

## **Minutes for telecon of the MJO-TF on 27 June 2013, 14 GMT.**

TF members on phone: Ken Sperber, Eric Maloney, Jerome Vialard, Jon Gottschalk, Matt Wheeler, Steve Woolnough, Charlotte DeMott, Surya Rao, Duane Waliser, Tomoki Miyakawa, Camille Risi

Others: Frederic Vitart, Min-Seop Ahn

### **1.) Introductions (Matt and Eric)**

Matt welcomed Surya Rao from IIT, and Camille Risi from France (LMD), as this is their first telecon as MJO task force members. He thanked the rest of the task force for joining the call.

### **2) Discussion on S2S (Duane, Harry, Frederic)**

Frederic discussed the concept of S2S, a joint WCRP/WWRP project. S2S is concerned with predictability on subseasonal to seasonal timescales. Duane stated that S2S represents a TIGGE for subseasonal timescales, and includes a large database of operational center forecasts out to 60 days. It is a rich model database that offers many exciting science and applications study opportunities. Last February, S2S had a group meeting at which the MJO emerged as one of about five research themes that S2S would like to cultivate; others include monsoons, extreme events, mid-latitude weather, verification and Africa. Within the S2S discussions from the beginning there has been interest to integrate closely on this theme with the MJO TF, namely having the MJO TF act as a research arm for S2S on this topic. To complete the planning stages for S2S, it is necessary to develop a 2-3 page augmentation to the Implementation Plan for each research theme, and for the MJO, the S2S MJO subgroup (includes: Hendon, Lee, Vitart, Waliser, Woolnough) would like to work in close collaboration with the MJO TF to develop the specific objectives for the MJO segment of S2S.

The key questions of the current discussion are: What can the task force do to take advantage of the S2S database? How can the MJO Task Force guide model forecast improvements that would be synergistic with S2S? In addition, the S2S monsoon project might also have some synergies with the MJOTF, but not as directly. Ken mentioned that he will keep Andy Turner and the CLIVAR tiger team on intraseasonal, seasonal and interannual variability and predictability of monsoon systems in the loop as we develop synergies with S2S. Duane said that we should generate a strawman white paper on MJOTF-S2S integration before the Macau meeting, to serve as a point of discussion at the meeting.

As far as topics for specific joint initiatives between S2S and the MJOTF, Matt suggested that those having time or the resources available to do analysis on the model database should spearhead any joint efforts. Since coupled and uncoupled models are included in the database, we might advance an air-sea coupling initiative

(see further discussion below). The Maritime Continent as a barrier for prediction could be also fruitful, which may also have some relevance to air-sea coupling, as further discussed below. Duane stressed the additional need to also look at science on the applications side, and view subseasonal forecasts in an applied setting - having one or two strong research questions/topics as well as examinations/demonstrations of the potential of MJO forecasts to provide value to applications and decision support. Previous email discussions broached air-sea coupling, TC prediction, and extratropical teleconnections as possible topics (Steve has people working on the latter). A key question is whether MJO leads to significant extratropical predictability. Eric cited an example of a private sector effort that thought the NAO is most important for intraseasonal predictability at higher latitudes. However, Frederic and Steve noted that the MJO can force variations in the NAO that could contribute to its importance. Charlotte noted that the recent October 2012 NOAA climate diagnostics workshop might provide some ideas to mine particularly on forecasting applications, and it might be worth perusing their website. Duane is aware of ongoing work by Schlosser to examine the effect of the MJO on wind energy production, although a manuscript is not out yet.

It was noted that synergy exists between possible thrusts related to air-sea interaction and the Maritime Continent prediction barrier. Steve indicated that Nick Klingaman found that coupling is important to the Maritime Continent prediction issue. The S2S database is unique in that it might allow the ability to look at ensemble members where the MJO makes it through Maritime continent and those that do not. Duane asked whether operational centers feel that ocean coupling or the perceived Maritime Continent barrier is the bigger problem. Frederic seemed to indicate that coupling does not matter much. Jon indicated that unknown missing processes are more important than coupling for Maritime Continent. Duane also cited that land-atmosphere interactions could be important. Steve indicated that recent work with the UKMO model suggests mean state bias may affect Maritime Continent prediction. As far as whether the S2S database is good enough to diagnose on a process-level there are reasons for biases, the diurnal cycle of surface variables may be there which provides some hope. Steve indicated that the database may struggle to do proper process-oriented study however, but might instead suggest which processes might need to be tested in follow-up studies. Duane noted that the MJOTF-GASS experiment has ample model output to study the diurnal cycle and land-atmos-ocean interactions questions. Eric noted that there could be some synergies between TC work ongoing at CSU and S2S, related to the extreme events subgroup of S2S, which is being led by Frederic.

