

# Veronica J. Bray, PhD

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## EDUCATION:

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### **PhD in Planetary Science - 2004 to 2008, Imperial College London, UK.**

Thesis Title: Impact Crater Formation on the Icy Satellites

Project Supervisors: Dr. Gareth Collins and Dr. Joanna Morgan

### **MSci Planetary Science, First Class - 2000 to 2004, University College London, UK.**

MSci Dissertation: Meander Geometry of Venusian Canals

BSc Dissertation: The Origin and Morphological Evolution of Palimpsests on Ganymede

Project Supervisors: A. P. Jones, K. T. Pickering and J. E. Guest

## PROFESSIONAL EXPERIENCE

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### **Associate Staff Scientist, December 2011 – Present, University of Arizona, Tucson, AZ.**

- Continued work with HiRISE and LROC teams, and investigation of central pit craters.

### **Adjunct Lecturer, August 2011 – Present, University of Arizona, Tucson, AZ.**

- Teaching Tier 2 Astrobiology to an 80 person undergraduate class
- Composed full curriculum, homework/labs and exams.

### **Postdoctoral Research Associate, September 2008 – December 2011, University of Arizona, Tucson, AZ.**

- Targeting Team member for the Lunar Reconnaissance Orbiter Camera (LROC).
- Working with Alfred McEwen on the analysis of small-scale features of Martian and Lunar craters using HiRISE and LROC imagery.
- Working with Jay Melosh to investigate the formation of central pit craters on Ganymede and Mars.
- Co-Supervisor of LPL graduate students Catherine Elder and Corwin Atwood-Stone.

### **Visiting Scientist, January 2009 - January 2010, Lunar and Planetary Institute, Houston, TX.**

- Collaboration with Paul Schenk to collect topographic profiles of craters on the icy Galilean Satellites.

### **International Scholar, February - December 2006, Lunar and Planetary Laboratory, Tucson, AZ.**

- Project with Elizabeth Turtle on mapping and analysis of fracturing patterns and cratering on Enceladus.

### **Visiting Graduate Student, September 2006, Lunar and Planetary Institute, Houston, TX.**

- Project with Paul Schenk to extract topographic profiles of craters on Ganymede and Europa from Galileo images via photogrammetry and stereo image analysis.

### **Chicxulub Seismic Experiment Team Member, December 2005 to January 2006, Yucatan, Mexico.**

- Installed seismometers across the Yucatan, Mexico, in preparation for an international offshore-onshore seismic experiment to study the Chicxulub impact crater.

## PUBLICATIONS

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- Bray, V. J.**, G. S. Collins, J. V. Morgan and H. J. Melosh. Hydrocode simulation of Ganymede and Europa cratering trends. Submitted to *Icarus*.
- Tornabene, L., G. Osinski, A. McEwen, J. Boyce; **V. J. Bray**, C. Caudill, J. Grant, S. Mattson, P. Mouginis-Mark (*In Review*) Crater-related pitted materials on Mars. *Icarus*.
- Bray, V. J.**, P. M. Schenk, H. J. Melosh, J. V. Morgan, G. S. Collins. Ganymede crater dimensions – implications for peak and pit formation and development. (2012) *Icarus* 217:115-129.
- Bray, V. J.**, L. L. Tornabene, L. Keszthelyi, A. S. McEwen, B. R. Hawke, T. Giguere, S. Kattenhorn, W. Garry, B. Rizk, C. Caudill, L. R. Gaddis, C. van der Bogert (2010). New insight into lunar impact melt mobility from the LRO Camera. *Geophys. Res. Lett.* doi:10.1029/2010GL044666.
- Helpenstein, P., Thomas, P. C., Veverka, J., Burns, J. A., Roatsch, T., Giese, B., Wagner, R., Denk, T., Neukum, G., Turtle, E. P., **Bray, V. J.**, Perry, J., Rathbun, J. and C. C. Porco (2010). Tectonism and Terrain Evolution on Enceladus. *Icarus*. In Review.
- Banks, M. E., Bryne, S., Galla, K. G., Murray, B. C., McEwen, A. S., **Bray, V. J.**, Fishbaugh, K. E., Dundas, C. M., Herkenhoff, K. E., Murray, B. C., and the HiRISE Team (2010), Crater Population and Resurfacing of the Martian North Polar Layered Deposits, *Journal of Geophysical Research*.115. doi:10.1029/2009JE003523
- Reufer, A., N. Thomas, W. Benz, S. Byrne, **V. Bray**, C. Dundas and M. Searls (2010). Models of high velocity impacts into dust-covered ice: Application to Martian northern lowlands. *Planetary and Space Science*, 58 (10):1160-1168.
- Dundas, C. M., L. P. Keszthelyi, **V. J. Bray**, and A. S. McEwen (2010), Role of material properties in the cratering record of young platy-ridged lava on Mars, *Geophys. Res. Lett.*, 37, L12203, doi:10.1029/2010GL042869.
- Bray, V. J.**, (2009). Impact Crater Formation on the Icy Galilean Satellites. Ph. D. Thesis, Imperial College London, United Kingdom.
- Bray, V. J.**, G. S. Collins, J. V. Morgan and P. M. Schenk (2008). The Effect of Target Properties on Crater Morphology: Comparison of Central Peak Craters on the Moon and Ganymede, *Meteoritics and Planetary Science*, 43 (12): 1979-1992.
- Waltham, D., K. T. Pickering, and **V. J. Bray** (2007), Particulate gravity currents on Venus, *J. Geophys. Res.*, 113, E02012, doi:10.1029/2007JE002913.
- Bray V. J.**, D. B. J. Bussey, R. C. Ghail, A. P. Jones, K. T. Pickering (2007), Meander geometry of Venusian canali: Constraints on flow regime and formation time, *J. Geophys. Res.*, 112, E04S05, doi:10.1029/2006JE002785.

