

Dr Thomas M. Davison

Personal Details

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Work Address	Department of Earth Science and Engineering, Imperial College London, London, SW7 2AZ, UK.

Professional Employment

Oct 2018 – Present	Research Fellow
April 2013 – Oct 2018	Postdoctoral Research Associate Dept. of Earth Science and Engineering, Imperial College London <ul style="list-style-type: none">- Role of impacts in the thermal evolution of meteorite parent bodies- Multiscale simulations of impacts between planetesimals/asteroids using the iSALE shock physics code- Core developer of iSALE shock physics code (software development using FORTRAN, code testing and management)- Lead developer of python visualisation / data analysis tool for iSALE model output (pySALEPlot)- Assistant supervision of multiple PhD, MSci and Undergraduate Research Opportunities Programme students- Various undergraduate teaching responsibilities, including: academic tutorials, guest lectures, maths workshops and exam marking.
Oct 2012 – Dec 2012	76th Arthur H. Compton Lecturer Enrico Fermi Institute, The University of Chicago <ul style="list-style-type: none">- Devised and presented public lecture series: “Constructing the Solar System: A Smashing Success!”
Jan 2011 – Mar 2013	Postdoctoral Research Scholar Department of the Geophysical Sciences, The University of Chicago
Nov 2010 – Dec 2010	Postdoctoral Research Assistant Dept. of Earth Science and Engineering, Imperial College London

Qualifications

Oct 2007 – Dec 2010: PhD — Planetary Sciences

“Numerical modelling of porous planetesimal collisions”
Department of Earth Science and Engineering, Imperial College London.

<i>Scholarships / awards:</i>	<ul style="list-style-type: none">- Janet Watson Scholarship- Student Travel Award, 72nd Annual Meeting of the Meteoritical Society (2009)
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Oct 2002 – Sept 2006: MSci — Geology and Geophysics (first class honours)

“Investigating the effect of ocean depth on marine impact crater morphology”
Department of Earth Sciences and Engineering, Imperial College London

<i>Scholarships / awards:</i>	<ul style="list-style-type: none">- Watts Medal (Best final-year student)- H H Read Scholarship (Academic achievement)- R Stoddart Longcroft Prize- John Perry Memorial Medal (Distinction in Mathematics and Mechanics)- Liversidge Scholarship for Chemistry
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Funding

- Arthur Holmes Centenary Research Grant:

- £1250 for travel costs to attend the Goldschmidt Conference and give a keynote talk.

- Grant writing:

- Key role in writing project proposals (I was the named PDRA) and data management plans for the last two STFC Consolidated Grants.

Teaching at Imperial College London

- **Student supervision:**
 - PhD: I am currently co-supervising one PhD student; I have also aided in supervision of two other students.
 - MSci: I have been the lead supervisor on one MSci projects, plus co-supervised two more projects.
 - UROP (*Undergraduate Research Opportunities Programme*): I have supervised one project, plus I have been co-supervisor on three more projects.
- **Guest lecturer:**
 - I devised and gave a lecture “Impacts in the Early Solar System” for the “Impact Cratering” 3rd/4th year undergraduate course (Dept. Earth Science & Engineering, 2014 – 2016).
 - I gave a lecture “Impact cratering: Shock physics on a planetary scale” for the “Hydrodynamics and Shocks” undergraduate lecture course (Dept. of Physics, Nov 2013 & Nov 2014).
- **Academic tutorial:** I designed and ran academic tutorials for 2nd year undergraduates on the topic of “The formation of the Moon” (Dept. Earth Science & Engineering, 2014 – 2018).
- **Course tutor:**
 - I aided in the development of the problem sets and tutored students during workshops for the “Impact Cratering” undergraduate course (Dept. Earth Science & Engineering, 2014 – 2018).
 - I helped to develop the course materials and ran one room of the workshops for the “Mathematical Methods I” undergraduate course (Dept. Earth Science & Engineering, 2013 – 2017).
 - I designed and ran the practical exercises for the “Hydrocode modelling for experimentalists” short course for industry partners (Institute for Shock Physics, May 2013 & Nov 2014).
- **Examiner:**
 - I have marked exams for several courses from 1st to 4th year undergraduates.
 - I have run viva voce exams for 1st year undergraduate projects.
 - I have invigilated 1st and 2nd year examinations.
 - I have attended the end-of-year examiners meeting (2016).
- **Teaching assistant:** During my PhD (2007–10), I demonstrated for 7 geophysics and maths courses at undergraduate to masters level in the Dept. Earth Science & Engineering.

