Morphodynamic processes of blowout on the fixed dune, China

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Blowout is a common landform on sandy grassland in semi-arid area and part of semi-humid area, and it is the symbol of the activation of fixed dune and the primary manifestation of desertification. This paper selected the south edge of Otingdag Sandy Land as the research area, and used WindSonic and high-precision RTK GPS to measure the airflow and topography of three blowouts with different morphology on the fixed dune. Meanwhile, combining with the image data and meteorological data, we analyzed the morphology evolution process of the three different blowouts and discussed the relationship between airflow and morphology of blowouts. The results showed that the northwest, west and southwest winds were dominant in the study area, and the west wind among them was the most frequent; The average annual wind speed tends to decrease, and the wind direction gradually tends to be stable and unidirectional, which is consistent with the direction of movement of the blowout in this area; From the air inlet to the top of the sand accumulation area, each blowout experienced the process of diffusion deceleration, convergence acceleration, separation deceleration and gradual acceleration along the long axis of the blowout, but the location that highest or lowest wind speed occurred were not the same in different blowout; The relationship between the wind direction and the long axis of blowout determines the airflow pattern inside blowouts. When the airflow diagonally enters the blowout, the airflow pattern tends to be complicated, and the deceleration and acceleration zone in blowout are obviously deviated. After the airflow enters the blowout, the wind speed and direction change obviously, which affects the spatial pattern of erosion or accumulation and further alters the morphology of the blowout. The morphology also in turn reacts on the near-surface airflow, which results in the response and feedback of the morphology and dynamics of the blowout.