WILLIAM B. McKINNON **October 2005**

Current Position

Professor, Department of Earth and Planetary Sciences, Washington University, Saint Louis MO 63130; phone 314-935-5604, fax 314-935-7361

Fellow, McDonnell Center for the Space Sciences, Washington University, Saint Louis MO

Science Team Member, NASA *New Horizons* mission to Pluto and the Kuiper Belt

Personal Data

Born August 14, 1954, in Montreal, Canada
United States citizen
Married with three children

Education

1981	Ph.D in Planetary Science and Geophysics, California Institute of Technology Thesis Advisor: H.J. Melosh
1979	M.S. in Planetary Science, California Institute of Technology
1976	S.B. in Earth and Planetary Science, Massachusetts Institute of Technology

Positions Held

1997-present	Professor of Earth and Planetary Sciences, Washington University
1998-1999	Visiting Scientist, Southwest Research Institute, Boulder CO
1990-1991	Consultant, Time-Life Books, for their *Voyage Through the Universe* series
1988-1997	Associate Professor, Earth and Planetary Sciences, Washington University

1982-present	Fellow, McDonnell Center for the Space Sciences, Washington University
1982-1988	Assistant Professor, Earth and Planetary Sciences, Washington University
1982	Senior Research Associate, Lunar and Planetary Laboratory, University of Arizona, Tucson AZ
1981	Visiting Research Associate, Earth and Space Sciences, State University of New York at Stony Brook, Stony Brook, NY
1980-1982	Research Associate, Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ
1977-1980	Graduate Research Assistantship, Caltech, Pasadena CA
1977, 1979	Graduate Teaching Assistantship, Caltech, Pasadena CA
1976	Viking Project Undergraduate Intern, Jet Propulsion Laboratory, Caltech, Pasadena, CA

Teaching Experience

Courses "*The Solar System*," undergraduate course, spring 1985, 1987, 1989, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2003, 2005

"*Applied Statistics 101: Quantitative Applications in Arts & Sciences*," fall 2003

"*Planetary Geology*," undergraduate/graduate course, fall 1983, 1986, spring 1991, fall 1993, 1995, 1997, 1999, 2001, 2003, spring 2006

"*Advanced Planetary Geology*," graduate course, spring 2002, 2004

"*Planetary Geophysics and Dynamics*," graduate course, spring 1986, fall 1994, spring 1997, fall 2000, 2002

"*Graduate Seminar*," fall 2000

"*Geodynamics*," graduate course, spring 1988, 1989, fall 1989, spring 1990, 1991, 1992, 1993, 1995

"*Planetary Seminar*," spring, fall 1990

"*Planetary Science*," undergraduate course, fall 1985, l987, 1992

"*Structural Geology*," undergraduate course, spring 1983, 1984

"*Introduction to Geophysics*," graduate course, fall 1983, 1984

"*Planetary Physics*," graduate course, fall 1982

Theses Supervised

Michelle O. Kirchoff, Ph.D, in progress
Andrew J. Dombard, Ph.D 2000
Lance A.M. Benner, Ph.D 1994
James S. Alexopoulos, A.M. 1992
Paul M. Schenk, Ph.D. 1988
Steven M. Mueller, A.M. 1985
Service on ≈27 thesis committees.

Undergraduate Advising

Freshman Advisor 1987–1991,
Faculty Advisor, mid 1980s, KWUR-FM (campus radio station)

Fellowships and Honors

1997	Editor's Citation for Excellence in Reviewing - *Icarus*
1988	AGU Referee's Citation – *Journal of Geophysical Research*
1976-1977	Earle C. Anthony Fellowship
1976	Phi Beta Kappa
1976	Sigma Xi
1972-1973	National Merit Scholarship

Committees and Activities

Vice-chair and Chair, Division for Planetary Sciences of the American Astronomical Society (DPS), elected (2003-2005)

Chair, DPS Prize Subcommittee (2005-2006)

Member, Scientific Organizing Committee, Lunar and Planetary Institute Workshop on *Planetary Chronology*, to be held spring 2006, Houston, TX (2005-2006)

Member, NRC-NAS *Committee on Priorities for Space Science Enabled by Nuclear Power and Propulsion* (Steering Committee) (2004-2005)

Member, NASA Jupiter Icy Moons Orbiter Science Definition Team (2003-2005)

Member, Scientific Organizing Committee and Summarizer, Lunar and Planetary Institute Workshop on *The Europan Ice Shell: Past, Present, and Future*, held Feb 2004 (2003-2004)

Member, NASA Planetary Geology and Geophysics Review Panel (summer 2003)

Member, Scientific Organizing Committee, 35th Division for Planetary Sciences of the American Astronomical Society (DPS) Meeting, Monterey, CA (2003)

Member, Scientific Organizing Committee, and Session Summarizer, Lunar and Planetary Institute Workshop on *Impact Cratering: Bridging the Gap Between Modeling and Observations*, held Feb 2003 (2002-2003)

Co-organizer, Fall American Geophysical Union (AGU) Meeting Special Session on *Outer Planet Satellite Interiors*, held Dec 2002 (2002)

Member, Division for Planetary Sciences of the American Astronomical Society (DPS) Prize Committee (2001-2003)

Program Panel and Focus Area Chair, NASA *Forum on Innovative Approaches to Outer Planetary Exploration 2001-2020* (February 2001)

Member, Organizing Committee, *Conference on Jupiter - Planet, Satellites and Magnetosphere*, held June 2001 (2000-2001)

Chair, Scientific Organizing Committee, 33rd Division for Planetary Sciences of the American Astronomical Society (DPS) Meeting, held in New Orleans, LA, Nov 2001 (1999-2001)

