

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.

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We would like to thank the reviewer for his/her constructive comments, we will try to address each of the points raised.

However, I feel that there is a wealth of information and data in the waterbase that could have been exploited to substantiate the discussion of the pH data (using the same database and the same statistical approaches). For instance Chlorophyll-a data could have been useful to indicate the changes of primary production in relation to eutrophication.

For the North Sea, our preliminary analysis of other variables such as chlorophyll-a
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and salinity, and detailed analysis of dissolved nitrogen (in Van Engeland et al., 2010) did not show any patterns that could be related to the long-term pH signal. This was different for ammonium where the trend was very similar, but we could not readily come up with a mechanistic explanation for this correlation. It is likely that both variables are influenced by the same process(es).

This analysis would be interesting in the light of the analysis of Chlorophyll-a by McQuatters-Gollop et al. (2007) that actually suggest a recent increase of primary production in the Southern North Sea.

It is correct that changes in the chlorophyll inventory are often accompanied by concurrent changes in primary production. However, while McQuatters-Gollop et al. (2007) and other studies have shown increased chlorophyll concentrations in the southern North Sea, measurements in the Marsdiep (Cadée & Hegeman, 2002) and modelling of the Belgian coastal zone (Lancelot et al., 2007) show a strong decrease in primary production after 1990. This is consistent with the pH patterns we observed in that area.

Also, while the authors acknowledge the possible role of atmospheric deposition in controlling pH in coastal waters (e.g. Doney et al. 2007), they could try to estimate even roughly what could have been the role of this process in the trends of pH in Dutch coastal environments.

All known data show a reduction of atmospheric deposition (Brion et al., 2004), which should induce an increase in pH. This is contrary to our results.

Finally, I've checked the waterbase, and besides the data, no meta-data on the measurement techniques seem to be available from <http://www.waterbase.nl/>. The authors need to specify how and where they obtained the meta-data relative to the pH measurements.

pH measurement tables downloaded from WaterBase include a column indicating the use of one of the following methods:

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original (Dutch)

bepaling van de zuurgraad in water

bepaling pH - veldmeting

alkaliteit mbv titratie

MdSV Sea-Bird Electronics 911 plus system

bepaling van de pH met behulp van een glaselectrode

translation

acidity in water

acidity field measurement

acidity by means of titration

MdSV Sea-Bird Electronics 911 plus system

acidity by means of a glass electrode

Unfortunately these names are not very informative and we assumed a change in methodology whenever there was a change in this field.

references

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