

## **H.J. MELOSH**

**BORN:** June 23, 1947, Paterson, New Jersey

**ATTENDED:** Princeton University, 1965-1969, A.B. (physics) magna cum laude  
Caltech 1969-1972, Ph.D. (physics and geology)

### ***Academic Experience***

Graduate Teaching Assistant, Caltech, 1969-1971  
Visiting Scientist, CERN (Geneva, Switzerland), 1971-1972  
Research Associate, University of Chicago, Enrico Fermi Institute, 1972-1973  
Instructor in Geophysics and Planetary Science, Caltech, 1973-1975  
Assistant Professor of Planetary Science, Caltech, 1976-1978  
Associate Professor of Planetary Science, Caltech, 1978-1979  
Associate Professor of Geophysics, SUNY, Stony Brook, 1979-1982  
Associate Professor of Planetary Science, Univ. of Arizona, 1982-1985  
Professor of Planetary Science, Univ. of Arizona, 1985-present  
Halbouty Distinguished Visiting Chair, Texas A&M University, October, 2000  
Regents Professor of Planetary Science, Univ. of Arizona, January, 2004.  
Distinguished Professor of Earth and Atmospheric Science, Purdue University,  
August, 2009.

### ***Fellowships and Honors:***

Phi Beta Kappa  
Sigma Xi  
NSF Fellowship, 1969-1972  
Best Scientific Secretary Prize, Int'l Summer School of Theoretical  
Physics, Erice, Sicily, 1972  
Fellow of the Meteoritical Society (July, 1988)  
Fellow of the Geological Society of America (November, 1988)  
AGU Editor's Citation for Excellence in Refereeing, Tectonics (July,  
1989)  
Fellow of the American Geophysical Union (January 1993)  
Paul Simon Guggenheim Fellow, 1996-1997.  
Barringer Medal of the Meteoritical Society, 1999  
Asteroid 8216 name "Melosh" Approved by the IAU, 2000  
Gilbert Award of the Geological Society of America, 2001  
Fellow of the American Association for the Advancement of Science,  
October 2001  
Member, National Academy of Sciences, Elected 29 April 2003  
Humboldt Prize Fellowship, August 2005-2006  
Hess Medal of the American Geophysical Union, 2008  
Leon Blitzer Teaching Award, January 2009  
Sigma Xi Research Award, April 2010

*Member:* American Geophysical Union  
Geological Society of America  
Meteoritical Society  
American Astronomical Society, Division of Planetary  
Sciences  
AAAS

### ***National and International Committees and Panels***

Lunar and Planetary Review Panel, 1980-1983  
COMPLEX 1982-1985  
NASA Planetary Geology & Geophysics Working Group, 1984-1986  
IASPEI commission on Quantitative Methods in Geodynamics, member  
1984-present  
Ames Vertical Gun Steering Committee, 1984-present  
Planetary Geology Strategy Committee, 1986-1988  
Associate Editor, JGR Solid Earth, 1987-1989  
Editor, Reviews of Geophysics, Dec. 1988-1992  
Member, Origin of Sedimentary Basin Task Force, International  
Lithosphere Program, French Petroleum Institute, Malmaison,  
France  
Lunar and Planetary Review Panel, 1991-1993  
Scientific Observer, European Science Foundation, Network on "The  
role of impact processes in the geological and biological evolution of  
planet Earth". 1993-1996.  
Planetary Geology and Geophysics Management Operations Working  
Group, 1991-1995.  
Editorial Committee, Annual Reviews of Earth and Planetary Science,  
1997-2006.  
AGU Macelwane Award Committee, 1998-1999.  
Dwornik Prize Judge, 1999.  
Strategic Planning Group of the SETI Institute, 2000-2002  
Hess Award Committee, AGU 2000-2002  
Consultant to the Hayden Planetarium of the American Museum of  
Natural History, 2003-2005

### ***PhD Graduate Students Supervised***

W. B. McKinnon  
A. M. Vickery  
D. M. Janes  
C. A. Williams  
W. B. Tonks  
E. A. Ryan  
M. Wallace

E. Asphaug  
E. Pierazzo  
A. M. Freed  
E. P. Turtle  
J. N. Head  
J. E. Richardson  
G. D. Bart  
A. Sheffer  
T. J. Goldin

