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EDUCATION

Washington University, Department of Earth and Planetary Sciences, St. Louis, Missouri.

Ph.D. in Earth and Planetary Sciences (May 1994)

Vanderbilt University, College of Arts and Sciences, Nashville, Tennessee.

B.S. in Physics (May 1984)

PROFESSIONAL EMPLOYMENT

Professor (Aug 2003 – present) Department of Geography and Geosciences, Bloomsburg University, Bloomsburg, Pennsylvania.

Associate Professor (August 2000 – Aug 2003) Department of Geography and Geosciences, Bloomsburg University, Bloomsburg, Pennsylvania.

NASA-ASEE Faculty Fellow (June 1999 - Aug 1999) Jet Propulsion Laboratory, Pasadena, California. Worked with S. Ostro on Radar Studies of Near-Earth Asteroids.

Assistant Professor (January 1995 – August 2000) Department of Geography and Earth Science, Bloomsburg University, Bloomsburg, Pennsylvania.

Garber Postdoctoral Fellow (September 1994 – December 1994, May 1995 - August 1995) Center for Earth and Planetary Studies, Smithsonian Institution, Washington, D. C.

Postdoctoral Research Associate (March 1994 – August 1994) Department of Earth and Planetary Sciences, Washington University, St. Louis, Missouri.

Research/Teaching Assistant (Aug 1990 - Feb 1994) Department of Earth and Planetary Sciences, Washington University, St. Louis, Missouri.

Engineering Division Officer (Dec 1985 - June 1989) U.S.S. Glenard P. Lipscomb (SSN-685) and P.C.U. Albany (SSN-753), United States Navy.

GRANTS

National Science Foundation, Astronomy & Astrophysics

Multi-wavelength Observations and Analysis of Asteroid 2100 Ra-Shalom, with Dr. B. E. Clark-Joseph (Ithaca College), co-investigator. (Aug 2003 – July 2005) (\$36.2/\$35.6K).

Visiting Astronomer

Arecibo Observatory, Puerto Rico, Aug 2003 – observations of 2100 Ra-Shalom

NASA Infrared Telescope Facility, Hawaii, Aug 2003 – observations of 2100 Ra-Shalom

Arecibo Observatory, Puerto Rico, Aug 2000 – observations of 2100 Ra-Shalom

NASA Planetary Geology and Geophysics Program

Remote Sensing of Planetary Surfaces, (Jan 2002 – Dec 2004) (\$34.5K/\$34.5K/\$34.5K)

Remote Sensing of Fractal Planetary Surfaces, with Dr. B. Campbell, co-investigator (Jan 1999 – Dec 2001) (\$146K).

A Study of the Venusian Surface Utilizing a Self-affine Paradigm, with B. Campbell, co-investigator (Jan 1997 - Dec 1998) (\$51K).

National Science Foundation Grant for Instrumentation and Laboratory Improvements

A Computer Laboratory for Geography and Earth Science, with K. Trifonoff, principal investigator (July 1997-July 1999) (\$26K + matching university funds)

Pennsylvania State System of Higher Education Faculty Professional Development Grants

Certification of Planetary Landing Sites (May 1996-May 1997) (\$3.8K).

Geomorphology from Space – Radar (May 1998-May 1999). (\$2.1K)

United States Geologic Survey

Pennsylvania Land Processes Research: Two Projects, National Mapping Division Data Grant Program for Land Processes Research, with D. Braun, K. Trifonoff, (May 1996-May 1997). (Data grant)

PROFESSIONAL SERVICE

Panels and Committees

Bloomsburg University Tenure Committee (2003 – present)

Mars Exploration Rover 2003 Landing Site Selection Committee (2001-2003)

Chair, NASA Planetary Cartography and Geological Mapping Working Group (2000-2001)

NASA Planetary Cartography and Geological Mapping Working Group (1997-2001)

NASA Planetary Geology and Geophysics Review Panel (1997-1999)

Bloomsburg University Faculty Professional Development Committee (1997-1998)

Bloomsburg University Sabbatical Committee (1997-1999)

Advisory Board Member, *Earth in Space*, American Geophysical Union, (1995-2000).