Member, NASA *Hubble Space Telescope* Cycle 10 Review Panel (Nov 2000)

Member, Program Committee, 32th Division for Planetary Sciences of the American Astronomical Society (DPS) Meeting, Pasadena, CA (2000)

Member, NASA Outer Solar System Senior Science Team (summer 2000)

Member, Geological Society of America (GSA) Shoemaker Award Committee (1999-2000)

Member, NASA Solar System Exploration Subcommittee (SSES) (1999-2002)

Chair, NASA Campaign Strategy Working Group on Prebiotic Chemistry in the Outer Solar System (1999)

Member, Program Committee, 30th Division for Planetary Sciences of the American Astronomical Society (DPS) Meeting, Madison, WI (1998)

Member, Planetary Science Discussion Panel, UV-Optical Space Astronomy Beyond HST Meeting (1998)

Member, NASA Campaign Strategy Working Group on Prebiotic Chemistry in the Outer Solar System (1996-1997 & 1998-1999)

Member, Program Committee, 27th Lunar and Planetary Science Conference (1996)

Member, NASA Outer Planets Science Working Group (1994–1996)

Member, NASA Planetary Geosciences Management and Operations Working Group (1994–1998)

Member, Organizing Committee, *Solar System Ices* Meeting, held Feb 1995 in Toulouse, France (1994)

Member, Organizing Committee, *Icy Galilean Satellite* Conference, held Feb 1996 in San Juan Capistrano, CA (1993–1994)

Member, Organizing Committee, *Pluto & Charon* Conference, held July 1994 in Flagstaff, AZ, (1992–1993)

Member, NRC-NAS Committee on Planetary and Lunar Exploration (COMPLEX) (1992–1995)

Member, NASA Mars Observer Participating Scientist Review Panel (1991)

Member, NASA Neptune/Pluto, Neptune/Pluto Outer Planets & Outer Planets Science Working Groups (1991–1994)

Member, NASA Planetary Research and Analysis Study Group (1991–1992)

Member, NASA Origins of Solar Systems Review Panel (1991–1994)

Member, Division for Planetary Sciences of the American Astronomical Society (DPS) Committee, elected (1990–1993)

Member, American Geophysical Union (AGU) Macelwane Medal Subcommittee (1990–1991)

Member, NASA Cassini Saturn Orbiter Review Panel (1990)

Member, NASA Planetary Geology and Geophysics Working Group (1986-1991)

Member, Uranus Conference Organizing Committee (1986-1988)

Member, Program Committee, 18th Lunar and Planetary Science Conference (1987)

Member, Program Committee, 17th Lunar and Planetary Science Conference (1986)

Member, NRC-NAS Committee on Planetary and Lunar Exploration (COMPLEX) (1985-1988)

Community Service and Editorial Positions

Consulting Editor, *Icarus* (2002–present)

Best Planetary Student Paper Judge, Fall American Geophysical Union (AGU) Meeting (2000, 2003)

Member, Search Committee for AGU *Journal of Geophysical Research-Planets* Editor (1998)

Best Student Paper Judge, 28th Lunar and Planetary Science Conference (1997)

Best Student Paper Judge, 27th Lunar and Planetary Science Conference (1996)

Associate Editor, *Icarus* (1991–2002)

Best Student Paper Judge, 22th Lunar and Planetary Science Conference (1991)

Associate Editor, AGU *Journal of Geophysical Research — Planets* (1991–1994)

Associate Editor, AGU *Journal of Geophysical Research* (1990–1992)

Member, Editorial Board, *Icarus* (1988–1990)

Editor for Planetology, *EOS Transactions AGU* (1985-1987)

Recent and Selected Invited Lectures

Beyond the Shell Game: The Geophysics of Europa. *Europa Focus Group Workshop*, NASA Ames Research Center, Moffett Field CA, February 2006.

Geophysical limits to Europan hydrothermal history. *Special Session on Hydrothermal Solar System, Fall American Geophysical Union Meeting*, San Francisco CA, December 2005.

Cassini/Huygens at Titan: Recent Results, *Department of Earth and Planetary Sciences*, Washington University, Saint Louis, February 2005.

Remarkable moons: Structure and evolution of the Galilean satellites of Jupiter, *Center for Integrative Planetary Science,* University of California, Berkeley CA, October 2004.

Voyage to the Edge of the Solar System: NASA's Plan to Explore Pluto and Beyond, *Washington University Club of Cleveland, Cleveland Museum of Natural History*, March 2004.

Io: A new view of its interior, redox evolution & tectonics, plus speculations on the Hadean Earth, *Division for Geological and Planetary Sciences*, California Institute of Technology, Pasadena CA, February 2004.

Overview of Europa's icy shell: Questions of thickness, composition, rheology, tectonics, and astrobiological potential. *Workshop on Europa's Icy Shell: Past, Present, and Future*, Lunar and Planetary Institute, Houston TX, February 2004.

The power of JIMO for determining Galilean satellite internal structure and origin (D.J., Stevenson, W.B. McKinnon, R. Canup, G. Schubert, and M. Zuber) *Special Session on the Science Rationale for the Jupiter Icy Moons Orbiter Mission, Fall American Geophysical Union Meeting*, San Francisco CA, December 2004.

Io: A new view of it's interior, redox evolution & lithosphere, and lessons for the Hadean Earth. *Lunar and Planetary Institute*, Houston TX, October 2003.

Interior physics of Pluto, Charon, and other large KBOs. *First Decadal Review of the Edgeworth-Kuiper Belt*, Antofagasta, Chile, March 2003.

