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Characteristics of High Snow Accumulation Events, in Princess Elizabeth Land, East Antarctica

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Snow accumulation measurements from ten automatic weather stations in Princess Elizabeth Land, East Antarctica were used to analyze high snow accumulation (HSA) events on a synoptic timescale from 1998 to 2016. Between 9.2 and 14.6 HSA events occurred each year at the ten stations, accounting for >39.1–70.1% of the total snow accumulation at each station. The snow accumulation and temperature were significantly correlated on a monthly timescale with the frequency of HSA events at three stations. The synoptic weather patterns related to the HSA events showed geographical variations from the coast to inland areas. The majority of HSA events at the coastal stations AM02 (75%) and LGB69 (88.2%) were directly related to cyclones, whereas 73.6% of the HSA events at Dome A were controlled by anticyclones. Warm moist air from the South Indian Ocean reached the Antarctic plateau south of 80° S and orographic rain was associated with 88.7 and 96.7% of the HSA events at the high-altitude stations Eagle and Panda, respectively. A knowledge of possible changes in the frequency of such events in Antarctica are required to estimate future changes in sea-level and to understand paleoclimatic environments.