Major comments

I suggest authors to revise the sentence in page 1462, line 9-10. The impact of SST on the different responses of Walker cell should not be neglected. When we check the figure 5, clear differences in SST between the mid-Pliocene and the RCP4.5 experiment (Figure 5d vs 5e) can be observed in the tropical Pacific. Here, the mid-Pliocene experiment was run for 700 years. In this experiment, the upper ocean has reached equilibrium. Thus, the relative larger warming can be observed in the eastern tropical Pacific (Figure 5e), when compared to the western tropical Pacific. This warming pattern agrees with observations. In contrast, the RCP4.5 experiment actually was run for 150 years, after the atmospheric CO2 became stable at 543 ppm. In this experiment, the upper ocean cannot reach equilibrium. When compared to the control run, strong warming appears along the equator Pacific. Seen in this way, due to the different experimental design, the responses of tropical Pacific SST should be distinguished in the mid-Pliocene and the RCP4.5 experiment. The different changes in tropical Pacific SST highly likely cause the different responses of Walker cell in these two experiment.

Reply:

The sentences in page 1462, line 9-10 (Therefore, SST changes in both warm climates perhaps could not explain so large differences of Walker cell responses between RCP4.5 scenario and mid-Pliocene.) are revised by the following:

Nevertheless, the impact of SST on the different responses of Walker cell should not be neglected. When we check the Fig.5, clear differences in SST between the mid-Pliocene and the RCP4.5 experiment (Fig.5d versus Fig.5e) can be observed in the tropical Pacific. Here, the mid-Pliocene

experiment was run for 700 years. In this experiment, the upper ocean has reached equilibrium. Thus, the relative larger warming can be observed in the eastern tropical Pacific (Fig.5e), when compared to the western tropical Pacific. This warming pattern agrees with observations. In contrast, the RCP4.5 experiment actually was run for 150 years, after the atmospheric CO2 became stable at 543 ppm. In this experiment, the upper ocean cannot reach equilibrium. When compared to the control run, strong warming appears along the equator Pacific (Fig.5d). Seen in this way, due to the different experimental design, the responses of tropical Pacific SST should be distinguished in the mid-Pliocene and the RCP4.5 experiment. The different changes in tropical Pacific SST highly likely cause the different responses of Walker cell in these two experiment.

Minor comment

Please check if the color scale of Figure 4c is same as Figure 4a and 4b.

Reply:

Fig.4c has been used the same color scale as the Fig.4a and Fig.4b.

The latest plot can be seen in the final manusrcipt.