

Cumulative Bio-Bibliography, December 2012

Erik Asphaug

**Ronald Greeley Chair of Planetary Geology
School of Earth and Space Exploration
Arizona State University, Tempe AZ**

Academic interests: Planetary collisions; comet and asteroid geophysics; surface processes; planetary systems; the Moon; solar system exploration

EMPLOYMENT HISTORY

2012-present ASU School of Earth and Space Exploration, Professor
2006-2012 UCSC Earth and Planetary Sciences, Professor
2002-2006 UCSC Earth Sciences, Associate Professor
2000-2002 UCSC Earth Sciences, Assistant Professor
1998-2000 UCSC Earth Sciences, Associate Research Geophysicist
1996-1998 SETI Institute, Principal Investigator
1993-1995 NASA Ames Research Center, NRC Postdoctoral Fellow
1988-1993 University of Arizona, Tucson, Graduate Researcher
1985-1988 St. Gregory High School, Tucson, Science and English Faculty

EDUCATION

1993 PhD U. Arizona, Tucson: Planetary Sciences, Minor in Geophysics
1984 BA Rice University, Houston: Mathematics and English

EDUCATIONAL FELLOWSHIPS AND SCHOLARSHIPS

1989-93 U. Arizona, NASA Graduate Student Researcher Program
1988-89 U. Arizona, Faculty of Sciences Graduate Research Fellowship
1980-84 Rice University Class of 1930 Scholarship (full tuition)
1981-84 Rice University Max Roy Scholarship for Science and Math

ACADEMIC HONORS

Asteroid (7939) Asphaug, discovered by Eleanor Helin
Harold C. Urey Prize of the Division of Planetary Sciences (DPS)
of the American Astronomical Society, 1998

ACADEMIC SERVICE

Director, UCSC-IGPP Center for the Origin, Dynamics and Evolution of Planets
(CODEP), during UCSC expansion period 2003-2007

Research Programs

Currently active PI awards >\$0.1M:

\$500,793 Small Bodies and Planetary Collisions (NASA PG&G)

\$312,287 Modeling Stone Circles and Labyrinths on Mars as a Record of
Seasonal Variation (NASA MFRP)

\$260,000 Sensitivity of the Outcomes of Impacts and Explosions to NEO Surface
and Interior Properties (NASA NEOO)

Courses Taught

Planetary science majors: Formation of the Solar System, Planetary Science,
Planetary Surfaces, Mathematics for the Earth Sciences
Graduate lecture courses: Planetary Collisions, Planetary Surfaces, Geophysics of
Comets & Asteroids; High Strain Rate Planetary Mechanics
Non-majors: Planetary Discovery

University Committees

2010, 2011 Academic Senate Committee on the Library
2010, 2011 Graduate Admissions Committee, Earth and Planetary Sciences
2009 Member, Faculty Search Committee, Earth and Planetary Sciences
2006 Faculty Search Committee, Science Writing Program Director
2005-2006 Academic Senate Comm. on Rules, Jurisdictions & Elections
2003-2004 Chair, Faculty Search Committee, Earth and Planetary Sciences
2002-2004 Academic Senate Committee on Academic Freedom
2000-2003 Graduate Preliminary Examination Committee, Earth Sciences

Public Events and Lecture Series

2001, 2003 Organizer, CODEP Public Guest Lecture Series, Santa Cruz
2000-2002 Organizer, CODEP Academic Seminars, IGPP
1998-2000 Organizer, Planetary Science Academic Seminars, Earth Sciences

ADVISING

Assistant Researchers Supervised

Misha Kreslavsky (2006-)
Don Korycansky (2002-2006)
Craig Agnor (2005)

Postgraduate Scholars Supervised

Martin Jutzi (2009-2011)
Lindsey Chambers (2008-2011)
Don Korycansky (2000-2002)
Craig Agnor (2002-2004)

Graduate Students Supervised at UCSC

Current (alphabetical)

James Guillochon (Astronomy and Astrophysics), PhD thesis committee
Doug Hemingway (Earth and Planetary Sciences), PhD thesis **co-advisor**
Naor Movshovitz (Earth and Planetary Sciences), PhD thesis **advisor**
Delia Santiago (Earth and Planetary Sciences), PhD thesis **advisor**

Completed (reverse chronological)

