

Jean-Luc Margot

Associate Professor, Dept. of Earth and Space Sciences, University of California, Los Angeles
595 Charles Young Drive East, 5642 Geology Building, Los Angeles, CA 90095

Academic positions

Member, Institute of Geophysics and Planetary Physics, 2009-present.
Associate Professor, Department of Astronomy, Cornell University, 2008.
Assistant Professor, Department of Astronomy, Cornell University, 2004-2008.
Visiting Associate Researcher, University of California, Los Angeles, 2003-2004.
Postdoctoral Fellow, Caltech 2001-2003.
Postdoctoral Research Associate, Arecibo Observatory 1999-2001.
Graduate Research Assistant, Department of Astronomy, Cornell University, 1994-1999.
Erasmus Fellow, Electromagnetics Institute, Technical University of Denmark, 1993.

Education

Ph.D., Astronomy and Space Sciences, Cornell University, May 1999.
Thesis: Lunar topography from Earth-based radar interferometric mapping.
B.S., Electrical Engineering, Université Catholique de Louvain, Belgium, June 1993.
Thesis: Measurement of atmospheric water content from satellite radiometry.

Honors and Awards

AAS Division for Planetary Sciences Urey prize, 2004.
O.K. Earl prize fellow in Planetary Science, Caltech, 2001.
Graduated with “Grande Distinction”, Université Catholique de Louvain, 1993.
European Union Erasmus Fellow, Technical University of Denmark, January-June 1993.

Teaching Experience

Instructor, ESS 9 Solar System and Planets, Spring '09, UCLA.
Instructor, ASTRO 102 Our Solar System, Spring '05, '06, '07, '08, Cornell University.
Instructor, ASTRO 578 Planet Formation and Evolution, Fall '06, '08, Cornell University.
Instructor, ASTRO 621 Planetary Radar Astronomy, Spring '06, Cornell University.
Instructor, ASTRO 671 Classic Papers in Planetary Science, Fall '07, Cornell University.
Guest lecturer, COMM 276 Cases in Comm. and Social Influence, '07, '08, Cornell University.
Guest lecturer, EAS 122, Earthquake! (and other natural disasters), '07, '08, Cornell University.

Publications

M. T. Zuber and 16 co-authors, The Equatorial Shape and Gravity Field of Mercury from MESSENGER Flybys 1 and 2, *Icarus*, submitted.
J. L. Margot and J. D. Giorgini, Probing general relativity with radar astrometry in the inner solar system, *Proceedings of IAU symposium 261: Relativity in Fundamental Astronomy - Dynamics, Reference Frames and Data Analysis*, revised.

