

Liam James Steele

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Education

Ph.D. Planetary Science, The Open University (2010–2014)

Thesis: A study of the martian water cycle and cloud radiative effects using data assimilation.
Supervisors: Prof. Stephen Lewis & Dr Manish Patel.

B.Sc. Physical Science (First-class honours), The Open University (2005–2009)

Studied part-time while in full-time employment in the civil service.

Academic employment

Postdoctoral scholar, Jet Propulsion Laboratory (2018-)

Investigating the role of ice clouds in the atmosphere of Mars, and their interaction with thermal tides.

Postdoctoral researcher, The University of Chicago (2017–2018)

Researching the erosion of intra-crater sedimentary mounds and intermittent warming forced by water ice clouds on ancient Mars.

Postdoctoral researcher, The Open University (2014–2017)

Researching the Martian water cycle, including atmospheric transport and regolith-atmosphere interaction, in both the present day and the relatively recent past (collaborating with Aymeric Spiga).

Additional employment

Civil servant, Department for Environment, Food and Rural Affairs (1999–2010)

Work involved compiling reports and performance statistics for other government departments and local authorities, liaising with the Food Standards Agency and local authorities in order to resolve agricultural disputes, and dealing with queries from members of the public.

Publications

Steele, L. J., Kite, E. S. & Michaels, T. I. (2018) “*Crater mound formation by wind erosion on Mars*”, *Journal of Geophysical Research: Planets*, 122.

Conway, S. J., Harrison, T. N., Soare, R. J., Britton, A. W., & **Steele, L. J.** (2017) “*New slope-normalized global gully density and orientation maps for Mars*”, *Geological Society, London, Special Pub.*, 467.

Steele, L. J., Balme, M., Lewis, S. R. & Spiga, A. (2017) “*The water cycle and regolith-atmosphere interaction at Gale crater, Mars*”, *Icarus*, 289, 56-79.

Chapman, R. M., Lewis, S. R., Balme, M. & **Steele, L. J.** (2017) “*Diurnal variation in martian dust devil activity*”, *Icarus*, doi:10.1016/j.icarus.2017.01.003.

Steele, L. J., Balme, M. & Lewis, S. R. (2017) “*Regolith-atmosphere exchange of water in Mars' recent past*”. *Icarus*, 284, 233–248.

Steele, L. J., Lewis, S. R., & Forget, F. (2015) “*Validation of modelled clouds and an assessment of their impact on the martian climate*”, European Space Agency technical report, 39 pp.

Steele, L. J., Lewis, S. R. & Patel, M. R. (2014). “*The radiative impact of water ice clouds from a reanalysis of Mars Climate Sounder data*”, *Geophysical Research Letters*, 41(13) 4471–4478.

Steele, L. J., Lewis, S. R., Patel, M. R., Montmessin, F., Forget, F., & Smith, M. D. (2014). “*The seasonal cycle of water vapour on Mars from assimilation of Thermal Emission Spectrometer data*”, *Icarus*, 237 97–115.

Lewis, S. R., **Steele, L. J.**, & Forget, F. (2013) “*High altitude dust affecting aerobraking*”, European Space Agency technical report, 47 pp.

Presentations

Steele, L. J. (2018) “*Modeling Mars' Climate, from Possibly Warm and Wet to Most Definitely Cold and Dry*”, JPL Planetary Science Seminar, Pasadena.

Steele, L. J., Lewis, S. R. & Patel, M. R. (2014) “*The radiative impact of water ice clouds from a reanalysis of Mars Climate Sounder data*”, invited talk, AGU Fall Meeting, San Francisco.

Steele, L. J., Lewis, S. R. & Patel, M. R. (2014) “*The radiative impact of water ice clouds on Mars from a reanalysis of Mars Climate Sounder data*”, Cascais, Portugal.

Steele, L. J., Lewis, S. R. & Patel, M. R. (2014) “*The radiative impact of water ice clouds from assimilation of Mars Climate Sounder data*”, Fifth international workshop on the Mars atmosphere: Modelling and observations, Oxford.

Steele, L. J., Lewis, S. R., Patel, M. R., Montmessin, F., Forget, F. & Smith, M. D. (2013) “*The martian water cycle through assimilation of Thermal Emission Spectrometer data*”, EPSC, London.

Steele, L. J., Lewis, S. R., Patel, M. R., Montmessin, F., Forget, F. & Smith, M. D. (2013) “*Modelling and assimilating the martian water cycle*”, Euromars progress meeting, Granada.

