

# 47<sup>th</sup> Lunar and Planetary Science Conference – The Woodlands, Texas 20-27<sup>th</sup> March 2016

Frances Butcher – First-year PhD student researching the geomorphology of glacial landscapes on Mars

Frances Butcher, Department of Physical Sciences, The Open University [frances.butcher@open.ac.uk](mailto:frances.butcher@open.ac.uk)

## The Lunar and Planetary Science Conference (LPSC)

The generous BSG Postgraduate Conference Attendance grant of £850 allowed me to attend the 47<sup>th</sup> Lunar and Planetary Science Conference (LPSC) in The Woodlands, Houston, Texas between 20<sup>st</sup> and 27<sup>th</sup> March 2016. LPSC is the largest annual international conference in the planetary science calendar, and has a particular focus on the geology and geomorphology of lunar, planetary and cometary bodies in the Solar System. LPSC provides the optimal opportunity to engage with planetary scientists beyond the relatively small community of Mars geomorphologists in the UK.

## Highlights

- I was selected to give a talk entitled '*The Dorsa Argentea, Mars: Comparison to >5900 Terrestrial Esker Systems and Statistical Tests for Topographic Relationships*' (Figure 1). The talk was a synthesis of the dissertation research I conducted for my Bachelors degree at the University of Cambridge (2015) that tested the hypothesis that an assemblage of ~7000 km of ridges near to Mars' south pole were formed by deposition of sediment in subglacial meltwater conduits. Giving the talk allowed me to disseminate the research in my paper '*Are the Dorsa Argentea on Mars glacial eskers*' (Butcher et al. 2016, Icarus) which is now available online: <http://dx.doi.org/10.1016/j.icarus.2016.03.028>.
- I was also fourth author on a poster entitled '*Characterising Rock Abundance at ExoMars landing site Candidates*' (Sefton-Nash et al.), for which I collected data, that was presented in a session on landing sites for Mars rovers. The poster can be viewed at: <http://www.hou.usra.edu/meetings/lpsc2016/eposter/1918.pdf>.
- I attended sessions on a range of topics in Mars geomorphology, including:
  - Mars sedimentology, stratigraphy, impact-related processes, and gullies
  - Fluviolacustrine activity on Mars and global climate implications
  - Ice on Mars
  - Recurring slope lineae and evidence for present-day liquid water brines on Mars.
- I had valuable discussions with researchers presenting posters on a range of topics, including:
  - Quantitative planetary landform analysis using geometric morphometrics,
  - Use of impact crater morphology to understand subsurface volatiles on Mars
  - Debris-covered glaciers on Mars and terrestrial analogues
  - Gullies on Mars
- I had the opportunity to network with other planetary scientists studying glaciation on Mars. This allowed me to better understand how my research fits with that currently being undertaken by other research groups around the world, and stimulated new ideas for the development of my research project. Several of my discussions led to potential for collaboration with researchers in the UK and the USA over the coming years.
- Beyond sessions focussed on Mars geomorphology, I attended several sessions covering a diverse range of topics in planetary science, including:
  - The Masursky Lecture by the principle investigator of the New Horizons mission, Alan Stern: '*New Horizons: The Exploration of the Pluto System and the Kuiper Belt Beyond*',
  - Results from the Dawn mission to dwarf planet, Ceres.
  - Geographical information systems science and spatial data in planetary science.

The slide features a blue background with white and yellow text. At the top left, there are logos for The Open University, LPG Nantes, and the Scott Polar Research Institute. The title is prominently displayed in the center. Below the title, the authors' names are listed: Frances E. G. Butcher<sup>1</sup>, Susan J. Conway<sup>1,2</sup>, Neil S. Arnold<sup>3</sup> and Matt R. Balme<sup>1</sup>. Contact information for Frances Butcher is provided at the bottom left, including an email address and a Twitter handle. Logos for BSG Geomorphology and The Ogden Trust are at the bottom right.

**The Dorsa Argentea, Mars:  
Comparison to >5900 Terrestrial  
Esker Systems and Statistical Tests  
for Topographic Relationships**

Frances E. G. Butcher<sup>1</sup>, Susan J. Conway<sup>1,2</sup>,  
Neil S. Arnold<sup>3</sup> and Matt R. Balme<sup>1</sup>

[frances.butcher@open.ac.uk](mailto:frances.butcher@open.ac.uk) @fegbutcher

<sup>1</sup> Department of Physical Sciences, The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK.  
<sup>2</sup> LPG Nantes – UMR CNRS 6112, Université de Nantes, France.  
<sup>3</sup> Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge, CB2 1ER, UK.

The slide is titled 'The Dorsa Argentea, Mars' and contains three maps labeled (a), (b), and (c). Map (a) is a global view of Mars with a color-coded elevation scale. Map (b) is a detailed map of the southern polar region of Mars, showing various glacial features and contact types. Map (c) is a THEMIS image of the Dorsa Argentea region, showing a close-up of the ridges. A legend on the right side of the slide defines the colors and symbols used in the maps.

**The Dorsa Argentea, Mars**

(a) Global view of Mars showing elevation. (b) Detailed map of the southern polar region of Mars showing glacial features and contact types. (c) THEMIS image of the Dorsa Argentea region showing a close-up of the ridges.

**Polar Units (Tanaka et al. 2014)**

- Late Amazonian polar cap
- Amazonian polar undivided
- Amazonian polar
- Hesperian polar (Dorsa Argentea Formation)
- Hesperian polar edifice

**Contact Type**

- Certain
- Approximate

(b) Modified from Tanaka et al. 2014. (c) THEMIS Image credit: NASA/JPL-Caltech/Arizona State University.

@fegbutcher @OU Plan Enviro Group

Figure 1. The first two slides of my presentation.