Polar climate mredictability Seasonal to Multi-decadal: Arctic Ocean processes and their predictability

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Updated time series of the Arctic Ocean Oscillation (AOO) index showing decadal variability for 1946present and illustrated by decadal changes in different environmental parameters correlating with AOO will be discussed. In particularly, in 2009, the wind-driven circulation regime can be characterized as cyclonic with a Beaufort Gyre that is significantly reduced in strength and a Trans-Polar drift that is effectively non-existent. This is the first time that an annual cyclonic circulation regime has been observed in the Arctic since 1997. The anticyclonic circulation regime that persisted through 2008 lasted at least 12 years instead of the typical 5-8 years (as reported in Proshutinsky and Johnson (1997) who analyzed statistics of Arctic circulation regimes between 1946 and 1989). The climatological seasonality of Arctic dynamics is anticyclonic ice and ocean circulation prevailing in winter and cyclonic circulation in summer. Since 2007, this seasonality has changed dramatically. Second, based on idealized and realistic model experiments roles of different factors driving Arctic's dynamics and thermodynamics (wind- and thermo-driven factors, freshwater cycling and beta-effect) will be analyzed and synthesized to hypothesize how the "arctic system work".