

Sea ice outlook 2009 overview: Stratospheric dynamics and sea ice extent

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The results from an investigation of stratospheric circulation in winter and spring, and comparison of summertime surface winds and SLP with vortex splitting and minima in sea ice extent composites suggested that the September, 2009 ice extent would be comparable to or less than the September ice extent minimum in 2008, based on dynamic considerations. It was shown that springtime stratospheric circulation patterns were not conducive to a record minimum in ice extent in 2009. In particular, the absence of a distinctive transition between cyclonic and anticyclonic stratospheric circulation over the Arctic Ocean associated with sea ice minimum composites in spring of 2009 indicated that dynamical contributions would not accelerate ice loss or the decline in sea ice extent in September, 2009.

Differences between summer surface winds and SLP and vortex splitting and sea ice extent composites provided further evidence of dynamic contributions to the third record minimum ice extent observed in September, 2009. Despite the existence of a strengthened SLP to the north of the Canadian Archipelago and Greenland and increased convergence in these regions, comparison of SLP in June, 2009 and minimum sea ice extent composites highlighted an absence of the meridional pattern established by the SLP high (low) over the Beaufort Sea (Siberia) associated with a record reduction in ice extent in 2007, as outlined in Overland (2009). Similar results were found for July. Further examination of stratospheric and surface dynamical phenomena throughout the annual cycle provides one instrument with which to understand preconditioning events and feedback mechanisms responsible for changes in summertime ice extent in the Arctic.