Reviewer 1 comments

General comments

1 This coupler exists and has been used in projects – its development is fluid however. Some code has been included and is described in the appendix

2 An explanation of this has been given The user specifies this.

3 There is a misunderstanding here and more text has been added. It does not automate biology it does give a control panel (via xml) that reduces the need to tinker with code.

4 Agreed and in discussion. This will always be a problem especially where authorship is spread amongst numerous research groups. Couplerlib helps with some of the technical aspects and exposes all sorts of assumptions. How we deal with them is a big issue for the community. Discussion

5 Not really an issue - the HTL takes up a fraction of the computing time (this is now quantified in the paper). Also the use of Couplerlib as a validator with direct linkage would overcome these problems where they occur (not here).

6 I have removed the section on stability. Which is a pity because it gets to the core of what the problems are between the models but not totally pertinent to Couperlib.

P1 title – True my aim is to outline how a metadata based approach can help link disparate models. I find the whole field a little vague at the moment. Comment to editor I have not changed this because I don't want it to appear there are two separate papers.

P2 2-2 Reworded

P2 L13 In practice this sort of coupling may be carried out locally and across the cloud (for example linking Linux to Windows)

P2 L24 Done

P2 L26-L27 This was probably the biggest deficiency of the ERSEM – EwE link. There is active research on ERSEM detritus and couplerlib can support this. The thing to emphasise was that by controlling the linkage specification one can work round things that don't work very well – obviously with less than ideal results, and the couplelrib spec. can be updated as the models evolve without having to change all models.

P2 L28 inserted

P2 L2 changed

P3 L6 Definition added

P3 L11-12 removed – this is not a paper about bibliometrics and things will change over time.

P3 L17 These have been mentioned –provides another useful weapon in our armoury which do not (as in this case) always exist.

P4 L1-4 Reworded (note that in this large EU funded model) there is a lot of objective setting aimed at what are seen as policy priorities rather than modelling priorities.

P4 L17 – reworded

P5 L9 – Impressive because this model is getting a reasonable match to data

P5 L26-27 Work has been carried out on this but has not been mentioned in this paper because this is about 1D modelling not 3D.

P6 L25 The section has been modified to point out we are largely describing the managed interface, but network and offline methods have been used with this model and how the model can be used with direct coupling which is not appropriate here.

P7 L7 This is correct terminology and is exemplified, also a big problem in coupling think of C and FORTRAN array ordering conventions

P7L8 Of course we could set up a model to use different units – but the idea of Couplerlib is to work with existing models. Direct coupling means data is shared in memory and so cannot hold both converted and unconverted – also array indexes may be different, dimensions different etc.

P8 L3 we have mentioned that sometimes off line coupling is preferable - looking at the HTL implications of a few runs of a very big LTL model for example.

P8 L6 Done

P8 L19-23 I have clarified what appears to be a misunderstanding. Couplerlib works under human control via xml linkage specification files, it automates indirection, units and low level things.

P8 L24 Noted that this a project requirement

P9 L7-L17 Pointed out that although this bit is Onerous it only needs to be done once. Discussion section points out advantages.

P9 L19 Explained that this is how unique services identified across network

P11 L20 a bit more explanation is included

P12 L18 A bit of clarification has been include here

P13 L3 Screendumps are too poor quality to print – some included in appendix

P14 L1 Its not really the focus of the paper and Table 1 shows the links. A food web output from EwE is rather a mess

P14 L17 Very many were tried and most were deemed unsatisfactory, as discussed, see next point.

P15 L1 This has been clarified. The author of ERSEM and myself came up with this as a solution, which is probably the best way of resolving this sort of problems short of a rewrite. Discussion focusses on limitations.

P15 L8-20 During development big timesteps (1 month) led to problems

P15 L16-17 Yes this has be clarified

P16 L3 I have added more about the dictionary and included it. It's up to the user to specify what links are allowed. At the least the dictionary allows synonyms between models to be specified which

is less error prone than dealing with linking the third item in the array in one model to the tenth in a different model

P16 L6 The two section have been reversed.

P16 L7-L13 Note also comment on ERSEM metabolism

P16 L14 New reference inserted here for this

P16 L20 and P16 L24-25 We have tweaked these to get the model to iterate sensibly. Is it true that we have in effect put an error in one part of the model to correct an error elsewhere – probably But having to put ad hoc changes to compensate is a price we pay for using existing models – Couplerlib lets us do this and lets us get results> Discussion.

P20 L3 I regard the zooplankton predictions of all Biogeochemical models as poor, this has been a refrain in the community Discussion.

P20-L7-L26 Yes spinnup is being observed and the graph shows the dramatic effects of this. Further work looked at the dynamics after spinnup. This work waS not presented because it used Ecospace – it could be a follow up paper. Discussion added

P20 L25 No I did not 'With extensive reworking .of the () models" Discussion indicates what we have to do. If I though we couldn't do this (i.e. E2E modelling was hopeless, I wouldn't be doing it). But rewriting the coupled models was beyond the scope of this project.

P21 L6 They are idealised for sensitivity purposes (noted).

P 21 L21-25 Not a dichotomy as such and text altered to indicate that these two forces (nutrient limiting and predation negative feedback are working in tandem

P23 l25 changed to indicate Si dependency of diatoms

P24 L24 Winter feeding was reduced – sandeels example was empirical data in support of this assumption – Clarified.

P28 L28 Clarified

P22-30 I have removed some discussion on model stability which is an important issue in its own right but cannot be done justice here.

Table 1 . We have had to link the two models with what we have available. More specifically – Omnivores is a reference to how ERSEM is set up with the whole group eating from itself, although not all will do this. Omnivorous and herbivorous is a better term for what is the same thing so not really an issue . There a is fair bit of mismatch in the benthic groups which is really problematic and has been dealt with by loose coupling, There is discussion of phytoplankton has been dealt with in the text.

Figure 3 This is very technical, hard to read and breaks up the narrative , This could go online as a separate appendix .Editorial decision on whether to move this to appendix needed.

Figure 4This seems to work online when I view it – may need reformatting

Figure 5 Yes, this has been discussed

Figure 6 This seems to be OK

Reviewer 2

Abstract – sentence added.

Introduction – Model does not focus on zooplankton … true I have changed emphasis slightly – a discussion section on the advantages of Couplerlib, a little bit more info on the dictionary

PP5579-L8 MSFD relies on indicators and it is not always clear how they relate to environmental health , modelling acts as a bridge . Comment added to text.

PP5579-L 19 Sentence added to show diversity of what is meant

P5580 L3 This has been changed to make it clearer

P5580-L6 Reference to WP removed

PP5582 –L5-6 Clarified that it has been developed and its source referred to in appendix 1

Methodology

More reference to dictionary and included in appendix

P5583- L21 I have used version without network

PP584-L18 There is an xml file that specifies the linkages – included in appendix, see also next section.

5589 – Agreed that a user guide would be helpful but producing it will require resources that we do not have at the moment. Some of this material has been put in to answer specific questions by reviewers.

5590 68 in total

5591 15-16 Noted that benthic coupling is two way for detritus and no overwriting on benthos occurs

P5592 Explained that this is really about examining transition when input is changed

Results

Explained that most of time is in ERSEM with very little in EwE or couplerlib

P5595 L24-26 Explained that most important route is via zooplankton and that fish larvae is a dead end group.

PP597 Agreed that this is not showing model at its strongest

Discussion

Section on Ecosim stability removed