Travis Orloff (Earth and Planetary Sciences), PhD thesis **advisor**
Reid Parsons (Earth and Planetary Sciences), PhD thesis committee
Catherine Plesko (Earth and Planetary Sciences), PhD thesis **advisor**
Lindsey Chambers (Earth and Planetary Sciences), PhD thesis **advisor**
Lissa Ong (Earth and Planetary Sciences), MS thesis **advisor**
Charles Barnhart (Earth and Planetary Sciences), PhD thesis committee
Gary Hoffman (Earth and Planetary Sciences), PhD thesis committee
Nancy McKeown (Earth and Planetary Sciences), PhD thesis committee

Darcy Ogden (Earth and Planetary Sciences), PhD thesis committee
Martha Evonuk (Earth Sciences), PhD thesis committee
Delia Santiago (Earth and Planetary Sciences), MS thesis **co-advisor**
Erin Kraal (Earth Sciences), PhD thesis **advisor**
Randi Cohen (Astronomy and Astrophysics), PhD thesis committee
Lisé Whitfield (Earth Sciences), MS thesis committee
Javier Santillan (Earth Sciences), PhD thesis committee

External Member, PhD Thesis Committee

Martin Jutzi, Physikalisches Institut der Universität Bern (2009)
Andreas Reufer, Physikalisches Institut der Universität Bern (2011)

Undergraduate Thesis Students Supervised at UCSC (alphabetical)

Elena Amador	Shawn Hart
Katherine Armstrong	Aviva Maine
Adam Bredt	Jamie Mannion
Dan Chamberlain	Ben Moss
Jaimie Chuu	Alex Morgan
Crystal Donnerly	Stephen Sherman
Tucker Ely	Cindy-Renee Sloan
Traci Engel	Patrick Testoni
Harrison Gray	Alexandra Wiener

OUTSIDE PROFESSIONAL ACTIVITIES

Technical and Management

Principal Investigator, *Comet Radar Explorer*, an ASU/JPL competed mission proposal to use radar to image the detailed 3D structure of a comet nucleus interior, responding to NASA's *Discovery* AO
Team Member, *Asteroid Return Mission*, Keck Institute for Space Studies, 2011
Team Member, *International Space Science Institute*, Response of Solid Celestial Bodies and their Granular Surfaces, 2011-2012
Program Lead, UARC-NASA Small Spacecraft Summer Study Program (S4P), NASA Ames, June-August 2008
Science Champion, *Near Earth Asteroid Trajectory Opportunities in 2020-2024*, NASA/JPL report for the NASA *Planetary Science Decadal Survey*, 2010
Science Team, *Asteroid Return Mission Feasibility Study*, Final Report for the 2010 NASA Innovation Fund

Other Spacecraft Mission Participation

Science Team, *Lunar Cratering Observation and Sensing Satellite* (LCROSS), NASA Ames, 2006-2010
Galileo Solid State Imaging Team Associate, NASA, 1996-2003

Mission Proposal and Concept Study Participation (Recent)

Co-Proposer, *Triple F* Comet Nucleus Sample Return Mission (Jürgen Blum), submitted to ESA *Cosmic Vision* Call, 2010
Science Team, *Asteroid Sounding Experiment by Radiowave Transmission* (ASSERT), DLR/CNES proposal to JAXA's *Hayabusa 2* mission, 2010

Advisory and Review Committees

NASA Planetary Geology and Geophysics Review Panel, 2011
NASA Lunar and Planetary Geoscience Review Panel, 1995, 1996, 1998
Primitive Bodies Panel, NRC *Planetary Sciences Decadal Survey*, 2009-2010
External Reviewer, *Defending Planet Earth: Near-Earth Object Surveys and Hazard Mitigation Strategies*, NRC Space Studies Board, 2009
International Astronautical Federation (IAF) *Technical Committee on Near-Earth Objects*, 2008-present
Mitigation Working Group, Core Team, responding to Congressional Directive George E. Brown, Jr. Near-Earth Survey Act of 2005 (co-author of *Report to Congress* on 8 March 2007).
NSF Planetary Astronomy Review Panel, 2005
Eugene Shoemaker Impact Cratering Award Committee, 2002, 2003