- J. L. Margot**, A Mercury orientation model including non-zero obliquity and librations, *Celestial Mechanics and Dynamical Astronomy* **105**, 329-336, 2009.
- J. J. Kavelaars and 17 co-authors, The Canada-France ecliptic plane survey - L3 data release: The orbital structure of the Kuiper Belt, *Astronomical Journal* **137**, 4917-4935, 2009.
- M. Brozovic, S. J. Ostro, L. A. M. Benner, J. D. Giorgini, R. F. Jurgens, R. Rose, M. C. Nolan, A. A. Hine, C. Magri, D. J. Scheeres, **J. L. Margot**, Radar observations and a physical model of Asteroid 4660 Nereus, a prime space mission target, *Icarus* **201**, 153-166, 2009.
- S. J. Peale, **J. L. Margot**, M. Yseboodt, Resonant forcing of Mercury's libration in longitude, *Icarus* **199**, 1-8, 2009.
- L. A. M. Benner, S. J. Ostro, C. Magri, M. C. Nolan, E. S. Howell, J. D. Giorgini, R. F. Jurgens, **J. L. Margot**, P. A. Taylor, M. W. Busch, M. K. Shepard, Near-Earth asteroid surface roughness depends on compositional class, *Icarus* **198**, 294-304, 2008.
- J.-M. Petit, J. J. Kavelaars, B. J. Gladman, **J. L. Margot**, P. D. Nicholson, R. L. Jones, J. Wm. Parker, M. L. Ashby, A. Campo Bagatin, P. Benavidez, J. Coffey, P. Rousselot, O. Mousis, P. A. Taylor, The Extreme Kuiper Belt Binary 2001 QW322, *Science* **322**, 432, 2008.
- M. W. Busch, L. A. M. Benner, S. J. Ostro, J. D. Giorgini, R. F. Jurgens, R. Rose, D. J. Scheeres, C. Magri, **J. L. Margot**, M. C. Nolan, A. A. Hine, Physical properties of near-Earth Asteroid (33342) 1998 WT24, *Icarus* **195**, 614-621, 2008.
- M. K. Shepard, B. E. Clark, M. C. Nolan, L. A. M. Benner, S. J. Ostro, J. D. Giorgini, F. Vilas, K. Jarvis, S. Lederer, L. F. Lim, T. McConnochie, J. Bell, **J. L. Margot**, A. Rivkin, C. Magri, D. Scheeres, P. Pravec. Multi-wavelength observations of Asteroid 2100 Ra-Shalom. *Icarus* **193**, 20-38, 2008.
- B. A. Campbell, D. B. Campbell, **J. L. Margot**, R. R. Ghent, M. Nolan, J. Chandler, L. M. Carter, N. J. S. Stacy, Focused 70-cm Wavelength Radar Mapping of the Moon, *IEEE Trans. Geoscience and Remote Sensing* **45**, 4032-4042, 2007.
- M. W. Busch, J. D. Giorgini, S. J. Ostro, L. A. M. Benner, R. F. Jurgens, R. Rose, M. D. Hicks, P. Pravec, P. Kusnirak, M. J. Ireland, D. J. Scheeres, S. B. Broschart, C. Magri, M. C. Nolan, A. A. Hine, **J. L. Margot**, Physical modeling of near-Earth Asteroid (29075) 1950 DA, *Icarus* **190**, 608-621, 2007.
- J. L. Margot**, S. J. Peale, R. F. Jurgens, M. A. Slade, I. V. Holin. Large Longitude Libration of Mercury Reveals a Molten Core. *Science* **316**, 710-714, 2007.
- P. A. Taylor*, **J. L. Margot**, D. Vokrouhlický, D. J. Scheeres, P. Pravec, S. C. Lowry, A. Fitzsimmons, M. C. Nolan, S. J. Ostro, L. A. M. Benner, J. D. Giorgini, C. Magri. Spin Rate of Asteroid (54509) 2000 PH5 Increasing due to the YORP Effect. *Science* **316**, 274-277, 2007.
- S. J. Peale, M. Yseboodt, **J. L. Margot**. Long Period Forcing of Mercury's Libration in Longitude. *Icarus* **187**, 365-373, 2007.
- C. Magri, S. J. Ostro, D. J. Scheeres, M. C. Nolan, J. D. Giorgini, L. A. M. Benner, **J. L. Margot**. Radar observations and a physical model of Asteroid 1580 Betulia. *Icarus* **186**, 152-177, 2007.

