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A. Personal

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B. Education

B.A. in College Scholars, summa cum laude, specializing in Geology and Physics,
University of Tennessee, 1983.
Ph.D. in Geophysics, Massachusetts Institute of Technology, 1988.

C. Employment

Southwest Research Institute, Staff Scientist, 2003–2005; Assistant Director 2005–;
Blackhawk Geoservices, Inc., Senior Geophysicist, 1996–2003; R&D Manager, 2003;
University of Colorado, Visiting/Research Professor, 1998–2003.
Arizona State University, Assistant Professor, 1992–1996.
Southern Methodist University, Postdoctoral Research Associate, 1989–1991.
Massachusetts Institute of Technology, Graduate Teaching Assistant, 1988.
Massachusetts Institute of Technology, Graduate Research Assistant, 1983-1987.
NASA Planetary Geology Undergraduate Research Program, Ames Research Center, 1982, 1983.
Naval Ocean Research and Development Activity, Bay St. Louis, MS, Co-op, 1981-1983.

D. Experience

Electromagnetics: PI and Co-I of SERDP and Navy projects for detection and discrimination of unexploded ordnance and land mines. PI and Co-I of NASA projects to build prototype compact EM sensors for planetary exploration. PI and collaborator of NASA projects for analysis of radar measurements of Venus. PI of NASA projects for analysis of crustal magnetism and distribution of unfrozen cryospheric water on Mars. PI of two NASA Mars Scout mission concept studies and Step 1 proposals. PI of MSL ground-penetrating radar proposal.

Seismology: Co-PI of DOE project to investigate naturally fractured gas reservoirs using multiazimuth seismic attributes. PI of SERDP project for shallow 3D tomography to map contaminant pathways. Experience in crustal-structure tomography, marine refraction, and other shallow-investigation methods (surface waves, shear waves, refraction, reflection).

Resistivity and IP: PI of SERDP (same as seismology) and DOE projects for shallow tomography, including direct detection of nonaqueous contaminants using IP. Experience in shallow resistivity exploration.

Gravity: PI of NASA projects to investigate crustal structure of Venus and Mars. Experience in shallow gravity exploration.

Tectonics and Geodynamics: Applications of previously cited seismic and gravity projects to regional and local structural geology.

Hydrogeology: Water-resources and modeling consultant. PI of NASA project to model hydrothermal processes, role of water in landslides, and groundwater circulation on Mars.

Education: 5 M.S., 3 Ph.D. students graduated. Courses taught in geology, geodynamics, geophysics, and hydrogeology. Head undergraduate advisor.

Professional Service: Chairman NASA MIDP; Geophysics Subgroup Leader NASA PIDDP, MIDP; Member NASA PGG, MDAP, MFRP Review Panels; Assoc. Editor GRL and JGR-Planets; Mars Subsurface Working Group; Mars 2005 Orbital Radar Virtual Science Definition Team; Mars Smart Lander Science Definition Team and Science Advisory Group; numerous journal-article (mainly JGR, GRL, Icarus) and proposal (mainly NASA, NSF, DOD) reviews.