**ACTION ITEM:** Do more brainstorming on synergies between S2S and the MJOTF. Duane will lead generation of a 2-3 page white paper on synergy between the MJOTF and S2S, entraining feedback from the telecom and email discussions. This paper will serve as a starting point for discussion in Macau.

### **3) Air-Sea interaction discussion (Jerome, Surya, Charlotte)**

Last time, Jerome suggested a possible review paper on air-sea interaction. He clarified the objectives of this suggestion during the current telecon. Jerome stated that the impression one gets of previous review papers of air-sea interactions are that they are overly broad. Only a small fraction of this review material has been dedicated to the specific feedback of the ocean onto the atmosphere. The consensus in the community seems to be that the MJO is not truly coupled like ENSO, but the MJO is an atmospheric phenomenon with some ocean feedback onto the atmosphere. It is somewhat vague in literature how strong this feedback actually is. Is it of first-order importance, or is it weak? This is an especially salient question if we want to do intraseasonal forecasting. Jerome feels that a literature review is necessary, but that we as a task force should explore doing more than a review. One possibility is a coordinated set of experiments in which we do experiments to diagnose MJO variability in coupled and uncoupled runs, feedbacks onto the atmosphere, and then implications for prediction. Is a set of coordinated experiments realistic to expect? If so, should we lean on existing CMIP5 models? If the general feeling is that such an approach would be useful, should we propose methodology to test this question in context of CMIP5 database? The discussion here has obvious links to the previous S2S discussion on coupled and uncoupled models. One question from the S2S database is whether we can see a difference in MJO predictability between coupled and uncoupled models? Surya chimed into this discussion, although his phone was a bit muffled, and so he will send an email summary of his discussion points, related to discussion of the CFS coupled model. Steve provided a key caveat to this discussion, in that coupling often changes the basic state, and hence it is difficult to determine whether coupling is what is important, rather than basic state changes, particularly for long integrations. Gilles Bellon has been doing experiments running an atmospheric model with coupled model SSTs, which is a framework to determine whether basic state is important. Steve noted that hindcast frameworks might be a good approach, since the models start from similar basic state and same initial conditions, and modeling centers might be more likely to do these sort of experiments given the stronger links to the prediction problem and the more limited resources involved in such integrations relative to long simulations.

Charlotte and Nick Klingamand discussed offline possibly using the KPP ocean mixed layer model and heat budget constraints to maintain a common SST basic state under different atmosphere models as a possible framework to remove the mean state bias issue. From a practical point of view, Steve and Nick have a version of KPP that might be relatively easy to implement in other models, if we wanted to go that route. Jerome's impression is that adding different atmospheric GCMs which you can perturb atmospheric physics but coupled to ocean models in which you can constrain the mean state is a very good method. In the context of S2S, Jon was asked whether his impression is that coupled models produce better predictions than uncoupled models. He indicated that for CFS it does seem to matter with coupling to dynamical ocean, although he is not sure in general. Steve said that the Met Office runs a 15-day ensemble prediction system experimentally in both coupled and uncoupled, and so this might be a useful dataset to mine. It was suggested that the

current conversation and ideas on air-sea interaction could be entrained into the S2S strawman document. Duane noted that he agreed, but the importance of air-sea interaction should be placed in context of hindcasts or forecasts since this is what modeling centers find most relevant. Steve agreed this was a good idea, and that forecasting groups may be most likely to change their mode of operation if coupling is demonstrated to be important to the MJO, and this would also be very appealing to funding agencies. But of course, we should also pursue the academic question of why coupling matters.

**ACTION ITEMS:** Surya, Jerome, and Charlotte will engage the task force with follow-up emails to continue the discussion of the telecon, and also help crystallize the concept for a coordinated set of experiments to examine the importance of air-sea coupling to the MJO. Steve will generate a draft document on recent work with KPP to help inform the potential process modeling effort.