Johns Hopkins Applied Physics Laboratory “Red Team” member (Aug 1997, June 1998)

Professional Societies

American Geophysical Union

Division of Planetary Sciences, American Astronomical Society

Faculty for the 21st Century, Project Kaleidoscope

HONORS & AWARDS

NASA-ASEE Summer Faculty Fellowship (Summer, 1999) Jet Propulsion Laboratory, Pasadena, CA.

Dean’s Salute for Excellence (Fall, 1998) Bloomsburg University, Bloomsburg, PA.

Garber Postdoctoral Fellowship (September 1994 - December 1994, May 1995 - August 1995) Center for Earth and Planetary Studies, Smithsonian Institution, Washington, D. C.

University Graduate Fellowship (Aug 1989 - Aug 1990) Department of Earth and Planetary Sciences, Washington University, St. Louis, Missouri.

Naval ROTC scholarship (Aug 1980 – May 1984) Full tuition and fees, Vanderbilt University, Nashville, Tennessee

REFEREED PUBLICATIONS

- Clark, B.E., S.J. Bus, A.S. Rivkin, T. McConnochie, J. Sanders, S. Shah, T. Hiroi, **M. Shepard**, E-type asteroid spectroscopy and compositional modeling, *J. Geophys. Res.*, 2004.
- Campbell, B. A. and **M. K. Shepard**, Coherent and incoherent components in near-nadir radar scattering: Applications to radar sounding of Mars. *J. Geophys. Res.*, 108, 5132-5140, 2003.
- Bell, J.F. III, S. W. Squyres, K.E. Herkenhoff, J.N. Maki, H.M. Arneson, D. Brown, S.A. Collins, A. Dingizian, S.T. Elliot, E.C. Hagerott, A.G. Hayes, M.J. Johnson, J.R. Johnson, J. Joseph, K. Kinch, M.T. Lemmon, R.V. Morris, L. Scherr, M. Schwochert, **M.K. Shepard**, G.H. Smith, J.N. Sohl-Dickstein, R.J. Sullivan, W.T. Sullivan, and M. Wadsworth, Mars Exploration Rover Athena Panoramic Camera (Pancam) investigation, *J. Geophys. Res.*, 108, 8063-8093, 2003.
- Campbell, B.A., R.R. Ghent, and **M.K. Shepard**, Limits on inference of Mars small-scale roughness from MOLA data, *Geophys. Res. Letters*, 30, 1115, 2003
- Shepard, M. K.**, B. A. Campbell, M. H. Bulmer, T. G. Farr, L. R. Gaddis, J. J. Plaut, The roughness of natural terrain. A planetary and remote sensing perspective. *J. Geophys. Res.*, 106, 32777-32795, 2001.
- Shepard, M. K.**, L. A. M. Benner, S. J. Ostro, A. W. Harris, K. D. Rosema, I. I. Shapiro, J. F. Chandler, D. B. Campbell, 2000. Radar observations of asteroid 2100 Ra-Shalom, *Icarus*, 147, 520-529, 2000.
- Shepard M. K.** and B. A. Campbell, Near-Nadir Microwave Scattering from a Self-Affine Fractal Surface, *Icarus*, 141, 156-171, 1999.
- Shepard M. K.** and R. E. Arvidson, The Opposition Surge and Photopolarimetry of Fresh and Coated Basalts, *Icarus*, 141, 172-178, 1999.
- Helpenstein, P. and **M. K. Shepard**, Submillimeter-Scale topography of Undisturbed Lunar Soils, *Icarus*, 141, 107-131, 1999.
- Shepard M. K.** and B. A. Campbell, Shadows on a Planetary Surface and Implications for Photometric Roughness, *Icarus*, 134, 279-291, 1998.
- Guinness, E. A., R. E. Arvidson, I. H. D. Clark, and **M. K. Shepard**, Optical Scattering Properties of Terrestrial Varnished Basalts Compared with Rocks and Soils at the Viking Lander Sites, *Journal of Geophysical Research*, 102, 28,687-28,704, 1997.
- Campbell, B. A. and **M. K. Shepard**, Effect of Venus Surface Illumination on Photographic Image Texture, *Geophysical Research Letters*, 24, 731-734, 1997.
- Campbell, B. A. and **M. K. Shepard**, Lava Flow Surface Roughness and Depolarized Radar Scattering, *Journal of Geophysical Research*, 101, 18,941-18,952, 1996.
- Shepard, M. K.**, R. A. Brackett, and R. E. Arvidson, Self-Affine (Fractal) Topography: Surface Parameterization and Radar Scattering, *Journal of Geophysical Research*, 100, 11,709-11,718, 1995a.
- Shepard, M. K.**, R. E. Arvidson, M. Caffee, B. Finkel, and L. Harris, Cosmogenic Exposure Ages of Basalt Flows: Lunar Crater Volcanic Field, Nevada, *Geology*, 23, 21-24, 1995b.
- Pollack, J. B., M. E. Ockert-Bell, and **M. K. Shepard**, Viking Lander image analysis of Martian atmospheric dust, *Journal of Geophysical Research*, 100, 5235-5250, 1995.
- Shepard, M. K.**, R. E. Arvidson, R. A. Brackett, and B. A. Fegley, A Ferroelectric Model for the Low Emissivity Highlands on Venus, *Geophysical Research Letters*, 21, 469-472, 1994.
- Arvidson, R. E., R. A. Brackett, **M. K. Shepard**, N. R. Izenberg, B. Fegley, Jr., and J. J. Plaut, Microwave Signatures and Surface Properties of Ovda Regio and Surroundings, *Venus, Icarus*, 112(1), 171-186, 1994.
- Shepard, M. K.**, R. E. Arvidson, and E. A. Guinness, Specular Scattering from a Terrestrial Playa and Implications for Planetary Surface Studies, *Journal of Geophysical Research*, 98, 18,707-18,718, 1993.
- Arvidson, R. E., **M. K. Shepard**, E. A. Guinness, S. B. Petroy, J. J. Plaut, D. L. Evans, T. G. Farr, R. Greeley, N. Lancaster, L. R. Gaddis, Characterization of Lava-Flow Degradation in the Pisgah and Cima Volcanic Fields, California, using Landsat Thematic Mapper and AIRSAR data, *Bulletin, Geological Society of America*, 105, 175-188, 1993.

