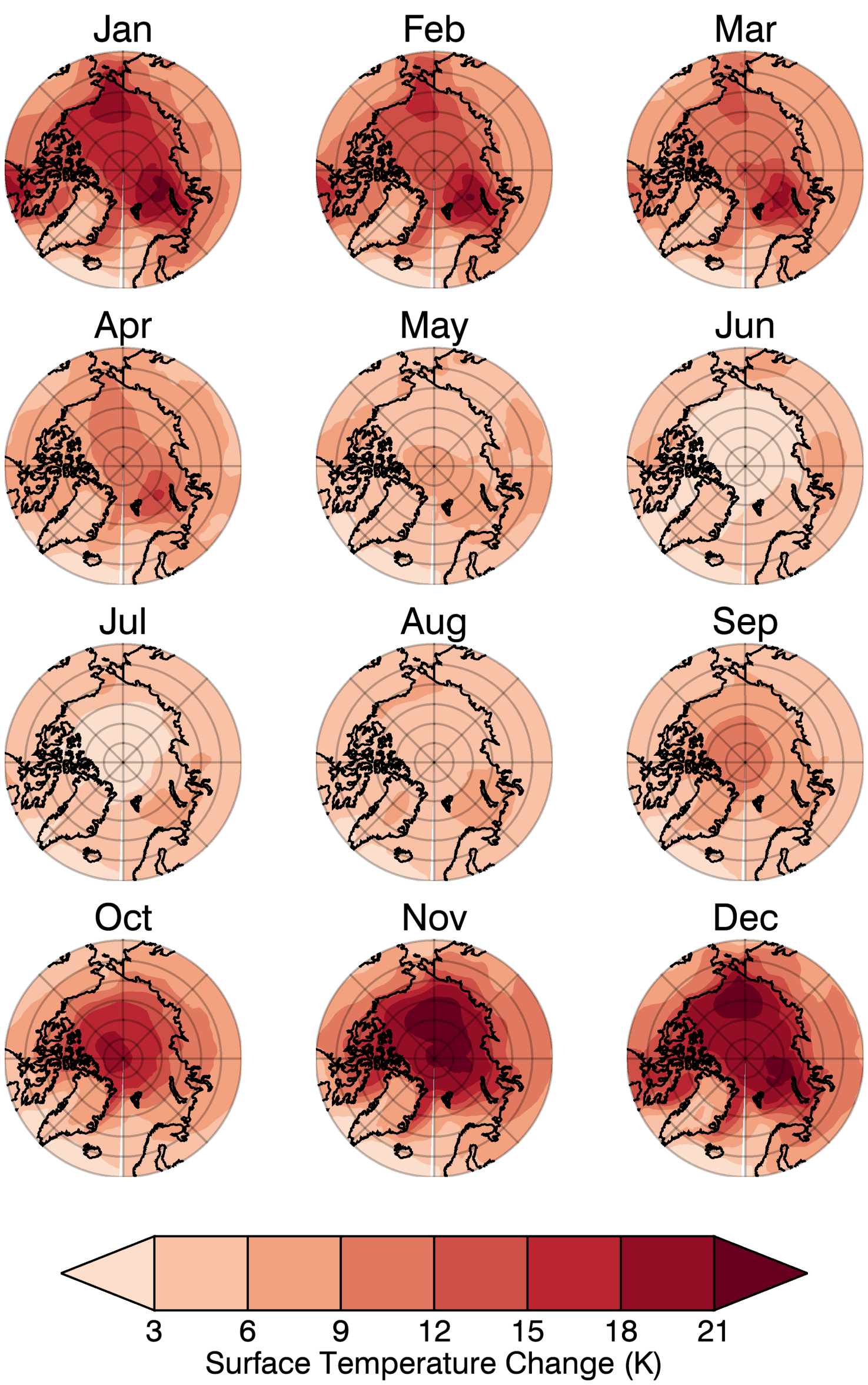