#### **4) Highlights of Singapore GASS/MJOTF workshop (Steve)**

Steve provided a summary of the recent GASS/MJOTF Diabatic Heating and Vertical Structure project meeting in Singapore. All in all, it was a very productive meeting. The workshop included presentations from the team leaders that solicited further recommendations for the model diagnosis effort. The workshop also included contributed talks on process-oriented work to understand the MJO in models. A session was led by Chidong Zhang on the DYNAMO field project that discussed not only planning for the next intercomparison case, but also how DYNAMO observations might be used for process-oriented diagnosis of the models. The workshop also heard an interesting talk from James Ruppert that used DYNAMO sounding data to show a possible role for the diurnal cycle of SST in forcing diurnal convection which then may moisten the atmosphere during period leading up to the MJO enhanced convection phase. This presentation solicited some experiment ideas to determine the importance of such processes. At the meeting, a DYNAMO case (November 2011) was defined as an extension for the project. A similar set of diagnostics will be produced as for the two YOTC cases, but with a modified experiment and output design, including outputting data only over warm pool at higher time resolution, and only 20 day hindcasts will be conducted. Also, a CRM-based intercomparison in the DYNAMO array region led by Wei-Kuo Tao, and another limited area modeling intercomparison project led by Samson Hagos, will be conducted for this November DYNAMO case.

Matt asked about the timeline for initial publications from the diabatic heating project. Steve said initial papers are likely to be submitted during autumn of this year, but definitely not slip into next year. As far as major conclusions to this point, we have not found a smoking-gun process-oriented diagnostic to distinguish good and average models. We see lots of necessary conditions for a model to produce an MJO, but no sufficient ones. Duane noted that another pessimistic interpretation might be that we don't have any truly good MJO models yet. Some models did very good job in hindcasts, although most models had at least some modest hindcast skill.

Most of models were average and many average models had characteristics of good models from the standpoint of our existing process-oriented diagnostics. Similar issues exist for the long simulations. Duane said that output data from all of the runs will still be made available in early fall, although they still need some quality control before release. Matt plans to generate a link to the diabatic heating project website from the MJOTF website.

**ACTION ITEMS:** Process-oriented diagnostic development is still needed to distinguish “average” MJO models from “good” MJO models. Initial publications on the project will be submitted in the Fall. Model output data will be made publically available in the early Fall. Matt will generate a link on the MJOTF website to the diabatic heating project website.

### **5) Planning for Macao (Matt)**

Matt gave a brief update on planning for the October Macao meeting. The abstract deadline for contributed papers is June 30 (3 days!). Six people told Matt that they needed travel funding: Nick, Charlotte, Camille, Prince, Min-Seop, June-Yi. Michel Rixen gave us the green light for travel funding for these people, and so that is good news.

**ACTION ITEMS:** Submit abstracts for contributed papers by June 30! Matt to follow-up with Michel Rixen on travel funding for the above 6 people.

### **6) Updates on Process-oriented diagnostics papers, and future plans (Daehyun and Eric)**

Eric gave an update on the two process-oriented diagnostics papers being led by Daehyun and Jim Benedict. Daehyun sent his paper on relative humidity composites to the task force a few days prior to the telecon for the group to look over before the telecon. This paper will be submitted soon, and so the task force is requested to send any further comments to Daehyun in the next few days. Eric mentioned that a second paper on process-oriented diagnostics led by Jim Benedict is nearing submission, and that this paper will be in submission-ready format in a week or so. Eric will circulate a draft to the task force for comments before submission.

Eric encouraged the task force to continue thinking of process-oriented diagnostics to apply to models, as so far we may not have found a smoking gun diagnostic that distinguishes good and bad models. Steve noted that maybe our diagnostics are successful at distinguishing between good and bad models, but maybe not between good and average.

**ACTION ITEMS:** Provide comments to Daehyun and Eric on the two process-oriented diagnostics papers to be submitted (Eric will send the second paper out shortly). Daehyun and Jim Benedict will submit the papers within the next month.

Continue development of new process-oriented diagnostics to distinguish good MJO models from the rest.

### **7) update on CMIP5 analysis (Min-Seop)**

Min-Seop sent a presentation to the task force detailing new MJO diagnostics he has been developing and applying to CMIP5 models that go beyond the MJO Working Group diagnostics (which he has also been pursuing). While it was late in the telecon and the information content of Min-Seop's presentation was extensive, the task force found many of the new diagnostic developments to be quite interesting and useful. Steve was particularly interested in the distinction made between on-equatorial and off-equatorial variance. Tomoki expressed that he thought these two forms produced indistinguishable results in Min-Seop's plots (as he further expressed in a subsequent e-mail), although the task force thought further investigations would be interesting. The task force encouraged Min-Seop to press ahead with the excellent analysis he is doing.

**ACTION ITEMS:** Matt and Eric will work on getting links to the CMIP5 analysis website posted on the MJOTF webpage. Eric will also send this link by email to the task force.