## BIBLIOGRAPHY

### Papers in Peer-Reviewed Journals

#### H.J. Melosh

- MELOSH, H.J. (1969) Estimate of the gravitational radiation from NP0532. *Nature* **224**, 781-782.
- MELOSH, H.J. (1974) Quarks: Currents and constituents. *Phys. Rev.* **D9**, 1095-1112.
- MELOSH, H.J. (1975) Mascons and the Moon's orientation. *Earth and Planetary Sci. Lett.* **25**, 322-326.
- MELOSH, H.J. (1975) Large impact craters and the Moon's orientation. *Earth and Planetary Sci. Lett.* **26**, 353-360.
- MELOSH, H.J. (1976) Nonlinear stress propagation in the Earth's upper mantle. *J. Geophys. Res.* **81**, 5621-5632.
- MELOSH, H.J. (1976) Plate motion and thermal instability in the asthenosphere. *Tectonophysics* **35**, 363-390.
- MELOSH, H.J. (1976) On the origin of fractures radial to lunar basins. *Proc. 7th Lunar Sci. Conf.*, 2967-2982.
- STEIN, S., MELOSH, H.J. and MINSTER, J.B. (1977) Ridge migration and asymmetric seafloor spreading. *Earth and Planetary Sci. Lett.* **36**, 51-62.
- MELOSH, H.J. (1977) Global tectonics of a despun planet. *Icarus* **31**, 221-243.
- MELOSH, H.J. (1977) Shear stress on the base of a lithospheric plate. *Pure and Applied Geophys.* **115**, 429-439.
- MELOSH, H.J. (1977) Crater modification by gravity: A mechanical analysis of slumping. In *Impact and Explosion Cratering* (editor D. Roddy), pp. 1245-1260, Pergamon Press.
- MELOSH, H.J. and DZURISIN, D. (1978) Mercurian tectonics: A consequence of tidal despinning? *Icarus* **35**, 227-236.
- MELOSH, H.J. and DZURISIN, D. (1978) Tectonic implications for the gravity structure of Caloris basin, Mercury. *Icarus* **33**, 141-144.
- MELOSH, H.J. (1978) Dynamic support of the outer rise. *Geophys. Res. Lett.* **5**, 321-324.
- MELOSH, H.J. (1978) The tectonics of mascon loading. *Proc. 9th Lunar Science Conf.*, pp. 3513-3525.
- MELOSH, H.J. (1978) Reply [to J.C. Savage and W. Prescott]. *J. Geophys. Res.* **83**, 5009-5010.
- MELOSH, H.J. and MCKINNON, W. (1978) The mechanics of ringed basin formation. *Geophys. Res. Lett.* **5**, 985-988.
- MELOSH, H.J. and EBEL, J. (1979) A simple model for thermal instability in the upper mantle. *Geophys. J. R.A.S.* **59**, 419-436.
- PECHMANN, J. BURT and MELOSH, H.J. (1979) Global fracture patterns of a despun planet: Application to Mercury. *Icarus* **38**, 243-250.
- MELOSH, H.J. (1979) Acoustic fluidization: A new geologic process? *J. Geophys. Res.* **84**, 7513-7520.

- MELOSH, H.J. and RAEFSKY, A. (1980) The dynamical origin of subduction zone topography. *Geophys. J. R.A.S.* **60**, 333-354.
- MELOSH, H.J. (1980) Cratering mechanics: Observational, experimental, and theoretical. *Annual Rev. Earth and Planet. Sci.* **8**, 65-93.
- MELOSH, H.J. (1980) Rheology of the earth: Theory and observation. In *Physics of the Earth's Interior* (eds. Dziewonski and Boschi), pp. 318-336, North-Holland Publishing Company.
- PASSEY, Q. and MELOSH, H.J. (1980) The effects of atmospheric breakup on crater field formation. *Icarus* **42**, 211-233.
- MELOSH, H.J. (1980) Tectonic patterns on a tidally distorted planet. *Icarus* **43**, 334-337.
- MELOSH, H.J. (1980) Tectonic patterns on a reoriented planet: Mars. *Icarus* **44**, 745-751.
- McKINNON, W.B. and MELOSH, H.J. (1980) Evolution of planetary lithospheres: Evidence from multiringed basins on Ganymede and Callisto. *Icarus* **44**, 454-471.
- MELOSH, H.J. and RAEFSKY, A. (1981) A simple and efficient method for introducing faults into finite element computations. *Bull. Seis. Soc. Am.* **71**, 1391-1400.
- MELOSH, H.J. (1981) Atmospheric breakup of terrestrial impactors. In *Multi-ring Basins* (eds. P.H. Schultz and R.B. Merrill), pp. 29-35, Pergamon.
- MELOSH, H.J. (1982) A simple mechanical model of Valhalla Basin, Callisto. *J. Geophys. Res.* **87**, 1880-1890.
- GAFFNEY, E.S. and MELOSH, H.J. (1982) Noise from shallow buried explosive events: Implications for target strength degradation. *J. Geophys. Res.* **87**, 1871-1879.
- MELOSH, H.J. (1982) A schematic model of crater modification by gravity. *J. Geophys. Res.* **87**, 371-380.
- MELOSH, H.J. and FLEITOUT, L. (1982) The earthquake cycle in subduction zones. *Geophys. Res. Lett.* **9**, 21-24.
- MELOSH, H.J. (1982) The mechanics of large meteoroid impacts in the earth's oceans. *Geol. Soc. Amer. Spec. Pap.* **190**, 121-127.
- MELOSH, H.J. (1983) Vertical movements following a dip-slip earthquake. *Geophys. Res. Lett.* **10**, 47-50.
- MELOSH, H.J. and RAEFSKY, A. (1983) Anelastic response of the earth to a dip-slip earthquake. *J. Geophys. Res.* **88**, 515-526.
- VICKERY, A.M. and MELOSH, H.J. (1983) The origin of the SNC meteorites: An alternative to Mars. *Icarus* **56**, 299-318.
- MELOSH, H.J. (1983) Reply [to R.J. Pike]. *J. Geophys. Res.* **88**, 2505-2507.
- MELOSH, H.J. and GAFFNEY, E.S. (1983) Acoustic fluidization and the scale dependence of impact crater morphology. *J. Geophys. Res.* **88**, Suppl., A830-A834.
- MELOSH, H.J. (1983) Acoustic fluidization. *Am. Scientist* **71**, 158-165.
- MELOSH, H.J. (1984) Impact ejection, spallation, and the origin of meteorites. *Icarus* **59**, 234-260.

