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Impacts of the Aleutian-Icelandic low seesaw on surface climate during the 20th century

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An interannual seesaw between the intensities of the Icelandic and Aleutian lows and its impact on surface climate observed during the 20th century are investigated. In a recent period from the late 1960s to the early 1990s, their seesaw relationship was particularly apparent in late winter. The associated anomalies in surface air temperature were significant in many regions over the extratropical Northern Hemisphere except in central portions of the continents. The seesaw also modified the ocean-atmosphere exchange of heat and moisture extensively over the North Atlantic and North Pacific by changing evaporation and precipitation. Since the seesaw formation was triggered by eastward propagation of stationary Rossby wave trains from the North Pacific into the North Atlantic, anomalous circulation over the North Pacific in January was identified as a good precursor for February surface air temperatures in the Euro-Atlantic sector during that period.

The seesaw relationship between the two lows underwent multidecadal modulations during the 20th century. It was weak in the mid-1950s through the mid-1960s, while it was particularly strong during the preceding period from the 1920s to the 1940s with its impact on surface temperatures as extensive as in the recent period. Although its maturity was in January, the precursory signal of the seesaw in that early period was also found in the North Pacific one month earlier, which suggests that the formation was through essentially the same mechanisms as in the recent period.