

Rossman Philip Irwin III

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EMPLOYMENT

- 2001–pres. **Smithsonian Institution**, National Air and Space Museum, Washington, DC
Geologist: Research interests include Martian valley network development, paleolakes, the crustal dichotomy boundary, planetary geologic mapping, and terrestrial desert geomorphology
- 1999–2001 **Science Applications International Corporation**, McLean, VA
GIS Analyst: Web design, technical editing, and geographic information systems support for VMap1 Coproducer Working Group (National Imagery and Mapping Agency client)
- 2001 **University of Virginia Department of Environmental Sciences**, Charlottesville, VA
Teaching Assistant: Orphaned Lands Assessment (abandoned mineral mines)
- 1997–1999 *Teaching Assistant*: GIS, Physical Geology, Rocks and Minerals, Structural Geology Labs
- 1998–1999 *Research Assistant*: Viking spacecraft image processing and photomosaics
- 1997–1998 **Southern Environmental Law Center**, Charlottesville, VA
Intern: research on non-point source pollution, environmental effects of urban development

EDUCATION

- 2001–2005 **University of Virginia**, Ph.D., 2005, Environmental Sciences (30 hrs.)
Dissertation: *Paleolakes and the Crustal Dichotomy Boundary on Mars*, 305 p.
- 1997–2000 **University of Virginia**, M.S., 2000, Environmental Sciences (25 hrs.)
Thesis: *Geomorphic Evolution of Part of Terra Cimmeria on Mars*, 107 p.
- 1993–1997 **Virginia Polytechnic Institute and State University**, B.S., 1997, Geological Sciences (124 hrs.)
Emphasis on Earth systems and structural geology
- 1997 **Louisiana State University**, Field Geology (6 hrs.)
Geologic mapping, section measurement, and surveying in the Colorado Front Range
- 1995 **South Dakota School of Mines and Technology**, Field Paleontology (2 hrs.)
Camarasaurus dig in the Morrison Formation, Wyoming

JOURNAL ARTICLES AND BOOK CHAPTERS

- Irwin, R. P., III**, and T. R. Watters, Geological constraints on the origin of the Martian crustal dichotomy, submitted to *Journal of Geophysical Research*.
- Grant, J. A., **R. P. Irwin III**, J. P. Grotzinger, R. E. Milliken, L. L. Tornabene, A. S. McEwen, C. M. Weitz, S. W. Squyres, T. D. Glotch, and B. J. Thomson (2007), HiRISE imaging of impact megabreccia and sub-meter aqueous strata in Holden crater, Mars, *Geology*, in press.
- Irwin, R. P., III**, and J. A. Grant, Large basin overflow floods on Mars, in *Megaflooding on Earth and Mars*, edited by D. Burr, V. Baker, and P. Carling, Cambridge University Press, Cambridge, U.K., in press.
- Irwin, R. P., III**, A. D. Howard, and R. A. Craddock, Fluvial valley networks on Mars, in *River Confluences and the Fluvial Network*, edited by S. Rice, A. Roy, and B. Rhoads, John Wiley and Sons, West Sussex, U.K., in press.
- Watters, T. R., P. J. McGovern, and **R. P. Irwin III** (2007), Hemispheres apart: The crustal dichotomy on Mars, *Ann. Rev. Earth Planet. Sci.*, 35, 621–652.
- Weitz, C. W., **R. P. Irwin III**, F. C. Chuang, M. C. Bourke, and D. A. Crown (2006), Formation of a terraced fan deposit in Coprates Catena, Mars, *Icarus*, 184, 436–451.
- Howard, A. D., J. M. Moore, and **R. P. Irwin III** (2005), An intense terminal epoch of widespread fluvial activity on early Mars: 1. Valley network incision and associated deposits, *J. Geophys. Res.*, 110, E12S14, doi:10.1029/2005JE002459.

JOURNAL ARTICLES (continued)