- Campbell, B. A., R. E. Arvidson, and **M. K. Shepard**, Radar Polarization Properties of Volcanic and Playa Surfaces: Applications to Terrestrial Remote Sensing and Magellan Data Interpretation, *Journal of Geophysical Research*, 98, 17,099-17,113, 1993.
- Arvidson, R. E., R. Greeley, M. C. Malin, R. S. Saunders, N. Izenberg, J. J. Plaut, E. R. Stofan, and **M. K. Shepard**, Surface Modification of Venus as Inferred from Magellan Observations of Plains, *Journal of Geophysical Research*, 97, 13,303-13,317, 1992.
- Shepard, M. K.**, R. E. Arvidson, E. A. Guinness, and D. W. Deering, Scattering Behavior of Lunar Lake Playa Determined from PARABOLA Bidirectional Reflectance Data, *Geophysical Research Letters*, 18, 2241-2244, 1991.

BOOKS/BOOK CHAPTERS

- Campbell, B. A., R. E. Arvidson, **M. K. Shepard**, and R. A. Brackett, *Surficial Geology of Venus*, in Venus II, University of Arizona Press, 1997.

ABSTRACTS AND PRESENTATIONS

- Shepard, M.K.**, B.E. Clark, L.A.M. Benner, J.D. Giorgini, P. Kusnirak, J-L. Margot, M.C. Nolan, S.J. Ostro, P. Pravec, L. Sarounova, D.K. Yeomans, Multi-wavelength observations of 2100 Ra-Shalom: Radar and Lightcurves. 35th Lunar and Planetary Science Conference, Houston, TX, 2004.
- Clark, B.E., **M. K. Shepard**, S.J. Bus, F. Vilas, A.S. Rivkin, L. Lim, S. Lederer, K. Jarvis, S. Shah, and T. McConnochie, Multi-wavelength observations of 2100 Ra-Shalom: Visible, infrared, and thermal spectroscopy results. 35th Lunar and Planetary Science Conference, Houston, TX, 2004.
- Shepard, M. K.** Albedo Dependence of Photometric Roughness, 35th Division of Planetary Sciences Meeting, Monterey, CA 2003.
- P. Helfenstein and **M. K. Shepard** A Blind Test of Hapke's Photometric Model. 34th Lunar and Planetary Science Conference, Houston, TX, 2003. (abstract only).
- Shepard, M. K.**, Initial results from the Bloomsburg University Goniometer (B.U.G.) Laboratory, Remote Sensing Science Symposium, Pittsburg, PA, 2002.
- Shepard, M. K.**, F. P. Seelos IV, R. E. Arvidson, A. Haldemann, The Roughness of the Martian Surface at Decimeter-to-Meter Scales: What We Know, (invited), Mars Exploration Rover 2003 Landing Site Workshop, Pasadena, CA, 2002.
- Shepard, M. K.**, Sampling the Roughness of a Self-Affine Surface Using Laser Altimeter Pulse-Width Statistics, 33rd Lunar and Planetary Science Conference, Houston, TX, 2002.
- F. P. Seelos IV, E. A. Guinness, J. D. Bowman, **M. K. Shepard**, N. O. Snider, and R. E. Arvidson, Recovery and Analysis of Digital Elevation Data from Viking Lander Camera Observations, 33rd Lunar and Planetary Science Conference, Houston, TX, 2002.
- M. C. Nolan, J-L. Margot, E. S. Howell, L. A. M. Benner, S. J. Ostro, J. D. Giorgini, R. F. Jurgens, D. B. Campbell, **M. K. Shepard**, C. Magri, Near-Earth Asteroids Observed Using the Post-Upgrade Arecibo Planetary Radar, Asteroids 2001 Conference, Palermo, Italy, 2001.

