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GREENLAND BLOCKING AS A MECHANISM FOR RECENT ARCTIC/MID-LATITUDE WEATHER LINKAGES

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High-latitude blocking (HLB) located near and west of Greenland is a process that links Arctic processes to mid-latitude weather. HLB lies north of the jet stream and tends to bifurcate or divert the jet stream southward, rather than providing a complete block to the westerly flow. It is differentiated from mid-latitude blocking located in the central Atlantic to Europe and the western Pacific along eddy-driven jet streams. It is important to identify and understand an increase in recent HLB in early winter during the last five years relative to time series since 1948, even though this length is too short to robustly distinguish the influence of Arctic forcing from random events. In the last five early winters (December-January 2009-10 through 2013-14), two record and four other negative Arctic Oscillation atmospheric circulation index events have been observed, with positive Greenland Blocking Indices (GBI, greater 500 hPa geopotential heights) and increased geopotential thickness west of Greenland. Cold air penetrated into the southeastern United States in December 2009 and 2010 and January 2014 related to amplification in the long-wave upper-level atmospheric wind pattern. Northward air flow over Davis Strait acts as a positive feedback to maintain the Greenland air temperature anomalies. Positive GPH anomalies can relate to both dynamics through vorticity advection, and thermodynamics through lower level advection of temperature anomalies or low level heating, as given by the geopotential tendency equation. Recent Decembers with increases in the GBI show a decrease of temperature anomalies with height especially over Baffin and Hudson Bays, suggesting a low level thermodynamic contribution that can be related to recent Arctic (temperature) Amplification. Although not definitive, such results suggest that low level temperature anomalies can influence regional GPH patterns such as Greenland blocking and cold conditions in central and eastern North America.