E. Publications

Refereed Articles

- Grimm, R.E., and H.Y. McSween, Jr., Numerical simulation of crystal fractionation in shergottite meteorites, Proc. Lunar Planet. Sci. Conf. 13th, Part 1, *J. Geophys. Res.*, 87, Suppl., A385-A392, 1982.
- Grimm, R.E., and S.W. Squyres, Spectral analysis of groove spacing on Ganymede, *J. Geophys. Res.*, 90, 2013-2021, 1985.
- Grimm, R.E., Penecontemporaneous metamorphism, fragmentation, and reassembly of ordinary chondrite parent bodies, *J. Geophys. Res.*, 90, 2022-2028, 1985.
- Grimm, R.E., and S.C. Solomon, Tectonic tests of proposed polar wander paths for Mars and the Moon, *Icarus*, 65, 110-121, 1986.
- Grimm, R.E., and S.C. Solomon, Limits on modes of lithospheric heat transport on Venus from impact crater density, *Geophys. Res. Lett.*, 14, 538-541, 1987.
- Grimm, R.E., and S.C. Solomon, Viscous relaxation of impact crater relief on Venus: Constraints on crustal thickness and thermal gradient, *J. Geophys. Res.*, 93, 11911-11929, 1988.
- Grimm, R.E., and S.C. Solomon, Tests of crustal divergence models for Aphrodite Terra, Venus, *J. Geophys. Res.*, 94, 12103-12131, 1989.
- Grimm, R.E., and H.Y. McSween, Jr., Water and the thermal evolution of carbonaceous chondrite parent bodies, *Icarus*, 82, 244-280, 1989.
- Grimm, R.E., and R.J. Phillips, Tectonics of Lakshmi Planum, Venus: Tests for Magellan, *Geophys. Res. Lett.*, 17, 1349-1352, 1990.
- Arvidson, R.E., R.E. Grimm, R.J. Phillips, G.G. Schaber, and E.M. Shoemaker, On the nature and rate of resurfacing of Venus, *Geophys. Res. Lett.*, 17, 1385-1388, 1990.
- Phillips, R.J., R.E. Grimm, and M.C. Malin, Hot-spot evolution and the global tectonics of Venus, *Science*, 651-658, 1991.
- Grimm, R.E., and R.J. Phillips, Gravity anomalies, compensation mechanisms, and the geodynamics of western Ishtar Terra, Venus, *J. Geophys. Res.*, 8305-8324, 1991.
- Herrick, R.R., and R.E. Grimm, Comment on "Terrestrial spreading centers under Venus conditions: Evaluation of a crustal spreading model for western Aphrodite Terra" by C. Sotin et al., *Earth Planet. Sci. Lett.*, 104, 114-115, 1991.
- Solomon, S.C., S.E. Smrekar, D.L. Bindschadler, R.E. Grimm, W.M. Kaula, G.E. McGill, R.J. Phillips, R.S. Saunders, G. Schubert, S.W. Squyres, and E.R. Stofan, Venus tectonics: An overview of Magellan observations, *J. Geophys. Res.*, 97, 13199-13255, 1992.
- Grimm, R.E., and R.J. Phillips, Anatomy of a venusian hot spot: Geology, gravity, and mantle dynamics of Eistla Regio, *J. Geophys. Res.*, 97, 16035-16054, 1992.
- Kaula, W.K., D.L. Bindschadler, R.E. Grimm, V.L. Hansen, K.M. Roberts, and S.E. Smrekar, Styles of deformation in Ishtar Terra and their implications, *J. Geophys. Res.*, 16085-16120, 1992.
- Phillips, R.J., R.R. Herrick, R.E. Grimm, R.F. Raubertas, I.C. Sarkar, R.E. Arvidson, and N. Izenberg, Impact crater distribution on Venus: Implications for planetary resurfacing history, *J. Geophys. Res.*, 15923-15948, 1992.
- Grimm, R.E., and H.Y. McSween, Heliocentric zoning of the asteroid belt by 26Al heating, *Science*, 259, 653-655, 1993.
- Fink, J.F., N. T. Bridges, and R.E. Grimm, Shapes of Venusian "pancake" domes imply episodic emplacement and silicic composition, *Geophys. Res. Lett.*, 20, 261-264, 1993.
- Grimm, R.E., Recent deformation rates on Venus, *J. Geophys. Res.*, 99, 23163-23171, 1994.
- Grimm, R.E., The deep structure of plateau highlands on Venus, *Icarus*, 112, 89-103, 1994.
- Banerdt, W.B., A.S. Konopliv, N.J. Rappaport, W.L. Sjogren, R.E. Grimm, and P.G. Ford, The isostatic state of Mead crater, *Icarus*, 112, 117-129, 1994.
- Brown, C.D., and R.E. Grimm, Tectonics of Artemis Chasma: A Venusian "plate" boundary, *Icarus*, 117, 219-249, 1995.
- Brown, C.D., and R.E. Grimm, Lithospheric rheology and flexure at Artemis Chasma, Venus, *J. Geophys. Res.*, 101, 12697-12708, 1996.
- Brown, C.D., and R.E. Grimm, Floor subsidence and rebound of large Venus craters, *J. Geophys. Res.*, 101, 26057-26067, 1996.
- Brown, C.D., and R.E. Grimm, Tessera deformation and the contemporaneous thermal state of the plateau highlands, Venus, *Earth Planet. Sci. Lett.*, 147, 1-10, 1997.

