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Editorial

Introduction to the Planetary Dunes special issue, and the aeolian career of Ronald Greeley

The Third International Planetary Dunes Workshop was held June 12–15, 2012, at the Lowell Observatory in Flagstaff, Arizona, dedicated to Ronald Greeley (Third International Planetary Dunes, 2012). More than sixty researchers and students participated in three days of presentations and discussions, plus a full day field trip on June 13 to see aeolian sandstones near Page, Arizona. Most participants also took part in an optional field trip on June 16 to see the active dune field near Grand Falls, a short distance outside of Flagstaff. A summary of the main conclusions from this meeting is available in Fenton et al. (2013). This special issue of Icarus presents seventeen papers that resulted from the discussions that were held at the 2012 workshop; see Bourke et al. (2010) for an introduction to the special issue of Geomorphology that resulted from the first planetary dunes workshop. This Icarus special issue is the result of the diligent efforts of the authors, numerous conscientious reviewers, and the Editors (and Eva) at Icarus. The contents of the special issue are summarized next, followed by a review of the aeolian career of Ronald Greeley.

1. Earth

The first three papers deal with observations of sand dunes on Earth, with the aim of applying this information to improve the understanding of dunes on other planets. Fenton et al. (2014a) introduce the technique of inverse maximum gross bedform-normal transport to characterize winds from dune morphology identified solely from the analysis of single overhead images; the procedure was validated by testing on the Great Sand Dunes in central Colorado, USA. Hooper and Dinwiddie (2014) describe meltwater-induced debris flows at the Great Kobuk sand dunes in Alaska, triggered by solar-insolation-induced thawing of niveo-aeolian deposits within the dunes; this process is likely analogous to seasonal debris flows observed on some martian dunes. Zimbelman and Scheidt (2014) collected precision topography of a large reversing dune at the Bruneau Dunes in Idaho, where scaled profiles can be compared when the width varies by more than a factor of ten, and the Bruneau results are useful for assessing the condition of some Transverse Aeolian Ridges (TARs) on Mars.

2. Mars

The next eight papers deal with interpretations of dune fields on Mars, using a wide variety of image analysis techniques. Hayward et al. (2014) describe global trends for martian dune fields derived from a multi-year effort of cataloging with a consistent imaging data set; inferred wind directions are generally consistent with patterns predicted from modeling, and the effect of local topography on surface winds may explain some of the observed inconsistencies. Fenton et al. (2014b) applied the inverse maximum gross bedform-normal transport technique to HiRISE images of sand dunes in Ganges Chasma on Mars, which show that the main sand-moving winds in this canyon system are driven by large-scale circulation patterns. Putzig et al. (2014) explored the thermal behavior of the sand dunes that comprise the north polar erg on Mars, demonstrating that sand-sized agglomerated dust is no longer required to explain low observed temperatures, and a shallow ice table with in dunes comprised of ordinary sand tends to dominate the observed temperature changes. Lorenz et al. (2014) examined aeolian bedforms over the wide elevation range found on large martian volcanoes; the bedforms exhibit systematic size trends that are inversely proportional to the density of the martian air, as expected from several models.

Sefton-Nash et al. (2014) obtained constraints on equatorial wind regimes by comparing observations of aeolian trends visible on equatorial layered deposits to predictions from general circulation models; the direction of particle flux maxima fits well with yardang orientations, and gross bedform-normal transport directions are good matches to transverse sand dunes. Chojnacki et al. (2014) compared dune fields in Valles Marineris with other non-polar martian sand dune populations; observed characterisitics of the dune fields inside the rift valley indicate the dunes are largely influenced by the local regional geologic and topographic environment, and a diversity of primary and secondary minerals are associated with the rift valley dune fields. Yizhaq et al. (2014) analyzed sand ripples at Eagle crater imaged by the Opportunity rover, and by coupling a numerical model for saltation with a dynamic ripple model, they conclude that the fine-grained ripples developed below the fluid threshold, consistent with the presence of substantial hysteresis in martian saltation. Finally, Vaz and Silvestro (2014) use a new set of analysis tools to characterize small-scale aeolian structures in the vicinity of the Curiosity landing site in Gale crater.

