



“Weekend-effect” evidence for intensification of storms by pollution over U.S.

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Aerosols change the way precipitating clouds evolve, due to their effect on condensation and ice formation. The net effect of aerosols on precipitation varies depending on the local environment and synoptic situation, the types of aerosols, and also on how far downstream one looks for effects. Repeated experiments with controlled release of aerosols would be helpful in unraveling how aerosols affect precipitation. The weekly variation in human activity may provide just such a set of experiments. Using the rainfall estimates from the passive microwave instrument on the Tropical Rainfall Measuring Mission (TRMM), which has been orbiting for over eight years and can view areas as far north as about 40 degs, we find that there is indeed a weekly variation in summer (JJA) rainfall over the southeastern U.S. land area, with the average rain rate peaking in the middle of the week (Tue-Thu). Rainfall over nearby oceanic areas, on the other hand, seems to peak on weekends.

A bootstrap statistical test indicates that the variations are unlikely to be due to chance. Physically related weekly variations in the statistics of ground-based measurements and model reanalysis data are found. The midweek peak in rainfall over land coincides with the well documented midweek peak in pollution around much of the U.S., and is unlikely to be due to other weekly variations in human influence. The midweek increase is also unlikely to be a consequence of the radiative heating or cooling of the atmosphere by the aerosols.