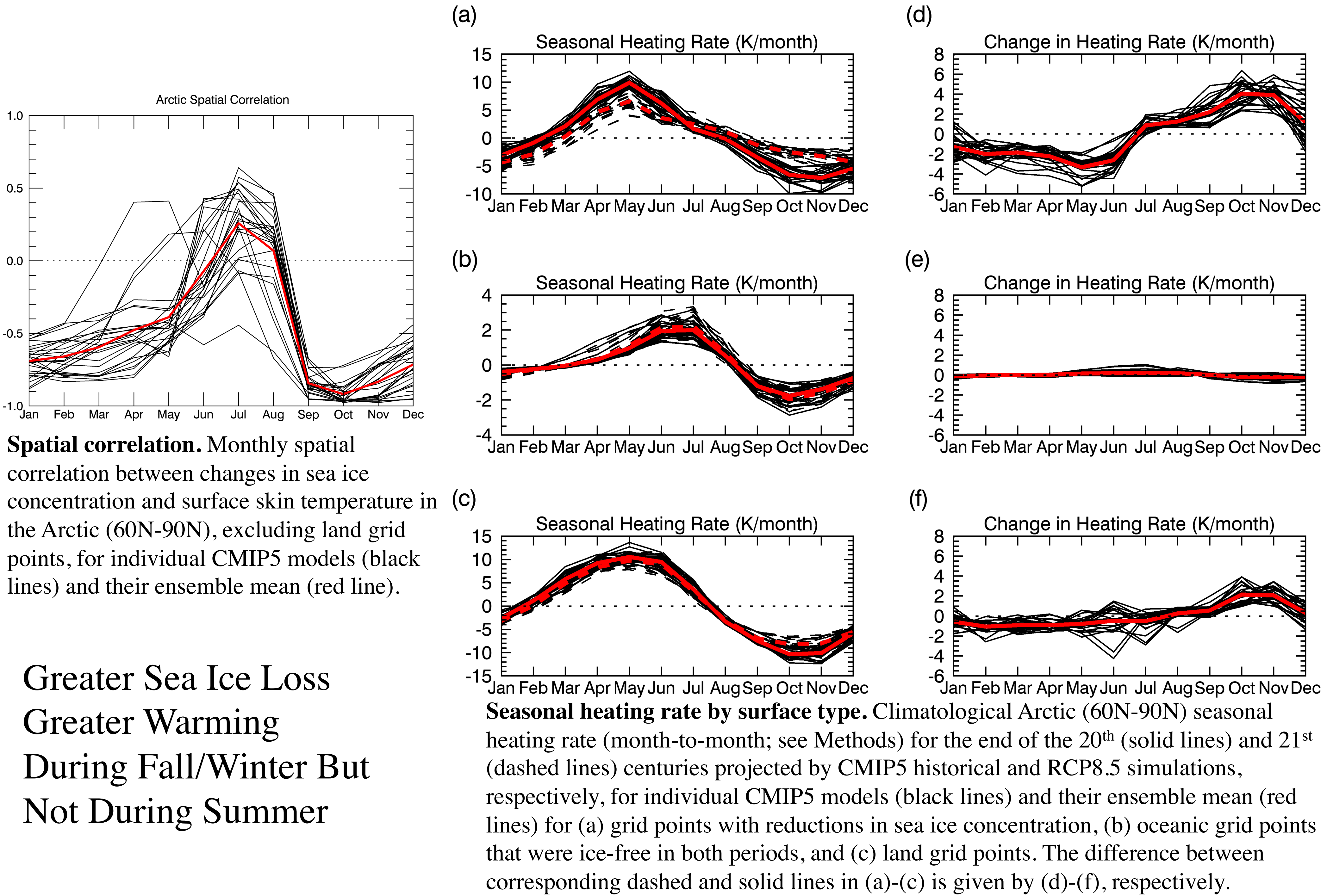
