FIELD TRIP TO THE BRUNEAU DUNES AND THE SNAKE RIVER PLAIN BASALTS. J.R. Zimbelman[1],[1]CEPS/NASM MRC 315, Smithsonian Institution, Washington, D.C., 20013-7012; zimbelmanj@si.edu.

Introduction: A one-day field trip is planned as part of the agenda for the Fourth International Planetary Dunes workshop. On May 20 we will travel in a caravan of personal vehicles from Boise to Bruneau Dunes State Park, located about 10 km east of the small community of Bruneau, a trip of roughly 68 miles each way. Shortly after leaving Boise, we will first make a brief stop at the north bank of a branch of the Boise River where trails provide access to talus accumulated at the base of an exposure of columnar basalt, which is an excellent place to see the materials that comprise the Snake River Plain. Information about the field trip settings, including detailed driving instructions from MapQuest, are available on the workshop web site in a composite pdf file.

Background and Regional Setting: Boise is positioned near the eastern end of a broad NNW-SSE-oriented valley that connects to an even broader valley extending to the ENE, in which the Snake River Plain (SRP) is located (Fig. 1). The western branch of the SRP is a complex graben bounded by a system of normal faults [1], the northern side of which records more than 2.7 km of vertical displacement since Early Pliocene [2]. The structural control for the eastern SRP is less obvious, but a unique style of plains volcanism, based on numerous low-profile small shields, covers the plain [3]. The eastern SRP valley is associated with massive volcanic centers that decrease in age toward the active Yellowstone region at the eastern end of the valley, leading to speculation that the eastern SRP may be the track of the Yellowstone hostpot as plate motion carried North America over the hotspot [4]. The Columbia River Basalt (CRB) province is NNW of the western SRP (Fig. 1), although the earliest CRB eruptions (16.5 Ma) correlate with the location of the Yellowstone hotspot at that time [5]. The Bruneau Dunes are located within an evacuated cut-off meander loop of the Snake River, which flows across a good portion of the SRP [6]; the present sand accumulation at the dunes likely post-dates the Bonneville flood (14.5 Ka [7]), and has grown into the tallest single-structured free-standing sand dunes in North America, with >140 m of relief [6, 8].

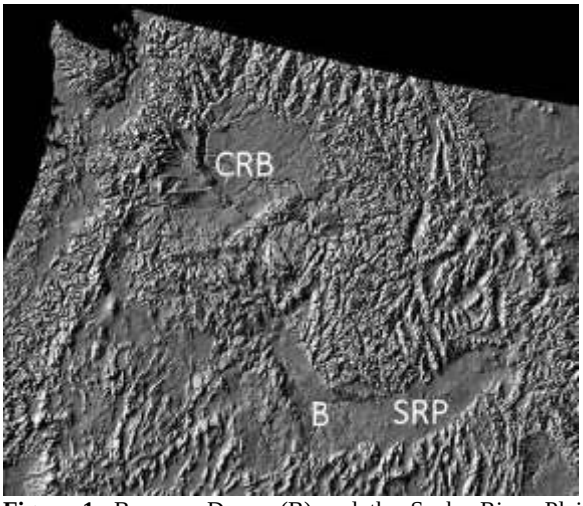

Figure 1: Bruneau Dunes (B) and the Snake River Plain (SRP) shown on a shaded relief image of the northwestern US (geomaps.wr.usgs.gov). The Columbia River Basalts (CRB) are exposed to the NNW of the SRP.

Snake River Plain Basalts: The SRP basalts are both chemically and morphologically distinct from the CRB province, leading Greeley to propose that they represent a form of basaltic "plains" volcanism separate from typical flood volcanism [3]. The western SRP consists of basalt flows of Early Pliocene to Middle Pleistocene age, while the eastern SRP basalts are Late Pleistocene to Holocene age [1]. A stop was chosen to view good exposures of columnar basalt from a parking area on the north side of a branch of the Boise River along Idaho Highway 21 (43° 52' 19.7" N, 116° 5' 33.8" W; Fig. 2). Trails from the parking area go to the base of a talus slope comprised of weathered basalt columns.