Water on Europa. *Gordon Research Conference on Water and Aqueous Solutions*. Plymouth NH, August 2002.

Thermal, albedo, and porosity evolution of large Kuiper Belt objects, and the case of 20000 Varuna. *Asteroids, Comets, Meteors 2002*. Berlin, Germany, July 2002.

Farewell to Galileo, and what's next for Jupiter exploration. *NASA-Missouri Space Grant Consortium*, Saint Louis Science Center, April 2002

Chaos on Io. *Department of Earth and Planetary Sciences*, Washington University, February 2002.

The importance of being organic – Sources and consequences of carbonaceous matter in the outer solar system. *Geological Society of America Annual Meeting*, The Future of Geochemistry: A Symposium in Honor of Harold C. Helgeson, Boston MA, October 2001.

Mission to Pluto and Beyond. *Mid-St. Louis Rotary Club*, Richmond Heights MO, July 2001

Chaos on Io. *St. Louis Astronomical Society*, April 2001

Structure, composition, dynamics, and evolution of the Galilean satellites (G. Schubert, T. Spohn, and W.B. McKinnon) *Conference on Jupiter-The Planet, Satellites and Magnetosphere*, Boulder CO, June 2001.

Perspectives on the geology and geophysics of the Galilean satellites from Voyager to Galileo. (W.B. McKinnon, R. Sullivan, and R.J. Phillips) *Conference on Jupiter-The Planet, Satellites and Magnetosphere*, Boulder CO, June 2001.

Ocean karma: What goes around comes around on Europa (or does it?) (W.B. McKinnon and E.L. Shock) *Lunar and Planetary Science Conference XXXII*, Special Session on Europa, Houston TX, March 2001.

Ocean karma on Europa. *Lunar and Planetary Laboratory*, University of Arizona, Tucson AZ, March 2001

A proposed sequence of exploration for Europa and the other Galilean satellites. *Forum on Innovative Approaches to Outer Planetary Exploration 2001-2020*. Lunar and Planetary Institute, Houston TX, February 2001.

Tectonics of the Galilean satellites (R.T. Pappalardo, W.B. McKinnon, L.M. Prockter, and P.M. Schenk) *Geological Society of America Annual Meeting*, Special Session on Structure and Tectonics of Planets and Satellites, Reno NV, November 2000.

Tectonics of the satellites of Saturn, Uranus, and Neptune.(W.B. McKinnon, R.T. Pappalardo, A.J. Dombard, and P.J. Thomas) *Geological Society of America Annual Meeting*, Special Session on Structure and Tectonics of Planets and Satellites, Reno NV, November 2000.

Review of Campaign Strategy Working Group Recommendations. *Europa Lander Science, Missions, and Instrumentation Workshop*, 32nd Division for Planetary Sciences of the American Astronomical Society Annual Meeting, Pasadena CA, October 2000.

Chaos on Io. *Department of Space Studies*, Southwest Research Institute, Boulder CO, October 2000.

The icy Galilean satellites: A mystery orbiting outside a puzzle resonating with an enigma. *Space Sciences Division Colloquium*, NASA Ames Research Institute, Moffett Field CA, November 1999.

Pluto and Triton: Present and former members of the Kuiper Belt. *St. Louis Astronomical Society*, November 1999.

Millennial perspectives on the origin and evolution of Pluto and Triton (W.B. McKinnon and J.S. Kargel) *Pluto and Triton: Comparisons and Evolution over Time*, Lowell Observatory Workshop, Flagstaff AZ, Sept. 1999.

NASA-Russian Space Agency (RSA) *Pluto Science Workshop*, Moscow, Russia (1996)

"Ask-an-Astronomer" for the Hubble Space Telescope (HST) Institute at the National Science Teachers Association Conference, Saint Louis, MO (1996)

6th Jet Propulsion Laboratory (JPL) Summer School in Planetary Science (1994)

3rd Jet Propulsion Laboratory (JPL) Summer School in Planetary Science (1991)

Astro-Science Workshop (for Chicago-area high school students), Adler Planetarium, Chicago IL (fall 1984, 1988, 1989, 1990, 1991, 1992, 1993, 1994)

Planetary Geology Speakers Bureau, University of Nebraska, Omaha (1983)

Funded and Previously Funded Research

Principal Investigator: "Structure and Evolution of Outer Planet Satellites," Planetary Geology and Geophysics Program, NASA.

Principal Investigator: "Numerical Studies of Convection in Icy Satellites, " Outer Planets Fundamental Research Program, NASA.

Co-Investigator: “Fine Resolution Topographic Mapping of the Jovian Moons with Ka-Band InSAR,” High Capability Instruments for Planetary Exploration, NASA.

Co-Investigator: “Hydrothermal Ecosystems in a Planetary Context,” Exobiology, NASA

Principal Investigator: “Deformation of the Europan Ice Shell by Tidal and Convective Stresses: Constraints from GEM Data,” Jupiter Systems Data Analysis Program, NASA.

Principal Investigator: “Deformation of the Europan Ice Shell by Tidal and Convection Stresses,” Jupiter Systems Data Analysis Program, NASA.

Principal Investigator: "Dynamical Investigation of Planetary Satellite Capture," Origins of Solar Systems, NASA.

Co-Investigator: "Coupled Aqueous Alteration of Minerals and Organic Compounds on Meteorite Parent Bodies and Icy satellites," Exobiology, NASA.

Principal Investigator: "Formation and Evolution of Impact Craters on Venus," Venus Data Analysis Program, NASA.

Co-Investigator: "Acquisition of Computer Workstations for Geophysical Research," Earth Science: Instrumentation and Facilities, NSF.

