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Multi-decadal and seasonal variability of dust observations in West Greenland.

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Since the early 1900s expedition records from west Greenland have reported local dust storms. The Kangerlussuaq region, near the inland ice, is dry (mean annual precipitation <160 mm) with, on average, 150 snow-free days per year. The main local dust sources are active, proglacial outwash plains although reworking of loess deposits may also be important. This paper presents an analysis of 70-years of dust storm observations (1945-2015) based on WMO weather codes 6 (dust haze), 7 (raised dust or sand) and 9 (distant or past dust storm) and associated wind data. The 70-year average number of dust observations days is 5 per year but variable ranging from 0 observations to 23 observations in 1985. Over the past 7 decades the number of dust days has increased from <30 in 1945-54 to >75 in 1995-2004 and 2005-2015. The seasonality of dust observations has remained consistent throughout most of the period. Dust days occur all year round but are most frequent in May-June and September-October and are associated with minimum snow cover and glacial meltwater-driven sediment supply to the outwash plains during spring and fall flood events. Wind regime is bimodal dominated by katabatic winds from the northeast, which are strongest and most frequent during winter months (Nov-Jan), with less frequent, southwesterly winds generated by Atlantic storms mostly confined to spring (May, June). The southwesterly winds are those most likely to transport dust onto the Greenland ice sheet.