

Simulating the Red Sea Ecology with parallel 1D marine ecosystem models and clustering

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Abstract

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1. Introduction

3D marine ecological models are useful....

...But expensive and difficult to run.

In this article we look at ways to simulate 3D ecosystems more cheaply by running many parallel 1D regional models.

We are going to test that idea on the Red Sea because....

We will also the hybrid-SEIK data assimilation scheme, because....

We will assimilate Chl data even if it is imperfect because it is the best available data for the Red Sea.

What we are going to do in this paper step by step.

What is new in this paper and why.

Introduce sections.

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13 **2. Data**

14 *2.1. CCI chlorophyll data*

15 *We use CCI chlorophyll data because it has more coverage..*

16 *With a quick look at the data this is what we see....*

17 *2.2. DINEOF*

18 *There are still missing data in CCI, so we use DINEOF for data filling be-*
19 *cause....*

20 *More or less this is the way DINEOF works....*

21 *This is how we applied DINEOF....*

22 *Now we show the results of DINEOF.*

23 *2.3. Clustering*

24 *To do 1D models, we cluster the Red Sea using clustering algorithms. We chose*
25 *GMM because....*

26 *This is more or less the way GMM works....*

27 *This is how we used it....*

28 *This is what we got....*

29 **3. Model and Assimilation**

30 *3.1. 1D-ERSEM model*

31 *Description of ERSEM.*

32 *Initialization/Parameters/Forcing.*

33 *3.2. Data Assimilation*

34 *We chose hybrid-SEIK DA scheme because....*

35 *Equations of hybrid-SEIK.*

36 *Parameters.*

37 **4. Results**

38 *4.1. Model evaluation*

39 Here, we compare the results of the free-run with the assimilated-run. We
40 show that we have a good prediction skill, and that the assimilation improves
41 the model.

42 *4.2. Analysis*

43 Here we look at the results and interpret them biologically. Do we find
44 comparable results as Acker, Raitsos, Weiker, etc. What can we say about the
45 hypothesis that they made about the process that drive primary productivity in
46 the Red Sea.

47 **5. Conclusion**

48 Are several 1D parallel 1D models a good alternative to 3D simulations?

49 What did we learn about the Red Sea ecology?

50 Future works?

51 **Acknowledgment**

52 The research reported in this publication was supported by King Abdullah
53 University of Science and Technology (KAUST).

54 **6. Bibliography**