



Changes in the Arctic Melt Season and Implications for Sea Ice Loss

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The Arctic melt season has lengthened by 6 days dec-1 from 1979 to 2012, dominated by later autumn freeze-up within the Kara, Laptev, East Siberian, Chukchi and Beaufort seas between 5 and 12 days dec-1. While melt onset trends are generally smaller, the timing of melt onset has a large influence on the total amount of solar energy absorbed during the summer melt season. The additional heat stored in the upper ocean during the last decade increases sea surface temperatures and largely explains the one to two week delay in autumn freeze-up within the Arctic basin. Cumulative anomalies in total absorbed solar radiation from May through September for the most recent pentad locally exceed 300-400 MJ m⁻² in the Beaufort, Chukchi and East Siberian seas. This extra solar energy is equivalent to melting 0.97 to 1.3 m of ice during the summer.