Co-Investigator: "Catastrophic Effects of Seismic Waves from Impacts," McDonnell Center Innovative Research Program, NASA.

Principal Investigator: "Physical Studies of Uranian Satellite Geologic Materials," Uranus Data Analysis Program, NASA.

Principal Investigator: "Rheological Measurements of Liquid Ammonia Water as a Function of Temperature and Composition," McDonnell Center Innovative Research Program, NASA.

Co-Investigator: "Search for Oceanic Impact Craters," McDonnell Center Innovative Research Program, NASA.

Professional Societies

American Association for the Advancement of Science
American Geophysical Union, Planetology Division
Division for Planetary Sciences of the American Astronomical Society
International Astronomical Union, Commission 16, Physical Study of Planets and Satellites

Meteoritical Society
Astronomical Society of the Pacific
Planetary Society

PUBLICATIONS

McKinnon, W.B. (1978). An investigation into the role of plastic failure in crater modification. *Proc. Lunar Planet. Sci. Conf. 9th*, 3965–3973.

Melosh, H.J., and W.B. McKinnon (1978). The mechanics of ringed basin formation. *Geophys. Res. Lett.* **5**, 985–988.

McKinnon, W.B., and H.J. Melosh (1980). Evolution of planetary lithospheres: Evidence from multi-ringed basins on Ganymede and Callisto. *Icarus* **44**, 454–471.

McKinnon, W.B. (1981). Application of ring tectonic theory to Mercury and other solar system bodies. *Multi-Ring Basins, Proc. Lunar Planet. Sci.* **12A**, 259–273.

McKinnon, W.B. (1981). Tectonic deformation of Galileo Regio and limits to the planetary expansion of Ganymede. *Proc. Lunar Planet. Sci.* **12B**, 1585–1597.

McKinnon, W.B. (1982). Impact into the Earth's ocean floor: Preliminary experiments, a planetary model, and possibilities for detection. *Geological Implications of Impacts of Large Asteroids and Comets on the Earth, Geol. Soc. Am. Spec. Paper* **190**, 129–142.

McKinnon, W.B. (1984). On the origin of Triton and Pluto. *Nature* **311**, 355–358.

Schenk, P.M., and W.B. McKinnon (1985). Dark halo craters and the thickness of grooved terrain on Ganymede. *Proc. Lunar Planet. Sci. Conf. 15th, J. Geophys. Res.* **90**, suppl., C775–C783.

McKinnon, W.B. (1985). Geology of icy satellites. In *Proc. NATO Workshop Ices in the Solar System*, J. Klinger, D. Benest, A. Dollfus, and R. Smoluchowski, eds. (Dordrecht: D. Reidel), 826–856.

Chapman, C.R., and W.B. McKinnon (1986). Cratering of planetary satellites. In *Satellites*, J.A. Burns and M.S. Matthews, eds. (Tucson: Univ. Arizona Press), 492–580.

McKinnon, W.B., and E.M. Parmentier (1986) Ganymede and Callisto. In *Satellites*, J.A. Burns and M.S. Matthews, eds. (Tucson: Univ. of Arizona Press), 718–763.

McKinnon, W. B. (1987). Jovian and Saturnian satellites. *Rev. Geophys.* **25**, 260–270.

Schenk, P.M., and W.B. McKinnon (1987). Ring geometry on Ganymede and Callisto. *Icarus* **72**, 209–234.

O'Dea, C.P., and W.B. McKinnon (1987). VLA observations of radio sources near Wolf 359. *Pub. Astron. Soc. Pac.* **99**, 1039–1043.

McKinnon, W.B., and S. Mueller (1988). Pluto's structure and composition suggest origin in the solar, not a planetary, nebula. *Nature* **335**, 240–243.

Mueller, S., and W.B. McKinnon (1988). Three-layered models of Ganymede and Callisto: Compositions, structures, and aspects of evolution. *Icarus* **76**, 437–464.

Melosh, H.J., and W.B. McKinnon (1988). The tectonics of Mercury. In *Mercury*, F. Vilas, C.R. Chapman, and M.S. Matthews, eds. (Tucson Univ. or Arizona Press), 374–400.

Schenk, P.M., and W.B. McKinnon (1989). Fault offsets and lateral crustal movement on Europa: Evidence for a mobile ice shell. *Icarus* **79**, 75–100.

McKinnon, W.B., and S. Mueller (1989). The density of Triton: A prediction. *Geophys. Res. Lett.* **16**, 591–594.

McKinnon, W.B. (1989). On the origin of the Pluto–Charon binary. *Astrophys. J. (Lett.)* **344**, L41–L44; Erratum. *Astrophys. J. (Lett.)* **346**, L106.

McKinnon, W.B. (1989). Impact jetting of water ice, with application to the accretion of icy planetesimals and Pluto. *Geophys. Res. Lett.* **16**, 1237–1240.

McKinnon, W.B. (1990). *Impact cratering. Encyclopedia of Physical Sciences and Technology 1990 Yearbook*, 363–371; *1992 Ed.* **8**, 1–8;

COMPLEX (1990). 1990 Update to Strategy for the Exploration of the Inner Planets. National Academy Press, Washington. 47 pp.

COMPLEX (1990). *Strategy for the Detection and Study of Other Planetary Systems and Extrasolar Planetary Materials: 1990–2000.* National Academy Press, Washington. 86 pp.

Schenk, P.M., and W.B. McKinnon (1991). Dark ray and dark floor craters on Ganymede and the provenance of large impactors in the Jovian system. *Icarus* **89**, 318–346.