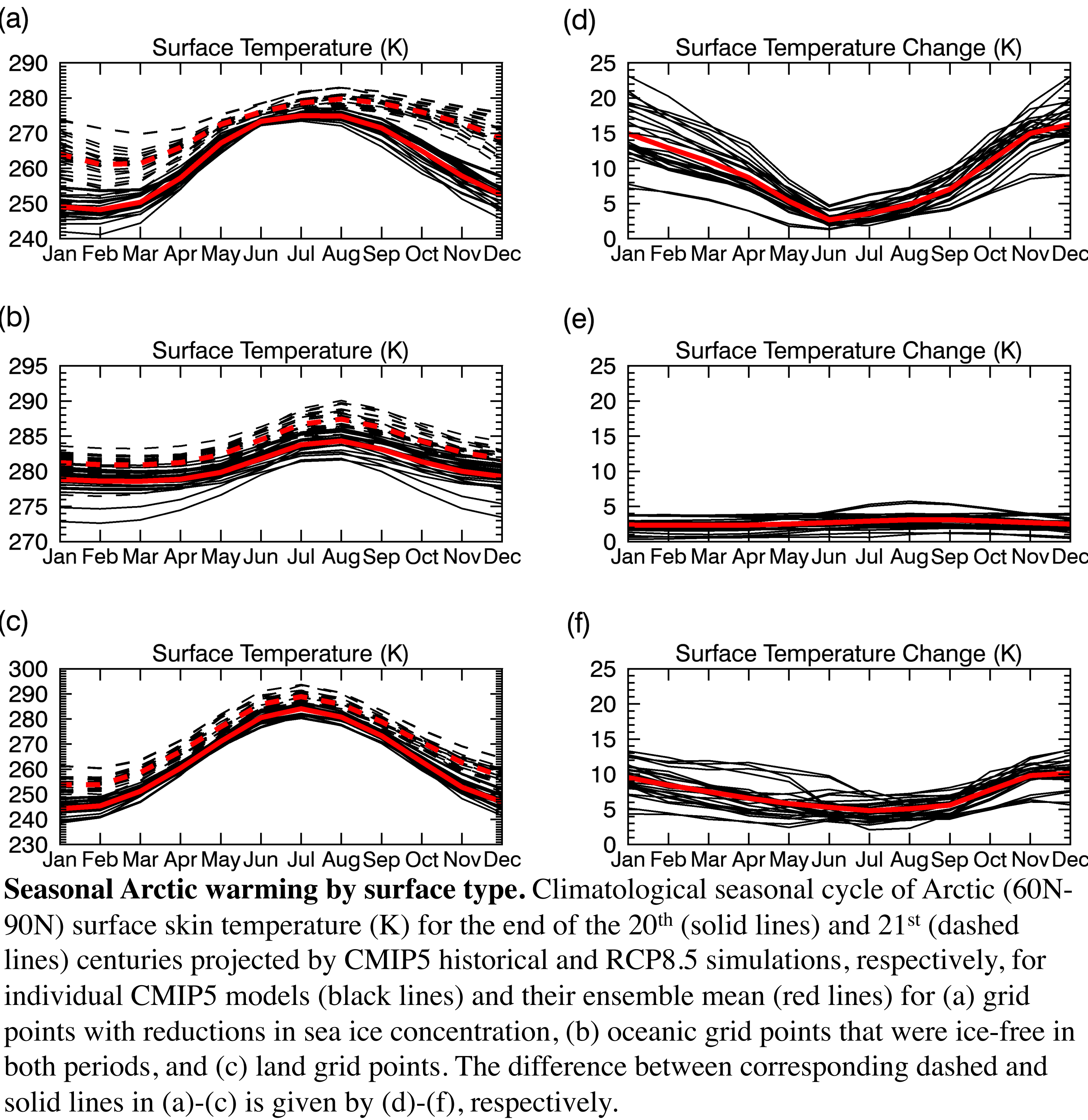


