Characteristics of a Lake Michigan Blowout
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Abstract

The relationship between wind and topography has been studied in recent scientific literature. Our research question is “what are the patterns of sand movement, wind speed/direction, and topography in a blowout?” The objectives of the study were to study the changes in wind speed and direction in different parts of the blowout, measure differences in erosion from week to week by using erosion pins, and measure the topography with a total station. Results indicated an increase in erosion in the deflation zone and deposition on the slip face as shown by erosion pin measurements, anemometer data, and information gathered using the total station.

Methods

We used the following methods to measure processes and characteristics of our blowout (Fig. 2):
- Total station survey to map topography (Fig. 3)
- Wind vanes and anemometers to measure wind velocity in and around blowout
- Transect line and grid of erosion pins to track surface changes
- Sand traps to measure sand transport rate

Figure 2: Blowout

Results

Topography: The saucer blowout was measured to be 10 meters tall, and 16 meters across (Fig. 4). The leeward side of the blowout was steeper than the windward side. The main axis of the blowout is approximately WSW.

Surface Changes: We were able to see evidence of sand deposition over the course of the two-week study. In locations lower in the blowout, erosion occurred while on the crest more deposition occurred. Fraser et al. (1998) also concurs with this finding in similar studies [3]. Just at the peak during lower wind weeks we saw that sand had actually started to erode back into the blowout.

Figure 3: Total station survey

Discussion

The wind direction in the blowout is aligned with the main axis of the blowout which suggests that topography influences wind direction.

Most of the high wind speeds happen at the higher elevation of the blowout. This helps explain higher levels of sand deposition and deposition is occurring on the crest and leeward side of the dune, causing the dune to advance.

Conclusions

We concluded that the wind was moving faster at the crest of the blowout than in the bowl and the wind direction was being deflected by the blowout. Due to the wind, erosion is occurring in the blowout and deposition is occurring on the crest and leeward side of the dune, causing the dune to advance.

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References