- S. J. Ostro, **J. L. Margot**, L. A. M. Benner, J. D. Giorgini, D. J. Scheeres, E. G. Fahnestock, S. B. Broschart, J. Bellerose, M. C. Nolan, C. Magri, P. Pravec, P. Scheirich, R. Rose, R. F. Jurgens, E. M. De Jong, S. Suzuki. Radar Imaging of Binary Near-Earth Asteroid (66391) 1999 KW4. *Science* **314**, 1276-1280, 2006.
- D. J. Scheeres, E. G. Fahnestock, S. J. Ostro, **J. L. Margot**, L. A. M. Benner, S. B. Broschart, J. Bellerose, J. D. Giorgini, M. C. Nolan, C. Magri, P. Pravec, P. Scheirich, R. Rose, R. F. Jurgens, E. M. De Jong, S. Suzuki. Dynamical Configuration of Binary Near-Earth Asteroid (66391) 1999 KW4. *Science* **314**, 1280-1283, 2006.
- D. B. Campbell, B. A. Campbell, L. M. Carter, **J. L. Margot**, N. J. S. Stacy. No evidence for thick deposits of ice at the lunar south pole. *Nature* **443**, 835-837, 2006.
- J. K. Harmon, M. C. Nolan, **J. L. Margot**, D. B. Campbell, L. A. M. Benner, J. D. Giorgini. Radar observations of Comet P/2005 JQ5 (Catalina). *Icarus* **184**, 285-288, 2006.
- M. K. Shepard, **J. L. Margot**, C. Magri, M. C. Nolan, J. Schlieder, B. Estes, S. J. Bus, E. L. Volquardsen, A. S. Rivkin, L. A. M. Benner, J. D. Giorgini, S. J. Ostro, M. W. Busch. Radar and infrared observations of binary near-Earth Asteroid 2002 CE26. *Icarus* **184**, 198-210, 2006.
- L. A. M. Benner, M. C. Nolan, S. J. Ostro, J. D. Giorgini, D. P. Pray, A. W. Harris, C. Magri, **J. L. Margot**. Near-Earth Asteroid 2005 CR37: Radar images and photometry of a candidate contact binary. *Icarus* **182**, 474-481, 2006.
- J. A. Stansberry, W. M. Grundy, **J. L. Margot**, D. P. Cruikshank, J. P. Emery, G. H. Rieke, D. E. Trilling. The Albedo, Size, and Density of Binary Kuiper Belt Object (47171) 1999 TC36. *ApJ* **643**, 556-566, 2006.
- M. C. Nolan, J. K. Harmon, E. S. Howell, D. B. Campbell, **J. L. Margot**. Detection of large grains in the coma of Comet C/2001 A2 (LINEAR) from Arecibo radar observations. *Icarus* **181**, 432-441, 2006.
- M. Yseboodt* and **J. L. Margot**. Evolution of Mercury's Obliquity. *Icarus* **181**, 327-337, 2006.
- P. Pravec and 56 co-authors. Photometric survey of binary near-Earth asteroids. *Icarus* **181**, 69-93, 2006.
- S. J. Ostro, L. A. M. Benner, C. Magri, J. D. Giorgini, R. Rose, R. F. Jurgens, D. K. Yeomans, A. A. Hine, M. C. Nolan, D. J. Scheeres, S. B. Broschart, M. Kaasalainen, **J. L. Margot**. Radar observations of Itokawa in 2004 and improved shape estimation. *Meteoritics and Planetary Science* **40**, 1563-1574, 2005.
- P. D. Nicholson, R. G. French, D. B. Campbell, **J. L. Margot**, M. C. Nolan, G. J. Black, H. J. Salo. Radar imaging of Saturn's rings. *Icarus* **177**, 32-62, 2005.
- S. J. Ostro, L. A. M. Benner, M. C. Nolan, C. Magri, J. D. Giorgini, D. J. Scheeres, S. B. Broschart, M. Kaasalainen, D. Vokrouhlický, S. R. Chesley, **J. L. Margot**, R. F. Jurgens, R. Rose, D. K. Yeomans, S. Suzuki, E. M. De Jong. Radar observations of asteroid 25143 Itokawa (1998 SF36). *Meteoritics and Planetary Science* **39**, 407-424, 2004.
- S. R. Chesley, S. J. Ostro, D. Vokrouhlický, D. Capek, J. D. Giorgini, M. C. Nolan, **J. L. Margot**, A. A. Hine, L. A. M. Benner, A. B. Chamberlin. Direct Detection of the Yarkovsky Effect via

Radar Ranging to Near-Earth Asteroid 6489 Golevka. *Science* **302**, 1739-1742, 2003.