- Grimm, R.E., and P. Hess, "The Crust of Venus", in *Venus II* (eds. S.W. Bougher, D. Hunten, and R. Phillips), Univ. of Arizona Press, Tucson, AZ, 1205-1244, 1997.
- Anderson, S., and R.E. Grimm, Rift processes at the Valles Marineris, Mars: Constraints from gravity on necking and rate-dependent strength evolution, *J. Geophys. Res.*, 103, 11,113-11,124, 1998.
- Brown, C.D., and R.E. Grimm, Recent tectonic and lithospheric thermal evolution of Venus, *Icarus*, 139, 40-48, 1999.
- Grimm, R.E., C.R. Bates, D.R. Phillips, H.B. Lynn, K.M. Simon, and W. Beckham, Detection and analysis of naturally fractured gas reservoirs: Multiazimuth seismic surveys in the Wind River basin, *Geophysics*, 64, 1277-1292, 1999.
- Bates, C.R., D.R. Phillips, R. Grimm, and H. Lynn, The seismic evaluation of a naturally fractured tight gas sand reservoir in the Wind River Basin, Wyoming, *Petroleum Geoscience*, 7, 35-44, 2001.
- Grimm, R.E., Low-frequency electromagnetic exploration for groundwater on Mars, *J. Geophys. Res.*, 107, 10.1029/2001JE001504, 2002.
- Harrison, K.P., and R.E. Grimm, Controls on martian hydrothermal systems: Application to valley-network and magnetic-anomaly formation, *J. Geophys. Res.*, 107, 10.1029/2001JE001616, 2002.
- McSween, H.Y., A. Gosh, R.E. Grimm, L. Wilson, and E.D. Young, Thermal evolution models of asteroids, in *Asteroids III* (eds. W.F. Bottke Jr., A. Cellino, P. Paolicchi, and R. Binzel), Univ. Arizona Press, Tucson, pp. 559-571, 2003.
- Grimm, R.E., A comparison of time domain electromagnetic and surface nuclear magnetic resonance sounding for subsurface water on Mars, *J. Geophys. Res.*, 2002JE001882, 2003.
- Harrison, K.P., and R.E. Grimm, Rheological controls on Martian landslides, *Icarus*, 163, 347-362, 2003.
- Grimm, R.E., Triaxial modeling and target classification of multichannel, multicomponent EM data for UXO discrimination, *J. Environ. Eng. Geophys.*, 8, 239-250, 2003.
- Harrison, K.P., and R.E. Grimm, Tharsis recharge: A source of groundwater for Martian outflow channels, *Geophys. Res. Lett.*, 31, L14703, doi: 10.1029/2004GL020502, 2004.
- Harrison, K.P., and R.E. Grimm, Groundwater-controlled valley networks and the decline of surface runoff on Early Mars, *J. Geophys. Res.*, *J. Geophys. Res.*, 110, E12S16, doi:10.1029/2005JE002455, 2005.
- Grimm, R.E., G. Olhoeft, K. McKinley, J. Rossabi, and B. Riha, Nonlinear complex resistivity survey for DNAPL at the Savannah River Site A-014 Outfall, *J. Environ. Eng. Geophys.*, 10, 351-364, 2005.
- Bottke, W.F., D. Nesvorný, R.E. Grimm, A. Morbidelli, and D.P. O'Brien, Iron meteorites as remnants of planetesimals formed in the terrestrial planet region, *Nature*, 439, doi:10.1038/nature04563, 2006.
- Heggy E., S. M. Clifford, R. E. Grimm, C. L. Dinwiddie, J. A. Stamatakos, S. H. Gonzalez, Low-frequency radar sounding investigations of the North Amargosa Desert, Nevada: A potential analog of conductive subsurface environments on Mars, *J. Geophys. Res.*, 111, E06S03, doi:10.1029/2005JE002523, 2006.
- Heggy E., S. M. Clifford, R. E. Grimm, C. L. Dinwiddie, D. Y. Wyrick, B. E. Hill (2006), Ground-penetrating radar sounding in mafic lava flows: Assessing attenuation and scattering losses in Mars-analog volcanic terrains, *J. Geophys. Res.*, 111, E06S04, doi:10.1029/2005JE002589.
- Grimm, R. E., E. Heggy, S. Clifford, C. Dinwiddie, R. McGinnis, and D. Farrell, Absorption and scattering in ground-penetrating radar: Analysis of the Bishop Tuff, *J. Geophys. Res.*, 111, E06S02, doi:10.1029/2005JE002619, 2006.

