Serina Diniega
serina.diniega@jpl.nasa.gov
+1 818-393-1487
http://science.jpl.nasa.gov/people/Diniega/

Caltech Postdoc, Jet Propulsion Laboratory
PhD, University of Arizona
MS, International Space University
BS, California Institute of Technology

Research Interests & Future Goals

- Develop simple mathematical models of planetary surface feature formation & evolution
- Using analysis & simulation, determine connections between environmental conditions & landform morphology
- Promote the education/interest of the next generation in mathematics, engineering, & science

Research Position & Education

Jet Propulsion Laboratory (JPL), Science Postdoc — 2010-2013
Advisor: Suzanne Smrekar

University of Arizona (UA), PhD in Applied Mathematics, minor in Planetary Science — 2004-2010
PhD dissertation: Modeling Aeolian Dune & Dune Field Evolution
Advisors: Karl Glasner (Math) & Shane Byrne (Planet. Sci.)
MS in Applied Mathematics — 2005

International Space University (ISU; Strasbourg, France), MS in Space Studies — 2004
Thesis: Regolith distribution model for sub-kilometer ellipsoidal asteroids
Advisors: Akira Fujiwara & Hajime Yano (Japan. Aerospace Exploration Agency)

California Institute of Technology (Caltech), BS, with honors, Mathematics — 1999-2003

Current Research

Inflationary lava flow model development — 2010-present
Formulate & analyze a simple model to evaluate to what extent large changes in lava flow dynamics can be driven by natural small rheological variations within the lava flow & to investigate possible connections between these dynamics & measurable lava field landforms. Focus is on terrestrial flows & Mars (using HiRISE images).

Active gullies on Martian dunes — 2009-present
Survey & monitoring of gullies located on dunes, yielding measurements of seasonal activity since 2000. We aim to define general characteristics of these gullies, explore the relationship between gullies found on dune & non-dune slopes, & identify frost-driven mechanisms of gully formation & evolution.

Dune & dune field evolution model development, analysis, & application — 2005-present
Phenomenological continuum models of dune & dune field evolution were used to explain & explore the behavior & morphology of dune fields, with special focus on identifying & quantifying influential environmental factors that create dune sizes & spatial distributions.

Professional Service

Mars Reconnaissance Orbiter High Resolution Imaging Science Experiment (MRO HiRISE) Science Team Member, Image Cycle Science Coordinator
Scientific Manuscript Review: Computer Physics Comm., Earth Surface Process. & Landforms, Geomorphology
Grant Review: NASA SMD (panelist); NSF GLD, NASA LASER, NASA PG&G
Section Editor to Springer 2013 *Encyclopedia of Planetary Landforms* (mass-wasting)
Contributor to Springer 2013 *Encyclopedia of Planetary Landforms* (tumulus, gully, linear gully, dune convoy)
JPL Team A panelist (science: Martian geomorphology, volcanology)
Session convener: AGU
Session chair: ICIAM, LPSC
JPL education programs, mentor for undergraduate students: Summer 2011, Spring/Fall 2012

Professional Affiliations

American Geophysical Union (AGU), Mars-Dune.org Consortium, Society for Industr. & Applied Math. (SIAM)

Publications

Diniega, S., S.E. Smrekar, S. Anderson, E. Stofan (submitted). The influence of temperature-dependent viscosity on lava flow dynamics. *JGR.*

Diniega, S., C.J. Hansen, C. Hugenholtz, C.M. Dundas (in revision). A new dry hypothesis for the formation of Martian linear gullies. *Icarus*.

Diniega, S. & 17 co-authors (in press). Mission to the Trojan Asteroids: lessons learned during a JPL Planetary Science Summer School mission design exercise. *Planet. Space Sci.*

Dundas C.M., **S. Diniega**, C.J. Hansen, S. Byrne, A.S. McEwen (2012), HiRISE observations of seasonal activity & morphological changes in Martian gullies. *Icarus* **220**, no. 1, 124-143. doi:10.1016/j.icarus.2012.04.005.

