

# **Multi-Regime States and Extreme Behavior of Arctic Atmospheric Circulation**

**Brandon J. Fisel**

Department of Geological and Atmospheric Sciences, Iowa State University, Ames, Iowa

**William J. Gutowski, Jr.**

Department of Geological and Atmospheric Sciences, Iowa State University, Ames, Iowa

The arctic circulation can develop multiple dynamical regimes, which has implications for the predictability of arctic weather. From previous studies of ensemble simulations of June – December 2007, we found that multiple regimes occur more (less) with greater (smaller) sea-ice area present, as the interactive ice surface allows the modeled atmosphere to have more freedom in its variability. In this study, we expand our analysis of regime behavior to 17 years (1991 – 2007) using six CORDEX ensemble simulations to examine if the same seasonal regime behavior occurs over longer time periods, and to understand whether this behavior becomes more persistent in recent years when sea ice is rapidly declining. We also analyze temperature extremes to understand the occurrence of extreme behavior in regime modes. Our results show there is a tendency for warm (cold) extreme behavior to be preferred with 1- (2-) regime behavior. The regime and extreme behavior as uncovered through this work has implications for the predictability of the future arctic weather extremes as summer ice cover wanes.