3. Titan

The Cassini mission continues to provide new insights into the unique sand dunes that cover nearly a fifth of the surface of Saturn's largest moon. Lorenz (2014) summarizes the key parameters involved with aeolian processes on Titan, including the sensitivity of saltation to these parameters, and also evaluates the dune-building timescales for Titan. Rodriguez et al. (2014) examined the Titan dunes correlating radar data with compositional information from the Visual and Infrared Mapping Spectrometer; the dune material is dominated by solid organics of atmospheric origin that

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represent the largest visible surface reservoir of hydrocarbons on Titan. Savage et al. (2014) report on analyzing 7000 measurements of the width and spacing of dunes obtained from five study sites on Titan; the average width is 1.3 km and the average crest spacing is 2.7 km, comparable to large dunes on Earth, and cumulative probability plots of the measurements indicate that the dunes on Titan are of a single population.

Three papers make use of sophisticated modeling to investigate the dunes on Titan. Mastrogiuseppe et al. (2014) used Cassini radar altimetry, restricted to locations where the altimeter footprints were entirely on dunes, to investigate heights of the Fensal dune field on Titan, through application of a non-coherent electromagnetic echo model to the processing of the returned altimetry signal. Le Gall et al. (2014) modeled both the microwave backscatter and thermal emission from linear dune fields to compare to Cassini radar and radiometric data of Titan's dunes, in order to investigate regional variations among the dune fields on Titan. Paillou et al. (2014) modeled multi-frequency synthetic aperture radar response of linear dunes of the Great Sand Sea in Egypt, along with topography obtained during space shuttle missions, to compare to the radar response obtained during the T8 flyby that included large sections of the dunes on Titan, concluding that a single surface scattering term is insufficient to explain the radar signal strength backscattered by the dunes on Titan.

4. Ronald Greeley

In a career that spanned more than four decades, Ronald Greeley (Fig. 1) was widely acknowledged as a driving force behind the growth and development of the field of planetary science, particularly planetary geology. He was a Regents' Professor in the School of Earth and Space Exploration at Arizona State University, served as the Director of the NASA-ASU Regional Planetary Image Facility, and he was the Principal Investigator of the Planetary Aeolian Laboratory at NASA-Ames Research Center. He passed away suddenly at his home in Tempe, Arizona, on October 27, 2011. The Third International Planetary Dunes Workshop was dedicated to Ronald Greeley, and Ron would have been thrilled to hear the many remarkable results that were reported at the workshop.

Greeley earned undergraduate and graduate degrees in geology from Mississippi State University, and he earned his doctorate in geology at the University of Missouri in Rolla in 1966. He worked for Standard Oil Company of California as a paleontologist before military duty assigned him to the NASA Ames Research Center at Moffett Field, California, in 1967. Following his military commitment, Ron continued to work for NASA at Ames in a civilian capacity, studying impact cratering processes in preparation for the Apollo missions to the Moon, as well as the early Mariner investigations of Mars. Results from this work were fully utilized as a science team member on the Mars Viking Mission from 1976 to 1982.