Selected Other Publications

- Solomon, S.C., and R.E. Grimm, Tectonic activity on Venus, *Nature*, 331, 305-306, 1988.
- Grimm, R.E., Well-skin effects in a consolidated sedimentary aquifer, 8th Symposium of the Arizona Hydrological Society, 137-138, 1995.
- Grimm, R.E., *Hydraulics of the Concho Well Field*, Salt River Project, Phoenix, 79 pp., 1995.
- Grimm, R.E., M.W. Blohm, and E. M. Lavelly, UXO characterization using multicomponent, multichannel time-domain electromagnetic induction, in *UXO Forum 97*, Dept. of Defense Explosives Safety Board, Alexandria, VA, 134-143, 1997.
- Grimm, R.E., and H.B. Lynn, Effects of acquisition geometry, large-scale structure, and regional anisotropy on AVOA: An example from the Wind River basin, 67th Internat. Mtg., Soc. Explor. Geophys., Expanded Abstracts, 1997-2000, 1997.
- Grimm, R.E., What do we really know about the heat flow of Venus (or anyplace else we can't stick with probes), *The Leading Edge*, November, 1542-1546, 1998.
- Anderson, F.S., and R.E. Grimm, Rifting of Valles Marineris, Mars: A finite-element analysis, *Lunar Planet. Sci. XXX*, Lunar and Planetary Institute, Houston, CD-ROM, #1954, 1999.

- Grimm, R.E., Magnetic lineations on Mars: Formation by crustal accretion or depletion? *Lunar Planet. Sci. XXXI*, Lunar and Planetary Institute, CD-ROM, #2056, 2000.
- Grimm, R.E., Time-domain EM measurements and modeling of UXO, *UXO Forum 2001*.
- Mekic-Stall, N., P. Sirls, and R.E. Grimm, 2D & 3D crosshole sonic logging tomography (CSLT) versus crosshole sonic logging (CSL) for drilled shafts, *2nd Ann. Conf. Appl. Geophys and NDT Technol. and Meth. to Transport Facilities and Infrastructure, FHWA-02-001 (CD-ROM)*, Paper #32, 2002.
- Grimm, R.E., and T.A. Sprott, Model-based sensor design optimization for UXO classification, *UXO/Countermine Forum*, 2002.
- Grimm, R.E., Comparison of ground-penetrating radar and low-frequency electromagnetic sounding for detection and characterization of groundwater on Mars, *6th Inter. Conf. Mars*, 2003.
- Wold, R., D. George, R. Grimm, D. Johnston, and A. Becker, EM and magnetic (dual-mode) system for detection and classification of UXO, *UXO/Countermine Forum*, 2003.
- Snyder, D.D., S. Macinnes, R. Grimm, M. Poulton, The value of three-component measurements in EM discrimination of UXO, *SAGEEP*, 2003.
- Over 100 conference presentations (most listed in GeoRef/GeoBase)

Current Abstracts and Papers in Press

- Clifford, S.M, and 11 others (incl. R.E. Grimm), Mars analog investigations of the west Egyptian desert utilizing multifrequency GPR and other electromagnetic sounding techniques, *Lunar Planet. Sci. XXXVII*, 2006.
- Dinwiddie, C.L., S.K. Sandberg, R.N. McGinnis, and R.E. Grimm, Geophysical field investigation of a potential hyper-arid desert analog to Mars: the western desert of Egypt, *Lunar Planet. Sci. XXXVII*, 2006.
- Grimm, R.E., M. Bullock, S. Jepsen, G. Olhoeft, S. Painter, and J.Priscu, Unfrozen groundwater in the martian cryosphere, *Lunar Planet. Sci. XXXVII*, 2006.
- Jewitt, D., L. Chizmadia, R. Grimm, and D. Prialnik, Water in the small bodies of the Solar System, *Protostars and Planets V*, in press, 2006.