**Ocean Science
Discussions**

Interactive comment on "A pre-operational 3-D variational data assimilation system in the North/Baltic Sea" *by* S. Y. Zhuang et al.

Anonymous Referee #2

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General Comments ――――――

The manuscript presents a study about a 3DVAR assimilation system for the North Sea/Baltic Sea. The system uses core components which can be found in the literature. The methodology is explained and statistical results are given. We appreciate the discussion of coastal zone specific assimilation issues.

The paper is relatively well structured and the results look convincing.

The presentation of the material could be improved in some places. For example the presentation of the re-cursive filter is hardly understandable for somebody who is not familiar with the subject.

More detailed information on the minimisation procedure should be added. What is the

termination criteria ? How many iterations are typically required ? How much computer time is needed ?

A comparison with observations, which are not used in the analysis would have been nice, but due to the realively long correlation length and times one can more or less imagine how those comparison would look like.

Did the authors observe any impact of the analysis in the barotropic part ?

Discussion of an interesting case (front etc) would have been nice and would also have helped in the explanation of the scheme.

The english should be checked by a native speaker.

We recommend publication after minor revisions

Specific Comments ――――――

Abstract ―――― line 10: please reformulate/correct ".. that no assimilation is done."

page 1133, line 11 : The statement sounds like it is not possible to assimilate 3D observations with a Kalman filter in general - please be more specific.

line 21: " .... satellite ... relatively poor ..." This statement is too general - what kind of data are you talking about ?

page 1134, line 12 : " ... more efficient approaches .." it is not at all clear what you mean by "efficient"

page 1137: line 12 : " ... realively uncorrelated." please reformulate, e.g., " .. the covariance matrix of v is the identity matrix."

eq. 15: the description of the vertical error covariance is a little bit confusing. Is a parametric form (eq 15) used instead of empirical functions ?

page 1144: line 14: something wrong with observation location

The use of relative quantities like, e.g. the forecast skill, to quantify the assimilation performance would have been nice.

Figure 8: units missing

Figure 7: units missing

Figure 9: units missing