Figure 2: Stop for examination of Snake River Plain basalts along Idaho Highway 21, next to a catchment dam on a branch of the Boise River. Oblique Google Earth Pro image. Inset: columnar basalt and talus at the site (JRZ photo).

Bruneau Dunes: The largest sand accumulations at the Bruneau Dunes are interpreted to be reversing dunes (Fig. 3), supported by long-term wind records from nearby Mountain Home [6, 8]. Transverse and barchanoid bedforms do occur arround the main dunes, particularly west of the dunes in an area that Murphy called the 'Little Sahara' [6]. The dunes are preserved

Figure 3: Vertical view of the Bruneau Dunes; Google Earth Pro image. "P" indicates parking lot adjacent to the lake. Red line shows proposed hiking route to the crest of the dunes. White arrow shows orientation of photo in Fig. 4.

as part of the Idaho park system [9], and a daily entrance fee (per vehicle) is required at the entrance. The visit to the dunes will begin at the parking lot adjacent to the main dunes ("P" is Fig. 3; 42° 53' 44.8" N, 115° 41' 50.0" W). The parking area is next to a large lake that is available for non-motorized recreation (Fig. 4).

Figure 4: Oblique view of the Bruneau Dunes, looking south (see arrow in Fig. 3). Note abundant vegetation present both around the lake margin and on the stabilized flanks of the large dunes. JRZ photo, 9/5/12.

From the parking area, we will hike to the crest of the main dunes (red line, Fig. 3). The first half of the hike is basically level, circumventing the lake margin, but the second half of the hike involves moderate exertion to climb up the side of one of the large dunes, portions of which approach the angle of repose. The lowest portions of the large dunes are vegetated and locally stabilized (Fig. 4), but the crests of the tallest dunes are unvegetated and definitely active (Fig. 5). From the crest of the tall dunes, a panoramic view of the surrounding low hills visually confirms that the dunes are situated within a shallow depression, locally named Eagle Cove [6]. Sedimentology supports the interpretation that the dune sands are derived from loose mat-

Figure 5. Frame from a time series obtained by a GardenWatchCam placed to monitor the southern end of the dunes (bottom of Fig. 3). Image shows strong saltation by wind from the northwest, with transverse features over dark (wet) substrate sand. 5/9/11.

erials in the nearby hills, along with equal contributions of basalt fragments and silica sand, the later two likely derived from deposits left by the Bonneville flood [2, 6]. After several hours of exploring the dunes on your own, participants will return to Boise by retracing the path followed in getting to the park. Additional information about the park is available from [9].

References: [1] King J.S. (1977) NASA CR-154621 (R. Greeley and J.S. King, Eds), pp. 45-57. [2] Malde H.E. (1968) U.S. Geol. Surv. Prof. Paper 596, 52 p. [3] Greeley R. (1977) NASA CR-154621 (R. Greeley and J.S. King, eds), pp. 24-44. [4] Christensen R.L. (1990) Volcanoes of North America (C.A. Wood and J. Kienle, Eds.), pp. 263-266, Cambridge Univ. Pr. [5] Hooper P.R. (1997) Large Igneous Provinces (J.J. Mahoney and M.F. Coffin, Eds.), pp. 1-27, AGU Geophy. Mon. 100. [6] Murphey J.D. (1973) The geology of Eagle Cove at Bruneau, Idaho, M.S. thesis, SUNY-Buffalo, 77 p. [7] Currey D.R. (1990) Paleogeo. Paleoclim. Paleoecol. 76, 189-214. [8] Zimbelman J.R., Scheidt S.P. (2012) Icarus 230, 29-37. [9] parksandrecreation.idaho.gov/parks/bruneau-dunes/.