## PROFESSIONAL ACTIVITIES

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- Member of LROC and HiRISE science and targeting teams (2008-Present)
- Lunar and Planetary Science Conference Program Committee Member (2011 and 2012)
- White paper co-author (“Ganymede science questions and future exploration”, Collins et al., submitted as part of the 2010 planetary decadal survey)
- NASA grant proposal review panel member (2009 and 2012).
- External reviewer for NASA grant proposals (2009, 2010, 2011)
- Panellist and invited speaker at the Lunar Reconnaissance Orbiter Science Targeting Meeting (June 2009)
- Reviewer for Meteoritics and Planetary Science (2009), Icarus (2008, 2011, 2012) and Journal of Geophysical Research (2011)
- Reviewed book chapter in “Science of Solar System Ices” (Edited by J. Castillo and others)
- Reviewed book chapter in “Impact Cratering: Processes and Products” (G. Osinski and E. Pierrazzo Eds)

## HONORS AND AWARDS

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NASA Group Achievement Award to the HiRISE Team, 2011

NASA Group Achievement Award to the LRO Team, 2010

Janet Watson Departmental Scholarship, 2004 – 2007

European Space Agency (ESA) student scholarship, 2006

Dean’s Award for graduating top of the 2004 class for Planetary Science (*Valedictorian*)

Planetary Science Prize for Academic Excellence, 2001

## TEACHING EXPERIENCE

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### **Adjunct Lecturer, August 2011 – Present, University of Arizona, Tucson, AZ.**

- Teaching Tier 2 Astrobiology to an 80 person undergraduate class
- Composed full curriculum, homework/labs and exams.

### **Co-supervisor of 2 graduate students, December 2008 - Present, University of Arizona.**

- Designed research projects, directed research and tutored on manuscript writing and scientific method.

### **Tutoring for High School level Maths and Science, October 2007 - September 2008, Imperial Tutors, UK.**

- Taught students in small groups or individually with lesson and homework plans based on the National Curriculum. Intensive exam-time classes and advice on exam/revision techniques were also offered.

### **Demonstrator for Undergraduate Courses, Autumn Term 2007, Imperial College London, UK.**

- Courses: Physics for Geoscientists (~50 students), Computing Skills for Geologists (~20 students).
- Available to Undergraduate students during classes and in practical sessions for discussion and explanation of course material.

### **Fieldtrip Demonstrator for Undergraduate Mapping, September 2005, Imperial College London, UK.**

- One of 7 personnel responsible for ensuring the safety of 65 undergraduate students.
- Responsible for unsupervised teaching 8 students about the geological processes occurring in the area of the Urra Basin, Spain, and how to create detailed field notes/maps
- Conducted one-on-one tutorials at the end of each day to ensure continuing assessment of their work.

- Responsible for evaluating and marking the final term projects for more than 10 students; the grades assigned counted towards their undergraduate degree.

**Principal Archery Coach**, September 2001 - 2005, University of London, UK

- Taught individuals and groups (up to 50 people) the basics of archery and shooting-range safety in accordance with the rules of the UK governing body for archery.
- Organised and planned training regimes for each different ability level.
- Also offered advanced lessons for the more experienced archers in the London clubs.

**Assistant Drama Teacher**, January - December 1995, Acorn Players Special Needs Group, Harrow, UK.

- Worked with students in groups or individually to learn lines and make costumes for a stage production at the Harrow Arts Centre.
- Had to be able to change teaching/advisory style to suit each student, and be aware of any special requirements.

## **PUBLIC OUTREACH ACTIVITIES**

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- Featured Scientist in the UK's 'Astronomy Now' Magazine (August 2010)
  - Invited speaker at the Sun Vista Retirement Community Astronomy Club (August 2009)
  - Featured Scientist in the UK's 'Starlight' Magazine for children and young persons (February 2009)
  - Interviewed for Astronomy Now's featured article on Impact Cratering (February 2009)
  - Invited seminar-series speaker, Imperial College (August 2007, February 2005), the Southampton Oceanography Centre (November 2005) and University College London (January 2005).
  - Invited speaker at the Technical Presentation Skills Course hosted by the Graduate School of Engineering and Physical Sciences at Imperial College (Autumn 2005).
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