- Irwin, R. P., III**, A. D. Howard, R. A. Craddock, and J. M. Moore (2005), An intense terminal epoch of widespread fluvial activity on early Mars: 2. Increased runoff and paleolake development, *J. Geophys. Res.*, *110*, E12S14, doi:10.1029/2005JE002460.
- Irwin, R. P., III**, R. A. Craddock, and A. D. Howard (2005), Interior channels in Martian valley networks: discharge and runoff production, *Geology*, *33*(6), 489–492.
- Irwin, R. P., III**, A. D. Howard, and T. A. Maxwell (2004), Geomorphology of Ma’adim Vallis, Mars, and associated paleolake basins, *J. Geophys. Res.*, *109*, E12009, doi:10.1029/2004JE002287.
- Irwin, R. P., III**, T. R. Watters, A. D. Howard, and J. R. Zimbelman (2004), Sedimentary resurfacing and fretted terrain development along the crustal dichotomy boundary, Aeolis Mensae, Mars, *J. Geophys. Res.*, *109*, E09011, doi:10.1029/2004JE002248.
- Irwin, R. P., III**, T. A. Maxwell, A. D. Howard, R. A. Craddock, and D. W. Leverington (2002), A large paleolake basin at the head of Ma’adim Vallis, Mars, *Science*, *296*, 2209–2212.
- Irwin, R. P., III**, and A. D. Howard (2002), Drainage basin evolution in Noachian Terra Cimmeria, Mars, *J. Geophys. Res.*, *107*(E7), 10.1029/2001JE001818.
- Irwin, R. P., III**, and R. E. Davis (1999), The relationship between the Southern Oscillation Index and tropical cyclone tracks in the Eastern North Pacific, *Geophys. Res. Lett.*, *26*, 2251–2254.

NASA RESEARCH GRANTS

- 2007–2010 Geomorphology of theater-headed valleys (PI), Mars Fundamental Research Program, \$202K
- 2005–2008 Process controls on Martian drainage basin evolution (PI), Mars Data Analysis Program, \$111K
- 2008–2009 Mapping, Characterization, and Analysis of Channel/Valley Features on Titan (Co-I), Devon Burr, PI, Cassini Data Analysis Program.
- 2007–2010 Field investigations of pluvial landforms in the western United States as analogs to features on Mars (Co-I), James R. Zimbelman, PI, Mars Fundamental Research Program, \$126K
- 2007–2010 New global geologic map of Mars (Co-I), Kenneth L. Tanaka, PI, Planetary Geology and Geophysics Program, \$529,600
- 2006–2009 Geologic indicators of lacustrine environments on Mars (Co-I), Ted A. Maxwell, PI, \$160K
- 2006–2009 Gradation on Mars: Processes, timing, and analogs (Co-I), John A. Grant, PI, Planetary Geology and Geophysics Program, \$80K
- 2006–2009 Assessing the preservation of fluvial pathways in the terrestrial geologic record (Co-I), Rebecca M. E. Williams, PI, Mars Fundamental Research Program, \$231K
- 2005–2008 Analysis and Modeling of Dichotomy Boundary and Tectonic Features on Mars (Co-I), Thomas R. Watters, PI, \$170K
- 2003–2006 Evaluation of Possible Lacustrine Features in the Martian Highlands (Co-I), Ted Maxwell, PI, \$145K

FIELD STUDIES

- Colorado Plateau of Utah/Arizona: origin of theater-headed valleys; geomorphology of inverted paleochannels
- Great Basin of Nevada/Utah: topography of paleolake shorelines
- Central Australia: interaction of fluvial and aeolian processes at boundary of Simpson Desert
- Queensland, Australia: geomorphology of inverted paleochannels
- Island of Hawai’i: initiation of drainage network in the Ka’u Desert, Kilauea Volcano; theater-headed valleys in Kohala

CONFERENCES (only first author presentations included)

