

Experimental Plan for ESM

Task 1). Each group conducts a 2-month simulation starting from around May 1 (say April 26, 27, 28...) through June 30, 2003 with multi-ensemble members. Some groups had simulation starting earlier than May 1, such as April 1, or even early. It is okay. We do not require a specific numbers of ensemble members. Each modeling group could make decision based on their normal practice, but should be no less than 6 members. The purpose of this run is to evaluate the biases of each model for May T-2m and June precipitation. Since every model has large bias over Tibetan Plateau, the purpose of this run is to evaluate whether your model's bias for May T-2m over Tibetan Plateau and bias for June precipitation is consistent with observed lag-relationship between these two variables, as well as to check your model's ability in producing observed anomaly. The figures produced from this task are shown in Figure 1. Based on the 12 modeling groups' results that we have received so far, the bias relationship between these two variables are generally consistent. The task I is crucial for our next step sensitivity study for the 2003 eastern Asian case. Please send your ensemble mean results for global May T-2m temperature and June precipitation generated from the Task I run to Dr. Ismaila Diallo at iduallo@ucla.edu before May 31, 2019.

Task 2). Some modeling groups have the model climatology run. For those groups, please send each year's global May T-2m temperature and June precipitation (starting around 1980 to around 2010) to Dr. Ismaila Diallo at iduallo@ucla.edu. For the modeling groups, which do not have such climatology data, please skip this task.

Based on the analyses from the observational data and the results from Task I and Task II, plus evidence from other studies, we will establish *the Tibetan Plateau Oscillation (TPO) index* for the future S2S prediction. The workshop believes with Task 2 data, our proposed TPO would be more robust. A paper for TPO is under consideration.

Task 3 (the main task). The sensitivity run will test the effect of May 2003 T-2m temperature anomaly in Tibetan Plateau on June 2003 precipitation. The first goal for the model is to reproduce observed May 2003 T-2m temperature anomaly in Tibetan Plateau in the sensitivity run, then the second step is to evaluate the precipitation difference (between sensitivity run and control run) in June. To make model generate the observed May 2003 T-2m temperature, we will produce a mask based on your model bias produced in Task 1. You will need to impose this mask to the initial condition (See Figure 2) at the first time step of your model integration. The model run will star around May 1. But you may adjust this based on your model conditions. The model will run through June 30 with multi-ensemble members. We do not impose a fixed ensemble member number, but it is at least 6. We prefer more than 8.

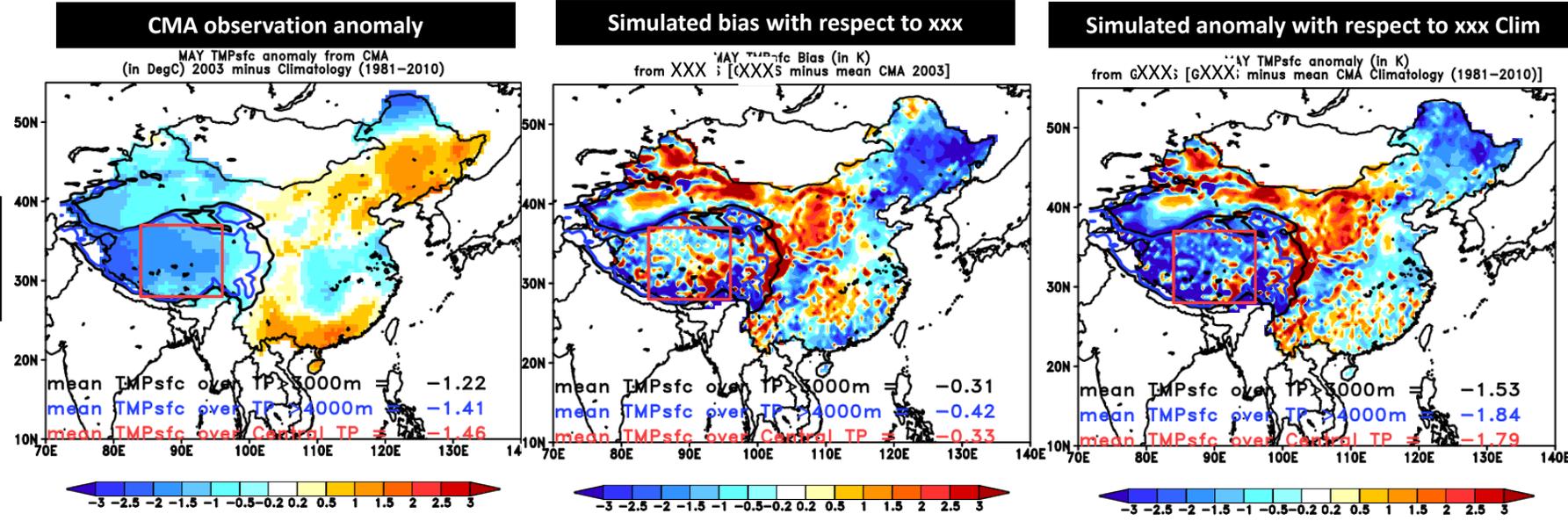
Currently, every model has difficulty to produce observed T-2m temperature anomaly. You may have to, based on the control run, do the test $+\Delta T$ and $-\Delta T$ to generate the observed T-2m temperature anomaly. Figure 3-4 explain how to do this type of sensitivity study in detail with schematic diagrams. There may be more different scenarios but bottom line is that the model May T-2m bias and June P bias must be consistent with the MCA relationship based on observed May T-2m and June P. Some information has also been explained in Xue et al. (2018 JGR, Section 3.1.2 and Section 3.2.2).

