ACTIVITY CYCLE OF PARABOLIC DUNES BASED ON MORPHOLOGY AND CHRONOLOGY FROM SEWARD SAND HILLS, SASKATCHEWAN, CANADA

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Abstract — Morphologic and chronologic data are used to develop a conceptual model of parabolic sand dune reactivation and stabilization in response to changing climate, referred to as an activity cycle. The duration of an activity cycle is controlled by moisture availability in the dunes. Optical ages from the back ridges and dune-track ridges of adjacent dunes in Seward Sand Hills, southwestern Saskatchewan, demonstrate that the last cycle occurred during the 19th century. Ages of ridges behind the smaller of two dunes appear congruous, becoming older with depth and younger downwind, unlike those from the larger dune which record depositional events subsequent to the formation of major morphologic features. Initial rates of dune advance were rapid in response to climatic stress accumulated in the dunes. Fluctuation in the water table interrupted dune migration at least four times, in each case producing dune-track ridges. Rates of advance following formation of the first dune-track ridge averaged about 2.2 $m \cdot a^{-1}$, similar to those of presently active dunes in the region.