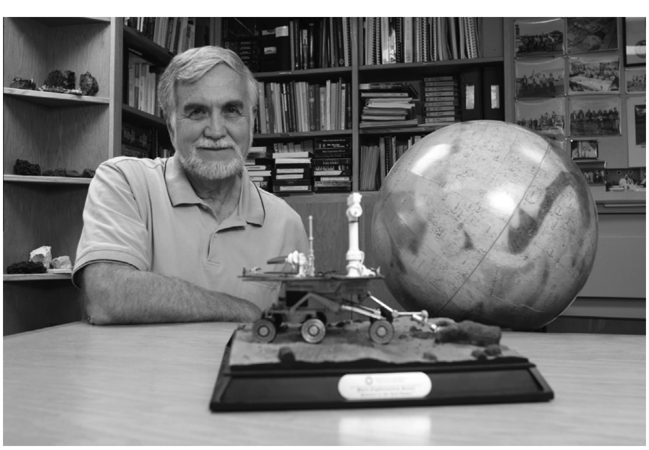

Fig. 1. Ronald Greeley in his office at Arizona State University, with a model of a Mars Exploration Rover (MER); Greeley was a member of the MER Science Team. See Third Planetary Dunes Workshop (2012). ASU photograph #3525249.

Greeley began teaching geology at Arizona State University in 1977 while continuing to conduct research related to volcanism, wind-surface interactions, and the photo-geological mapping of planets and their satellites. He was a pioneer in the combination of the interpretation of planetary image data with both laboratory experiments and field studies of terrestrial analogs, in order to understand the processes that contributed to the geologic history of planetary surfaces. Greeley was a member of several science teams for robotic spacecraft missions to Mars, Venus, and the moons orbiting the giant outer planets. He was a Fellow of the American Geophysical Union and the American Association for the Advancement of Science. In 1997, he was awarded the G. K. Gilbert Award by the Planetary Geology Division of the Geological Society of America. The Mars Exploration Rover science team recently honored him by naming the winter stopping place for the Opportunity rover 'Greeley Haven' (Arizona State University, 2012).

Greeley authored or co-authored 16 books and more than 450 scientific papers during his productive scientific career. He taught a wide variety of subjects, and through the numerous students he influenced so greatly, his influence will continue to impact planetary science in general, and aeolian studies in particular, well into the future. Ron was active in many diverse lines of research, but the following concentrates on his many contributions to aeolian research, including the expansion of this topic to include planetary bodies other than Earth. Greeley's publications include more than 140 peer-reviewed papers that deal with some aspect of aeolian research. Following is a brief listing of a few of Greeley's aeolian publications, in an attempt to illustrate the diversity of topics encompassed by his aeolian research. Interested readers will find citations to other Greeley aeolian publications in the reference lists of the papers cited below.

Greeley's involvement in the investigation of aeolian problems began with wind tunnel studies designed to understand how wind-related features can form in the current martian environment (Greeley et al., 1974), which subsequently led to important new contributions to the theory of wind-induced particle motion on Mars (Iversen et al., 1976; White et al., 1976; Greeley et al., 1976). The combination of laboratory and theoretical work was applied effectively to the interpretation of features observed in spacecraft images obtained from Mars (Veverka et al., 1977; Greeley et al., 1978); this triad of laboratory/field studies, theory, and spacecraft data analysis established a pattern of investigation that typified nearly all of Greeley's subsequent studies.