- MELOSH, H.J. (1985) Ejection of rock fragments from planetary bodies. *Geology* **13**, 144-148.
- MELOSH, H.J. (1985) Impact Cratering Mechanics: Relationship between the shock wave and excavation flow. *Icarus* **62**, 339-343.
- MELOSH, H.J. and SONNETT, C.P. (1986) When Worlds Collide: Jetted vapor plumes and the moon's origin. In *Origin of the Moon*, (eds. W.K. Hartmann, R.J. Phillips, and G.J. Taylor), Lunar and Planetary Inst., Houston, pp. 621-642.
- KIPP, M.E. and MELOSH, H.J. (1986) A preliminary numerical study of colliding planets. In *Origin of the Moon*, (eds. W.K. Hartmann, R.J. Phillips, and G.J. Taylor), Lunar and Planetary Inst., Houston, pp. 643-647.
- MELOSH, H.J. (1986) The physics of very large landslides. *Acta Mechanica* **64**, 89-99.
- PEARCE, S.J. and MELOSH, H.J. (1986) Terrace Width Variations in Complex Lunar Craters. *Geophys. Res. Lett.* **13**, 1419-1422.
- MELOSH, H.J. (1987) The mechanics of large rock avalanches. *GSA Rev. in Engng. Geology* **7**, 41-49.
- MELOSH, H.J. (1987) High-Velocity solid ejecta fragments from Hypervelocity Impacts. *Int. J. Impact Engng.* **5**, 483-492.
- VICKERY, A.M. and MELOSH, H.J. (1987) The Large Crater Origin of SNC Meteorites. *Science* **237**, 738-743.
- MELOSH, H.J. and McKINNON, W.B. (1988) The Tectonics of Mercury. In *Mercury*, University of Arizona Press, pp. 374-400.
- JANES, D. and MELOSH, H.J. (1988) Sinkers Tectonics: An approach to the surface of Miranda. *J. Geophys. Res.* **93**, 3127-3143.
- MELOSH, H.J. (1988) The rocky road to Panspermia, *Nature* **332**, 687-688.
- MELOSH, H. J. (1988) Action and delayed reaction, *Nature* **336**, 205.
- HORSTMAN, K.C. and MELOSH, H.J. (1989) Drainage pits in cohesionless materials: Implications for the surface of Phobos. *J. Geophys. Res.*, **94**, 12,433-12,441.
- MELOSH, H. J. and WILLIAMS, C. A. (1989) The mechanics of graben formation in crustal rocks: A finite element analysis, *J. Geophys. Res.*, **94**, 13,961-13,973.
- MELOSH, H. J. and VICKERY, A. M. (1989) Impact erosion of the primordial atmosphere of Mars, *Nature* **338**, 487-489.
- MELOSH, H. J. and JANES, D. M. (1989) Ice volcanism on Ariel, *Science* **245**, 195-196.
- BENZ, W., CAMERON, A. G. W. and MELOSH, H. J., (1989) The origin of the moon and the single impact hypothesis III, *Icarus* **81**, 113-131.
- HILLGREN, V. J. and MELOSH, H. J., (1989) Crater relaxation on Ganymede: Implications for ice rheology, *Geophys. Res. Lett.* **16**, 1339-1342.
- MELOSH, H. J. (1990) Giant rock avalanches, *Nature* **348**, 483-484.
- TONKS, W. B. and MELOSH, H. J. (1990) The physics of crystal settling and suspension in a turbulent magma ocean, in *Origin of the Earth*, H. Newsom and J. Jones, Eds., Oxford U. Press, p151-174.
- JANES, D. M. and MELOSH, H. J. (1990) Tectonics of planetary loading: A general model and results, *J. Geophys. Res.*, **95**, 21,345-21,356.
- VICKERY, A. M. and MELOSH, H. J., (1990) Atmospheric erosion and impactor retention in large impacts: Application to mass extinctions, in *Global*

