

Arctic low cloud changes as observed by MISR and CALIOP: Implication
for the enhanced autumnal warming and sea ice Loss

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Abstract –

Retreat of Arctic sea ice extent has led to more evaporation over open water in summer and subsequent cloud changes in autumn. Studying recent satellite cloud data over the Arctic Ocean, we find that low (0.5-2 km) cloud cover in October has been increasing significantly during 2000-2010 over the Beaufort and East Siberian Sea (BESS). This change is consistent with the expected boundary-layer cloud response to the increasing Arctic evaporation accumulated during summer. Because low clouds have a net warming effect at the surface, October cloud increases may be responsible for the enhanced autumnal warming in surface air temperature, which effectively prolong the melt season and lead to a positive feedback to Arctic sea ice loss. Thus, the new satellite observations provide a critical support for the hypothesized positive feedback involving interactions between boundary-layer cloud, water vapor, temperature and sea ice in the Arctic Ocean.