CHANGES IN THE STRUCTURE AND PROPAGATION OF THE MJO WITH INCREASING CO_2

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Problem: The physical mechanisms under which the MJO responds to increasing CO_2 are poorly understood.

Analysis: The MJO was analyzed in 20 year-long simulations of a "post-CMIP5" version of NASA GISS EM2 coupled to a slab ocean. These had CO_2 concentrations of 0.5, 1, 2 and 4 times preindustrial levels.

Findings: We found that MJO-related rainfall intensifies at 5.5%K^{-1} (Fig. 1), its eastward propagation accelerates at a rate of 3.3%K^{-1} (Fig 2c), and becomes larger at a rate of 2.8%K^{-1} (Fig. 2a) as CO_2 concentrations increase. These changes can be understood in terms of changes in the spectrum of tropical variability and changes in the mean state.

Significance: The GISS model can be used to simulate the MJO under different climates. Novel diagnostic tools and linear theory can be used to quantitatively understand why the MJO accelerates with warming.

References: Adames, Á. F., D. Kim, A. H. Sobel,A. Del Genio, and J. Wu (2017a), JAMES doi:10.1002/2017MS000913.

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Fig. 1

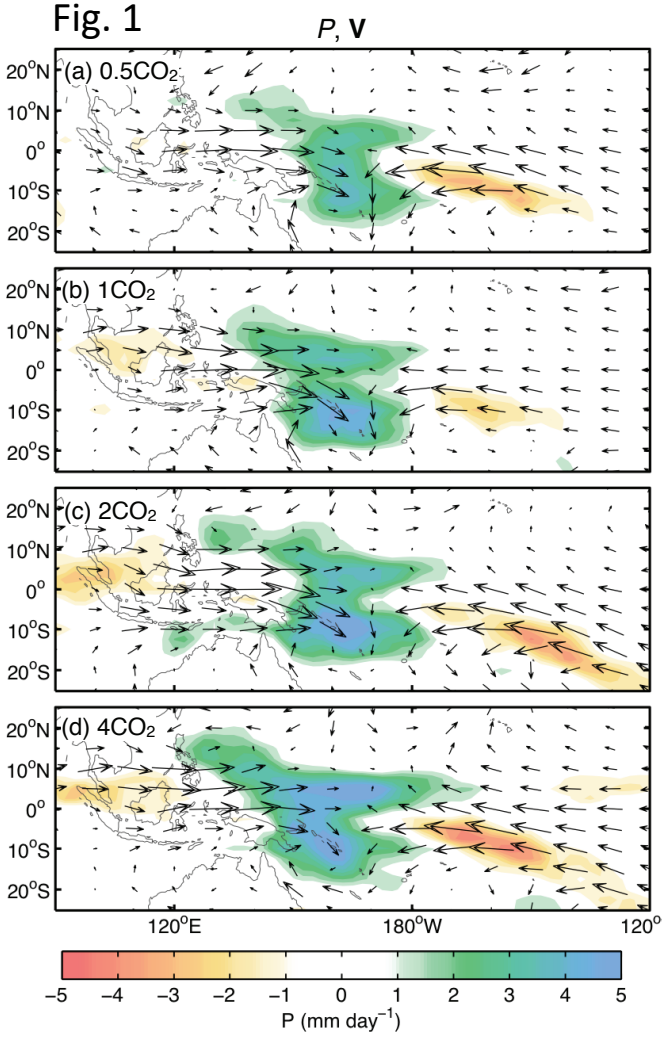

Fig. 2