J. L. Margot and M. E. Brown. A low density M-type asteroid in the main belt. *Science* **300**, 1939–1942, 2003.

S. J. Ostro, J. D. Giorgini, L. A. M. Benner, A. A. Hine, M. C. Nolan, **J. L. Margot**, P. W. Chodas, C. Veillet. Radar detection of Asteroid 2002 AA29. *Icarus* **166**, 271-275, 2003.

J. L. Margot, M. C. Nolan, L. A. M. Benner, S. J. Ostro, R. F. Jurgens, J. D. Giorgini, M. A. Slade, and D. B. Campbell. Binary Asteroids in the Near-Earth Object Population. *Science* **296**, 1445–1448, 2002.

J. L. Margot. Astronomy: Worlds of mutual motion. *Nature* **416**, 694-695, 2002.

L. A. M. Benner, S. J. Ostro, M. C. Nolan, **J. L. Margot**, J. D. Giorgini, R. S. Hudson, R. F. Jurgens, M. A. Slade, E. S. Howell, D. B. Campbell, D. K. Yeomans. Radar observations of asteroid 1999 JM8. *Meteoritics and Planetary Science* **37**, 779-792, 2002.

J. D. Giorgini, S. J. Ostro, L. A. M. Benner, P. W. Chodas, S. R. Chesley, R. S. Hudson, M. C. Nolan, A. R. Klemola, E. M. Standish, R. F. Jurgens, R. Rose, A. B. Chamberlin, D. K. Yeomans, **J. L. Margot**. Asteroid 1950 DA's Encounter with Earth in 2880: Physical Limits of Collision Probability Prediction. *Science* **296**, 132-136, 2002.

S. J. Ostro, M. C. Nolan, **J. L. Margot**, C. Magri, A. W. Harris, J. D. Giorgini. NOTE: Radar Observations of Asteroid 288 Glauke. *Icarus* **152**, 201-204, 2001.

J. L. Margot, D. B. Campbell, R. F. Jurgens, and M. A. Slade. Digital elevation models of the Moon from Earth-based radar interferometry. *IEEE Trans. Geoscience and Remote Sensing* **38**, 1122–1133, 2000.

S. J. Ostro, R. S. Hudson, M. C. Nolan, **J. L. Margot**, D. J. Scheeres, D. B. Campbell, C. Magri, J. D. Giorgini, D. K. Yeomans. Radar Observations of Asteroid 216 Kleopatra. *Science* **288**, 836-839, 2000.

J. L. Margot, D. B. Campbell, R. F. Jurgens, and M. A. Slade. Topography of the lunar poles from radar interferometry: A survey of cold trap locations. *Science* **284**, 1658–1660, 1999.

J. L. Margot, D. B. Campbell, R. F. Jurgens, and M. A. Slade. The topography of Tycho Crater. *J. Geophys. Res.* **104**, E5, 11875–11882, 1999.

Review Papers

K. S. Noll, W. M. Grundy, E. I. Chiang, **J. L. Margot**, S. D. Kern. Binaries in the Kuiper Belt. In *The Solar System Beyond Neptune* (eds M. A. Barucci, M. Boehnhardt, D. Cruikshank, A. Morbidelli), University of Arizona Press, 2008.

J. Stansberry, W. Grundy, M. Brown, D. Cruikshank, J. Spencer, D. Trilling, **J. L. Margot**. Physical Properties of Kuiper Belt and Centaur Objects: Constraints from Spitzer Space Telescope. In *The Solar System Beyond Neptune* (eds M. A. Barucci, M. Boehnhardt, D. Cruikshank, A. Morbidelli), University of Arizona Press, 2008.

W. J. Merline, S. J. Weidenschilling, D. D. Durda, **J. L. Margot**, P. Pravec, A. D. Storrs. Asteroids Do Have Satellites. In *Asteroids III* (eds W. Bottke, A. Cellino, P. Paolicchi, and R. P.

