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Synoptically Driven Boundary Layer Behavior over Summit Station Greenland during the Unusual Melt Season of 2012

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The summer of 2012 saw two periods of extensive melting of the ice surface over Greenland, the first since 1889 over the highest regions of the ice sheet. Fortunately a rather complete set of observations of the boundary layer evolution was provided by an acoustic minisounder and supported by an extensive array of cloud and radiation measurements. During the summer, three were a total of three multi-day warming periods in response, each time, to negative excursions of the Arctic Oscillation. During two of these, corresponding to periods of extensive melt, a ridge-trough pattern set up to transport warm, moist air from the south over Greenland: over the ocean this transport appeared as Atmospheric Rivers. In this paper, we describe the boundary layer over the period of June-August and its response to this synoptic forcing, in particular the rapidity of boundary response to changing radiative forcing.