- Catastrophes in Earth History*, B. Sharpton and P. Ward, Geol. Soc. Amer. Special Paper 247, 289-300.
- MELOSH, H. J. (1990) Origin and Evolution of the Moon, in *The Reference Encyclopedia of Astronomy and Astrophysics*, Van Nostrand Reinhold.
- MELOSH, H. J. (1990) The mechanics of low angle normal faulting in the Basin and Range, *Nature* **343**, 331-335.
- MELOSH, H. J., SCHNEIDER, N. M., ZAHNLE, K. J. and LATHAM, D., (1990) Ignition of global wildfires at the Cretaceous/Tertiary boundary, *Nature* **343**, 251-254.
- MELOSH, H. J. (1990) Giant impacts and the thermal state of the early Earth, in *Origin of the Earth*, H. Newsom and J. Jones, Eds., Oxford U. Press, p 69-83.
- GREENBERG, R., CROFT, S. K., EPLEE, E., JANES, D. M., KARGEL, J. LEBOSKY, L., LUNINE, J., MARCIALIS, R., MELOSH, H. J., OJAKANGAS, G., STROM, R. G. (1991) Miranda, in *Uranus*, J. Bergstrahl, E. D. Miner and M. S. Matthews (Eds.), p. 693-735, University of Arizona Press, Tucson.
- MELOSH, H. J. and VICKERY, A. M. (1991) Melt droplet formation in energetic impact events, *Nature*, **350**, 494-497.
- MELOSH, H. J. (1991) Atmospheric impact processes, *Adv. Space Res.* **11**, no. 6, pp. 87-93.
- WATTS, A. W., GREELEY, R., and MELOSH, H. J. (1991) The formation of terrains antipodal to major impact events, *Icarus*, **93**, 159-168.
- MELOSH, H. J. and STANSBERRY, J., (1991) Doublet craters and the tidal disruption of binary asteroids, *Icarus*, **94**, 171-179.
- MELOSH, H. J. (1992) Impact crater geology, in *Encyclopedia of Earth System Science*, Academic Press, volume 2, p.591-605.
- VERVACK, R. J. and MELOSH, H. J. (1992) Wind interaction with falling ejecta: Origin of the parabolic features on Venus, *Geophys. Res. Lett.*, **19**, 525-528.
- MELOSH, H. J., RYAN, E. A., and ASPHAUG, E. (1992) Dynamic fragmentation in impacts: Hydrocode simulation of laboratory impacts, *J. Geophys. Res.* **97**, 14,735-14,759.
- TONKS, B. and MELOSH, H. J., (1992) Core formation by giant impacts, *Icarus* **100**, 326-346.
- MELOSH, H. J. (1992) Airblast scars on Venus, *Nature* **358**, 622-623.
- MELOSH, H. J., VICKERY, A. M., and TONKS, W. B. (1993) Impacts and the early environment and evolution of the terrestrial planets, in E. H. Levy and J. I. Lunine (Eds), *Protostars and Planets III*, University of Arizona Press, Tucson, AZ. pp.1339-1370.
- VILOTTE, J. P., MELOSH, H. J., SASSI, J., and RANALLI, G. (1993) Lithosphere rheology and sedimentary basins, *Tectonophysics*, **226**, 89-95.
- TONKS, W. B. and MELOSH, H. J., (1993) Magma ocean formation due to giant impacts, *J. Geophys. Res.* **98**, 5319-5333.
- ASPHAUG, E. and MELOSH, H. J. (1993), The Stickney impact on Phobos: A dynamical model, *Icarus* **101**, 144-164.
- CYR, K. and MELOSH, H. J. (1993) Tectonic patterns and regional stresses near Venusian coronae, *Icarus*, **102**, 175-184.

- MELOSH, H. J. (1993) Tunguska comes down to Earth, *Nature* **361**, 14-15.
- MELOSH, H. J. and I. V. NEMCHINOV (1993) Solar asteroid diversion, *Nature*, **366**, 21-22.
- MELOSH, H. J. (1993) Blasting rocks off planets, *Nature*, **363**, 498-499.
- MELOSH, H. J. and P. SCHENK (1993) Split comets and the origin of crater chains on Ganymede and Callisto, *Nature*, **365**, 731-733.
- SCOTTI, J. V. and H. J. MELOSH (1993) Estimate of the size of comet Shoemaker-Levy 9 from a tidal breakup model, *Nature*, **365**, 733-735.
- CLOETINGH, S., SASSI, W, and TASK FORCE TEAM (including H. J. MELOSH and 19 others), (1994) The origin of sedimentary basins: A status report from the task force of the International Lithosphere Program, *Marine and Petroleum Geology* **11**, 659-683.
- WALLACE, M. and MELOSH, H. J. (1994) Buckling of a pervasively faulted lithosphere, *PAGEOPH*, **142**, 239-261.
- MELOSH, H. J., NEMCHINOV, I. V. and ZETZER, Yu. I. (1994) Non-nuclear strategies for deflecting comets and asteroids, in T. Geherls, *Hazards from Comets and Asteroids*, U. of Arizona press, Tucson, AZ., p 1111-1132.
- MELOSH, H. J. (1994) Swapping rocks: Exchange of surface material among the planets, *The Planetary Report*, **14**, 16-19.
- MELOSH, H. J. and WHITAKER, E. A., (1994) Split comets and crater chains on the Moon, *Nature*, **369**, 713-714.
- WANG, K., DRAGERT, H. and MELOSH, H. J. (1994) Finite element study of uplift and strain across Vancouver Island, *Can. J. Earth Sci.* **31**, 1510-1522.
- MELOSH, H. J. (1995) Under the ringed basins, *Nature* **373**, 104-105.
- KRING, D. A., HILDEBRAND, A. R., DRAKE, M. J., MELOSH, H. J. and VICKERY, A. M. (1995), Report of centimeter-sized tektites in Pima County, Arizona, cannot be verified, *Meteoritics*, **30** 110-112.
- MELOSH, H. J. (1995) Around and around we go, *Nature* **376**, 386-387.
- FREED, A. M., LIN, J., SHAW, P. R., MELOSH, H. J. (1995) Long-term survival of the axial valley morphology at abandoned slow-spreading centers, *Geology* **23** 971-974.
- KRING, D. A., MELOSH, H. J. and HUNTEN, D. M. (1996) Impact-induced perturbations of atmospheric sulfur, *EPSL* **140**, 201-212.
- NOLAN, M. C., ASPHAUG, E., MELOSH, H. J., GREENBERG, R (1996) Impact craters on asteroids: Does gravity or strength control their size?, *Icarus* **124**, 359-371.
- MELOSH, H. J. (1996) Dynamical weakening of faults by acoustic fluidization, *Nature*, **379**, 601-606.
- BOTTKE, W. F., NOLAN, M., MELOSH, H. J., VICKERY, A. M., GREENBERG, R., (1996) Origin of the Spacewatch small Earth-approaching asteroids, *Icarus* **122**, 406-427.
- BOTTKE, W. F., NOLAN, M., MELOSH, H. J., VICKERY, A. M., GREENBERG, R., (1996) Provenance of the Spacewatch small Earth-approaching asteroids, In *Completing the Inventory of the Solar System* (T. W. Rettig, J. M. Han, Eds.) ASP Conference Series **107**, 3-11.