McKinnon, W.B, C.R. Chapman, and K.R. Housen (1991). Cratering of the Uranian satellites. In *Uranus*, J. Bergstralh, E.T. Miner, and M.S. Matthews, eds. (Tucson, Univ. of Arizona Press), 629–692.

Leith, A.C., and W.B. McKinnon (1991). Terrace width variations in complex Mercurian craters, and the transient strength of the cratered Mercurian and lunar crust. *J. Geophys. Res.* **96**, 20,923–20,931.

Alexopoulos, J.S., and W.B. McKinnon (1992). Multiringed impact craters on Venus: An overview from Arecibo and Venera images and initial Magellan data. *Icarus* **100**, 347–363; Erratum. *Icarus* **103**, 161.

Brackett, R.A,. and W.B. McKinnon (1992). Cratering mechanics on Venus: Pressure enhancement by the atmospheric "ocean." *Geophys. Res. Lett.* **19**, 2115–2118.

Shock, E.L., and W.B. McKinnon (1993). Hydrothermal processing of cometary volatiles — Applications to Triton. *Icarus* **106**, 464–477.

Alexopoulos, J.S., and W.B. McKinnon (1994). Large impact craters and basins on Venus: Implications for ring mechanics on the terrestrial planets. *Geol. Soc. Am. Spec. Paper 293, Large Meteorite Impacts and Planetary Evolution*, 178–198.

COMPLEX (1994). *An Integrated Strategy for the Planetary Sciences: 1995–2010.* National Academy of Sciences, Washington. 199 pp.

De Hon, R.A., A.C. Leith, and W.B. McKinnon (1994). Geologic map of the Hathor region (Jg–15) of Ganymede. *U.S. Geol. Surv. Misc. Inv. Map I–2388.*

Benner, L.A.M., and W.B. McKinnon (1995). Orbital evolution of captured satellites: The effect of solar gravity on Triton's post-capture orbit. *Icarus* **114**, 1–20.

McKinnon, W.B, J.I. Lunine, and D. Banfield (1995). Origin and evolution of Triton. In *Neptune and Triton*, D.P. Cruikshank, ed. (Tucson, Univ. Arizona Press), 807–877.

McKinnon, W.B., and P.M. Schenk (1995). Estimates of comet fragment masses from impact crater chains on Callisto and Ganymede. *Geophys. Res. Lett.* **22**, 1829-1832.

McKinnon, W.B., and A.C. Leith (1995). Gas drag and the orbital evolution of a captured Triton. *Icarus* **118**, 392-413.

Benner, L.A.M., and W.B. McKinnon (1995). On the orbital evolution and origin of comet Shoemaker-Levy 9. *Icarus* **118**, 155-168.

Leith, A.C., and W.B. McKinnon (1996). Is there evidence for polar wander on Europa? *Icarus* **120**, 387-398.

Schenk, P.M., E. Asphaug, W.B. McKinnon, H.J. Melosh, and P. Weissman (1996). Cometary nuclei and tidal disruption: The geologic record of crater chains on Callisto and Ganymede. *Icarus* **121**, 249-274.

Moore, J.M., and W.B. McKinnon (1997). Ganymede. In *Encyclopedia of Planetary Sciences*, J.H. Shirley and R.W. Fairbridge, eds. (London: Chapman & Hall), 263-267.

Mueller, S., and W.B. McKinnon (1997). Pluto. *Encyclopedia of Planetary Sciences*, J.H. Shirley and R.W. Fairbridge, eds. (London: Chapman & Hall), 645-650.

Schenk, P., and W.B. McKinnon (1997). Callisto. *Encyclopedia of Planetary Sciences*, J.H. Shirley and R.W. Fairbridge, eds. (London: Chapman & Hall), 73-75.

McKinnon, W.B. (1997). Europa. *Encyclopedia of Planetary Sciences*, J.H. Shirley and R.W. Fairbridge, eds. (London: Chapman & Hall), 243-246.

McKinnon, W.B. (1997). Mystery of Callisto: Is it undifferentiated? *Icarus* **130**, 540-543.

McKinnon, W.B., K.J. Zahnle, B.A. Ivanov, and H.J. Melosh (1997). Impact cratering on Venus: Models and observations. In *Venus II – Geology, Geophysics, Atmosphere, and Solar Wind Environment*, S.W. Bougher, D.M. Hunten, and R.J. Phillips, eds. (Tucson, Univ. Arizona Press), 969-1114.

Stern, S.A., W.B. McKinnon, and J.I. Lunine (1997). On the origin of Pluto, Charon, and the Pluto-Charon binary. In *Pluto and Charon*, S.A. Stern and D.J. Tholen, eds. (Tucson, Univ. Arizona Press), 605-663.

McKinnon, W.B., D.P. Simonelli, and G. Schubert (1997). Composition, internal structure, and thermal evolution of Pluto and Charon. In *Pluto and Charon*, S.A. Stern and D.J. Tholen, eds. (Tucson, Univ. Arizona Press), 295-343.

McKinnon, W.B. (1998). Geodynamics of icy satellites. In *Solar System Ices*, B. Schmitt, C. de Bergh, and M. Festou, eds. (Dordrecht: D. Reidel), 525-550.

McKinnon, W.B., and R.L. Kirk (1999). Triton. In *Encyclopedia of the Solar System*, P. Weissman, L.-A. McFadden, and T. Johnson, eds. (San Diego: Academic Press), 405-434.

McKinnon, W. B. (1999). Convective instability in Europa's floating ice shell. *Geophys. Res. Lett.* **26**, 951-954.

