

**Impact of the Madden-Julian Oscillation trend on the polar amplification of surface air temperature during 1979-2008**Changhyun Yoo<sup>†</sup>; Steven Feldstein; Sukyoung Lee<sup>†</sup>The Pennsylvania State University, USALeading author: [cyoo@psu.edu](mailto:cyoo@psu.edu)

The Madden-Julian Oscillation (MJO), which is the primary mode of intraseasonal variability in the tropics, has previously shown to have impact on extratropical surface air temperature (SAT). We have demonstrated that a change in frequency of occurrence of MJO phase has considerable influence on polar amplification of SAT during recent 30 years (1979-2008). The trend in MJO shows that phase 5 occurs more frequently during the later 15-year period (1994-2008, P2) than the earlier 15-year period (1979-1993, P1), while phase 3 shows moderate decrease and the other phases show negligible changes. Lagged composites of the SAT associated with MJO phases show substantial and systematic variation in the extratropics. Widespread Arctic warming takes place on lag +10 to +15 days for phase 5, while Arctic cooling occurs on lag +5 to +10 days for phase 3. Incorporating both the MJO trend and the intraseasonal SAT change associated with the MJO, we calculated the MJO-induced inter-decadal SAT trend. It is found that the MJO-induced SAT trend has considerable spatial correlation with the observed inter-decadal SAT trend. We therefore conclude 10 % of the SAT trend between 1979-2008 can be attributed to the change in frequency of occurrence of intraseasonal SAT change associated with the MJO.