It is impossible to do justice to the diversity of subjects that Greeley's aeolian research dealt with. In lieu of that, following are some key topics in planetary aeolian studies to which he made significant contributions over the years: wind tunnel and laboratory experiments (Greeley et al., 1974, 1980, 1981, 1982, 1984a,b, 2000b, 2003a; Greeley and Iversen, 1985; Lorenz et al., 2005; Neakrase et al., 2006; Neakrase and Greeley, 2010); erosion and abrasion by wind-blown sand (Greeley et al., 1982; Greeley and Iversen, 1985; Bridges et al., 1999; Golombek et al., 2006; Thomson et al., 2008); particle motion induced by the wind (Iversen et al., 1976; White et al., 1976; Greeley et al., 1976, 1980, 1988; Greeley and Iversen, 1985, 1987; Greeley, 2002; Sullivan et al., 2008); dust mobilization and dust devils (Greeley et al., 1981, 2000b, 2003a, 2004b, 2006b, 2010; Greeley and Iversen, 1985; Greeley and Williams, 1994; Greeley, 2002; Neakrase et al., 2006; Stanzel et al., 2008; Neakrase and Greeley, 2010); field investigations of aeolian sites (Greeley and Iversen, 1985, 1987; Lancaster et al., 1987; Greeley et al., 1989, 1996, 2002; Greeley and Williams, 1994); radar studies (Greeley and Iversen 1985; Greeley et al., 1988, 1989, 1991, 1997a); General Circulation Models (Greeley et al., 1993, 1994); Viking mission (Veverka et al., 1977; Greeley et al., 1978, 1992a, 1993, 2001, 2003b, 2002, 2004b; Greeley and Thompson, 2003; Tsoar et al., 1979; Greeley and Iversen, 1985; Lancaster and Greeley, 1990); Mars Pathfinder mission (Greeley et al., 1999, 2000a, 2002; Bridges et al., 1999; Sullivan et al., 2000); Mars Exploration Rover (MER) missions (Greeley et al., 2004a, 2005, 2006a,b, 2008, 2010; Sullivan et al., 2005, 2008; Golombek et al., 2006; Thomson et al., 2008); Mars Express High Resolution Stereo Camera (HRSC) (Greeley et al., 2005; Stanzel et al., 2008); Magellan mission (Greeley et al., 1991, 1992b, 1994, 1997b); Mars (Greeley et al., 1974, 1976, 1978, 1980, 1981, 1982, 1992a, 1993, 1999, 2000b, 2001, 2002, 2003a,b, 2004a,b, 2005, 2006a,b, 2008, 2010; Iversen et al., 1976; White et al., 1976; Veverka et al., 1977; Tsoar et al., 1979; Greeley and Iversen, 1985; Lancaster and Greeley, 1990; Bridges et al., 1999; Sullivan et al., 2000, 2005, 2008; Greeley, 2002; Greeley and Thompson, 2003; Neakrase et al., 2006; Golombek et al., 2006; Thomson et al., 2008; Stanzel et al., 2008; Neakrase and Greeley, 2010); Venus (Greeley et al., 1984a, b, 1987, 1991, 1992b, 1994, 1997b); Titan (Greeley and Iversen, 1985; Lorenz et al., 2005).

The 1985 book "*Wind as a Geological Process: Earth, Mars, Venus, and Titan*", which Greeley co-authored with J.D. Iversen, deserves special mention. This text has become a standard reference for planetary aeolian studies, comparable in some respects to the continued citation of Bagnold's seminal 1941 book. To illustrate this point, a survey of works cited in research articles published in the journal Geomorphology through 2004 showed that the Greeley and Iversen text was second only to Bagnold's book for the number of citations of monographs related to aeolian studies [Table 1 of Doyle and Julian, 2005].

Greeley's aeolian research either initiated or enhanced many of the topics that will continue to be significant to planetary aeolian research during the decades to come. Greeley's impressive record demonstrates that often the answer to aeolian problems can be found "blowin' in the wind" (with a nod to the popular song from the 1970s). Ron was a valuable mentor and advisor to dozens of graduate students, as well as to the countless undergraduates who he taught over the years. On a personal note, I was privileged to be one of Ron's graduate students during his tenure at ASU. Practice sessions within Ron's research group prior to conferences could be brutal at times, but working through something with Ron and fellow students always resulted in an improved product. Ron's style of presenting talks freed me from being tied to written notes; I was able to focus on what was being presented to the audience rather than struggling to read notes. I will be forever indebted to him for his wise council and instruction. Ron will be greatly missed by all of us.

References

Arizona State University, 2012. Mars rover to spend winter at 'Greeley Haven', named for late ASU geologist Ronald Greeley. e! Science News. <http://www.esciencenews.com/articles/2012/01/07/mars.rover.spend.winter.greeley.haven.named.late.asu.geologist.ronald.greeley>.