Professional Service

- **Peer reviewer:**
 - Reviewed articles for scientific journals, including: *The Astrophysical Journal*; *Earth, Moon and Planets*; *Geochimica et Cosmochimica Acta*; *Geophysical Research Letters*; *Icarus*; *Nature Geoscience*; *Meteoritics and Planetary Science*; *Planetary and Space Science*.
 - Reviewed research proposals for: *NASA Research Opportunities in Space and Earth Sciences: Emerging Worlds* (2014 & 2015); *UK Space Agency Aurora Science* (2015).
- **Organising committees:**
 - Impacts and Astromaterials Research Centre (IARC) Annual Symposium, Imperial College London (Sept 2013).
 - Committee Chair: British Geophysical Association *Postgraduate Research in Progress Meeting*, Imperial College London (Sept 2009).
- **Session chair:** Technical chair for the “Solar System Impacts” session at the 2017 Hypervelocity Impact Symposium (HVIS).
- **Outreach:**
 - Helped develop and run the *Impact: Earth!* demonstration where we made craters in a sandbox, filmed them with a high-speed camera and replayed them in slow-motion, to inform and engage the public about asteroids, meteorites and impact craters. This was exhibited at:
 - The Imperial Festival (May 2015)
 - The Imperial Fringe (Nov 2015)
 - Tim Peake, ESA astronaut, Pricipia launch event at the Science Museum (Dec 2015)
 - Helen Sharman (first British astronaut) 25 years in space celebration (May 2016)
 - Interactive zone for school children at the Royal Albert Hall tied in with a performance by the Royal Philharmonic Orchestra of Holst’s *The Planets* (June 2016)
 - Talks to primary and secondary school children on topic of asteroids and impact cratering.
 - Talk to the Imperial College Astronomy Society on impacts in the early solar system (2015).
- **Seminar series co-ordinator:**
 - Chicago Center for Cosmochemistry (C³), University of Chicago (2011 – 2013)
 - Applied Modelling and Computation Group (AMCG), Imperial College London (2008 – 2009)