Stern, S.A., and W.B. McKinnon (2000). Triton's surface age and impactor population revisited in light of Kuiper Belt fluxes: Evidence for small Kuiper Belt objects and recent geological activity. *Astron. J.* **119**, 945-952.

Dombard, A.J., and W.B. McKinnon (2000). Long-term retention of impact crater topography on Ganymede. *Geophys. Res. Lett.* **27**, 3663-3666.

Schenk, P.M., W.B. McKinnon, D. Gwynn, and J.M. Moore (2001). Flooding of Ganymede's bright terrains by low-viscosity water-ice lavas. *Nature* **410**,57-60.

Dombard, A.J., and W.B. McKinnon (2001). Formation of grooved terrain on Ganymede: Extensional instability mediated by cold, superplastic creep. *Icarus* **154**, 321-336.

McKinnon, W.B., P.M. Schenk, and A.J. Dombard (2001). Chaos on Io: A model for formation of mountain blocks by crustal heating, melting, and tilting. *Geology* **29**, 103-106.

Drake, M.J., W. Jeffrey, J.I. Lunine, W. McKinnon, and L. Porter (2001). *Report from the Forum on Innovative Approaches to Outer Planetary Exploration 2001-2020.* NASA.

McKinnon, W.B. (2002). Impact cratering. In *Encyclopedia of Physical Science and Technology, Third Edition*, R.A. Myers, ed. (San Diego: Academic Press), v. 7, 693-702.

McKinnon, W.B. (2002). On the initial thermal evolution of Kuiper Belt Objects. *Proc. Asteroids, Comets, Meteors (ACM 2002)*, ESA **SP-500**, 29-38.

Haskin, L.A., B.E. Moss, and W.B. McKinnon (2003). On estimating contributions of basin ejecta to regolith deposits at lunar sites. *Meteoritics and Planetary Science* **38**, 13-33.

McKinnon, W.B., and M.E. Zolensky (2003) Sulfate content of Europa's ocean and shell: Evolutionary considerations and geological and astrobiological implications. *Astrobiology*, **3**, 879-897.

Greeley, R., C.F. Chyba, J.W. Head, T.B. McCord, W.B. McKinnon, R.T. Pappalardo, and P. Figueredo (2004). Geology of Europa. In *Jupiter-The Planet, Satellites and Magnetosphere*, F. Bagenal, T.E. Dowling, and W.B. McKinnon, eds. (Cambridge Univ. Press), 329-362.

Schubert, G., J.D. Anderson, T. Spohn, and W.B. McKinnon (2004) Interior composition, structure and dynamics of the Galilean satellites. In *Jupiter-The Planet, Satellites and Magnetosphere*, F. Bagenal, T.E. Dowling, and W.B. McKinnon, eds. (Cambridge Univ. Press), 281-306.

Bagenal, F., T.E. Dowling, and W.B. McKinnon (2004). Introduction. In *Jupiter-The Planet, Satellites and Magnetosphere*, F. Bagenal, T.E. Dowling, and W.B. McKinnon, eds. (Cambridge Univ. Press), 1-18.

Moore, J.M., P.M. Schenk. L.S. Bruesch, E. Asphaug, and W.B. McKinnon (2004) Large impact features on middle-sized icy satellites. *Icarus* **171**, 421-443.

Madsen, S.N., Lou, Y., Hensley, S., Harvey, W.L., and W.B. McKinnon (2004) Radar TopoMapper concept for planetary exploration. *Instruments, Science, and Methods for Geospace and Planetary Remote Sensing*, *Proc. SPIE* **5660***,* 159-167.

Durham, W.B., W.B. McKinnon, and L.A. Stern (2005) Cold compaction of water ice. *Geophys. Res. Lett.* **32**, L18202, doi:10.1029/2005GL023484.

McKinnon, W.B. (2006) On convective instability in the ice I shells of outer solar system bodies, with deatiled application to Callisto. *Icarus*, in press.

Dombard, A.J., and W.B. McKinnon (2006). Elastoviscoplastic relaxation of impact crater topography with application to Ganymede and Callisto. *J. Geophys. Res.* **111**, E01001, doi:10.1029/2005JE002445.

Dombard, A.J., and W.B. McKinnon (2006) Folding of Europa's icy lithosphere: An analysis of viscous-plastic buckling and subsequent topographic relaxation. *J. Struct. Geol.*, in press.

Kirchoff, M.R., and W.B. McKinnon (2005) Formation of mountains on Io: Variable volcanism and thermal stresses, draft to be submitted.

Kirchoff, M.R., W.B. McKinnon, and P.M. Schenk (2005) Global distribution of volcanoes and mountains on Io: Control by asthenospheric heating and implications for a unique tectonism, draft to be submitted.

McKinnon, W.B. and P.M. Schenk (2005). Endogenic pits and other depressions on Europa: Limits on shell thickness from isostasy. *Icarus*, draft to be submitted.

EDITED BOOK AND THESIS

Jupiter - The Planet, Satellites and Magnetosphere (eds. F. Bagenal, T.E. Dowling, and W.B. McKinnon) 2004. Cambridge University Press, 719 pp..

Large Impact Craters and Basins: Mechanics of Syngenetic and Postgenetic Modification (W.B.McKinnon) 1980. Ph.D Thesis, California Institute of Technology.

OTHER ARTICLES

McKinnon, W.B. (2003) Summary of session on creation of the structure of complex craters. *Impact Cratering: Bridging the Gap Between Modeling and Observations*, www.lpi.usra.edu/meetings/impact2003/summary6.pdf.

McKinnon, W.B. (2002). News and Views: Out on the edge. *Nature* **418**, 135-136.

