-time from it. This back-and-forth then makes the optimization problem more engaging and could possibly even make geological datasets more accurate, or at least more internally consistent (circularity here is a real and present danger; for example, if fossil data are used to inform something important about the longitudinal position of a continent, it is somewhat problematic if that reconstruction is used to test a hypothesis about biology; but that is also one of the reasons that we need a more transparent, open, and dynamic paleogeographic system).

Less General Comments (C) and Questions (?):

?) How do you allow for error in the coordinates and ages of fossil collections? Many do have errors in location as well as in geochronological age. I'm never one to let such quibbles be a deal breaker, as usually I use such data in ways that allows the central

limit theorem to kick in. But here, it seems, a typo of a 9 in place of an 8 in the tens position of a latitude entry for a fossil collection might make a real difference.

C) The Paleobiology Database is open access, but not really open source. The code that does all of the logic of things like taxonomy and age assignments is largely hidden and in the mind of John Alroy (and similarly capable interpreters of Perl written with best-practices only as a good notion in mind.)

C) I found the age-to-age description somewhat tedious. That doesn't mean it isn't important or worth including, but it does mean that if there are points buried in there that you think are really important, they need to be clearly exposed in some way. The new take on the Emsian is quite interesting and worth highlighting.

?) On page 9614 you say that the existing reconstructions didn't draw on fossil data. Really? What did they draw on then? I always though most paleogeographic reconstructions past the point of seafloor-constraints involved everything possible.

C) On pg. 9618 you say, if I may translate into something more succinct, that it is difficult to identify the meaning of an absence in fossil data. Forgive the advocacy, but this is one of the reasons why macrostratigraphy is so useful. It is based just as much on the absences as the presences. In my view, macrostratigraphic data would be much, much more useful for constraining most elements of paleogeography for this reason (and others).

So, I will take this opportunity to ask my Australian colleagues, when are you (or we) going to get Macrostrat Australia going? It would be great for so many reasons....

?) Related to above, on page 9619 why do you say global coverage is poor in Carboniferous? What is the "denominator" here?

?) Fig. 5. What does it mean that this dataset "sufficiently represents" Phanerozoic biogeography?

?) Fig 10. Isn't it possible that the distribution of collections is a surface exposure vs.

subsurface issue? The vast majority of fossil collections in the PaleoDB come from surface outcrops. Again, this is a reason why Macrostrat-type data are so useful. They includes both surface and subsurface data, as well as data that help constrain some geodynamic things (like sediment thickness). It sure would be great to have such data for Australia!

Interactive comment on Biogeosciences Discuss., 9, 9603, 2012.