1. Background and Objective: The surface temperature of the Arctic is projected to warm more than any other region on Earth (i.e., Arctic Amplification). Even though the increase of solar absorption, due to the reduction of the surface albedo associated with the loss of sea ice, is strongest in summer, the warming is largest in late fall/early winter and smallest in summer. The most common theory put forward to explain the suppressed summer warming is that most of the additional solar energy goes into the melting of sea ice. The energy gain in summer, however, is thought to lead to the Arctic warming maximum in late fall/early winter by leading to enhanced heat release during this time period as a result of the enhanced surface latent and sensible heat fluxes into the atmosphere, also a consequence of the loss and thinning of sea-ice, warming the surface air temperature. While this commonly accepted theory makes clear the importance of sea-ice loss on Arctic warming, by focusing on surface skin temperature our study proposes a differing perspective on how sea-ice decline amplifies Arctic warming and establishes its seasonal pattern.

2. Seasonal Arctic Surface Warming Pattern

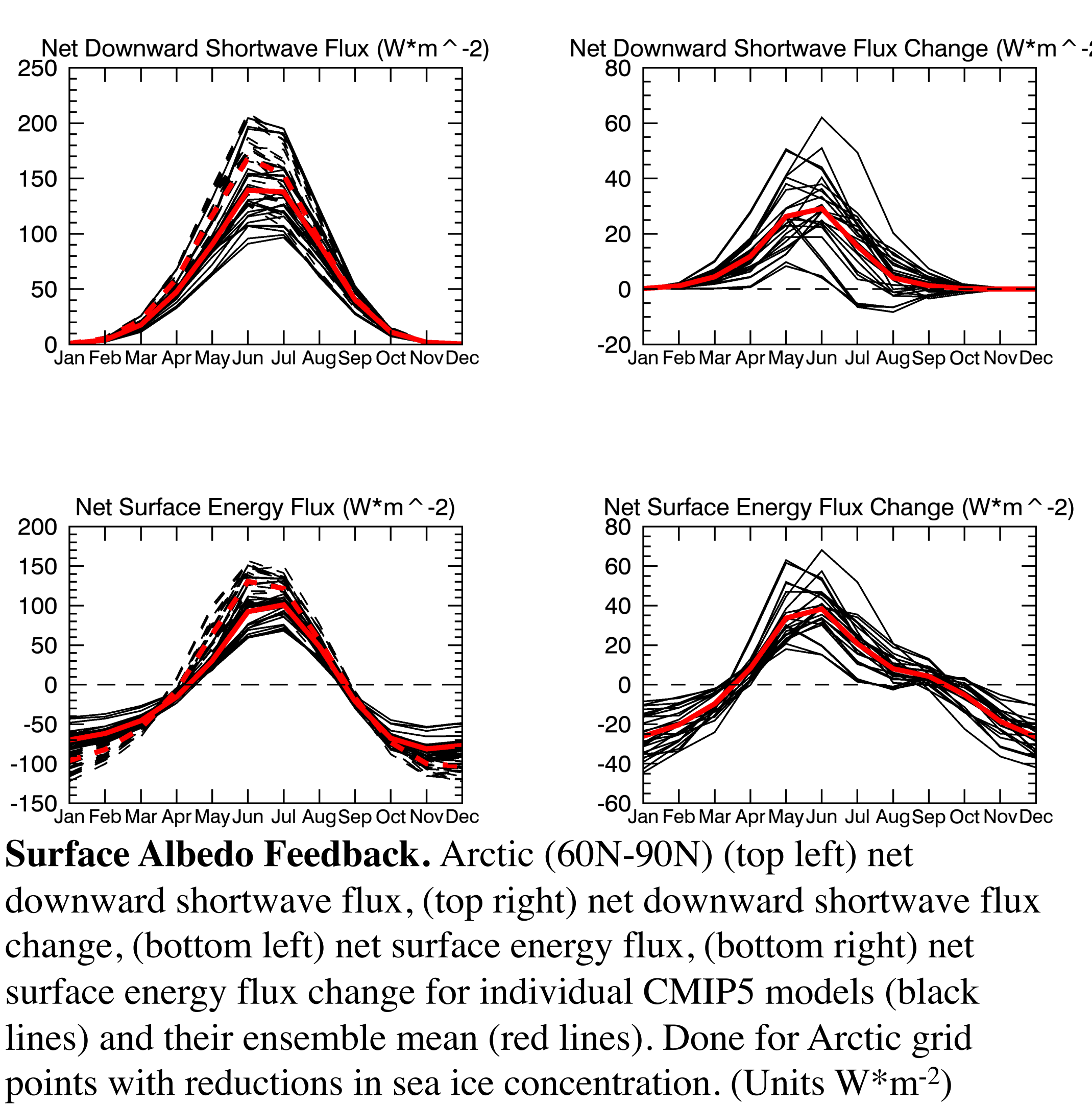


3. Connection between Sea Ice Loss and Surface Warming



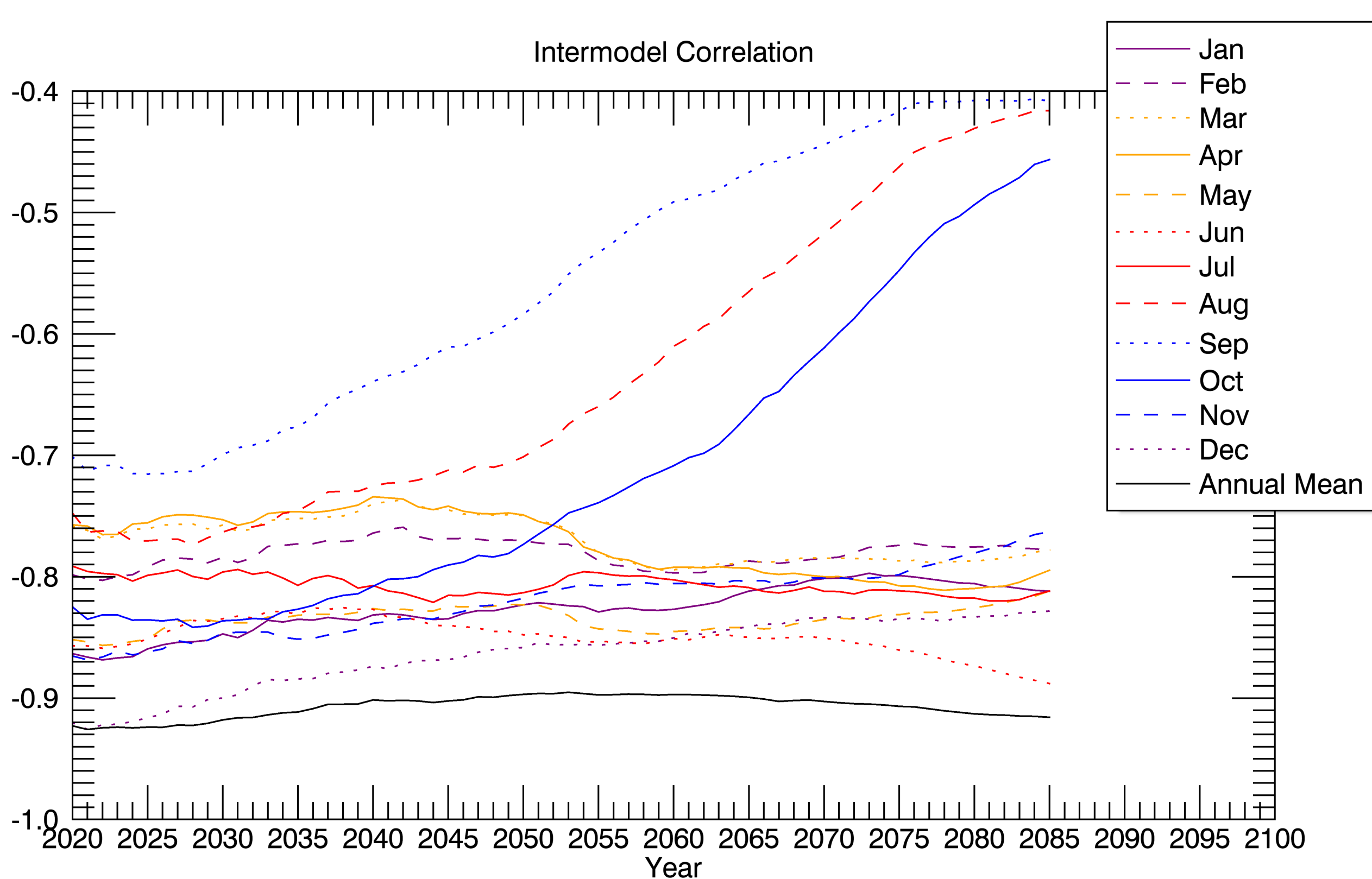
Greater Sea Ice Loss
Greater Warming
During Fall/Winter But
Not During Summer

4. Role of the Surface Albedo Feedback



SAF opposes the slowdown of the seasonal warming during spring and summer and enhances the slowdown of the seasonal cooling during fall and winter by melting more sea ice.

5. Temporal CMIP5 Intermodel Correlation



Seasonal Interplay between the SAF and heat capacity increase means CMIP5 models with greater sea ice loss experience stronger Arctic surface warming.

6. Summary: As Arctic sea ice converts to water the surface heat capacity increases. The heat capacity increase slows the seasonal cooling and warming in fall/winter and spring/summer, respectively, which amplifies Arctic warming in fall/winter and suppresses it in spring/summer. The SAF amplifies the warming by opposing the slowdown of the seasonal warming.