TOPOGRAPHIC PROFILES ACROSS A LARGE REVERSING DUNE, TO AID IN EVALUATING THE REVERSING DUNE HYPOTHESIS FOR TARs ON MARS. J. R. Zimbelman[1] and S. P. Scheidt[1], [1]CEPS/NASM MRC 315, Smithsonian Institution, Washington, D.C., 20013-7012; zimbelmanj@si.edu.

Introduction: The Bruneau Dunes in south-central Idaho are an excellent location to examine reversing dunes, at a site that includes the largest single-structured sand dune in North America [1, 2]. Study of reversing dunes is important for evaluating the hypothesis that large Transverse Aeolian Ridges (TARs) on Mars may be formed as reversing dunes [3].

Results: In April 2011, we obtained precision topographic surveys across the southern end of a 115-m-high reversing dune at Bruneau Dunes using a Differential Global Positioning System (DGPS; Fig. 1). The topographic

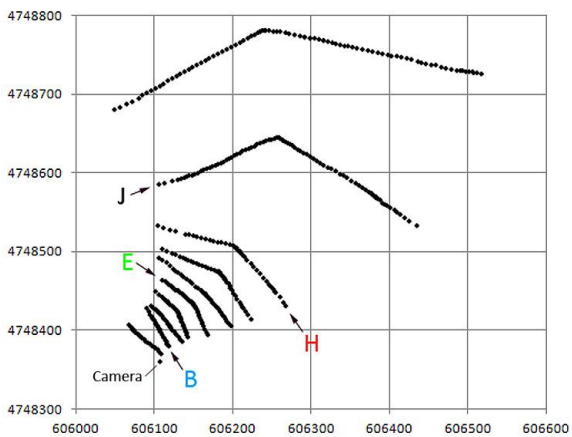

Figure 1. Survey lines over the southern end of a large reservsing dune at Bruneau Dunes, Idaho. Surveys are shown on a UTM grid (zone 11N) with 100-m boxes. Letters indicate profiles shown in Figs. 2 to 5; arrows indicate direction of each profile survey.

profiles show a steady progression of the dune from a low sand ridge ridge near the end of the dune (Fig. 2) to a symmetric sand dune as one approaches the highest portion of the dune (Figs. 3-5). Profiles were angled at the dune crest as the relief increased, to keep both portions of the survey line perpendicular to the slope of the dune face. Relief of the crest of the dune, obtained from the surveyed profiles relative to the west side of the dune, show the following progression going up the dune: 2.2 m, 5.5 m (Fig. 2), 6.5 m, 10 m, 16 m (Fig. 3), 17 m, 29 m, 37 m (Fig. 4), 80 m (Fig. 5), 115 m. The central portion of the dune, which includes the highest point along the dune crest, is represented by remarkably symmetric profiles, where both flanks at slopes not far below the angle of repose (Fig. 5). At the time of the surveys, we placed an inexpensive commercial timelapse digital camera (GardenWatchCam) to monitor the dune (Fig. 6); see [4, 5] for discussion of timelapse cameras for aeolian studies.

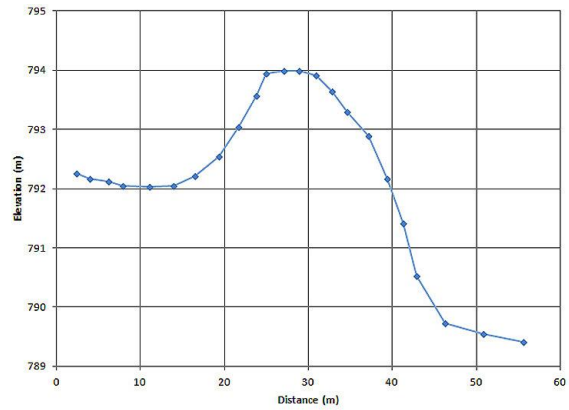

Figure 2. DGPS profile B near the distal end of the dune, going to the NW (see Fig. 1).

