PRIMARILY CITATION CANDIDATES:

1) **ARTICLE_NAME = Warm Arctic, Cold Continents by Judah COHEN et al.**

- Using a mesoscale model, Strey et al. (2010) and Porter et al. (2010) show that sea ice decline does result in warming and moistening of the Arctic boundary layer during the late summer and fall, impacting weather pat- terns locally and remotely. This warmer, moister air mass extended onto the adja- cent continents and affected snow cover across Eurasia (Strey et al., 2010).
- Modern-day record minima in observed sea ice extent occurred in September 2007 and again in September 2012—falling below 4 million km2 for the first time in the observational record, about half its value since 1979 (Figure 1a).
- Over the past decade, fall sea ice declined and fall Eurasian snow cover increased (Cohen et al., 2012a)
- Sea ice decline has been particularly remarkable in the Kara, Laptev, and Chukchi Seas, which lie north of Siberia. Such a dramatic change in sea ice extent in the region bordering the Siberian coast is likely to have a profound impact on the hydroclimatology of the region by providing a significantly larger area of open ocean, greatly increasing moisture availability and near-surface tempera- tures (Holland et al., 2007; Stroeve et al., 2007; Lawrence et al., 2008).
- The raw data exhibit modest negative correlations between Arctic sea ice and continental snow cover, supporting the hypothesis that less sea ice is con- ducive to more expansive snow cover (Figure 2a). However, when the data are detrended, correlations between interan- nual sea ice and snow cover interannual anomalies are closer to zero (Figure 2b)
- October snow cover is more extensive across the high-latitude continents in the latter period when September sea ice was low, especially in the Arctic seas that lie between Siberia and Alaska
- More extensive snow cover occurs with higher sea level pressure across northern Eurasia and adjacent Arctic waters with lower sea level pressure south of 60°N. The clockwise atmospheric flow around the area of anomalous high pressure passes directly over the region of greatest Arctic sea ice melt and is likely moistened by the newly open waters, leading to enhanced continental snowfall.
- Overland et al. (2011) link the warm surface temperatures in the Arctic observed during the past few years with cold continental winters. They argue that amplified Arctic warming weakens the climatologically strong atmospheric vortex over the high latitudes, resulting in a stronger high-pressure center over the Arctic and increased meridional flow that transports cold Arctic air to lower latitudes. With greater Arctic heights and north-south transport of air masses, they find that cold air outbreaks in lower latitudes have increased in frequency. This phenomenon is referred to as the warm Arctic/cold continents pattern and is most closely associated with loss of sea ice as increasing retreat of the ice results in warming of the Arctic atmosphere.
- Furthermore, the large melt of Arctic sea ice in summer/fall 2012, the rapid advance of snow cover across Eurasia in October 2012, and the pre- dominantly negative AO phase during winter 2012/2013 may all be associated with severe winter weather across the northern continents.

2) ARTICLE_NAME = Evidence Linking Arctic Amplification To Extreme Weather

- During the past few decades the Arctic has warmed approximately twice as rapidly as has the entire northern hemisphere
- Both observational and modeling studies have identified a variety of large-scale changes in the atmospheric circulation associated with sea-ice loss and earlier snow melt, which in turn affect precipitation, seasonal temperatures, storm tracks, and surface winds in mid-latitudes [e.g., Budikova, 2009; Honda et al., 2009; Francis et al., 2009; Overland and Wang, 2010; Petoukhov and Semenov, 2010; Deser et al., 2010; Alexander et al., 2010; Jaiser et al., 2012; Blüthgen et al., 2012].
- This warming is clearly observable during autumn in near-surface air temperature anomalies in proximity to the areas of ice loss [Serreze et al., 2009].
- Since the late 1980s when rapid ice loss and enhanced warming began, poleward thickness differences have decreased in all seasons, especially during fall and winter ($10% with > 95% confi- dence in fall trend).
- When zonal wind speed decreases, the large-scale Rossby waves progress more slowly from west to east, and weaker flow is also associated with higher wave amplitudes [Palmén and Newton, 1969].
- As the Arctic sea-ice cover continues to disappear and the snow cover melts ever earlier over vast regions of Eurasia and North America [Brown et al., 2010], it is expected that large-scale circulation patterns throughout the northern hemisphere will become increasingly influenced by Arctic Amplification.

3) ARTICLE_NAME = Impact Of Declining Arctic Sea Ice On Winter Snowfall

- Anomalously heavy snowfall wrought havoc in large parts of the United States and northwestern Europe for the winters of 2009–2010 and 2010–2011.
- The causes of the recent severe winters are unclear, particularly in context of the amplified warming in the Arctic (4, 5) that has contributed to the reduction of sea ice.
- As shown in Fig. S1, sig- nificantly above-normal winter snow cover has been present in large parts of the northern United States, northwestern and cen- tral Europe, and northern and central China for the four winters since the record low Arctic sea ice during 2007.
- For the period of the available satellite data record (since the late 1970s), Arctic sea ice extent has been decreasing in all months, with the most pronounced loss in September (22)
- The anomalously warm, ice-free ocean water increases the ocean surface flux of heat and moisture into the atmosphere in late autumn and early winter, which in turn has substantial impacts on winter atmo- spheric circulation.
- The regression map between sea ice area and sea level pressure (SLP) reveals that following anoma- lously low ice coverage in autumn, the winter SLP is substantially higher over the Arctic Ocean, the northern Atlantic, and much of high-latitude continents, which is compensated by lower SLP in midlatitudes (Fig. 2A).
- Fig. 3A shows that associated with the reduction of autumn sea ice, there is an increased incidence of blockings during winter over much of northern high-latitude continents, with the most pronounced increase in eastern Europe, central Siberia,

southern Alaska, and the northwestern United States (20–60% greater than climatol- ogy)

- These blocking patterns favor more frequent incursions of cold air masses from the Arctic into mid- and low-latitude of northern continents.
- Another potential contributor to anomalously large snowfall in
- recent winters is changes in atmospheric water vapor content over northern high latitudes. The rapid retreat of sea ice in summer and slow recovery of sea ice in autumn, particularly after 2007, greatly enhances moisture flux from the ocean to the atmosphere.
- The increase of humidity in autumn provides an additional local moisture source to Europe, in addition to cir- culation change induced moisture transport from midlatitudes through shifting the storm track southward and increasing stor- miness over the Mediterranean (Fig. 2A). Meanwhile, cold air masses that develop over central Siberia more readily spill over into Europe. Thus, in Europe, it is more likely to see anomalous snowstorm events during late autumn and early winter, which was the case for recent winters.
- The results of this study add to an increasing body of both obser- vational and modeling evidence that indicates diminishing Arctic sea ice plays a critical role in driving recent cold and snowy win- ters over large parts of North America, Europe, and east Asia. The relationships documented here illustrate that the rapid loss of sea ice in summer and delayed recovery of sea ice in autumn modulates not only winter mean statistics (i.e., snow cover and temperature) but also the frequency of occurrence of weather events (i.e., cold air outbreaks).
- If the decline of Arctic sea ice continues as anticipated by climate modeling re- sults (31, 32), we speculate that episodes of the aforementioned circulation change will become more frequent, along with more persistent snowstorms over northern continents during winter.