McKinnon, W.B. (2002). Review of *Planetary Sciences*, by I. de Pater and J.J. Lissauer. *EOS Trans. AGU* **83**, 259.

McKinnon, W.B. (2000) Io (v. 10, 370), Europa (v. 6, 379), Ganymede (v. 8, 27), and Callisto (v. 3, 68-69). Articles in *The Millennium 2000 World Book Encyclopedia* (Chicago: World Book, Inc.).

McKinnon, W.B. (1999). The midsize icy satellites. In *The New Solar System, 4th Edition*, J.K. Beatty, C.C. Petersen, and A. Chaikin, eds. (Cambridge: Sky Publishing Co.), 297-310.

McKinnon, W.B. (1999). Triton is doomed. In *Our Worlds, The Magnetism & Thrill of Planetary Exploration*, A. Stern, ed. (Cambridge University Press), 137-152.

McKinnon, W.B. (1997). News and Views Feature: Galileo at Jupiter – Meetings with remarkable moons. *Nature* **390**, 23-26.

McKinnon, W.B. (1997). News and Views: Sighting the seas of Europa. *Nature* **386**, 765-767.

McKinnon, W.B. (1997). Perspective: Extreme Cratering. *Science* **276**, 1346-1348.

McKinnon, W.B. (1995). News and Views: Sublime solar system ices. *Nature* **375**, 535-536.

McKinnon, W.B., and R.L. Korotev (1995). Reply to the Comment by P.D. Spudis on the review of *The Geology of multi-ring basins. Geochim. Cosmochim. Acta* **59**, 2637-2638.

McKinnon, W.B., and R.L. Korotev (1994). Review of *The Geology of Multi-Ring Impact Basins: The Moon and Other Planets* by P.D. Spudis. *Geochim. Cosmochim. Acta* **58**, 4532-4533.

McKinnon, W.B. (1993). News and Views: A puzzle orbiting an enigma. *Nature* **365**, 209–210.

McKinnon, W.B. (1993). News and Views: Vestal voyagers unveiled. *Nature* **363**, 211-212.

McKinnon, W.B. (1992). News and Views: Killer acid at the K/T boundary. *Nature* **357**, 15–16.

McKinnon, W.B. (1992). Triton's post-capture thermal history. *Planetary Geosciences 1989–1990, NASA* **SP–508**, 47–49.

McKinnon, W.B. (1991). News and Views: Icy clues to Triton's origins. *Nature* **354**, 431.

McKinnon, W.B. (1991). Focal Point: Worlds Apart. *Sky & Telescope* **82**, 340.

McKinnon, W.B. (1990). News and Views: Around Venus in 37 days. *Nature* **348**, 676–677.

McKinnon, W.B. (1990). News and Views: The Hyperion hypothesis. *Nature* **346**, 414–415.

McKinnon, W.B. (1989). Review of *Origin and Evolution of Planetary and Satellite Atmospheres*, Atreya et al., eds.: Who made the sky? *Nature* **342**, 565.

McKinnon, W.B. (1989). News and Views: Phobos 2 encounter — martian surfaces probed. *Nature* **341**, 565.

McKinnon, W.B. (1989). News and Views: Electrically heated asteroids. *Nature* **340**, 343–344.

McKinnon, W.B. (1989). News and Views: Impacts giveth and impacts taketh away. *Nature* **338**, 465–466.

Mueller, S., and W.B. McKinnon (1989). The changing status of Pluto. *The World & I* **4**, 274–281.

McKinnon, W.B. (1988). News and Views: Odd tectonics of a rebuilt moon. *Nature 333*, 701–702.

McKinnon, W.B. (1988). Physics news in 1987: Impact cratering. *Physics Today* **41**, S41–S42.

McKinnon, W.B. (1983). Planets & rings of ice. *Geotimes* **28**, 28–30.

SELECTED RECENT ABSTRACTS

McKinnon, W.B. (2006). Formation time of the Galilean satellites from Callisto's state of partial differentiation. . *Lunar Planet. Sci. XXXVII*, #2444.

Barr, A.C., and W.B. McKinnon (2006). Convection in icy satellites with self-consistent grain size. *Lunar Planet. Sci. XXXVII*, #2130.

Kirchoff, M.R., and W.B. McKinnon (2006). Mountain building on Io – Part 2: Effects of preexisting faults and pore sulfur on thermal stresses. . *Lunar Planet. Sci. XXXVII*, #2120.

Lichtenberg, K., W.B. McKinnon, and A.C. Barr (2006). Heat flux from impact ring graben on Europa. *Lunar Planet. Sci. XXXVII*, #2399.

Zolotov, M.Yu., M.L. Krieg, E.L. Shock, and W.B. McKinnon (2006). Chemistry of a primordial ocean on Europa. . *Lunar Planet. Sci. XXXVII*, #1435.

McKinnon, W.B. (2005). Geophysical limits to Europan hydrothermal history. *EOS Trans. AGU* **86**, Fall Meeting Suppl., abs. P53A-05. [INVITED]

Barr, A.C., and W.B. McKinnon (2005). Convection in large icy satellites with self-consistent grain-size evolution. *EOS Trans. AGU* **86**, Fall Meeting Suppl., abs. P22A-08.

McKinnon, W.B., and A.M. Hofmeister (2005). Ice XI on Pluto and Charon? *Bull. Am. Astron. Soc.* **37**, 732.

Barr, A.C., and W.B. McKinnon (2005). Does grain growth stop convection in the icy Galilean satellites? *Bull. Am. Astron. Soc.* **37**, 751.