Shepard, M. K., The Bloomsburg University Goniometer (B.U.G.) Laboratory: An Integrated Laboratory for Measuring Bidirectional Reflectance Functions. 32nd Lunar and Planetary Science Conference, Houston, TX, 2001.

Campbell, B. A., and **M. K. Shepard**, Near-Nadir Radar Scattering from Venus, 32nd Lunar and Planetary Science Conference, Houston, TX, 2001.

Campbell, B.A., Campbell, D.B., Grant, J.A., Hensley, S., Maxwell, T.A., Plaut, J.J., Rosen, P., **Shepard, M.K.**, and Simpson, R., 2001, Orbital imaging radar and the search for water on Mars: p. 16-17 in Conf. on Geophysical Detection of Subsurface Water on Mars, LPI, Houston, TX.

Shepard, M. K. and Z. M. Musselman, Geomorphology from Space – Radar. 30th Lunar and Planetary Science Conference, Houston, TX, 1999.

Z. M. Musselman and **M. K. Shepard**, A Test of a Common Super-Resolution Algorithm, 30th Lunar and Planetary Science Conference, Houston, TX, 1999.

Shepard, M. K., Estimating Surface Roughness at Scales Below Sensor Resolution, Mars 2001 Lander Workshop, Buffalo, NY, 1999.

Shepard, M. K. and B. A. Campbell, Near-Nadir Scattering from a Fractal Surface, (invited) National Radio Science Meeting, Boulder, CO, 1999.

Shepard, M. K. and R. E. Arvidson, Photopolarimetry of Varnished Basalts and Implications for Asteroid Regoliths, 30th Division for Planetary Science Meeting, American Astronomical Society, Madison, WI, 1998.

Shepard, M. K. and B. A. Campbell, Fractal Planets: A Generalized Surface Roughness Model for Remote Sensing, 29th Lunar and Planetary Science Conference, Houston, TX, 1998.

Shepard, M. K. and B. A. Campbell, Hagfors Revisited: Near-Nadir Coherent Scattering from a Fractal Surface, 29th Lunar and Planetary Science Conference, Houston, TX, 1998.

Campbell, B. A., R. Greeley, E. R. Stofan, R. Gaskell, **M. K. Shepard**, and K. Klaasen, Imaging the Surface of Venus: Feasibility of Drop-Probe Photography, 29th Lunar and Planetary Science Conference, Houston, TX, 1998.

Helfenstein, P., J. Veverka, and **M. K. Shepard**, Submillimeter-Scale Topography of Undisturbed Lunar Soils, 29th Lunar and Planetary Science Conference, Houston, TX, 1998.

Brenenborg, S. R., **M. K. Shepard**, and D. D. Braun, Pleistocene Boulder Field Deposits of Northeastern Pennsylvania, Northeastern Geological Society of America Meeting, King of Prussia, PA, Abstracts with programs p. 33, 1997

Shepard, M. K., Optical Methods for Planetary Landing Site Certification, XXVIII Lunar and Planetary Science Conference, Houston, TX, 1997.

