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1. What are the reasons for the record-breaking minimum this year?

An assessment of spring and summer sea ice and atmospheric dynamics predicted sea ice extent comparable to that for 2011, contrary to the record minimum of 3.6 million square kilometers observed. SIO submissions for August, 2012 noted that a decrease in sea ice concentrations throughout the Arctic pack and loss in ice thickness at the periphery of the ice pack indicated increased sensitivity of the ice cover to atmospheric forcing and attendant deformation and ridging. A predominantly cyclonic ice drift regime was also observed in July, 2012 resulting in divergence in the ice pack, with implications for subsequent sea ice deformation and loss. An assessment of stratospheric dynamic variability in spring, 2012 illustrated a tripolar configuration pattern in wind extrema at high latitudes also encountered in prior years associated with a record low in fall sea ice extent (2007 and 2011).

Recent studies have attributed the record loss to the development of a cyclone over the Arctic in early August and a weaker ice cover that is more sensitive to wind forcing than in prior years (Parkinson, 2012). Overland and Francis (2012) also documented persistence in a regional atmospheric phenomenon, namely the Dipole Anomaly, as one mechanism responsible for the poleward retreat and reduction in sea ice extent in recent years.

2. How would you characterize the success of Outlook predictions this year and any differences between methodologies?

The Outlook predictions appeared successful for timeframes on the order of four-to-six weeks in advance of the minimum.

3. What do you see as our main "lessons learned" from this year?

Primary lessons learned include the lack of predictability associated with a thinner and more mobile ice pack during summer. As has been noted in previous assessments (Lindsay, 2011), increased sensitivity of the ice pack to atmospheric forcing highlights the need for high-resolution modeling of (upper and surface) atmospheric phenomena for the purposes of accurate atmospheric and sea ice predictions and forecasts. A record loss in sea ice extent in 2012 further highlighted the need for improved understanding of nonlinear feedback mechanisms in ocean-sea-ice-atmosphere interactions within an increasingly fragmented ice cover.