Bridges, N.T., M.C. Bourke, P.E. Geissler, M.E. Banks, C. Colon, **S. Diniega**, M.P. Golombek, C.J. Hansen, S. Mattson, A.S. McEwen, M.T. Mellon, N. Stantzos, B.J. Thomson (2012), Planet-wide sand motion on Mars. *Geology* **40**, no. 1, 31-34. doi:10.1130/G32373.1.

Hansen, C. J., M. Bourke, N.T. Bridges, S. Byrne, C. Colon, **S. Diniega,** C. Dundas, K. Herkenhoff, A. McEwen, M. Mellon, G. Portyankina, N. Thomas (2011), Seasonal erosion & restoration of Mars' northern polar dunes. *Science* **331**, no. 6017, 575-578. doi:10.1126/science.1197636.

Diniega, S., S. Byrne, N.T. Bridges, C.M. Dundas, A.S. McEwen (2010), Seasonality of present-day Martian dune-gully activity. *Geology* **38**, no. 11, 1047-1050. doi:10.1130/G31287.1.

C. M. Dundas, A. S. McEwen, **S. Diniega**, S. Byrne, S. Martinez-Alonso (2010), New & recent gully activity on Mars as seen by HiRISE. *Geophys. Res. Lett*. **37**, L07202. doi:10.1029/2009GL041351.

Diniega, S., K. Glasner, S. Byrne (2010), Long scale evolution of aeolian sand dune fields: influences of initial conditions & dune collisions. *Geomorphology (special edition: Planetary Dunes)* **121**, 55-68. doi:10.1016/j.geomorph.2009.02.010.

Pelletier, J.D., T. Engelder, D. Comeau, A. Hudson, M. Leclerc, A. Youberg, **S. Diniega** (2009), Tectonic & structural control of fluvial channel morphology in metamorphic core complexes: The example of the Catalina-Rincon core complex, Arizona. *Geosphere* **5**, 385-407. doi:10.1130/GES00221.1.

Hey, R.N., F. Martinez, **S. Diniega**, D.F. Naar, J. Francheteau, Pito93 Scientific Team (2002), Preliminary attempt to characterize the rotation of seafloor in the Pito Deep area of the Easter Microplate using a submersible magnetometer. *Marine Geophysical Research* **23**, 1-12. doi:10.1023/A:1021257915420.

Recent Honors & Fellowships

NASA Postdoctoral Fellow (JPL, with advisor Sue Smrekar)	2010-2012
JPL Planetary Science Summer School participant	2011
NASA Harriett G. Jenkins Pre-doctoral Fellow	2007-2010
Al Scott Lecture & Prize, UA Program in Applied Math	2010
Lunar Planet. Inst. Career Development Award (LPSC)	2010
Served as rapporteur for Planetary Decadal Survey, Mars Panel: meetings 1 - 3	2009-2010
NASA Jenkins Mini Research Award (advisor: Nathan Bridges, JPL/APL)	2009
UA GIDP Travel Award (ICIAM, Geomorphology)	2007, 2009
SIAM, First place award for Educational Article: *Math Matters in Dune Modeling*	2008
LPI Mars Student Travel Award (Planet. Dune Workshops)	2008, 2010

Recent/Select Conference Presentations

Diniega, S. (2012). Interplay between seasonal frost and aeolian processes on Matara crater dunes (Mars). *AGU Fall Meeting.* Ab. P21C-1852. (poster)

McEwen, A.S., C.M. Dundas, **S. Diniega**, S. Byrne, N.T. Bridges, C.J. Hansen (2012). Present-day surface changes on Mars: Implications for recent climate variability and habitability. *AGU Fall Meeting*, Ab. P14A-03.