Durham, W.B., W.B. McKinnon, and L.A. Stern (2005). Cold compaction of porous ice, and the densities of Kuiper Belt objects. *Abs., IAU Symp. 229: Asteroids, Comets, Meteors*, 50.

Kirchoff, M.R., and W.B. McKinnon (2005). Mountain building on Io: An unsteady relationship between volcanism and tectonism. *Lunar Planet. Sci. XXXVI*, #2245.

McKinnon, W.B. (2005). Radar sounding of convecting ice shells in the presence of convection: Application to Europa, Ganymede, and Callisto. *Abs., Workshop on Radar Investigations of Planetary and Terrestrial Environments*, LPI Contrib. 1231, #6039.

McKinnon, W.B. (2004). What use Callisto? *Bull. Am. Astron. Soc.* **36**, 1169.

Mohit, P.S., B.T. Greenhagen, and W.B. McKinnon (2004) Polar wander on Ganymede. *Bull. Am. Astron. Soc.* **36**, 1084-1085.

Kirchoff, M.,W.B. McKinnon, and P.M. Schenk (2004). Mountain strike orientations on Io: Evidence for a global stress pattern. *Bull. Am. Astron. Soc.* **36**, 1100.

McKinnon, W.B., and M. Kirchoff (2004) Inferences from Io: The possible role of volcanic heat pipes and emergent mountain blocks in creating Earth's first sialic crust, *EOS Trans. AGU* **85**, Joint Assembly Suppl., JA466.

McKinnon, W.B. (2004) Oxidation history of Europa's ocean and mantle – A case of redox reversal. *Int. J. Astrobiol.* **3***, Suppl.*, 54.

McKinnon, W.B. (2004) On the oxidation states of the Galilean satellites: Implications for internal structures, ocean chemistry, and magnetic fields. *Lunar Planet. Sci. XXXV*, #2137.

Haskin, L.A., W.B. McKinnon, L.A.M. Benner, and B.L. Jolliff (2004) Thorium anomalies in the NW quadrant of the South Pole-Aitken Basin. *Lunar Planet. Sci. XXXV*, #1461.

McKinnon, W.B. (2004) Overview of Europa's icy shell: Questions of thickness, composition, rheology, tectonics, and astrobiological potential. *Abs., Workshop on Europa's Icy Shell: Past, Present, and Future*, LPI Contrib. 1195, 53-54.

McKinnon, W.B. (2003) Callisto and Titan: What lies beneath? *EOS Trans. AGU* **84**, Fall Meeting Suppl., F971.

Kirchoff, M.R., W.B. McKinnon, and P. Schenk (2003) Spherical harmonic analysis of mountain and volcanic center distributions on Io. *EOS Trans. AGU* **84**, Fall Meeting Suppl., F962.

McKinnon, W.B. (2003) Internal structures of the Galilean satellites: Unfinished business and the road ahead. *Abs., Forum on Concepts and Approaches for Jupiter Icy moons Orbiter*, LPI Contrib. 1163, 53.

McKinnon, W.B., and S.S. Desai (2003) Internal structures of the Galilean satellites: What can we really tell? *Lunar Planet. Sci. XXXIV*, #2104.

Kirchoff, M.R., and W.B. McKinnon (2003) Mountain building on Io: Variable volcanism and thermal stresses. *Lunar Planet. Sci. XXXIV*, #2030.

McKinnon, W.B., P.M. Schenk, and J.M. Moore (2003) Goldilocks and the three complex crater scaling laws. *Abs., Impact Cratering: Bridging the Gap Between Modeling and Observations*, LPI Contrib. 1155, 48.

McKinnon (2002). Origin and composition of the rock+metal interiors of the Galilean satellites. *EOS Trans. AGU* **83**, Fall Meeting Suppl., F853.

Zolotov, M.Y., E.L. Shock, and W.B. McKinnon (2002). Effects of early water-rock chemical interactions on interior structures, physical properties, and heat balances of the Galilean satellites. *EOS Trans. AGU* **83**, Fall Meeting Suppl., F839.

Kirchoff, M.R., and W.B. McKinnon (2002). Thermal stresses and mountain building on Io. *EOS Trans. AGU* **83**, Fall Meeting Suppl., F840.

McKinnon, W.B., P.M. Schenk, and A.J. Dombard (2002). Estimates of Europa's flow and ice shell thickness: Convergence at last? *Abs., Astrobiology Science Conference 2002*, 51.

Schenk, P.M., and W.B. McKinnon (2001). Constraints on Europa's ice shell thickness from topographic variability. *Abs., Jupiter-The Planet, Satellites and Magnetosphere*, 94-95.

McKinnon, W.B., A.M. Hofmeister, and M. Festou (2001). Thermal and albedo evolution of Kuiper Belt objects, a geophysical perspective. *International Workshop "Physical Properties of Kuiper Belt Objects,"* Observatoire de Paris, 21-22.

McKinnon, W.B., and E.L. Shock (2001). Ocean karma: What goes around comes around on Europa (or does it?) *Lunar Planet. Sci. XXXII*, # 2181.

McKinnon, W.B., J.L. Fisher, and A.L. Passer (2001). Does crustal thickness assist the transition from central-peak to peak-ring crater? *Lunar Planet. Sci. XXXII*, # 1772.

Schenk, P.M., and W.B. McKinnon (2001). Topographic variability on Europa from Galileo stereo images. *Lunar Planet. Sci. XXXII*, # 2078.

McKinnon, W.B. (2001). A proposed sequence of exploration for Europa and the other Galilean satellites. Abs., *Forum on Innovative Approaches to Outer Planetary Exploration 2001-2020*, 56.