Bourke, M.C., Lancaster, N., Fenton, L.K., Partelli, E.J.R., Radebaugh, J., Zimbelmsn, J.R., 2010. Extraterrestrial dunes: An introduction to the special issue on planetary dune systems. Geomorphology 121, 1–14.

Bridges, N.T. et al, 1999. Ventifacts at the Pathfinder landing site. J. Geophys. Res. 104, 8595–8615.

Chojnacki, M., Burr, D.M., Moersch, J.E., 2014. Valles Marineris dune fields as compared with other martian populations: Diversity of dune compositions, morphologies, and thermophysical properties. Icarus 230, 96–142.

Doyle, M.W., Julian, J.P., 2005. The most-cited works in Geomorphology. Geomorphology 72, 238–249. http://dx.doi.org/10.1016/j.geomorph.2005.04.016.

Fenton, L.K. et al, 2013. Summary of the third international planetary dunes workshop: Remote sensing and data analysis of planetary dunes, Flagstaff, Arizona, USA, June 12–15, 2012. Aeol. Res. 8, 29–38. http://dx.doi.org/10.1016/j.aeolia.2012.10.006.

Fenton, L.K., Michaels, T.I., Beyer, R.A., 2014a. Inverse maximum gross bedform-normal transport. 1: How to determine a dune-constructing wind regime using only imagery. Icarus 230, 5–14.

Fenton, L.K., Michaels, T.I., Chojnacki, M., Beyer, R.A., 2014b. Inverse maximum gross bedform-normal transport. 2: Application to a dune field in Ganges chasma, Mars and comparison with HiRISE repeat imagery and MRAMS. Icarus 230, 47–63.

Golombek, M.P. et al, 2006. Erosion rates at the Mars Exploration Rover landing sites and long-term climate change on Mars. J. Geophys. Res. 111, E12S10. http://dx.doi.org/10.1029/2006JE002754.

Greeley, R., 2002. Saltation impact as a means for raising dust on Mars. Planet. Space Sci. 50, 151–155.

Greeley, R., Iversen, J.D., 1985. Wind as a geological process: Earth, Mars, Venus, and Titan. Cambridge University Press, Cambridge, 333 p.

Greeley, R., Iversen, J.D., 1987. Measurements of wind friction speeds over lava surfaces and assessment of sediment transport. Geophys. Res. Lett. 14, 925–928.

Greeley, R., Williams, S.H., 1994. Dust deposits on Mars: The "Parna" analog. Icarus 110, 165–177.

Greeley, R., Thompson, S., 2003. Mars: Aeolian features and wind predictions at the Terra Meridiani and Isidis Planitia potential MER landing sites. J. Geophys. Res. 108. http://dx.doi.org/10.1029/2003JE002110.

Greeley, R., Iversen, J.D., Pollack, J.B., Udovich, N., White, B., 1974. Wind tunnel simulations of light and dark streaks on Mars. Science 183, 847–849.

Greeley, R., White, B., Leach, R., Iversen, J., Pollack, J., 1976. Mars: Wind friction speeds for particle movement. Geophys. Res. Lett. 3, 417–420.

Greeley, R., Papson, R., Veverka, J., 1978. Crater streaks in the Chryse Planitia region of Mars: Early Viking results. Icarus 34, 556–567.

Greeley, R., Leach, R., White, B., Iversen, J., Pollack, J., 1980. Threshold windspeeds for sand on Mars: Wind tunnel simulations. Geophys. Res. Lett. 7, 121–124.

Greeley, R., White, B.R., Pollack, J.B., Iversen, J.D., Leach, R.N., 1981. Dust storms on Mars: Considerations and simulations. Geol. Soc. Am. Sp. Paper 186, 101–121.

Greeley, R. et al, 1982. Rate of wind abrasion on Mars. J. Geophys. Res., 10009–10024 (3rd Mars Colloquium).