- Irwin, R. P., J. A. Grant, J. P. Grotzinger, R. E. Milliken, J. W. Rice Jr., M. C. Malin, and K. E. Edgett (2007), Mars Science Laboratory investigation of aqueous stratigraphy in Holden crater, *Second Mars Science Laboratory Landing Site Workshop*, Pasadena, California, lecture.
- Irwin, R. P., T. A. Maxwell, and A. D. Howard (2007), Water budgets on early Mars: Empirical constraints from paleolake basin and watershed areas, *7th International Conference on Mars*, Pasadena, California, Abstract 3400, poster.
- Irwin, R. P. (2007), Palaeoflood hydrology on Mars: Results and uncertainties, *Fourth International Palaeoflood Workshop*, Crete, Greece, lecture.
- Irwin, R. P., and T. R. Watters (2007), The crustal dichotomy of Mars: Geological constraints and testing of geophysical models, *American Geophysical Union Joint Assembly*, Acapulco, Mexico, Abstract P23A-07, lecture.
- Irwin, R. P., and T. R. Watters (2007), The crustal dichotomy of Mars: Geological constraints and testing of geophysical models, *38th Lunar and Planetary Science Conference*, Houston, Texas, Abstract #2301, lecture.
- Irwin, R. P. (2006), Basin overflow floods on Mars, *American Geophysical Union Fall Meeting, Eos Trans. AGU*, 87(52), Fall Meet. Suppl., Abstract P34B-06, lecture.
- Irwin, R. P., and J. A. Grant (2006), Aqueous sedimentary deposits in Holden Crater: Landing site for the Mars Science Laboratory, *First Mars Science Laboratory Landing Site Workshop*, Pasadena, California, lecture.
- Irwin, R. P., A. D. Howard, and R. A. Craddock (2006), Theater-headed valleys: The roles of overland flow and groundwater sapping, *37th Lunar and Planetary Science Conference*, Houston, Texas, Abstract 1912, lecture.
- Irwin, R. P., and T. R. Watters (2005), Geomorphology of the Martian crustal dichotomy boundary: Implications for age and origin, *American Geophysical Union Fall Meeting, Eos Trans. AGU*, 86(52), Fall Meet. Suppl., Abstract H33C-1400, poster.
- Irwin, R. P., and J. R. Zimbelman (2005), Sedimentary deposits in impact craters on Mars: Comparison with terrestrial pluvial lake basins, *Geological Society of America Annual Meeting*, Salt Lake City, Utah, Abstract 92487, lecture.
- Irwin, R. P. (2005), Rim breaching and ponding in Martian impact craters, *Workshop on the Role of Volatiles and Atmospheres on Martian Impact Craters*, Laurel, Maryland, Abstract 3039, lecture.
- Irwin, R. P. (2005), A hiatus and brief, intense reactivation of Martian valley networks around the Noachian/Hesperian transition, *Brown-Vernadsky Microsymposium 41*, Houston, Texas, lecture.
- Irwin, R. P., T. A. Maxwell, A. D. Howard, R. A. Craddock, and J. M. Moore (2005), A Noachian/Hesperian hiatus and erosive reactivation of Martian valley networks, *36th Lunar and Planetary Science Conference*, Houston, Texas, Abstract 2221, lecture.
- Irwin, R. P., R. A. Craddock, A. D. Howard, and T. A. Maxwell (2004), Channels in Martian valley networks: discharge and runoff production, *Second Conference on Early Mars*, Jackson Hole, Wyoming, Abstract 8040, lecture.
- Irwin, R. P., and T. R. Watters (2004), Crustal dichotomy boundary and fretted terrain development at Aeolis Mensae, Mars, *Hemispheres Apart: The origin and modification of the Martian crustal dichotomy*, Houston, Texas, Abstract 4025, lecture.
- Irwin, R. P. (2004), Channels in Martian valley networks: discharge estimates and paleoclimate implications, *Workshop on Martian Valley Networks*, Kohala Coast, Hawaii, Abstract, lecture, organizing committee.
- Irwin, R. P., R. A. Craddock, and A. D. Howard (2004), Inefficient fluvial erosion and effective competing processes: Implications for Martian drainage density, *Workshop on Martian Valley Networks*, Kohala Coast, Hawaii, Abstract, lecture, organizing committee.
- Irwin, R. P., R. A. Craddock, A. D. Howard, and T. A. Maxwell (2004), Inefficient fluvial erosion and effective competing processes: Implications for Martian drainage density, *35th Lunar and Planetary Science Conference*, Houston, Texas, Abstract 1991, talk given by R. Craddock.
- Irwin, R. P., T. A. Maxwell, and A. D. Howard (2004), Geomorphology and hydraulics of Ma'adim Vallis, Mars, during a Noachian/Hesperian boundary paleoflood, *35th Lunar and Planetary Science Conference*, Houston, Texas, Abstract #1852, lecture, session chair.
- Irwin, R. P., R. A. Craddock, A. D. Howard, and T. A. Maxwell (2004), Inefficient fluvial erosion and effective competing processes: Implications for Martian drainage density, *Brown-Vernadsky Microsymposium 39*, Houston, Texas, lecture.

CONFERENCES (continued)

