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Yearly, seasonal, and diurnal precipitation trends in the Southeastern United States derived from long-term remotely sensed data and quantification of hydro-climatic extremes

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The precipitation climatology of the Southeastern United States spans a very broad spectrum of precipitation regimes. A warm season that is characterized by isolated thunderstorms, mesoscale convective systems, and tropical cyclones, and a winter season characterized by widespread frontal rain, ice, and snowfall. Each of these types of precipitation systems impact regional hydrology in very different ways, and are associated with a large variety of natural hazards.
In order to assess precipitation patterns and hydro-climatic extremes, we use long-term records of remotely sensed data to derive yearly, seasonal, and diurnal characteristic of rainfall at fine scales. In this work, extreme events such as tropical storms are the object of a particular attention. We use thirteen years (1998-2010) of TRMM precipitation products: TRMM PR 2A25 (5-km resolution/one overpass a day) and TRMM Multi-satellite Precipitation Analysis (TMPA) 3B42V6 (25-km/three hourly). Results show that tropical cyclones for the overall period of observation account for about 8-12% of the seasonal (June to November) precipitation budget of the southeastern United States and up to 15-20% for areas located near the coasts. In addition to satellite products, the ongoing work focuses on including ground based precipitation estimates derived from the National Mosaic and Multi-Sensor Quantitative precipitation Estimates (NMQ/Q2). An inter-comparison of satellite and ground based precipitation estimates is provided for the years 2008-2009 as a first step toward a longer term approach that proposes to derive trends in the evolution of precipitation patterns and assessment of climate change effects on precipitation.