Biogeosciences Discuss., 10, C3000–C3002, 2013
www.biogeosciences-discuss.net/10/C3000/2013/

Biogeosciences
Discussions
Open Access

Interactive comment on "Estimating temporal and spatial variation of ocean surface $p\mathrm{CO}_2$ in the North Pacific using a Self Organizing Map neural network technique" *by* S. Nakaoka et al.

S. Nakaoka et al.

nakaoka.shinichiro@nies.go.jp

Received and published: 25 June 2013

Comments: In this study the authors assume that the oceanic pCO2 growth rate is constant in time, a recent study Lenton et al (2012; GBC) calculated the oceanic pCO2 growth rates seasonally and annually. In this study they showed a strong seasonal decoupling in the Subpolar and Subtropical Gyres – driven by different processes. One of the key results of this new paper is that including the oceanic growth rate improves the statistical significance of the results. I am concerned that assuming a fixed annual oceanic pCO2 growth rate would be an a priori constraint on the magnitude of variability in pCO2. Could the authors please comment on the sensitivity of their improved

methodology to the observed changes in oceanic pCO2 growth rates in the North Pacific.

Reply:

Dear Dr. Lenton,

We thank you for your evaluation and all the useful comments. Even though we show in this study that the inclusion of the secular trend effect slightly, but statistically significantly (p<0.05), reduced the RMSE for the whole of the North Pacific, we suggest in the revised manuscript that applying a basin-wide correction of 1.76 μatm yr–1 (4.82 $\times$ 10–3 μatm day–1) might not be the most advantageous and a non-uniform approach should be employed in the future where sub-region (province) specific correction should be calculated and applied. This is based on the fact that in some regions no improvement was observed which is in line with Lenton et al (2012, GBC). We have however checked the "gross" sensitivity of adding or not adding the secular trend to the training algorithm and adding the trend improved our estimates. We will investigate this aspect more thoroughly in our future studies.

Comments:Abstract- I would be a bit more explicit and state that this is a further improving and refining of the neural network technique

Reply: We have revised the abstract and it is now clear that the method we use here is an improvement of an already utilized approach.

Comment:P4581 Line 25: Is this data available yet?

Reply: I think the data will be available within a week.

Comment:P 4585 Line 22: fourparameter should be four-parameter.

Reply: Done.

Comment:P 4585 Line 29: Recommend adding "at these latitudes" at the end of the sentence.

Reply: We deleted the sentence because the description was incorrect.

Interactive comment on Biogeosciences Discuss., 10, 4575, 2013.