Diniega, S., S.E. Smrekar, S. Anderson, E. Stofan (2012). Lava flow dynamics driven by temperature-dependent viscosity variations. *LPSC 43*. Ab. 2556. (poster)

Diniega, S., L. Sigelmann, S. Sangha, S.E. Smrekar (2012). Identification & survey of martian lava inflationary features. *LPSC 43*. Ab. 2537. (poster)

Nahm A. L. Potter S. L. Sayanagi K. M. **Diniega S. &** 14 co-authors (2012). TASTER: Trojan ASteroid Tour, Exploration, & Rendezvous, a JPL PSSS Mission Design Exercise. *LPSC 43*. Ab. 2857. (poster)

Diniega, S., C. M. Dundas, C.J. Hansen, S. Byrne, A. McEwen (2011). Martian dune-gully seasonal activity & formation. *AGU Fall Meeting*. Ab. P21D-02. (Invited presentation)

Diniega, S., S.E. Smrekar, S.W. Anderson, E.R. Stofan (2011). Lava flow dynamics driven by temperature-dependent viscosity variations. *AGU Fall Meeting*. Ab. V53A-2599. (poster)

Diaz-Silva, R., K.M., Sayanagi, S. Gil, **S. Diniega**, & 15 co-authors (2011). TASTER: Trojan ASteroid Tour, Exploration & Rendezvous, a NASA Planetary Science Summer School Mission Design Exercise. *AGU Fall Meeting*. Ab. P23C-1723.

Diniega, S., S.E. Smrekar, S. Anderson, E. Stofan (2011). Lava flow dynamics driven by temperature-dependent viscosity variations. *Am. Phys. Soc. Div. Fluid Dynamics,* Ab. H17.9 (Baltimore, MD)

Diniega, S., S.E. Smrekar, S. Anderson, E. Stofan (2011). Lava flow dynamics driven by temperature-dependent viscosity variations. *GSA Annual Meeting* (Minneapolis, MN).

Diniega, S., N. Bridges, C. Hansen (2011). They're alive! Present-day evolution of Martian dunes. *EPSC-DPS* (Nantes, France). (poster)

Hansen, C.J., **S. Diniega**, C. Dundas, A. McEwen, G. Portyankina, N. Thomas (2011). Dry Ice & Dunes on Mars. *EPSC-DPS* (Nantes, France).

Diniega, S., S. Byrne, C. M. Dundas, A. McEwen, N. Bridges, (2011). Present-day Martian dune gully formation. *LPSC* **42**. Ab. 1540.

Diniega, S., S.E. Smrekar, S. Anderson, E. Stofan (2011). Lava flow dynamics driven by temperature-dependent viscosity variations. *LPSC* **42**. Ab. 1538. (poster)

Dundas, C. M., **S. Diniega**, A. S. McEwen, S. Byrne (2011). Observations of present-day gully activity on Mars. *LPSC* **42**. Ab. 2709. (poster)

Bridges, N.T., M.C. Bourke, C.M. Colon, **S. Diniega**, P.E. Geissler; M.P. Golombek; C.J. Hansen, S. Mattson, A.S. McEwen, N. Stantzos (2011). Planet-wide sand movement on Mars as documented by the HiRISE camera. *LPSC* **42**. Ab. 1215.

Diniega S., N.T. Bridges, S. Byrne, C.M. Dundas, C.J. Hansen, A.S. McEwen (2011). Seasonal activity within Martian dune gullies. *IAG Region. Conf. Geomorphology* (Addis Ababa, Ethiopia).

Hansen, C., N. Bridges, M. Bourke, S. Byrne, **S. Diniega**, C. Dundas, K. Herkenhoff, A. McEwen, G. Portyankina, N. Thomas, C. Colon (2010). Mars' Northern Dunes: Volatiles & Geology. AAS DPS meeting **42**, Ab. 30.22.

Diniega S., S. Byrne, K. Glasner (2010). Connecting aeolian & nivean processes with martian polar dune morphology. *Planetary Dunes Workshop: planetary analog* (Alamosa, CO). Ab. 2005.

Diniega, S., S. Byrne, N. Bridges, C. M. Dundas, A. McEwen (2010). Present-day martian dune gully activity. *LPSC* **41**. Ab. 2216.

