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Ocean Science
Discussions

Interactive comment on "Total suspended matter derived from MERIS data as indicator for coastal processes in the Baltic Sea" *by* D. Kyryliuk and S. Kratzer

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Remote sensing of coastal seas from space has provided us with some interesting observations leading to changes in the way that we understand shelf seas to work. For many shelf seas, especially in northern Europe, the strongest signal we can see in satellite imagery is the distribution of near-surface suspended sediments. A strength of this paper is that it uses this strong signal to tackle an important management issue: can we identify how far out to sea the effect of the coast extends? The paper builds on earlier work which predicts that the suspended sediment concentration should decay with distance offshore and the offshore extent of 'coastal processes' can be defined as the line marking where the suspended sediment load falls below a critical value.

There are two weaknesses with the paper, as I see it, which should be addressed by the authors. The first is that, I am not sure that suspended sediment concentrations are necessarily an indicator of 'coastal processes'. If, for example, there is an offshore mud bank in shallow water, this may produce a surface signature of suspended sediment which is nothing to do with the coast. In the Baltic, the width of the measured coastal zone is greater in the south-east than it is in the north-west, a feature the authors explain in terms of the muddy nature of the sea bed in the south-eastern study site. I'm not sure that a muddy sea bed can be attributed to 'coastal processes'. So, a relevant question is where do the sediments come from? The coast or the sea bed? In my experience, in north-west Europe, the major source of fine sediments is the sea bed - they are not really associated with coastal processes at all. Things may be different in the Baltic. I would be interested in the author's views on that point.

My second concern is that the curve-fitting employed by the authors is rather blind and appears to ignore important features in the data. Curves are fitted to plots of suspended load against distance offshore and a threshold is identified which marks the edge of the coastal zone. But if we look at a plot like figure 11b (SE3) (for example) there is obviously a sharp drop in sediment load at a distance 5 km offshore which appears to me to mark the edge of something. But the curve fitting technique identifies the actual limit of the coastal zone as further offshore than this. An even clearer example is in figure 11b S4 where there is obviously a clear edge at nearly 10km offshore which is missed by the curve-fitting technique. So the curve-fitting is ignoring obvious features (fronts and edges) in the data. Author comment please.

minor comments:

abstract, line 8, 'geographical extent' may be a better term than 'physical extent' here.

section 2.1 line 2, we are told that the study areas are selected on 'run-off, depth, wind exposure and bottom substrates'. Some details of what these features are like at the different study sites would be useful here.

You seem a little unsure in your description of how you avoided times of cyanobacteria blooms. I know these are dominant in satellite images of the Baltic in summer and it's important to avoid them. I'm convinced when you get to the chlorophyll maps and tell us that these don't look like the TSM distributions. So, perhaps make that point right up front?

When you fit the polynomial curve, you choose the order of polynomial that gives the highest r-squared. Usually, r-squared will increase as the order of the polynomial increases, until eventually the curve goes through all the points. What was the upper limit of the polynomial you chose?

An important criterion in defining the width of a river plume entering the sea is the Rossby radius, which is the turning radius on a rotating earth. In a simple way, we can say that the coastal zone is likely to scale with the local Rossby radius. It might be worth mentioning this and telling us how the Rossby radius in the Baltic compares with the widths you measure.

Table 2 caption, please tell us what these are the 'min, max, mean and median values' of. Also, since the units of all are the same, perhaps the final column could go in the caption too?

When you are doing the polynomial and logarithmic curve fitting, it would be worth spelling out what exactly are the dependent and independent variables you are using. Presumably they are not the same for the two types of curve?

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