Professional Meetings Chaired

Co-Chair, Science Program Committee, *2nd International Conf. on the Exploration of Phobos and Deimos*, NASA Ames, March 14-16 2011
Chair and Science Program Lead, NASA Workshop on *Spacecraft Reconnaissance of Asteroid and Comet Interiors*, Santa Cruz, Oct. 2006
Chair, UCSC *Workshop on Asteroid Impact Tsunamis*, May 17-18 2003
Chair, NASA *Workshop on the Scientific Requirements for Mitigation of Hazardous Comets and Asteroids*, September 2002

Other Professional Meetings Organized

Science Program Committee, *Catastrophic Disruption VIII*, Hawaii 2013
Science Program Committee, *Formation & Evolution of Moons*, Noordwijk 2012
Science Program Committee, *Goldschmidt 2007*
Science Program Committee, *Catastrophic Disruption VII*, Alicante 2007
Organizing Committee, *Workshop on Martian Water*, NASA Ames, Feb. 2006
Science Program Committee, *35th Annual Meeting AAS/DPS*, September 2003
Program Committee, *Catastrophic Disruption VI*, Cannes, July 2003
Program Committee, *Catastrophic Disruption IV*, Oregon 1998
Science Program Committee, *Evol. of Igneous Asteroids*, LPI, 1995

Editorial or Board Service to Publications

Frequent reviewer (10 per year or more) for peer-reviewed journals
2005-2008 Editorial Board (Guest), *Ann. Rev. Earth & Plan. Sci. Lett.*
2001-2003 Associate Editor, *Meteoritics and Planetary Science*
1995 Letter of Commendation, Excellence in Reviewing, *Icarus*

Membership or Activities in Professional Associations

American Geophysical Union (AGU)
International Astronautical Federation (IAF)
Division of Planetary Sciences of the American Astronomical Society (DPS)
American Association for the Advancement of Science (AAAS)
Meteoritical Society (METSOC)
Committee on Space Research (COSPAR)

Invited Talks (past 3 years)

- “High Resolution Radar Imaging of Comet Interiors”, 12/7/12, AGU Fall Meeting
(Invited by J. Castillo-Rogez)
- “Interpretations and Implications”, 8/8/12, Workshop on Asteroid Interiors,
Boulder (Host: D. Scheeres)
- “Collisional Evolution of Asteroid Vesta”, 6/20/12, ETH, Zurich, Switzerland
(Host: Paul Tackley)
- “Phobos: Rubble Pile?”, 6/18/20, ISSI Workshop on Granular Physics of Comets
and Asteroids, Bern, Switzerland (Host: Patrick Michel)
- “Small Bodies and Rubble Piles”, 6/7/12, Workshop on Dust, Atmosphere, and
Plasma: Moon and Small Bodies, Boulder (Host: M. Horanyi)
- “Giant Impacts, Hit and Runs, and Splats”, 4/11/12, MIT EAPS Colloquium
(Host: B. Weiss)
- “Late Origin of the Saturn System”, 3/12/12, LASP Colloquium, CU Boulder
(Host: F. Bagenal)
- “Low and Slow”, 2/28/12, Palo Alto Sub-Orbital Res. Conf. (Host: D. Durda)
- “Phobos, Comets, Vesta”, 2/2/12, SESE Technical Seminar (Host: J. Bell)
- “Origin of the Lunar Farside”, 2/1/12, ASU Colloquium (Host: J. Bell)
- “Forming the Moon”, 1/19/12, UCSC Faculty Emeriti Assoc. (Host: J. Marcum)
- “Inefficient Collisions, Hit and Runs, and Splats”, 11/30/11, SETI Seminar Series
(Host: A. Brown; www.seti.org/talks)
- “Chondrule Production by Inefficient Accretion”, 11/7/11, Workshop on
Formation of the First Solids in the Solar System (Host: S. Krot)
- “Comet Radar Explorer”, 8/11, International Primitive Bodies Exploration
Working Group, Pasadena (Host: K. Grogan)
- “The Inefficiencies of Planetary Collisions”, 6/11, Gordon Conference on the
Origins of Solar Systems (Host: M. Mayer)
- “Similar-Sized Collisions, Planetary Diversity and Meteorite Origins”, UCSC
Astronomy Colloquium, 9/29/10 (Host: E. Ramirez-Ruiz)
- “Spacecraft Reconnaissance of Near-Earth Objects”, University of Maryland
Astronomy Dept. Colloquium, 8/9/10 (Host: Doug Hamilton)
- “Giant Impacts Large and Small”, LASP Colloquium, U. Colorado, Boulder,
5/24/10 (Host: D. Scheeres)
- “Asteroids and Comets”, UCSC Geology Club, 2/22/10
- “Collisional Evolution of Asteroids”, Steve Ostro Memorial Symposium, JPL,
6/4/09 (Host: D. Yeomans)
- “Collisions During Planet Formation”, IGPP Dinner Lecture, UCLA, 5/5/09
(Hosts: J. Schubert and J.-L. Margot)
- “Planetary Collisions”, Cornell University Astronomy Colloquium, 2/12/09
(Host: J. Bell)