- SCHENK, P., ASPHAUG, E. McKINNON, W. B., MELOSH, H. J., WEISSMAN, P. (1996) Cometary nuclei and tidal disruption: The geologic record of crater chains on Ganymede and Callisto, *Icarus* **121**, 249-274.
- BOTTKE, W. F. and MELOSH, H. J. (1996) Binary asteroids and the formation of doublet craters, *Icarus* **124**, 372-391.
- MELOSH, H. J. (1997) Impact Cratering, in J. H. Shirley and R. W. Fairbridge, eds., *Encyclopedia of Planetary Sciences*, Chapman and Hall, pp. 326-335.
- TURTLE, E. P. and MELOSH, H. J. (1997) Stress and flexural modeling of the Martian lithospheric response to Alba Patera, *Icarus* **126**, 197-211.
- BOTTKE, W. F. and MELOSH, H. J. (1997) Formation of asteroid satellites and doublet craters by planetary tidal forces, *Nature* **381**, 51-53.
- McKINNON, W. B., ZAHNLE, K. J., IVANOV, B. A. and MELOSH, H. J. (1997) Cratering on Venus: Models and observations, in *Venus II*, Eds. Bougher, S. W., Hunten, D. M. and Phillips, R. J., University of Arizona Press, 969-1014.
- MELOSH, H. J. and RYAN, E. V. (1997) Asteroids: Shattered but not dispersed, *Icarus*, **129**, 562-564.
- PIERAZZO, E., VICKERY, A. M., and MELOSH, H. J. (1997) A re-evaluation of impact melt production, *Icarus* **127**, 408-432.
- MELOSH, H. J. (1997) Multi-ringed revelation, *Nature* **390**, 439-440.
- RYAN, E. V. and MELOSH, H. J. (1998) Impact fragmentation: From the laboratory to asteroids, *Icarus*, **133**, 1-24.
- SCHALLER, C. J. and MELOSH, H. J. (1998) Venusian ejecta parabolas: Comparing theory with observations, *Icarus*, **131**, 123-137.
- PIERAZZO, E., KRING, D. A., and MELOSH, H. J. (1998) Hydrocode simulation of the Chicxulub impact event and the production of climatically active gases, *JGR planets* **103**, 28607-28625.
- MELOSH, H. J. (1998) Blast Off, *The Sciences* **38**, no. 4, 40-46.
- MELOSH, H. J. (1998) Craters Unchained, *Nature* **394**, 221-223.
- DONES, L., GLADMAN, B., MELOSH, H. J., TONKS, W. B., LEVINSON, H. F., DUNCAN, M. (1999) Dynamical lifetimes and final fates of small bodies: Orbit integrations vs. Öpik calculations, *Icarus*, **142**, 509-524.
- GRIER, J. A., SWINDLE, T. D., KRING, D. J., MELOSH, H. J. (1999)  $^{40}\text{Ar}/^{39}\text{Ar}$  analysis of samples from the Gardnos impact structure, *Meteoritics and Planetary Science* **34**, 803-807.
- PIERAZZO, E. and MELOSH, H. J. (1999) Hydrocode modeling of Chicxulub as an oblique impact event, *Earth Planet Sci. Lett.* **165**, 163-176.
- MELOSH, H. J. and IVANOV, B. A. (1999) Impact crater collapse. *Ann. Rev. Earth Planet. Sci.* **27**, 385-415.
- MILEIKOWSKY, C., CUCINOTTA, F., WILSON, J. W., GLADMAN, B., HORNECK, G., LINDGREN, L., MELOSH, H. J., RICKMAN, H., VALTONEN, M. and ZHENG, J. Q. (2000) Natural transfer of viable microbes in space, Part 1: From Mars to Earth and Earth to Mars, *Icarus* **145**, 391-427.
- PIERAZZO, E. and MELOSH, H. J. (2000) Melt production in oblique impacts, *Icarus* **145**, 252-261.
- PIERAZZO, E. and MELOSH, H. J. (2000) Hydrocode modeling of oblique impacts: The fate of the projectile. *Meteoritics Planet. Sci.*, **35**, 117-130.