Guinness, E. A., R. E. Arvidson, **M. K. Shepard**, and I. Clark, Optical Scattering Properties of Terrestrial Varnished Basalts Compared with Rocks and Soils at the Viking Lander Sites, XXVIII Lunar and Planetary Science Conference, Houston, TX, 1997.

Shepard, M. K., and B. A. Campbell, Surface Roughness, Optical Shadowing, and Radar Backscatter, XXVII Lunar and Planetary Science Conference, Houston, TX, vol. 3, pp. 1189-1190, 1996.

Guinness, E. A., R. E. Arvidson, and **M. K. Shepard**, Specular Scattering from Rock Surfaces at the Viking Lander Sites, XXVII Lunar and Planetary Science Conference, Houston, TX, vol. 1, pp. 471-472, 1996.

Shepard, M. K., R. A. Brackett., and R. E. Arvidson, Implications for Self-Affine (Fractal) Topography for Radar Studies of Planetary Surfaces, American Geophysical Union Spring Meeting, Baltimore, MA, 1995.

Shepard, M. K., E. A. Guinness, and R. E. Arvidson, Spatial Statistical Analysis of the Ares Vallis Region from Viking Orbiter and Worst Case Scenario for Subpixel Scale Roughness, Mars Pathfinder II Workshop, Spokane, WA, 1995.

Campbell, B. A., **M. K. Shepard**, and D. B. Campbell, Surface Roughness and Diffuse Radar Scattering: Terrestrial Field Data Applied to Venus Studies, American Astronomical Society, Division for Planetary Sciences Hawaii Meeting, 1995.

Shepard, M. K., R. E. Arvidson, R. A. Brackett, and B. Fegley, Jr., A Ferroelectric Model for the Highlands of Venus, XXV Lunar and Planetary Science Conference, Houston, TX, 1994.

Shepard, M. K., R. E. Arvidson, M. Caffee, R. Finkel, and L. Harris, Cosmogenic Exposure Age Dating of Quaternary Basalts, Lunar Crater Volcanic Field, Nevada., Geological Society of America Meeting, Seattle, WA, 1994.

Arvidson, R. E., **M. K. Shepard**, R. E. Brackett, N. Izenberg, and B. Fegley, Jr., Microwave Signatures and Surface Properties of Ovda Regio and Surroundings, Venus, Geological Society of America Meeting, Seattle, WA, 1994.

Shepard, M. K., E. A. Guinness, and R. E. Arvidson, The Roughness of the Martian Surface: A Scale Dependent Model., XXIV Lunar and Planetary Science Conference, Houston, TX, vol. 3, pp. 1293-1294, 1993.

Ockert-Bell, M. E., J. B. Pollack, R. E. Arvidson, and **M. K. Shepard**, Improved Radiative Properties of Martian Atmospheric Dust Particles, Bulletin of the American Astronomical Society, vol. 25, no. 3, p. 1072, 1993.

Rivard, B., **M. Shepard**, and J. Plaut, Lithologic and Textural Controls on AVIRIS, TIMS, and SAR Signatures of Weathered Volcanic Rocks, Lunar Crater, Nevada., Geological Association of Canada Meeting, Edmonton, Alberta, Canada, 1993.

Shepard, M. K., R. E. Arvidson, E. A. Guinness, and D. W. Deering, Volume and Surface Scattering Properties of Lunar Lake Playa, Nevada. Poster Presentation, XXIII Lunar and Planetary Science Conference, Houston, TX, vol. 3, pp. 1285-1286, 1992.

Shepard, M. K., R. E. Arvidson, E. A. Guinness, Textural Properties of Lunar Lake Playa, Nevada, Determined by Bidirectional Reflectance Observations. American Geophysical Union Spring Meeting, Montreal, Canada, *Eos* Program with Abstracts, p. 185, 1992.

Arvidson, R. E., **M. K. Shepard**, and B. Rivard, The Potential Utility of Spectral Reflectance and Emission

Observations to Martian Landers., Workshop on Innovative Instrumentation for Mars, Munich, Germany, August 1992.

Shepard, M. K., R. E. Arvidson, D. W. Deering, Application of Hapke Photometric Model to Three Geologic Surfaces using PARABOLA Bidirectional Reflectance Data. American Geophysical Union Spring Meeting, Baltimore, MD, *Eos* Program with Abstracts, p. 176, 1991.