Television, Radio and Press Engagement (2010-2012)

- “Scientists in the Dark over the Birth of the Moon”, *Science Friday* radio
interview, Oct 19, 2012
- “Why Is Everyone So Fascinated With the Far Side of the Moon?”, *Pop.
Mechanics*, Feb 21, 2012

“Top 100 Stories of 2011 #23: The Moon Had a Long-Lost Twin”, *Discover Magazine*, Jan-Feb 2012 Special Issue

“What’s the age of the Moon? It could be waning” (AP radio), Aug 17, 2011

“Killer Shockwaves”, television interview for *Underwater Universe*, History Channel, first aired March 19, 2011

“Science in Action”, radio interview, BBC World Service, 11 June 2010

“On the Fringe”, *Science News* magazine, 16 Jan 2010, p. 16

“The Great Galactic Gold Rush”, *Playboy* magazine, April 2011

Jutzi & Asphaug (“Forming the Lunar Farside Highlands by the Accretion of a Companion Moon”, *Nature* 2011) gained worldwide attention. The AP story was the front page of the August 4, 2011 *Santa Cruz Sentinel*, *Los Angeles Times*, *Denver Post*, and dozens of other newspapers nationwide and worldwide. Magazines and websites included *The Economist* (2 pages), *Der Spiegel* (news feature); *Time* (online science lead Aug 3-4); *Scientific American*; *National Geographic*; *Science News*; *Air and Space*; *Popular Science*; *Nature* (lead Science News feature; also News & Views); *Dagbladet* (Norway; news feature interview), *Correio Braziliense* (Brazil, interview), *Mirror Evening* (China, interview); *Washington Post*; and most major news sites (e.g. MSNBC, Fox News). Radio and television included *Voice of America* (radio interview; website); ABC Radio live interviews from Brisbane and Canberra; BBC Radio live interview from Scotland; PBS *Morning Edition* (radio news lead, lead website story); NPR *Science Friday*; BBC *Material World*; *Coast to Coast AM*; KION Salinas local TV report from campus.

PEER-REVIEWED WRITINGS

1. Walker, J.D., Chocron, S., Durda, D.D., Grosch, D.J., Movshovitz, N., Richardson, D.C. & **Asphaug**, E. (2012). Momentum enhancement from aluminum striking granite and the scale size effect. *Int. J. Impact Eng.*, in press.
2. Movshovitz, N., **Asphaug**, E. & Korycansky, D. (2012). Numerical modeling of the disruption of comet D/1993 F2 Shoemaker-Levy 9 representing the progenitor by a gravitationally bound assemblage of randomly shaped polyhedra. *Astrophys. J.* **759**, 93.
3. Orloff, T., Kreslavsky, M., **Asphaug**, E. & Korteniemi, J. (2012). Boulder movement at high northern latitudes of Mars. *JGR Planets* **116**, E11006.
4. Benavidez, P.G., Durda, D.D., Enke, B.L., Bottke, W.F., Nesvorny, D., Richardson, D.C., **Asphaug**, E., & Merline, W.J. (2012). A comparison between rubble-pile and monolithic targets in impact simulations: Application to asteroid satellites and family size distributions. *Icarus* **219**, 57-76.
5. Orloff, T., Kreslavsky, M., **Asphaug**, E., and Korteniemi, J. Boulder movement at high northern latitudes of Mars. *J. Geophys. Res.* **116**, E11006.
6. Jutzi, M. and **Asphaug**, E. (2011). Forming the lunar farside highlands by the accretion of a companion moon. *Nature* **476**, 69-72.
7. **Asphaug**, E., Jutzi, M., and Movshovitz, N. (2011). Chondrule formation during planetesimal accretion. *Earth Planet. Sci. Lett.* **308**, 369-379