Some modeling groups may probably have difficulty to produce observed May T-2m temperature anomaly over Tibetan Plateau with only changing the initial condition. Possible other approaches for consideration includes start earlier (to provide more spin up time); impose not only the 1st step (to make low atmospheric condition more consistent with surface LST condition); prescribe deep layers (similar to SST since deep layers have also no diurnal variation). Because previous studies have only tested the initial condition effects, other approaches suggested above are just suggestions for your consideration. However, if success, you could report the approach in the paper in a special issue, which we plan to have after the next year's AGU or AMS.

We expect the task III finishes around August 31, 2019. We will prepare a paper for high impact journal, and more professional papers for a special issue.

Figure 1

MAY TMPsfc (in K)



June Precipitation (in mm/day)

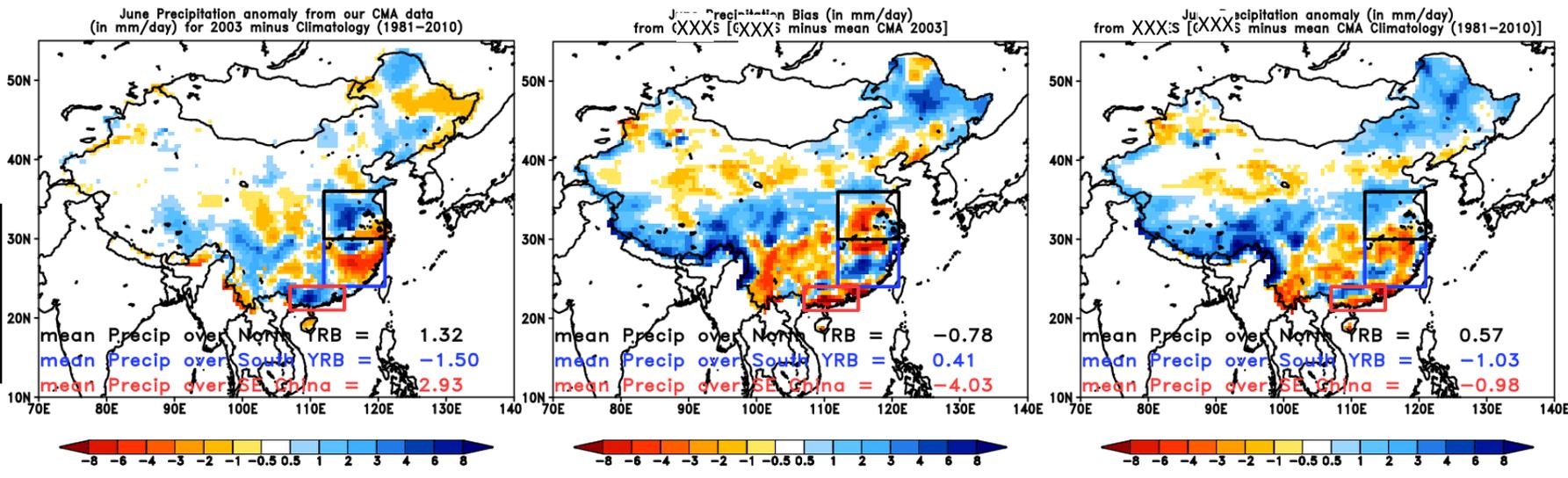


Figure 2

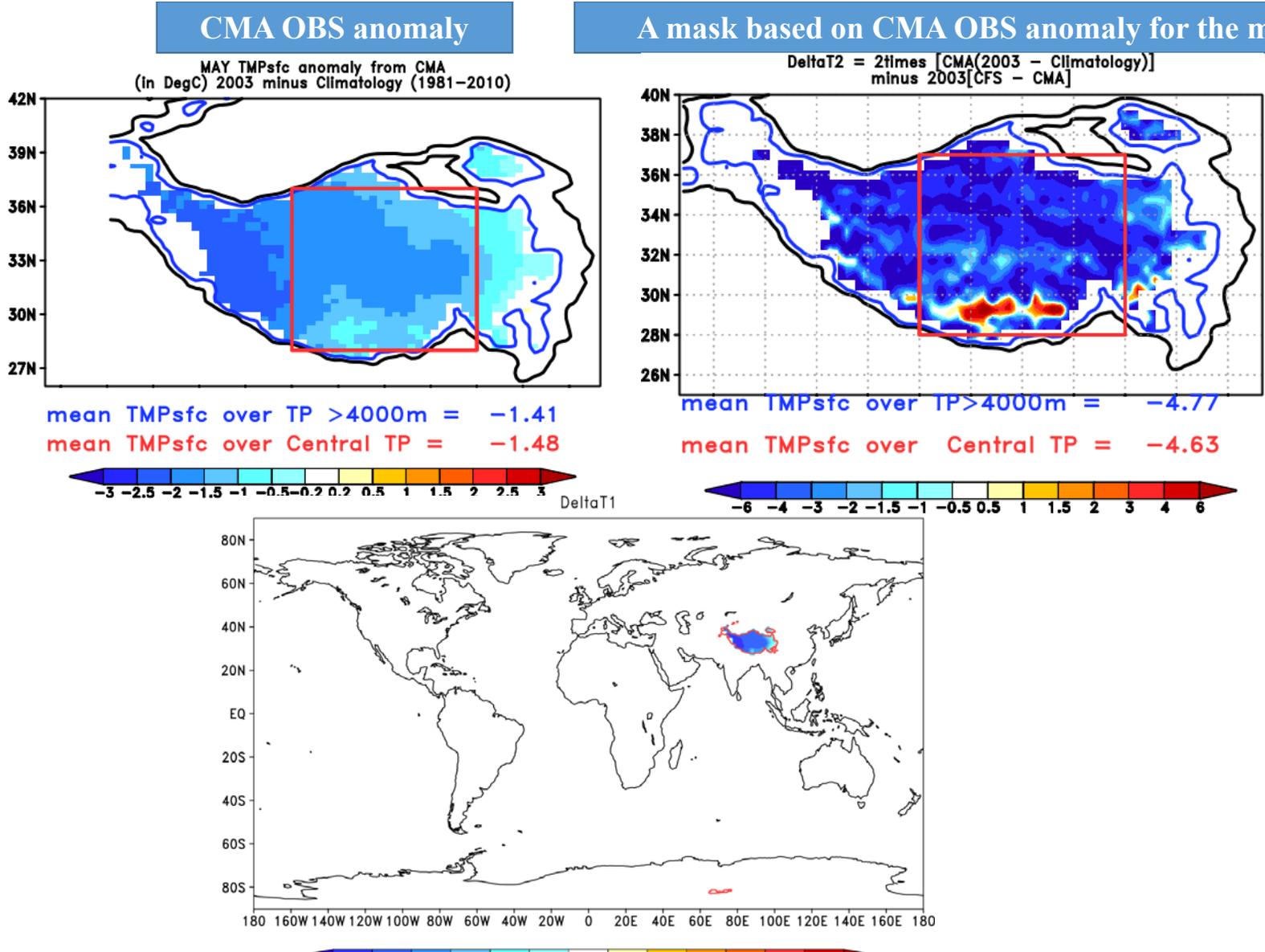


Figure 3

ILSTSS2S Sensitivity Study Scenario I

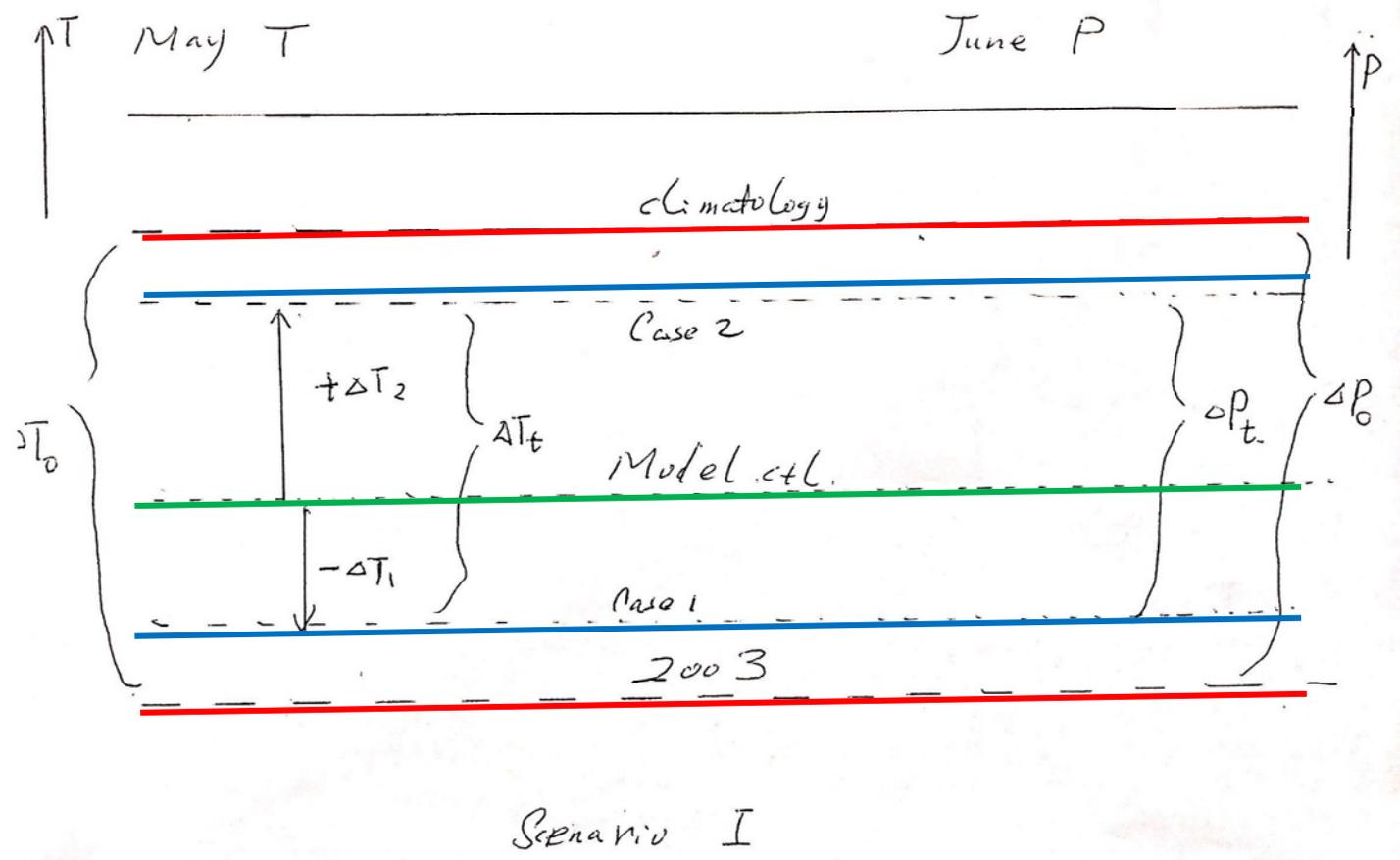


Figure 4

ILSTSS2S Sensitivity Study Scenario II

