



Responses of Seasonal Precipitation Intensity to Global Warming

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Under global warming, the water vapor increases with rising temperature at the rate of 7%/K. Most previous studies focus on the spatial differences of precipitation and suggest that wet regions become wetter and dry regions become drier. Our recent studies show a temporal disparity of global precipitation, which the wet season becomes wetter and dry season becomes drier; therefore, the annual range increases. However, such changes in the annual range are not homogeneous globally, and in fact, the drier trend over the ocean is much larger than that over the land, where the dry season does not become drier. Such precipitation change over land is likely because of decreased omega at 500hPa (more upward motion) in the reanalysis datasets from 1980 to 2013. The trends of vertical velocity and moist static energy profile over the increased precipitation regions become more unstable. The instability is most likely attributed to the change in specific humidity below 400hPa. Further, we will use Coupled Model Intercomparison Project Phase 5 (CMIP5) archives to investigate whether the precipitation responses in dry season are different between the ocean and land under global warming.