- PIERAZZO, E. and MELOSH, H. J. (2000) Understanding oblique impacts from experiments, observations and modeling. *Ann. Rev. Earth and Planet. Sci.*, **28**, 141-167.
- NICHOLSON, W. L., MUNAKATA, N., HORNECK, G., MELOSH, H. J. and SETLOW, P. (2000) Resistance of *Bacillus* endospores to extreme terrestrial and extraterrestrial environments, *Microbiology and Molecular Biology Reviews*, **64**, 548-572.
- MORGAN, J. V., WARNER, M. R., COLLINS, G. S., MELOSH, H. J. and CHRISTENSON, G. L. (2000) Peak ring formation in large impact craters, *EPSL*, **183**, 347-354.
- FREED, A. M., MELOSH, H. J., and SOLOMON, S. C. (2001) Tectonics of mascon loading: Resolution of the strike-slip faulting paradox, *JGR* **106**, 20,603-20,620.
- ECKHOLM, A. G. and MELOSH, H. J. (2001) Crater features diagnostic of oblique impacts: The size and position of the central peak. *GRL* **28**, 623-626.
- MASTRAPA, R. M. E., GLANZBERG, H., HEAD, J. N., MELOSH, H. J. and NICHOLSON, W. L. (2001) Survival of bacteria exposed to extreme acceleration: implications for panspermia. *EPSL*, **189**, 1-8.
- MELOSH, H. J. (2001) Can interplanetary rocks carry life? In S. Soter and N. deG. Tyson (Eds) *Cosmic Horizons*, Am. Museum of Nat. Hist. pp. 170-175.
- NOLAN, M.C., ASPHAUG, E., GREENBERG, R., and MELOSH, H. J. (2001) Impacts on asteroids: Fragmentation, regolith transport and disruption, *Icarus* **153**, 1-15.
- MELOSH, H. J. (2001) A new model Moon, *Nature* **412** 694-695.
- MELOSH, H. J. (2001) Deep down at Chicxulub, *Nature* **414** 861-862.
- HORNECK, G., MILEIKOWSKY, C., MELOSH, H. J., WILSON, J. W., CUCINOTTA, F. and GLADMAN, B. (2001) Viable transfer of microorganisms in the solar system and beyond. In *Astrobiology*, (G. Horneck and C. Baumstark-Khan, Eds.), pp. 57-76. Springer.
- RICHARDSON, D. C., LEINHARDT, Z. M., MELOSH, J., BOTTKKE, W. F. Jr., and ASPHAUG, E. (2002) Gravitational Aggregates: Evidence and Evolution, in *Asteroids III*, 501-515.
- COLLINS, G. S., MELOSH, H. J., MORGAN, J. V. and WARNER, M. R. (2002) Hydrocode simulations of Chicxulub crater collapse and peak-ring formation, *Icarus*, **157**, 24-33.
- MELOSH, H. J. (2002) An Argentine tektite field emerges from confusion, *Science* **296**, 1037.
- HEAD, J. N., MELOSH, H. J. and IVANOV, B. A. (2002) Martian meteorite launch: High-speed ejecta from small craters, *Science* **298**, 1752-1756.
- RUBIE, D. C., MELOSH, H. J., REID, J. E., LIEBSKE, C., AND RICHTER, K. (2003) Mechanisms of metal-silicate equilibration in the terrestrial magma ocean. *EPSL*, **205** 239-255.
- COOK, C. M., MELOSH, H. J. and BOTTKKE, W. F. (2003) Doublet craters on Venus, *Icarus* **165**, 90-100.
- MELOSH, H. J. (2003) Exchange of meteorites (and life?) between stellar systems. *Astrobiology* **3**, 207-219.

- IVANOV, B. A. and MELOSH, H. J. (2003) Impacts do not initiate volcanic eruptions: Eruptions near the crater. *Geology* **31**, 869-872.
- MELOSH, H. J. (2003) Shock Viscosity and Rise Time of Explosion Waves in Geologic Media, *J. Appl. Phys.* **94**, 4320-4325.
- COLLINS, G. S. and MELOSH, H. J. (2003) Acoustic Fluidization and the Extraordinary Mobility of Sturzstroms, *J. Geophys. Res.*, **108**, 2473
- BARATOUX, D. and MELOSH, H. J. (2003) A New Model for the Formation of Shatter Cones: Consequences for the Interpretation of Shatter Cone Data in Terrestrial Impact Structures, *Earth Planet. Sci. Lett.* **216**, 43-54.
- MELOSH, H. J. (2003) The history of air, *Nature* **424**, 22-23.
- MELOSH, H. J., EKHOLM, A. G., SHOWMAN, A. P., and LORENZ, R. D. (2004) The temperature of Europa's subsurface water ocean, *Icarus*, **168**, 498-502.
- COLLINS, G. S., MELOSH, H. J. and IVANOV, B. A. (2004) Damage and deformation in numerical impact simulations, *Meteoritics and Planetary Science*, **39**, 217-231.
- DUPONT-NIVET, G., BUTLER, R. F., ROBINSON, D., YIN, A., and MELOSH, H. J. (2004) Concentration of crustal displacement along a weak Altyn Tagh fault: Evidence from paleomagnetism of the northern Tibetan Plateau. *Tectonics*, **23** TC1020, doi: 10.1029/2002TC001397.
- MELOSH, H. J. (2004) Asteroid deflection: The mirror ablation approach, AIAA Paper 2004-1449, presented at the 2004 Planetary Defense Conference: Protecting the Earth from Asteroids.
- RICHARDSON, J. E., MELOSH, H. J., GREENBERG, R. (2004) Impact-induced seismic activity on Asteroid 433 Eros, *Science* **306**, 1526-1529.
- MELOSH, H. J. and COLLINS, G. S. (2005) Meteor Crater, Arizona: A low-velocity impact. *Nature* **434**, 157.
- MELOSH, H. J. (2005) The mechanics of pseudotachylite formation in impact events, In: *Impact Tectonics* (eds. Koeberl, C., and Henkel, H.). Impact Studies, vol. 6, Springer, Heidelberg, pp. 55-80.
- TURTLE, E. P., PIERAZZO, E., COLLINS, G. S. OSINSKI, G. R. MELOSH, H. J. MORGAN, J. V. REIMOLD, W. U. (2005) Impact structures: What does crater diameter mean? In *Geol. Soc. Amer. SP paper 384*, Kenkmann, T., Hörz, F. and Deutsch, A. (Eds). Large Meteorite Impacts III.
- COLLINS, G. S., MELOSH, H. J., MARCUS, R. A. (2005) Earth impact effects program: A web-based computer program for calculating the regional environmental consequences of a meteoroid impact on Earth. *Meteoritics and Planetary Sciences* **40**, 817-840.
- RICHARDSON, J. E., MELOSH, H. J., PIERAZZO, E., ARTEMEIVA, N. (2005) Impact theory and modeling for the Deep Impact mission: From mission planning to data analysis, *Space Science Reviews*, **117**, 241-267.
- FAJARDO-CAVAZOS, P., LINK, L., MELOSH, H. J., NICHOLSON, W. L. (2005) *Bacillus subtilis* spores on artificial meteorites survive hypervelocity atmospheric entry: Implications for lithopanspermia. *Astrobiology* **5**, 726-736.
- RICHARDSON, J. E., MELOSH, H. J., GREENBERG, R. J. and O'BRIEN, D. (2005) The global effects of impact-induced seismic activity on fractured asteroid surface morphology, *Icarus* **129**, 325-349.