Binzel), University of Arizona Press, 289-312, 2002.

S. J. Ostro, R. S. Hudson, L. A. M. Benner, J. D. Giorgini, C. Magri, **J. L. Margot**, M. C. Nolan. Asteroid Radar Astronomy. In *Asteroids III* (eds W. Bottke, A. Cellino, P. Paolicchi, and R. P. Binzel), University of Arizona Press, 151-168, 2002.

D. B. Campbell, R. S. Hudson, **J. L. Margot**. Advances in Planetary Radar Astronomy. *Review of Radio Science*, URSI, 2002.

Review Activities

NSF Planetary Astronomy review panel.

NASA Planetary Astronomy review panel.

NASA Near-Earth Object Observations review panel.

NASA Origins of Solar Systems external reviews.

NASA Cassini Data Analysis Program external reviews.

Numerous journal reviews for *Astronomy and Astrophysics*, *Astronomical Journal*, *Astrophysical Journal*, *Celestial Mechanics and Dynamical Astronomy*, “*Earth, Moon and Planets*”, *Geophysical Research Letters*, *Journal of Geophysical Research (Planets)*, *Icarus*, *Planetary and Space Science*, *Science*.

Recent Invited Talks

UCSB Physics Colloquium, Santa Barbara, CA, Nov. 2009.

Campus Spatial Paris Diderot and Institut de Physique du Globe de Paris, Paris, Sep. 2009.

University of Toronto Astronomy Colloquium, Toronto, ON, Jan. 2009.

Observatoire de Paris, Séminaire Astronomie et Systèmes Dynamiques, Paris, May 2008.

UCLA Earth and Space Sciences Colloquium, Los Angeles, CA, Mar. 2008.

Arizona State Univ. School of Earth & Space Exploration Colloquium, Phoenix, AZ, Mar. 2008.

The interior of Mercury, MESSENGER science team meeting, Washington, DC, Jun. 2007.

Recent measurements of the spin properties of Mercury, Henrard Symp., Namur, Dec. 2005.

Observations of Binary KBOs, Planet Formation and Detection, Aspen, CO, Feb. 2005.

University of Arizona LPL Colloquium, Tucson, AZ, Dec. 2004.

Princeton University Solid Earth Seminar Series, Princeton, NJ, Oct. 2004.

Royal Observatory of Belgium Seminar, Brussels, Jul. 2004.

MIT EAPS Department Lecture, Cambridge, MA, Feb. 2004.

Cornell Astronomy Colloquium, Ithaca, NY, Feb. 2004.

University of British Columbia Astronomy Colloquium, Vancouver, BC, Oct. 2003.

Invited review on binary systems, IAU General Assembly, Sydney, Jul. 2003.

UCLA Planetology Seminar, Los Angeles, CA, Jun. 2003.

University of Maryland Astronomy Colloquium, College Park, MD, Apr. 2003.

Caltech Planetary Science Seminar, Pasadena, CA, Dec. 2002.

Invited review on binary systems, Asteroids-Comets-Meteors Meeting, Berlin, Aug. 2002.

University of California at San Diego, La Jolla, CA, May 2002.

MIT EAPS Department Lecture, Cambridge, MA, Apr. 2002.

Cornell Astronomy Colloquium, Ithaca, NY, Feb. 2002.

Caltech Planetary Science Seminar, Pasadena, CA, Oct. 2001.

Stanford Radio Science Seminar, Palo Alto, CA, Mar. 2001.

Recent Education/Public Outreach

Special Public Session at AAS meeting, “Planetary Taxonomy”, Jun. 9, 2009.
Earth and Space Sciences exhibits at UCLA Day, May 9, 2009.
Cornell Club of France, “Frontiers of Solar System Exploration”, May 22, 2008.
Cornell Reunion 2007, “What makes a planet?”, Jun. 9, 2007.
Museum of Science and Technology, Syracuse, NY, “What makes a planet?”, Apr. 5, 2007.
Regional Planetary Image Facility meeting, “Science Update: Ice on the Moon?”, Nov. 1, 2006.
Friends of Astronomy Banquet Dinner Talk, “Asteroids and Kuiper Belt Objects”, Oct. 8, 2005.
Teacher Workshop Presentation, “Binary Minor Planets”, Jan. 17, 2005.

