

## ***Interactive comment on “Long-term record of pH in the Dutch coastal zone: a major role for eutrophication-induced changes” by P. Provoost et al.***

### **Anonymous Referee #1**

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#### General comment:

This paper discusses about the significance of general Ocean acidification models for coastal zones (including estuarine systems) with the example of the Dutch coastal zone. The paper is generally well written and structured although some parts of the discussion, and conclusions flowing out of it, could be better outlined - particularly the link between long term pH changes and nutrient loads.

#### Specific comments:

Introduction: Very well written and clearly conducting towards the objective of the paper – evaluate whether the generalised Ocean acidification model applies to the Dutch  
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Coastal zone, and coastal zones in general.

Methods: Well and clearly written but some questions arise from the wavelet analyses description which is maybe to concise. -Was the analysis performed for each station or only for the “test” stations? -Can you not perform a wavelet analysis on data from a group of stations ? (group them by distance from coast for example).

Results: How “representative” are the selected stations? For the North-Sea area especially, the covered area comprises very different zones (remote and close-to coast stations, influenced by river outlet or not, ...) that must display strong variability.

North sea: seasonal amplitude vs distance from coast. What does figure 6 represents exactly, all stations? All years? Does seasonal amplitude vary over years (with productivity)? You show the spatial variability of seasonal amplitude, why not also represent the temporal variability of seasonal amplitude?

Discussion: First paragraph is quite repetitive of what was presented in the introduction – not necessary to repeat. Maybe just concentrate of the pH changes that are not only linked to atmospheric CO<sub>2</sub> increase.

P4137 paragraph line 10 and down: what about year-to-year variations of productivity in these systems vs amplitude seasonal variation of pH ? When you give productivity ranges, it is worth to give the years they apply on as the studied systems almost all underwent changes of productivity over the years.

P4138 line 10: do you mean CO<sub>2</sub> dissolution rather than uptake?

P4138 last paragraph –For the Western Scheldt the pH increases only (but strongly) between 1985 and 1990 while the ammonium reduction was continuous since 1975 (Soetaert et al 2006)... The interpretation of increased pH is somewhat confusing – you link it to NH<sub>4</sub><sup>+</sup> reduction and so less nitrification, but also to nutrient reduction and increased turbidity – but this should both limit primary production and so decrease pH ?

P4139 line6 to 18: The decline in pH in the Western Scheldt starts in 1995 – I would

not call this recent. . . Do you mean in this paragraph that the decrease in pH observed is also linked to a shift in ecosystem metabolic balance as was observed in the Belgian coastal zone?

P4139 last sentence: “During periods of enhanced nutrient loadings pH increased, while pH decrease during periods of lower nutrient loads”: This view is too simplistic and does not apply, straightforward, on all the studied systems. You do not show a direct and evident link between long term nutrient load variations to the studied systems and long term pH changes. You should be more cautious and show (or cite from literature) more precise nutrient load variation data for the studied areas. It would be helpful to have a kind of summary table with, for each studied area: the period – the nutrient load variations – the PP variation (when available) – the pH variation.

Fig1. Symbols in the legend do not correspond with the ones in the figures for Wadden Sea, Western- and Eastern Scheldt.

Fig8. Not necessary – same info as in Figure 3

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