8. Jutzi, M. and **Asphaug**, E. (2011). Mega-ejecta on asteroid Vesta. *Geophys. Res. Lett.* **38**, L01102
9. Durda, D.R., Movshovitz, N., Richardson, D.C., **Asphaug**, E., Morgan, A., Rawlings, A.R. and Vest, C. (2011). Experimental determination of the coefficient of restitution for meter-scale granite spheres. *Icarus* **211**, 849-855.
10. Marinova, M.M., Aharonson, O. and **Asphaug**, E. (2011). Geophysical consequences of planetary-scale impacts into a Mars-like planet. *Icarus* **211**, 960–985
11. Colaprete, A., Schultz, P., Heldmann, J., Shirley, M., Ennico, K., Hermalyn, B., Wooden, D., Marshall, W., Ricco, A., Elphic, R.C., Goldstein, D., Summy, D., Bart, G.D., **Asphaug**, E., Korycansky, D., Landis, D., and Sollitt, L. (2010). Detection of Water in the LCROSS Ejecta Plume. *Science* **330**, 463-468.
12. Ong, L., **Asphaug**, E., Korycansky, D., and Coker, R.F. (2010). Volatile retention from cometary impacts on the Moon. *Icarus* **207**, 578-589.
13. **Asphaug**, E. (2010). Invited Review: Similar sized collisions and the diversity of planets. *Chemie der Erde* **70**, 199-219.
14. Korycansky, D.G. and **Asphaug**, E. (2009). Low-speed impacts between rubble piles modeled as collections of polyhedra, 2. *Icarus* **204**, 316-329
15. Korycansky, D.G., Plesko, C.S., Jutzi, M., **Asphaug**, E. and Colaprete, A. (2009). Predictions for the LCROSS Mission. *Meteoritics and Plan. Sci.* **44**, 603-620.
16. **Asphaug**, E. (2009). Growth and Evolution of Asteroids. *Ann. Rev. Earth Plan. Sci.* **37**, 413-438.
17. Pierazzo, E., Artemieva, N., **Asphaug**, E., Baldwin, E.C., Cazamias, J., Coker, R., Collins, G.S., Crawford, D.A., Davison, T., Elbeshausen, D., Holsapple, K.A., Housen, K.R., Korycansky, D.G., and Wünnemann, K. (2008). Validation of numerical codes for impact and explosion cratering: Impacts on strengthless and metal targets. *Meteoritics and Plan. Sci.* **43**, 1917-1938.
18. Mellon, M.T., Arvidson, R.E., Marlow, J.J., Phillips, R.J., and **Asphaug**, E. (2008). Periglacial landforms at the Phoenix landing site and the northern plains of Mars. *J. Geophys. Res.* **113**, E00A23.
19. **Asphaug**, E. (2008). Critical crater diameter and asteroid impact seismology. *Meteoritics and Plan. Sci.* **43**, 1075-1084.
20. Marinova, M.M., Aharonson, O., and **Asphaug**, E. (2008). Mega-impact formation of the Mars hemispheric dichotomy. *Nature* **453**, 1216-1219.
21. Chambers, L.S., Cuzzi, J.N., **Asphaug**, E., Colwell, J., and Sugita, S. (2008). Hydrodynamical and radiative transfer modeling of meteoroid impacts into Saturn's rings. *Icarus* **194**, 623-635.
22. Kraal, E. R., **Asphaug**, E., Moore, J. M., Howard, A., and Bredt, A. (2008). Catalogue of large alluvial fans in martian impact craters. *Icarus* **194**, 101-110.
23. Durda, D.D., Bottke, W.F., Nesvorny, D., Enke, B.L., Merline, W.J., **Asphaug**, E., and Richardson, D.C. (2007). Size frequency distributions