- Irwin, R. P., and T. A. Maxwell (2003), Multiple generations of Martian valley networks: Reconciling immature valley networks with extensive fluvial erosion, *6th International Conference on Mars*, Pasadena, California, Abstract 3243, lecture, session chair.
- Irwin, R. P., T. R. Watters, A. D. Howard, T. A. Maxwell, and J. R. Zimbelman (2003), Origin of Aeolis Mensae, Mars, fretted terrain in a thick sedimentary deposit, *6th International Conference on Mars*, Pasadena, California, Abstract 3092, poster.
- Irwin, R. P., T. R. Watters, A. D. Howard, T. A. Maxwell, and R. A. Craddock (2003), Dichotomy boundary at Aeolis Mensae, Mars: Fretted terrain developed in a sedimentary deposit, *34th Lunar and Planetary Science Conference*, Houston, Texas, Abstract 1824.
- Irwin, R. P. (2003), Geologic units in Gusev Crater, *4th Mars Exploration Rover Landing Site Workshop*, Arcadia, California, lecture.
- Irwin, R. P., T. A. Maxwell, D. W. Leverington, R. A. Craddock, and A. D. Howard (2002), Ancient Martian drainage basin re-integration by sediment infilling and basin overflow, *Geological Society of America Annual Meeting*, Denver, Colorado, Abstract 26-9, lecture.
- Irwin, R. P., T. A. Maxwell, A. D. Howard, R. A. Craddock, and D. W. Leverington (2002), Identification of a large paleolake basin at the head of Ma'adim Vallis, Mars, *3rd Mars Exploration Rover Landing Site Selection Workshop*, Arcadia, California, lecture.
- Irwin, R. P., T. A. Maxwell, A. D. Howard, and R. A. Craddock (2002), Topographic controls on Martian valleys and lakes, *33rd Lunar and Planetary Science Conference*, Houston, Texas, Abstract 1705, lecture.
- Irwin, R. P., A. D. Howard, T. A. Maxwell, and R. A. Craddock (2002), Drainage basin disruption and re-integration processes in the Martian highlands, *33rd Lunar and Planetary Science Conference*, Houston, Texas, Abstract 1729, poster.
- Irwin, R. P., and R. A. Craddock (2001), Drainage basin integration in the Martian highlands, *Field Trip and Workshop on the Martian Highlands and Mojave Desert Analogs*, LPI Contrib. 1101, Abstract, lecture.
- Irwin, R. P., and A. D. Howard (2001), Cratering and fluvial erosion in Noachian Terra Cimmeria, Mars, *32nd Lunar and Planetary Science Conference*, Houston, Texas, Abstract 1377, poster.

MEDIA AND PUBLIC OUTREACH

- On-camera interviews: BBC World News (UK TV and radio, live), Sky News (UK TV, live, 2 appearances), Fox News affiliates, ABC 7 News (Washington, DC) for commentary on events in space exploration
- Print and other media interviews: Associated Press (2), Science (2), Smithsonian Air and Space, Astronomy, Sky and Telescope, discovery.com (2), two local newspapers, and PBS NOVA interviews about my research or for commentary on current events
- Yearly public lectures at the National Air and Space Museum and occasional offsite public programs

PROFESSIONAL SERVICE

- Proposer of Holden Crater landing site for Mars Science Laboratory, 2006–pres. (site included in the short list of 6) Program Committee, Lunar and Planetary Science Conference 37, 38, and 39, 2006–2008
- Program Committee, American Geophysical Union Joint Assembly, 2007, 2008
- Organizing Committee, First and Second Workshop on Martian Valley Networks, 2004, 2008
- Review Panelist, NASA Mars Fundamental Research Program, 2005, 2007
- Reviewer, NASA Mars Data Analysis, Planetary Geology and Geophysics, Mars Fundamental Research, and Mars Reconnaissance Orbiter Participating Scientist Programs
- Reviewer, *Geology*, *Journal of Geophysical Research*, *Icarus*, *Geophysical Research Letters*, *Planetary and Space Science*, and *Advances in Space Research*
- Invited talks: *Lunar and Planetary Institute* (Houston, Texas), January 13, 2006; *Brown University* (Providence, Rhode Island), September 8, 2005; *California Institute of Technology* (Pasadena, California), December 7, 2004; *Roanoke College* (Salem, Virginia), April 7, 2004

SCHOLARSHIPS AND HONORS

2005 University of Virginia Joseph K. Roberts Award (\$200)
2004 University of Virginia DuPont Fellowship (\$4,500)
2002–2004 Virginia Space Grant Fellowship (\$10,000 over 2 years)
2002 University of Virginia Chamberlain Fellowship (\$4,000)
2001 University of Virginia Dean’s Fellowship (\$2,000)
1997 W. D. Lowry Field Camp Scholarship (\$1,000)
1993–1997 Virginia Scholars Scholarship (\$12,000 over 4 years)
1993–1997 Robert Byrd Scholarship (\$6,000 over 4 years)
1993–1994 Izaak Walton League Scholarship (\$1000 over 2 years)
1993 Virginia Tech Alumni Association Scholarship (\$1,000)
Honors Virginia Tech Dean’s List and President’s List
National Honor Society and Golden Key Honor Society
Valedictorian of Warren County High School, Front Royal VA

OTHER ACTIVITIES

1999 Private pilot certificate, single engine land
1994, 1997 Open water and advanced open water scuba certification (currently 27 hours logged)