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Detecting trends in tropical rainfall characteristics during 1979-2003

K. M. Lau (1) and **H. T. Wu** (2)

(1) Laboratory for Atmospheres, NASA/Goddard Space Flight Center, Greenbelt, MD, 20771, USA, (2) Science Systems & Applications, Inc., Lanham, MD, 20706, USA (wu@climate.gsfc.nasa.gov / Fax: 301-614-6307/ Phone: 301-614-6236)

Contrary to the well-documented rapid rise in global temperature in the last century, there isn't clear evidence of associated change in global precipitation. In this study we adopt a new strategy for the detection of long-term rainfall changes. From analyses of blended space-based and ground-based global rainfall data, we find a significant shift in tropical rainfall characteristics. This shift is identified with positive trends in the occurrence of extreme heavy and light rain events, coupled to a negative trend in moderate rain events in the tropics during 1979-2003. The trends are consistent with a shift in the large-scale circulation associated with: a) a relatively uniform increase in warm rain over the tropical oceans, b) enhanced ice-phase rain over the near-equatorial oceans, and c) reduced mixed-phase rain over the tropical ocean and land regions. Due to the large compensation among different rain categories, the total tropical rainfall trend remains undetectable.