- of fragments from SPH/N-body simulations of asteroid impacts: Comparison with observed asteroid families. *Icarus* **186**, 498-516.
24. Nesvorný, D., Enke, B.L., Bottke, W.F., Durda, D.D., **Asphaug**, E., and Richardson, D.C. (2006). Karin cluster formation via asteroid impact. *Icarus* **183**, 296-311.
 25. Korycansky, D.G. and **Asphaug**, E. (2006). Low-speed impacts between rubble piles modeled as collections of polyhedra. *Icarus* **181**, 605-617.
 26. Kraal, E. R., E. **Asphaug**, J. M. Moore, R. D. Lorenz (2006). Quantitative geomorphic modeling of Martian bedrock shorelines, *J. Geophys. Res.* **111**:E3.
 27. **Asphaug**, E., C. B. Agnor, Q. Williams (2006). Hit-and-run planetary collisions, *Nature* **439**, 155-160
 28. Durda, D. D., Bottke, W. F., Jr., Enke, B. L., Merline, W. J., **Asphaug**, E., Richardson, D. C., and Leinhardt, Z. M. (2004). The formation of asteroid satellites in large impacts: Results from numerical simulations. *Icarus* **170**, 243-257.
 29. Weissman, P. R., **Asphaug**, E. and Lowry, S. C. (2004). Structure and density of cometary nuclei. In *Comets II* (M. C. Festou, H. U. Keller, and H. A. Weaver, eds.), University of Arizona Press, 337-357.
 30. **Asphaug**, E. (2004). Interior structures for asteroids and cometary nuclei. Chapter for *Mitigation of Hazardous Impacts due to Asteroids and Comets* (Belton, M. J. S., Morgan, T., and Yeomans, D. K., eds.), Cambridge University Press.
 31. Agnor, C. and E. **Asphaug** (2004). Accretion efficiency during planetary collisions. *Astrophys. J.* **613**, L157-L160.
 32. Korycansky, D. and E. **Asphaug** (2004). Simulations of impact ejecta and regolith accumulation on asteroid Eros. *Icarus* **171**, 110-119
 33. Bruesch, L.S. and E. **Asphaug** (2004). "Modeling global impact effects on middle-sized icy bodies: Applications to Saturn's moons." *Icarus* **168**, 457-466
 34. Moore, J.M., P.M. Schenk, L.S. Bruesch, E. **Asphaug** and W.B. McKinnon (2004) "Large impact features on middle-sized icy satellites I: Prompt effects." *Icarus* **171**, 421-443
 35. Korycansky, D. G. and **Asphaug**, E. (2003). Impact evolution of asteroid shapes. 1. Random mass redistribution. *Icarus* **163**, 374-388.
 36. **Asphaug**, E., Korycansky, D., and Ward, S. (2003). Exploring ocean waves from asteroid impacts. *Eos* **84**, 2 Sep. 2003, 339-340.
 37. Binzel, R. P., A'Hearn, M., **Asphaug**, E., Antonella Barucci, M., Belton, M., Benz, W., Cellino, A., Festou, M. C., Fulchignoni, M., Harris, A. W., Rossi, A., and Zuber, M. T. 2003. Interiors of small bodies: Foundations and perspectives. *Planetary and Space Science* **51**, 443-454.
 38. Lorenz, R. D., Kraal, E., **Asphaug**, E., and Thomson, R. E. (2003). The seas of Titan. *Eos* **84**, 8 April 2003, pp. 125, 131-132.