Steele, L. J., Lewis, S. R., Patel, M. R., & Smith, M. D. (2012) “*Assimilating the martian water cycle with TES and MCS data*”, Mars Climate Sounder team meeting, Pasadena.

Posters

Steele, L. J., Kite, E. S. & Michaels, T. I. (2017) “*Mountain formation by wind erosion on Mars*”, Fourth International Conference on Early Mars, Flagstaff.

Chapman, R., Lewis, S. R., Balme, M. & **Steele, L. J.** (2017) “*Wind-Stress Dust Lifting in a Mars Global Circulation Model: Representation across Resolutions*”, AGU Fall Meeting, New Orleans.

Montabone, L., Lewis, S. R., **Steele, L. J.**, Holmes, J. A., Read, P. & Valeanu, A. (2016) “*The Mars Analysis Correction Data Assimilation (MACDA): A reference atmospheric reanalysis*”, 41st COSPAR Scientific Assembly, Istanbul.

Steele, L. J., Balme, M. R., Lewis, S. R. & Spiga, A. (2016) “*The diurnal water cycle at Gale Crater*”, LPSC, The Woodlands, Texas.

Lewis, S. R., **Steele, L. J.**, Holmes, J. A. & Patel, M. R. (2015) “*Assimilating Martian atmospheric constituents using a global circulation model*”, LPSC, The Woodlands, Texas.

Steele, L. J., Lewis, S. R., Patel, M. R., & Smith, M. D. (2012) “*Assimilating the martian water cycle*”, EPSC, Madrid.

Montabone, L., Lewis, S. R., **Steele, L. J.**, Holmes, J., Read, P. L., Ruan, T., Smith, M. D., Kass, D., Kleinböhl, A., Schofield, J. T., Shirley, J. H. & McCleese, D. J. (2012) “*Mars analysis correction data assimilation: a multiannual reanalysis of atmospheric observations for the red planet*”, The 4th WCRP International Conference on Reanalysis, Silver Spring, Maryland.

Steele, L. J., Lewis, S. R., Patel, M. R., & Mulholland, D. P. (2011) “*Water ice clouds in a martian global climate model using data assimilation*”, EPSC-DPS Joint Meeting, Nantes.

Steele, L. J., Lewis, S. R., Patel, M. R., & Wilson, R. J. (2011) “*Modelling radiatively active water ice clouds in the martian water cycle*”, The Fourth International Workshop on the Mars Atmosphere: Modelling and observation, Paris.

Lewis, S. R., Read, P. L., Montabone, L., Ruan, T. & **Steele, L. J.** (2011) “*Martian atmospheric data analysis: interpreting observations from Mars Global Surveyor, Mars Reconnaissance Orbiter and Mars Trace Gas Orbiter*”, UK Participation in the Aurora Programme, Royal Astronomical Society, London.

Research interests and experience

I am interested in the martian water cycle, both past and present, in terms of (i) the radiative impact of clouds on the atmosphere, (ii) the interaction of water between the regolith and atmosphere, and (iii) the effects of small-scale topographic features on the local and global water cycle. I am also interested in data assimilation, and using trace gases to study atmospheric processes.

Throughout my PhD and postdoctoral positions I have gained experience of running and modifying both global circulation models (GCMs) and mesoscale models. I have also manipulated spacecraft data and implemented algorithms in GCMs for the purpose of assimilating water vapour column retrievals from TES, and water ice and dust opacity profiles from MCS. I have good working knowledge of the following models:

Global models: UK MGCM, LMD MGCM, MarsWRF

Mesoscale models: LMD MMM, MRAMS

Awards and grants

£200 UK Space Agency grant to attend the EPSC conference in London, 2013.

£300 STFC grant to attend the 2012 EPSC conference in Madrid.

£300 STFC grant to attend the 2011 joint EPSC-DPS conference in Nantes.

€1000 ESA grant to attend the Fourth International Workshop on the Mars Atmosphere, in Paris, 2011.

Computer languages

Good working knowledge of Fortran 77/90, IDL, GrADS, Shell Scripts and Latex.

Additional information

Reviewer for Icarus and the Journal of Geophysical Research. On the supervision team for Rhian Chapman, a PhD student at The Open University. Organized planetary science seminars at The Open University. Member of the American Geophysical Union, the Royal Astronomical Society, the Royal Meteorological Society and the Institute of Physics.