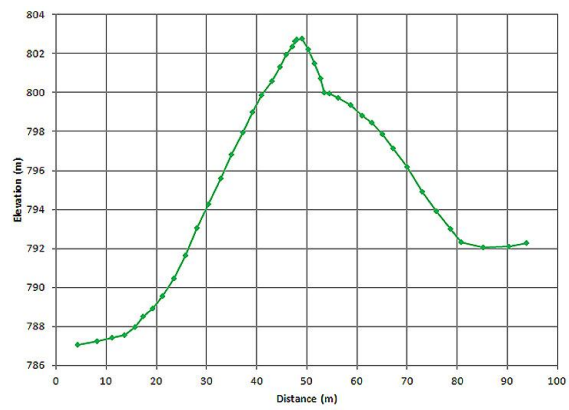

Figure 3. DGPS profile E, showing an enhanced accumulation of sand at the crest as a result of the latest sand-mving winds. Profile goes to SE (see Fig. 1).

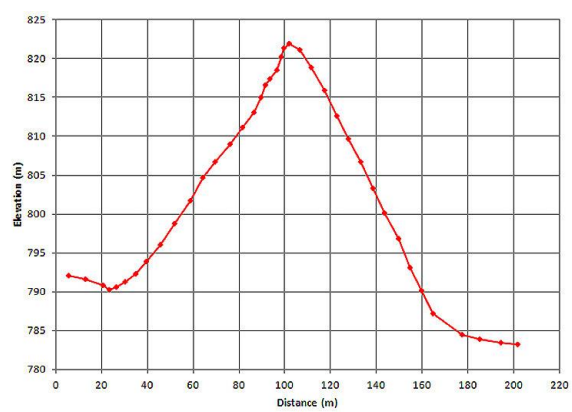

Figure 4. DGPS profile H, where topography is becoming symmetric with respect to both sides of the dune crest. Profile goes to WNW (see Fig. 1).

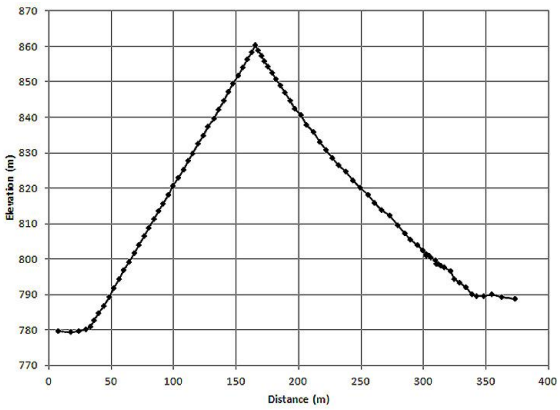

Figure 5. DGPS profile J. Topography here is very symmetric with respect to both sides of the dune crest, which remains the case on all of the central (highest) portion of the dune. Profile goes to E-SE (see Fig. 1).

Figure 6. South end of the Bruneau Dunes, in a photo taken by a GardenWatchCam looking north (see camera location in Fig. 1). Strong saltation, caused by wind blowing to the east, is evident at the dune crest. Timelapse images document movement of dry sand patches over the wet substrate of the main dune. Photo taken on May 5, 2011, at 8:32 pm MDT.

The Remote Automated Weather Station (RAWS) system [6] includes a RAWS installation at the Mountain Home Air Force Base, which is 21 km NW of the Bruneau Dunes. RAWS data has proved useful in studies of wind events at Great Sand Dunes National Park and Preserve in central Colorado [5]. The automatic camera monitoring provides a simple method for relating RAWS wind data from the Moutnain Home AFB site to conditions occurring at the south end of the Bruneau Dunes. Documentation of both the dune topography and the wind regime experienced at Bruneau Dunes will provide a valuable data set for evaluating the reversing dune hypothesis for TARs on Mars.

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