39. Ward, S. and **Asphaug**, E. (2003). Asteroid impact tsunamis of 2880 March 16. *Geophys. J. Int.*, 153, F1-F10.
40. Richardson, D. C., Leinhardt, Z., Melosh, H. J., Bottke, W. F., and **Asphaug**, E. (2002). Gravitational aggregates: evidence and evolution. In *Asteroids III* (W.F. Bottke, Jr., A. Cellino, P. Paolicchi, and R.P. Binzel, eds.), University of Arizona Press, pp. 501-516.
41. **Asphaug**, E., E. Ryan and M. Zuber (2002). Asteroid interiors. In *Asteroids III* (W.F. Bottke, Jr., A. Cellino, P. Paolicchi, and R.P. Binzel, eds.), University of Arizona Press, pp. 463-484.
42. Ward, S. N. and E. **Asphaug** (2002). Impact tsunami Eltanin. In *Deep Sea Research II: Topical Studies in Oceanography* (Gersonde, R., Kyte, F.T., Deutsch, A., and Ivanov, B., eds.), 49, 1073-1079.
43. Bierhaus, E. B., C. R. Chapman, W. J. Merline, S. Brooks and E. **Asphaug** (2001). Pwyll secondaries and other small craters on Europa. *Icarus* 153, 264-276.
44. Nolan, M. C., **Asphaug**, E., Greenberg, R. and Melosh, H.J. (2001). Impacts on asteroids: fragmentation, regolith transport and disruption. *Icarus* 153, 1-15.
45. Canup, R. M. and **Asphaug**, E. (2001). Origin of the Moon in a giant impact near the end of the Earth's formation. *Nature* 412, 708-712.
46. Moore, J. M., **Asphaug**, E., Belton, M. J. S., Bierhaus, B., Breneman, H. H., Brooks, S. M., Chapman, C. R., Chuang, F. C., Collins, G. C., Biese, B., Greeley, R., Head, J.W.III, Kadel, S., Klaasen, K. P., Klemaszewski, J. E., Magee, K. P., Moreau, J., Morrison, D., Neukum, G., Pappalardo, R. T., Phillips, C. B., Schenk, P. M., Senske, D., Sullivan, R. J., Turtle, E. P., and Williams, K. K. (2001). Impact features on Europa: Results of the Galileo Europa Mission (GEM). *Icarus* 151, 93-111.
47. Scheeres, D. J., S. J. Ostro, R. A. Werner, E. **Asphaug**, R. S. Hudson (2000). Effects of gravitational interactions on asteroid spin states. *Icarus* 147, 106-118.
48. Ward, S. N. and E. **Asphaug** (2000). Asteroid impact tsunami: A probabilistic hazard assessment. *Icarus* 145, 64-78.
49. Benz, W. and E. **Asphaug** (1999). Catastrophic disruptions revisited. *Icarus* 142, 5-20.
50. Moore, J. M., E. **Asphaug**, D. Morrison, J. R. Spencer, C. R. Chapman, B. Bierhaus, R. J. Sullivan, F. C. Chuang, J. E. Klemaszewski, R. Greeley, K. C. Bender, P. E. Geissler, P. Helfenstein and C. B. Pilcher (1999). Mass movement and landform degradation on the icy Galilean satellites: Results of the Galileo nominal mission. *Icarus* 140, 294-312
51. **Asphaug**, E. and D. J. Scheeres (1999). Deconstructing Castalia: Evaluating a postimpact state. *Icarus* 139, 383-386.
52. Greeley, R., Sullivan, R., Klemaszewski, J., Homan, K., Head, J.W., Pappalardo, R.T., Veverka, J., Clark, B.E., Johnson, T.V., Klaasen, K.P.,

- Belton, M., Moore, J., **Asphaug**, E., Carr, M.H., Neukum, G., Denk, T., Chapman, C.R., Pilcher, C.B., Geissler, P.E., Greenberg, R. and Tufts, R. (1998). Europa: Initial Galileo Geological Observations. *Icarus* 135, 4-24.
53. Scheeres D. J. and **Asphaug**, E. (1998). Debris and sample transport about asteroids. In *Space 1998* (R.G. Galloway and S. Lokaj eds.), American Society of Civil Engineering, Reston, Virginia, 340-346
54. **Asphaug**, E., S. J. Ostro, R. S. Hudson, D. J. Scheeres and W. Benz (1998). Disruption of kilometre-sized asteroids by energetic collisions. *Nature* 393, 437-440.
55. Moore, J. M., E. **Asphaug**, R. J. Sullivan, J. E. Klemaszewski, R. Greeley, K. C. Bender, P. E. Geissler, A. S. McEwen, B. R. Tufts, J. W. Head III, R. T. Pappalardo, K. B. Jones, C. R. Chapman, M. J. S. Belton, R. L. Kirk, and D. Morrison (1998). Large impact features on Europa: Results of the Galileo Nominal Mission. *Icarus* 135, 127-145.
56. Greeley, R., R. Sullivan, J. Klemaszewski, J. W. Head III, R. T. Pappalardo, J. Veverka, B. Clark, T. V. Johnson, M. Belton, J. Moore, E. **Asphaug**, M.H. Carr, G. Neukum, T. Denk, C. R. Chapman, C. B. Pilcher, P. E. Geissler, R. Greenberg, R. Tufts and the Galileo SSI Team (1998). Geology of Europa. *Icarus* 135, 4-24.
57. Nolan, M. C., E. **Asphaug**, R. Greenberg and H. J. Melosh (1997). Impacts on asteroids: fragmentation, regolith transport and disruption. *Icarus* 124, 359-371.
58. **Asphaug**, E. (1997). Impact origin of the Vesta family. *Meteor. Plan. Sci.* 32, 965-980.
59. Nolan, M. C., E. **Asphaug**, H. J. Melosh, and R. Greenberg (1996). Impact craters on asteroids: does gravity or strength control their size? *Icarus* 124, 359-371.
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