Journal Publications

20. Derrick, J.G., Rutherford, M.E., **Davison, T.M.**, *et al.* (2018) Interrogating heterogeneous compaction of analogue materials at the mesoscale through numerical modeling and experiments. *AIP Conference Proceedings: APS Topical Group on Shock Compression of Condensed Matter*. Volume 1979, Article no. 110004.
19. Derrick, J.G., LaJeunesse, J.W., **Davison, T.M.**, *et al.* (2018) Mesoscale simulations of shock compaction of a granular ceramic: effects of mesostructure and mixed-cell strength treatment. *Modelling and Simulation in Materials Science and Engineering*. Volume 26, Article no. 035009.
18. **Davison, T.M.**, Derrick, J.G., Collins, G.S., Bland, P.A., Rutherford, M.E., Chapman, D.J., Eakins, D.E. (2017) Impact-induced compaction of primitive solar system solids: The need for mesoscale modelling and experiments. *Procedia Engineering*. Proceedings of the 14th Hypervelocity Impact Symposium 2017. Volume 204, pp. 405–412.
17. Jourdan, F., Timms, N.E., Eroglu, E., Mayers, C., Free, A., Bland, P.A., Collins, G.S., **Davison, T.M.**, *et al.* (2017) Collisional history of asteroid Itokawa. *Geology*. Volume 45, Number 9, pp. 819–822.
16. Muxworthy, A.R., Bland, P.A., **Davison, T.M.**, Moore, J., Collins, G.S., Ciesla, F.J. (2017) Evidence for an impact-induced magnetic fabric in Allende, and exogenous alternatives to the core dynamo theory for Allende magnetization. *Meteoritics & Planetary Science*. Volume 52, Issue 10, pp. 2132–2146.
15. Collins, G.S., Lynch, E., McAdam, R and **Davison, T.M.** (2017) A numerical assessment of simple airblast models of impact airbursts. *Meteoritics & Planetary Science*, Volume 52, Issue 8, pp. 1542–1560.
14. Forman, L.V., Bland, P.A., Timms, N.E., Daly, L., Benedix, G.K., Trimby, Collins, G.S. and **Davison, T.M.** (2017) Defining the mechanism for compaction of the CV chondrite parent body. *Geology*, Volume 45, Number 6, pp. 559–562(4).
13. Forman, L.V., Bland, P.A., Timms, N.E., Collins, G.S., **Davison, T.M.**, Ciesla, F.J., P.W., Yang, L. and Ringer, S.P. (2016) Hidden secrets of deformation: Impact-induced compaction within a CV chondrite. *Earth and Planetary Science Letters*, Volume 452, pp 133–145(13).
12. **Davison, T.M.**, Collins, G.S. and Bland, P.A. (2016) Mesoscale modeling of impact compaction of primitive solar system solids. *The Astrophysical Journal*, Volume 821, Article number 68, (17pp).
11. Bland, P.A., Collins, G.S., **Davison, T.M.**, *et al.* (2014) Pressure-temperature evolution of primordial solar system solids during impact-induced compaction. *Nature Communications*, Volume 5, Article no. 5451.
10. **Davison, T.M.**, Ciesla, F.J. and Collins, G.S. (2014) The effect of impact obliquity on shock heating in planetesimal collisions. *Meteoritics & Planetary Science*, Volume 49, Issue 12, pp 2252–2265(14).
9. Williams, D.A., O'Brien, D.P., Schenk, P.M., Denevi, B.W., Carsenty, U., Marchi, S., Scully, J.E.C., Jaumann, R., De Sanctis, M.C., Palomba, E., Ammannito, E., Longobardo, A., Magni, G., Frigeri, A., Russell, C.T., Raymond, C.A., **Davison, T.M.**, and the Dawn Science Team. (2014) Lobate and Flow-like Features on Asteroid Vesta. *Planetary and Space Science*, Volume 103, pp 24–35(12).
8. Ciesla, F.J., **Davison, T.M.**, Collins, G.S. and O'Brien, D.P. (2013) Thermal consequences of impacts in the early Solar System. *Meteoritics and Planetary Science*, Volume 48, Issue 12, pp. 2559–2576(18).
7. **Davison, T.M.**, O'Brien, D.P., Ciesla, F.J. and Collins, G.S. (2013) The early impact histories of meteorite parent bodies. *Meteoritics and Planetary Science*, Volume 48, Issue 10, pp. 1894–1918(25).
6. **Davison, T.M.**, Ciesla, F.J. and Collins, G.S. (2012) Post-impact thermal evolution of porous planetesimals. *Geochimica et Cosmochimica Acta*, Volume 95, pp. 252–269(18).
5. **Davison, T.M.**, Collins, G.S., Elbeshausen, D., Wünnemann, K. and Kearsley, A.T. (2011) Numerical modeling of oblique hypervelocity impacts on strong ductile targets. *Meteoritics & Planetary Science*, Volume 46, Issue 10, pp. 1510–1524(15).
4. Collins, G.S., Elbeshausen, D., **Davison, T.M.**, *et al.* (2011). The size-frequency distribution of elliptical impact craters. *EPSL*, Volume 310, Issues 1–2, pp. 1–8(8).
3. **Davison, T.M.**, Collins, G.S. and Ciesla, F. (2010) Numerical modeling of heating in porous planetesimal collisions. *Icarus*, Volume 208, pp. 468–481(14).
2. Pierazzo, E., Artemieva, N., Asphaug, E., Baldwin, E.C., Cazamias, J., Coker, R., Collins, G.S., Crawford, D.A., **Davison, T.**, *et al.* (2008) Validation of numerical codes for impact and explosion cratering: Impacts on strengthless and metal targets. *Meteoritics & Planetary Science*, Volume 43, Issue 12, pp. 1917–1938(22).
1. **Davison, T.** and Collins, G.S. (2007) The effect of the oceans on the terrestrial crater size-frequency distribution: Insight from numerical modeling. *Meteoritics & Planetary Science*, Volume 42, Issue 11, pp. 1915–1927(13).

Technical Reports

1. Collins, G. S., Elbeshausen, D., **Davison, T. M.**; Wünnemann, K.; Ivanov, B.; Melosh, H. J. (2016): iSALE-Dellen manual. *Figshare*. DOI:10.6084/m9.figshare.3473690

Invited Seminars

6. Department of Space Research, Institute of Physics, University of Bern, Switzerland (Feb 28, 2018).
5. Museum für Naturkunde, Berlin, Germany (Nov 6, 2013).
4. *Seismology, Geology and Tectonophysics Seminar Series*, Lamont-Doherty Earth Observatory, Columbia University, NY (Feb 6, 2013).
3. *LPI Seminar Series*, Lunar and Planetary Institute, Houston, TX (Jan 25, 2013).
2. *Astrophysics Seminar*, Argonne National Laboratory, Argonne, IL (Dec 1, 2011).
1. School of the Physical Sciences, University of Kent, UK (Dec 5, 2008).