Greeley, R., Iversen, J., Leach, R., Marshall, J., White, B., Williams, S., 1984a. Windblown sand on Venus: Preliminary results of laboratory simulations. Icarus 57, 112–124.

Greeley, R., Marshall, J.R., Leach, R.N., 1984b. Microdunes and other aeolian bedforms on Venus: Wind tunnel simulations. Icarus 60, 152–160.

Greeley, R., Marshall, J.R., Pollack, J.B., 1987. Physical and chemical modification of the surface of Venus by windblown particles. Nature 327, 313–315.

Greeley, R. et al, 1988. A relationship between radar backscatter and aerodynamic roughness: Preliminary results. Geophys. Res. Lett. 15, 565–568.

Greeley, R., Christensen, P., Carrasco, R., 1989. Shuttle radar images of wind streaks in the Altiplano, Bolivia. Geology 17, 665–668.

Greeley, R., Marshall, J.R., Clemens, D., Dobrovolskis, A.R., Pollack, J.B., 1991. Venus: Concentrations of radar-reflective minerals by wind. Icarus 90, 123–128.

Greeley, R., Lancaster, N., Lee, S., Thomas, P., 1992a. Martian aeolian processes, sediments, and features. In: Kieffer, H.H., Jakosky, B. (Eds.), Mars. Univ. of Arizona Press, pp. 730–766.

Greeley, R. et al, 1992b. Aeolian features on Venus: Preliminary Magellan results. J. Geophys. Res. 97, 13319–13345.

Greeley, R., Skypeck, A., Pollack, J.B., 1993. Martian aeolian features and deposits: Comparisons with general circulation model results. J. Geophys. Res. 98, 3183–3196.

Greeley, R. et al, 1994. Wind streaks on Venus: Clues to atmospheric circulation. Science 263, 358–361.

Greeley, R., Blumberg, D.G., Williams, S.H., 1996. Field measurements of the flux and speed of wind-blown sand. Sedimentology 43, 41–52.

Greeley, R. et al, 1997a. Applications of spaceborne radar laboratory data to the study of aeolian processes. J. Geophys. Res. 102, 10971–10983.

Greeley, R., Bender, K.C., Saunders, R.S., Schubert, G., Weitz, C.M., 1997b. Aeolian processes and features on Venus. In: Bougher, S.W., Hunten, D.M., Phillips, R.J. (Eds.), Venus II: Geology, Geophysics, Atmosphere, and Solar Wind Environment. Univ. of Arizona Press, Tucson, pp. 547–589.

Greeley, R. et al, 1999. Aeolian features and processes at the Mars Pathfinder landing site. J. Geophys. Res. 104, 8573–8584.

Greeley, R., Kraft, M.D., Kuzmin, R.O., Bridges, N.T., 2000a. Mars Pathfinder landing site: Evidence for a change in wind regime from lander and orbiter data. J. Geophys. Res., Planets 105, 1829–1840.

Greeley, R., Wilson, G., Coquilla, R., White, B., Haberle, R., 2000b. Windblown dust on Mars: Laboratory simulations of flux as a function of surface roughness. Planet. Space Sci. 48, 1349–1355.

Greeley, R., Kuzmin, R.O., Haberle, R.M., 2001. Aeolian processes and their effect on understanding the chronology of Mars. Space Sci. Rev. 96, 365–392.

Greeley, R., Bridges, N.T., Kuzmin, R.O., Laity, J.E., 2002. Terrestrial analogs to wind-related features at the Viking and Pathfinder landing sites on Mars. J. Geophys. Res. 107. http://dx.doi.org/10.1029/2000JE001481.

Greeley, R. et al, 2003a. Martian dust devils: Laboratory simulations of particle threshold. J. Geophys. Res. 108 (E5). http://dx.doi.org/10.1029/2002JE001987.

Greeley, R., Kuzmin, R.O., Rafkin, S.C.R., Michaels, T., Haberle, R.M., 2003b. Wind-related features in Gusev crater, Mars. J. Geophys. Res. 108. http://dx.doi.org/10.1029/2002JE002006.