- MORGAN, J., WARNER, M., URRUTIA-FUCUGAUCHI, J., GULICK, S., CHRISTESON, G., BARTON, P., REBOLLEDO-VIEYRA and MELOSH, H. J. (2005) Chicxulub crater seismic survey prepares way for future drilling, *EOS* 86, 325-328.
- MELOSH, H. J. (2005) A smashing pair. *Nature* **434**, 153-154.
- A'HEARN, M. F., M. J. S. BELTON, W. A. DELAMERE, J. KISSEL, K. P. KLASSEN, L. A. MCFADDEN, K. J. MEECH, H. J. MELOSH, P. H. SCHULTZ, J. M. SUNSHINE, P. C. THOMAS, J. VEVERKA, D. K. YEOMANS, M. W. BACA, I. BUSKO, C. J. CROCKETT, S. M. COLLINS, M. DESNOYER, C. A. EBERHARDY, C. M. ERNST, F. T. L., L. FEGA, O. GROUSSIN, D. HAMPTON, S. I. IPATOV, J.-Y. LI, D. LINDLER, C. M. LISSE, N. MASTRODEMOS, W. M. OWEN JR., J. E. RICHARDSON, D. D. WELLNITZ, AND R. L. WHITE, (2005) Deep Impact: Excavating comet Tempel 1: *Science*, **310**, 258-264.
- SUNSHINE, J. M., M. F. A'HEARN, O. GROUSSIN, J.-Y. LI, M. J. S. BELTON, W. A. DELAMERE, J. KISSEL, K. P. KLASSEN, L. A. MCFADDEN, K. J. MEECH, H. J. MELOSH, P. H. SCHULTZ, P. C. THOMAS, J. VEVERKA, D. K. YEOMANS, I. C. BUSKO, M. DESNOYER, T. L. FARNHAM, L. FEGA, D. L. HAMPTON, D. J. LINDLER, C. M. LISSE, AND D. D. WELLNITZ, (2006) Exposed water ice deposits on the surface of comet 9P/Tempel 1: *Science*, **311**, 1453-1455.
- WÜNNEMANN, K., COLLINS, G. S., and MELOSH, H. J. (2006) A strain-based porosity model for use in hydrocode simulations of impacts and implications for transient-crater growth in porous targets, *Icarus* **180**, 514-527.
- GOLDIN, T. J., WÜNNEMANN, K., MELOSH, H. J., COLLINS, G. S. (2006) Hydrocode modeling of the Sierra Madera impact structure, *Meteoritics and Planetary Science* **41**, 1947-1958.
- MELOSH, H. J. (2007) Physical effects of comet and asteroid impacts: Beyond the crater rim. in Bobrowsky, P. T. and Rickman, H. (Eds.) *Comet/Asteroid Impacts and Human Society: An Interdisciplinary Approach*, pp. 211-224
- MELOSH, H. J. (2007) A Hydrocode Equation of State for SiO<sub>2</sub>, *Meteoritics and Planetary Science* 42, 2079-2098.
- MORGAN, J., CHRISTESON, G., GULICK, S., GRIEVE, R., URRUTIA, J., BARTON, P., REBOLLEDO, M., MELOSH, H. J. (2007) Joint IODP/ICDP Scientific Drilling of the Chicxulub Impact Crater, *Scientific Drilling*, **4**, 42-44.
- BART, G. D., and H. J. MELOSH (2007), Using lunar boulders to distinguish primary from distant secondary impact craters, *Geophys. Res. Lett.*, **34**, L07203, doi:10.1029/2007GL029306.
- RICHARDSON, J. E., MELOSH, H. J., LISSE, C. M., CARCICH, B. (2007) A ballistics analysis of the Deep Impact ejecta plume: Determining comet Tempel 1's gravity, mass and density. *Icarus* **190**, 357-390.
- RUBIE, D. C., F. NIMMO and H. J. MELOSH (2007) Formation of the Earth's Core, Chapter 9 of Stevenson, D. J. (Ed), *Treatise on Geophysics: The Core*. Elsevier.

