

Reports to SCOR (2020)

1. Name of group

Iron Model intercomparison project (FeMIP), SCOR WG 151

2. Activities since previous report to SCOR (e.g., virtual or in-person meetings, email discussions, special sessions). Limit 1000 words

Ocean Science session convened by Al Tagliabue and Andy Ridgwell. Titled 'The role of micronutrient cycles in global scale dynamics' it showcased 8 oral presentations and a set of posters, bringing together observations and modelling of iron and other micronutrients over different space and time scales.

The second working group meeting was held in conjunction with Ocean Sciences, San Diego on 16 Feb 2020. This meeting was attended by 23 people (2 remotely), including most of the working group and several guests. We had several talks covering four specific topics:

Iron inputs and internal cycling; iron model evaluation; role of dust in ocean iron cycle; role of biology in ocean iron cycle.

We also had several discussions based on the WG objectives:

Obj 1: Best practices in ocean iron cycle modelling

Obj 2: New tools in ocean iron model evaluation

Obj 3: Constraining the supply of iron by dust

The meeting was very productive and we feel led to significant process towards the goals of the working group.

3. Documents published since previous report to SCOR (e.g., peer-reviewed journal articles, reports, Web pages) and should be limited to publications that resulted directly from WG activities and which acknowledge SCOR support

None yet

4. Progress toward achieving group's terms of reference. List each term of reference separately and describe progress on each one. Limit 1000 words

Objective 1: Iron inputs and internal cycling.

The working group has put together the materials and finalized a table on the complexity used in various models. An open access article was being drafted by Tagliabue, but given the uncertainties

about what closures are optimal, it was not thought it useful to lay out a definitive view. The WG agreed that is premature to share code, but that sharing inputs fields would be a very useful step forward for data sharing.

Objective 2: New tools for ocean iron model evaluation.

Marcello Vichi has taken the lead of this objective, and it is near completion. A new tool for standardized model evaluation was demonstrated at the WG meeting. He will distribute his package of model evaluation matlab code via github and potentially a FeMIP specific website (see point 7 below).

Objective 3: Role of dust in ocean iron cycle.

Andy Ridgwell has undertaken several experiment with GENIE making different assumptions on the solubility, natural versus anthropogenic, depth of deposition, and scavenging particles. Unfortunately, Andy was unable to attend the Feb meeting.

Objective 4: Role of biology in the ocean iron cycle.

Phil Boyd and Stephanie Dutkiewicz have provided a table with the main physiological process that need to be captured in models that are important for iron cycling. Ben Twining has compiled a synthesis of iron quota in a range of marine microbes. Discussions have focused on hierarchal approaches to modelling the iron cycling through the ocean biota.

5. WG activities planned for the coming year. Limit 500 words

Objection1: We will compile and share on publicly available website (to be determined) fields for the following iron inputs: Dust, cosmic dust, glaciers, sea-ice and iceberg supplies, hydrothermal, and rivers. At the February meeting a person volunteered to move forward with each of the above fields. Additionally, we plan to make a FeMIP multi-model mean iron concentration field available in a FeMIP specific website (see point 7 below) which can then be used as a standard model initialization for any OMIPs.

Objective 2: We believe the scope of this objective planned by the working group has been achieved. However, as continuation, we plan to exploring translating Vichi's matlab code to other languages (e.g. python). Additionally, several working group members offered Vichi more modelled iron fields to evaluation and add to the synthesis. Vichi is near to completing a publication on this work.

Objective 3: We plan a video-conference with a subset of the WG plus several guests to discuss Andy Ridgwells results, and those from several other studies currently underway. At the February meeting we did discuss the difficulty constraining model parameterization given the large uncertainties in atmospheric deposition, and we discussed writing a paper review paper on this issue.

Objective 4: We plan a future meeting(s) to push forward with this topic. We will focus on synthesizing on what is known about iron uptake (by diverse organisms), iron limitation and recycling. We plan a video meeting in the near future, but given the scope of this topic, we believe and additional meeting in the 2021 timeframe would be good.

6. Is the group having difficulties expected in achieving terms of reference or meeting original time schedule? If so, why, and what is being done to address the difficulties Limit 200 words

Good progress and energy during meeting in February. Unfortunately, subsequent events regarding the pandemic and shut down of institutions and changes in home/work/schooling life has reduced much of the momentum on immediate plans. As the situations improve, the co-chairs will attempt to revitalize this plans.

7. Any special comments or requests to SCOR. Limit 100 words.

We now have code and fields (forcing and initial conditions) that we would like to make publicly available. Some of these are already on local sites, but we believe that a FeMIP specific website would be beneficial to be able to group these all together, and that would have longevity. Is there any feasibility of SCOR hosting such a website?

Additional information can be submitted and will be included in the background book for the SCOR meeting at the discretion of the SCOR Executive Committee Reporter for the WG and the SCOR Secretariat.