Greeley, R. et al, Athena Science Team, 2004a. Wind-related processes detected by the Spirit rover at Guzev crater, Mars. Science 305, 810–821.
Greeley, R., Whelley, P.L., Neakrase, L.D.V., 2004b. Martian dust devils: Directions of movement inferred from their tracks. Geophys. Res. Lett. 31, L24702. http://dx.doi.org/10.1029/2004GL021599.
Greeley, R. et al, 2005. Martian variable features: New insight from the Mars Express orbiter and the Mars Exploration Rover, Spirit. J. Geophys. Res. 110. http://dx.doi.org/10.1029/2005JE002403.
Greeley, R. et al, 2006a. Gusev crater: Wind-related features and processes observed by the Mars Exploration Rover, Spirit. J. Geophys. Res. 111. http://dx.doi.org/10.1029/2005JE002491.
Greeley, R. et al, 2006b. Active dust devils in Gusev crater, Mars: Observations from the Mars Exploration Rover, Spirit. J. Geophys. Res. 111, E12S09. http://dx.doi.org/10.1029/2006JE002743.
Greeley, R. et al, 2008. Columbia Hills, Mars: Aeolian features seen from the ground and orbit. J. Geophys. Res. 113, E06S06. http://dx.doi.org/10.1029/2007JE002971.
Greeley, R. et al, 2010. Gusev crater, Mars: Observations of three dust devil seasons. J. Geophys. Res. 115, E00F02. http://dx.doi.org/10.1029/2010JE003608.
Hayward, R.K., Fenton, L.K., Titus, T.N., 2014. Mars global digital dune database (MGD3): Global dune distribution and wind pattern observations. Icarus 230, 38–46.
Hooper, D.M., Dinwiddie, C.L., 2014. Debris flows on the Great Kobuk sand dunes, Alaska: Implications for analogous processes on Mars. Icarus 230, 15–28.
Iversen, J.D., Pollack, J.B., Greeley, R., White, B.R., 1976. Saltation threshold on Mars: The effect of interparticle force, surface roughness, and low atmospheric density. Icarus 29, 381–393.
Lancaster, N., Greeley, R., 1990. Sediment volume in the north polar sand seas of Mars. J. Geophys. Res. 95, 10921–10927.
Lancaster, N., Greeley, R., Christensen, P.R., 1987. Dunes of the Gran Desierto sand-sea, Sonora, Mexico. Earth Surf. Proc. Landforms 12, 277–288.
Le Gall, A., Janssen, M.A., Kirk, R.L., Lorenz, R.D., 2014. Modeling microwave backscatter and thermal emission from linear dune fields: Application to Titan. Icarus 230, 198–207.
Lorenz, R.D., 2014. Physics of saltation and sand transport on Titan: A brief review. Icarus 230, 162–167.
Lorenz, R.D., Kraal, E.R., Eddlemon, E.E., Chaney, J., Greeley, R., 2005. Sea-surface wave growth under extraterrestrial atmospheres: Preliminary wind tunnel experiments with application to Mars and Titan. Icarus 175, 556–560.
Lorenz, R.D., Bridges, N.T., Rosenthal, A.A., Donkor, E., 2014. Elevation dependence of bedform wavelength on Tharsis Montes, Mars: Atmospheric density as a controlling parameter. Icarus 230, 77–80.
Mastrogiuseppe, M., Poggiali, V., Seu, R., Martufi, R., Notarnicola, C., 2014. Titan dune heights retrieval by using Cassini radar altimeter. Icarus 230, 191–197.
Neakrase, L.D.V., Greeley, R., 2010. Dust devils in the laboratory: Effect of surface roughness on vortex dynamics. J. Geophys. Res. 115, E05003. http://dx.doi.org/10.1029/2009JE003465.
Neakrase, L.D.V., Greeley, R., Iversen, J.D., Balme, M.R., Eddlemon, E.E., 2006. Dust flux within dust devils: Preliminary laboratory simulations. Geophys. Res. Lett. 33. http://dx.doi.org/10.1029/2006GL026810.