Conference and Workshop Contributions

Invited presentations

3. KEYNOTE TALK: **Davison T.M.**, Derrick J.G., Collins. G.S. and Bland P.A. (2018) From microns to kilometres: Linking meteorite observations to asteroid impact processes. *Goldschmidt*, Boston, MA.
2. **Davison T.M.**, Collins G.S. and Bland P.A. (2017) Mesoscale modelling of the shock compaction of primitive solar system material. *Shock metamorphism in terrestrial and extra-terrestrial rocks workshop*, Perth, Australia.
1. **Davison T.M.**, Collins G.S. and Bland P.A. (2016) Mesoscale modelling of impact compaction of primitive solar system solids. *Workshop on Shock Metamorphism and High Pressure Phases in Meteorites and Terrestrial Impactites* at the *78th Annual Meeting of the Meteoritical Society*, Berlin, Germany. #6395

Other selected presentations

12. **Davison T.M.**, Collins G.S. and Bland P.A. (2017) Impact-induced compaction of primitive solar system solids: The need for mesoscale modelling. *14th Hypervelocity Impact Symposium*, Canterbury, Kent, UK.
11. **Davison T.M.**, Shivarani E., Collins G.S., O'Brien D.P., Ciesla F.J., and Bland P.A. (2017) Collisional histories of small planetesimals. *LPSC XLVIII*, Houston, TX.
10. **Davison T.M.**, Collins G.S., Bland P.A., Derrick J.G. and Ciesla F.J. (2016) Mesoscale modelling of the compaction of water-rich asteroids by low-velocity impacts. *RAS Specialist Discussion Meeting: Frozen Worlds and Landscapes of our Solar System*, London, UK.
9. **Davison T.M.**, Collins G.S., Bland P.A., Derrick J.G. and Ciesla F.J. (2016) Mesoscale modelling of the compaction of water-rich asteroids by low-velocity impacts. *78th Annual Meeting of the Meteoritical Society*, Berlin, Germany. #6374
8. **Davison, T.M.**, Collins, G.S., and Bland, P.A. (2016) Mesoscale modelling of the compaction of water-rich asteroids by low velocity impacts, *The origin, history and role of water in the evolution of the inner Solar System*, Kavli Royal Society Centre, UK.
7. **Davison, T.M.**, Collins, G.S. and Bland, P.A. (2015) Mesoscale modelling of compaction of primitive solar system solids in low-velocity collisions. *Gordon Research Conference: Origins of Solar Systems*, Mt Holyoke College, MA.
6. **Davison, T.M.**, Collins, G.S., O'Brien, D.P., Ciesla, F.J., Bland, P.A. and Travis, B.J. (2015) Impact bombardment of Ceres. *LPSC XLVI*, Houston, TX. #2116
5. **Davison, T.M.**, Collins, G.S. and Bland, P.A. (2014) Mesoscale numerical modeling of compaction of primitive solar system solids in low-velocity collisions. *LPSC XLV*, Houston, TX. #2718
4. **Davison, T.M.**, Ciesla, F.J., Collins, G.S. and O'Brien, D.P. (2013) The Thermal and Collisional Evolution of Planetesimals: Linking Models to Observations. *Workshop on Planetesimal Formation and Differentiation*, Department of Terrestrial Magnetism, Carnegie Institution for Science, Washington DC. #8020
3. **Davison, T.M.**, O'Brien, D.P., Collins, G.S. and Ciesla, F.J. (2013). The early impact histories of meteorite parent bodies. *European Planetary Science Congress*, London, UK. #444
2. **Davison, T.M.**, Ciesla, F.J. and Collins, G.S. (2012). The effect of impact obliquity on porous planetesimal collisions. *LPSC XLIII*, Houston, TX. #1235
1. **Davison T.M.**, Ciesla F.J. and Collins G.S. (2011) Quantification of the Post-Impact Thermal Evolution of Planetesimals. *74th Annual Meeting of the Meteoritical Society*, Greenwich, UK. #5092