



## Climate Program Opening Workshop August 21-25, 2017

**Lecture:** *Understanding the Physical Causes of Observed Trends in Extreme Precipitation: How Can Statistics Help*

**Speaker:** Kenneth Kunkel

**Abstract:**

Numerous studies have found an average increase in extreme precipitation for both the U.S. and Northern Hemisphere mid-latitude land areas, consistent with the expectations arising from the observed increase in greenhouse gas concentrations (now more than 40% above pre-industrial levels). However, there are important regional variations in these trends that are not fully explained. These trend studies are typically based on direct analyses of observational station data. Such analyses confront multiple challenges, such as incomplete data and uneven spatial coverage of stations. Central scientific questions related to this general finding are: Are there changes in weather system phenomenology that are contributing to this observed increase? What is the contribution of increases in atmospheric water vapor? There are also questions related to application of potential future changes in planning. Because of the rarity (by definition) of extreme events, trends are mostly found only when aggregating over space. When would we expect to see a signal at the local level? What are the uncertainties surrounding future changes and their potential incorporation into future design? Further development of statistical/mathematical methods, or innovative application of existing methods, is desirable to aid scientists in exploring these central scientific questions. This talk will describe characteristics of the observation record and the issues surrounding the above questions.