Other Professional Presentations

Predicting the formation of proto-channels & tubes within lava flows, 12 July 2012, *JPL, Postdoc. Res. Seminar*
Present-day erosion & evolution of Martian dunes, 7 Nov 2011, *JPL, Planetary Science Seminar*.
Pattern formation with Earth & Mars dune fields. 22 July 2011, *Caltech, Cassini Dunes Workshop.*
Dune gullies & inflationary features, 17 Aug. 2011, *USGS Flagstaff, HiRISE Team Meeting.*
Present-day seasonal evolution of martian gullies, 9 Dec 2010, *JPL, Mars Forum.*
Dune & dune field evolution, 30 April 2010, *UA, Applied Math Colloquium, Al Scott Prize Lecture.*
Present-day martian gully activity, 18 Feb. 2010, *UA, HiRISE Team Meeting.*
Modeling dune & dune field evolution, 17 Nov. 2009, *MIT, Mathematical Physics Seminar*.
Present-day martian gully activity, 16 Nov. 2009, *MIT, Planetary Science Seminar*.
Dune & dune field evolution, 3 Nov. 2009, *Caltech, Mechanical Engineering Seminar*.

Instruction, Organization & Outreach (Math & Science)

JPL Mars Seminar Organizer 2012-present
Planetary Science consultant & featured scientist for JPL Education office programs 2012-present
Present to students/JPL interns, assist with developing educational materials, featured scientist in DIY Science Fair Project video series
Invited Panelist for SDSU Career Event 2012
Judge at Pasadena Science Fair 2012
Panelist for 5th grade group as part of JPL Women Leadership Celebration 2012
Featured JPL Woman Scientist for discussion (broadcast), JPL Women Leadership Celebration 2012
Mars Geomorphology consultant for PBS/NOVA/NASA "Life Beyond Earth" TV show 2011
Invited presenter at JPL's Public Earth Day Event: Spewing fire & shifting sands 2011
Judge at Washington Elementary School Science Fair 2011
NASA Student Ambassador (Virtual Community COHORT II) 2009-present
Geology of the Solar system (PTYS411/511), unofficial teaching assistant 2007, 2010
Planet. Sci. Dept. semester field trip (to NM, focus on sedimentary rocks), co-organizer 2010
UA Sonia Kovalevski Day, organizer (math workshop with high school women)*:* 2008, 2010
College Algebra (Ma112), instructor 2008-2009
Fall: 31 students, 5th highest of 38 sections avg. score on common final
Spring: 26 students, 3rd highest of 28 sections avg. score on common final
Numerical Modeling class (Ma485), mentor for undergrad. group, discrete dune model 2007-2009
SIAM University Chapter, member: 2004-2010
President/ Student chapter "Most active member," featured in National SIAM newsletter 2007
Officer 2005, 2006
Organized panel discussions about post-graduation options 2007, 2008
Tucson Kids Club Math Event, organizer 2006-2010
This SIAM chapter outreach event was commended by the National SIAM organization.
Partial Differential Equations (Ma456), grader 2008
Solar System event supervisor/exam writer for the state-level Science Olympiad 2006, 2007
Participant in Mentoring Seminar, for Mathematical Modeling (Ma485) 2006
Presented on encouraging individual & group creativity, student assessment methods, & discussion techniques
Designed/taught planetary science curriculum for middle school students (Space Grant Fellow) 2005
Taught 180 6th-8th grade students at three schools in Tucson
Girl Scout Gold Award 1997
Organized 2-day math workshop for 4th-7th grade girls

Non-Academic Employment & Activities

JPL Advisory Council for Women, Member 2011-present
Executive Board Member (Membership Coordinator) 2011-2013
Caltech Y Board Member 2012-present
Long distance runner 2011-present
Women in Math (UA Noertherian Ring), Participant 2008-2010
Caltech Fencing Team, Member of club & NCAA teams, women's saber 2000-2003
NCAA Fencing Team Captain/Club President 2003
Spreading the Aloha Spirit:
Organizer of Math Dept.'s Christmas Charity Drive (for relocated hurricane victims) 2005
Hula (Hawaiian dance) performer 1986-present