Paillou, Ph., Bernard, D., Radebaugh, J., Lorenz, R., Le Gall, A., Farr, T., 2014. Modeling the SAR backscatter of linear dunes on Earth and Titan. Icarus 230, 208–214.
Putzig, N.E., Mellon, M.T., Herkenhoff, K.E., Phillips, R.J., Davis, B.J., Ewer, K.J., Bowers, L.M., 2014. Thermal behavior and ice-table depth within the north polar erg of Mars. Icarus 230, 64–76.
Rodriguez, S. et al, 2014. Global mapping and characterization of Titan's dune fields with Cassini: Correlation between RADAR and VIMS observations. Icarus 230, 168–179.
Savage, C.J., Radebaugh, J., Christiansen, E.H., Lorenz, R.D., 2014. Implications of dune pattern analysis for Titan's surface history. Icarus 230, 180–190.
Sefton-Nash, E., Teanby, N.A., Newman, C., Clancy, R.A., Richardson, M.I., 2014. Constraints on Mars' recent equatorial wind regimes from layered deposits and comparison with general circulation model results. Icarus 230, 81–95.
Stanzel, C., Patzold, M., Williams, D.A., Whelley, P.L., Greeley, R., Neukum, G.HRSC Co-Investigator Team, 2008. Dust devil speeds, directions of motion and general characteristics observed by the Mars Express High Resolution Stereo Camera. Icarus 197, 39–51.
Sullivan, R. et al, 2000. Results of the Imager for Mars Pathfinder windsock experiment. J. Geophys. Res. 105, 24547–24562.
Sullivan, R. et al, 2005. Aeolian processes at the Mars Exploration Rover Meridiani Planum landing site. Nature 436, 58–61. http://dx.doi.org/10.1038/nature03641.
Sullivan, R. et al, 2008. Wind-driven particle mobility on Mars: Insights from Mars Exploration Rover observations at "El Dorado" and surroundings at Gusev crater. J. Geophys. Res. 113, E06S07. http://dx.doi.org/10.1029/2008JE003101.
Third International Planetary Dunes, 2012. Third international planetary dunes workshop: Remote sensing and data analysis of planetary dunes. <www.lpi.usra.edu/meetings/dunes2012/>.
Thomson, B.J., Bridges, N.T., Greeley, R., 2008. Rock abrasion features in the Columbia Hills, Mars. J. Geophys. Res. 113, E08010. http://dx.doi.org/10.1029/2007JE003018.
Tsoar, H., Greeley, R., Peterfreund, A.R., 1979. Mars: The north polar sand sea and related wind patterns. J. Geophys. Res. 84, 8167–8180 (2nd Mars Colloquium).
Vaz, D., Silvestro, S., 2014. Mapping and characterization of small-scale aeolian structures on Mars: An example from the MSL landing site in Gale crater. Icarus 230, 151–161.
Veverka, J., Thomas, P., Greeley, R., 1977. A study of variable features on Mars during the Viking primary mission. J. Geophys. Res. 82, 4167–4187.
White, B.R., Greeley, R., Iversen, J.D., Pollack, J.B., 1976. Estimated grain saltation in a martian atmosphere. J. Geophys. Res. 81, 5643–5650.
Yizhaq, H., Kok, J.F., Katra, I., 2014. Basaltic sand ripples at Eagle crater as indirect evidence for the hysteresis effect in martian saltation. Icarus 230, 143–150.
Zimbelman, J.R., Scheidt, S.P., 2014. Precision topography of a reversing sand dune at Bruneau Dunes, Idaho, as an analog for Transverse Aeolian Ridges on Mars. Icarus 230, 29–37.

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