Geosci. Model Dev. Discuss., 6, C550–C551, 2013
www.geosci-model-dev-discuss.net/6/C550/2013/

Geoscientific Model Development Discussions
Open Access

Interactive comment on "The mathematics of the total alkalinity–pH equation: pathway to robust and universal solution algorithms" *by* G. Munhoven

A. Ridgwell (Editor)

andy@seao2.org

Received and published: 10 May 2013

Guy – I concur with both reviewers – this is an excellent piece of work with high potential for becoming an important and widely-used element of global carbon cycle (and other) models.

I add my own personal observations alongside that of one of the reviewers – in my own ('GENIE' model) code, which is solved implicitly, while for all past (paleo) and modern 'natural' (DIC,ALK) I have come across the algorithm has had no difficult in converging on a unique solution within only a couple of iterations, in the context of artificially adding lime (CaO) to the ocean surface (aka carbon dioxide removal geoenginereing), in exceeding ca. 4000 umol kg-1 ALK compared to ca. 2000 umol kg-1 DIC I find that failure in specific grid cells can start to occur. (This has prompted me to add a

pre-estimate of the possible range of pH to re-seed the model iteration with.) TL:DR – your algorithm is attractive

I encourage you to revise along the lines suggested by the reviewers. In particular – anything you can do to make the paper more accessible would greatly aid in its future uptake and impact.

I note the provision of the code plus full documentation (although sadly I have not had a chance to compile and run it myself) as an exemplary GMD effort.

andy

Interactive comment on Geosci. Model Dev. Discuss., 6, 2087, 2013.