Service Activities - UCLA

IGPP Steering Committee (Fall '09).
IGPP Education Committee (Fall '09).
Joint ESS-Astronomy Planet Curriculum Committee chair (Spring '09).
IGPP representative to Physical Sciences Curriculum Committee (Spring '09).
Earth and Space Sciences Web Committee (Spring '09).
Earth and Space Sciences UCLA Day Committee (Spring '09).

Service Activities - Cornell

Astronomy Colloquium co-chair (Fall '05-Spring '06).
Planetary Lunch Seminar co-chair (Fall '04-Spring '07).
First Year Graduate Student Committee (Fall '06-Spring '07).
Committee on Courses (Fall '07-Fall '08).
Academic Integrity Hearing Board/Grievance Committee (Fall '07-Fall '08).
Astronomy Department Representative for the Physical Sciences Library (Fall '04-Spring '05).
Astrobiology Committee (Spring '05-Spring '06).

Service Activities - Community

CCAT Chair of Solar System Science working group (Spring '05-Fall '08).
DPS 2008 Chair of the Science Program Committee.
Brouwer Award Selection Committee (Fall '07-Spring '09).
Arecibo Observatory Users Committee ('03-'04).

Research Grants

PDS archival of Earth-based radar topography data sets. NASA Lunar Advanced Science and Exploration Research, PI J. L. Margot, NNX09AJ66G, '09-'10.

High-Precision Measurements of Planetary Rotation. NASA Planetary Astronomy Program, PI J. L. Margot, NNX09AQ69G, '08-'11.

Optimal characterization of the interior of Mercury by integrating existing and future spin state measurements. NASA MESSENGER Participating Scientist Program, PI J. L. Margot, NNX09AR45G, '07-'13.

Characterization of Minor Planet Binaries in the Near-Earth, Main Belt, and Trans-Neptunian

Populations. NASA Planetary Astronomy Program, PI J. L. Margot, NNX09AQ68G, '07-'10.

Perihelion Advance and Yarkovsky Drift of Near-Earth Asteroids: Asteroid Physical Properties, Solar Oblateness, and General Relativity. NSF Planetary Astronomy Program, PI J. L. Margot, AST-0606953, '06-'11.

High-Precision Measurements of Planetary Rotation. NASA Planetary Astronomy Program, PI J. L. Margot, NNG05GG18G, '05-'08.

Characterization of Minor Planet Binaries in the Near-Earth, Main Belt, and Kuiper Belt Populations. NASA Planetary Astronomy Program, PI J. L. Margot, NNG04GN31G, '04-'07.

Binary systems in the Kuiper belt. Space Telescope Science Institute, PI J. L. Margot, HST-GO-09746.01, '03-'04.

Innovation in Teaching

Authored "A proposal for restructuring the Cornell Planetary Sciences curriculum" (Fall '05).

Introduced use of personal response systems in Cornell Astronomy courses (Spring '06).

Introduced use of blackboard course management system in Cornell Astro courses (Spring '06).

Introduced use of on-line course evaluations in Cornell Astronomy courses (Spring '07).

Introduced use of tablet PC in Cornell Astronomy courses (Spring '08).

Introduced use of moodle course management system in UCLA ESS courses (Spring '09).

Introduced use of SMS polling in UCLA ESS courses (Fall '09).

Professional Organizations

American Geophysical Union (Planetary Sciences Section).

American Astronomical Society (Planetary Sciences and Dynamical Astronomy).

Committee on Space Research.

International Astronomical Union.

International Union of Radio Science (Commission J Radio Astronomy).