- McDONALD, M., MELOSH, H. J., GULICK, S. (2008) Oblique impacts and peak ring position: Comparing Venusian craters to Chicxulub, *Geophys. Res. Lett.*, **35**, L07203, doi:10.1029/2008GL033346.
- MELOSH, H. J. (2008) Message from Mercury, *Nature* **452**, 820-821.
- JACKSON, L. E., BROWN, P., MELOSH, J., HILL, D. (2008) Meteorite strikes Peru, *Geotimes*, July 2008, 6-11.
- MELOSH, H. J. (2008) Did an impact blast away half of Mars' crust? *Nature Geosciences* **1**, 412-414.
- KENKMANN, T., COLLINS, G. S., WITTMANN, A. WÜNNEMANN, K., REIMOLD, W. U., MELOSH, H. J. (2008) A model for the formation of the Chesapeake Bay impact crater as revealed by drilling and numerical simulation. Geological Society of America Special Paper 458, in press.
- FAJARDO-CAVAZOS, P., LANGENHORST, F., MELOSH, H. J., NICHOLSON, W. L. (2009) Bacterial spores in granite survive hypervelocity launch by spallation: Implications for lithopanspermia, *Astrobiology* **9**, 647-657.
- BELTON, M. J. S. and MELOSH, H. J. (2009) Fluidization and multiphase transport of particulate cometary material as an explanation of the smooth terrains and repetitive outbursts on 9P/Tempel 1. *Icarus*, **200**, 280-291.
- VALTONEN, M., NURMI, P., ZHENG, J-Q., CUCINOTTA, F. A., WILSON, J. W., HORNECK, G., LINDGREN, L., MELOSH, J., RICKMAN, H. MILEIKOWSKY, C., (2009), Natural Transfer of Viable microbes in space from planets in Extra-Solar Systems to a Planet on our Solar System and Vice Versa, *Astrophys. J.* **690**, 210-215.
- IVANOV, B. A., MELOSH, H. J., PIERAZZO, E. (2009) Basin-forming impacts: Reconnaissance modeling, in *Large Meteorite Impacts*, GSA Special Paper XXX, in press.
- GOLDIN, T. J. and MELOSH, H. J. (2009) Self-shielding of thermal radiation by Chicxulub impact ejecta: Firestorm or fizzle? *Geology*, **37**, 1135-1138.
- PIERAZZO, E. and MELOSH, H. J. (2010) Extraterrestrial Causes of Environmental Catastrophes. In Mathews, J. A., *Handbook of Environmental Change*, Sage Pub., London, in press
- DONES, L., CHAPMAN, C. R., MCKINNON, W. B., MELOSH, H. J., KIRCHOFF, M. K., NEUKUM, G. and ZAHNLE, K. J., (2009) Icy Satellites of Saturn: Impact Cratering and Age Determination, Dougherty et al., *Saturn from Cassini-Huygens*, Springer, pp. 613-635.
- GROUSSIN, O., A'HEARN, M. A., BELTON, M. J. S., FRANHAM, T., FEAGA, L., KISSEL, J., LISSE, C. M., MELOSH, J., SCHULTZ, P., SUNSHINE, J. and VEVERKA, J. (2010) Energy Balance of the Deep Impact Experiment, *Icarus*, **205**, 627-637.
- BURLEIGH, K. J., MELOSH, H. J., TORNABENE, L. L., IVANOV, B. and McEWEN, A. S. (2009) Impact Airblasts Trigger Dust Avalanches on Mars, *Science*, submitted.
- BROWN, R. H., BARNES, J. W. and MELOSH, H. J. (2009) On the Origin of Titan's Xanadu Region, *Icarus*, submitted.
- SCHULTE, P., ALEGRET, L., ARENILLAS, I., ARZ, J. A., BARTON, P., BROWN, P. R., BRALOWER, T. R., CHRISTESON, G. L., CLAEYS, P., COCKELL, C.

- S., COLLINS, G. S., DEUTSCH, A., GOLDIN, T. J., GOTO, K., GRAJALES-NISHIMURA, J. M., GRIEVE, A. F., GULICK, S., JOHNSON, K. R., KIESSLING, W., KOEBERL, C., KRING, D. A., MACLEOD, K. G., MATSUI, T., MELOSH, J., MONTANARI, A., MORGAN, J. V., NEAL, C. R., NICHOLS, D. J., NORRIS, R. D., PIERAZZO, E., RAVIZZA, G., REBOLLEDO-VIEYRA, M., REIMOLD, W.-E., ROBIN, E., SALGE, T., SPEIJER, R. P., SWEET, A. R., URRUTIA-FUCUGAUCHI, J., VAJDA, V., WHALEN, M. T. and WILLUMSEN, P. S. (2010) The Chicxulub asteroid impact and mass extinction at the Cretaceous-Paleogene Boundary. *Science* **327**, 1214-1218.
- COLLINS, G. S., MELOSH, H. J. and WÜNNEMANN, K. (2010) Improvements to the epsilon-alpha porous compaction model for simulating impacts into high-porosity solar system objects. *International Journal of Impact Engineering*, submitted.
- BART, G. D. and MELOSH, H. J. (2010) Distributions of boulders ejected from lunar craters, *Icarus*, submitted.
- BART, G. D. and MELOSH, H. J. (2010) Impact into lunar regolith inhibits high velocity ejection of large blocks, *Journal of Geophysical Research*, submitted.
- PASEK, M. A., COLLINS, G., CARTER, E. A. and MELOSH, H. J. (2010) Shock metamorphism of quartz by lightning. *Science*, submitted.

## **BOOK**

- MELOSH, H.J. (1989) *Impact Cratering: A Geologic Process*. Oxford University Press, 245 pp.
- MELOSH, H. J. (2009) *Planetary Surface Processes*, Under contract with Cambridge University Press, MS due: December 2008.

## **EDITED BOOKS**

- IP, W.-H., MELOSH, H. J., and AMBROSIUS, B. A. C. (1991) *Asteroid and Spacecraft Dynamics*, Pergamon.
- MELOSH, H. J. (1997) *Origins of Planets and Life*, Ann. Rev. Inc., Palo Alto, CA.