Report on the workshop “Martian Gullies and their Earth Analogues”

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Summary of workshop

Conveners:
Susan J. Conway (Open University, now at Nantes University)
Paul Carling (University of Southampton)
Jonathan Carrivick (University of Leeds)
Tjalling de Haas (Utrecht University)
Allan Treiman (LPI)

The workshop “Martian Gullies and their Earth Analogues” was held on 20-21 June and hosted at the Geological Society’s headquarters, Burlington House, Piccadilly in London, UK. Following a successful application, the workshop was accepted into the Geological Society’s Year of Water programme and the venue’s hire fees were also waived. We raised £4107 in sponsorship including contributions from: British Geophysical Association, British Society for Geomorphology, European Association of Geoscientists and Engineers, European Geosciences Union, and the Royal Astronomical Society. The support of the International Association of Geomorphologists and International Association of Sedimentologists assured the presence of 4 students at the workshop (grants totalling 1100EUR). The workshop programme included, three invited presentations, 26 science talks and two discussion periods. The workshop welcomed 54 participants of whom 15 were students and 31% were female.

Attendees at the workshop enjoying discussion during the coffee break on the afternoon of day 2.

Highlights

The talks presented at the workshop provided an excellent summary of both the progress in understanding martian gullies made since the first workshop held in Houston in 2008 and the challenges which lie ahead. Excellent use is now being made of the highest resolution orbital images at 25 cm/pix taken by the HiRISE camera enabling metre-scale features and changes to be identified, a point brought home by Alfred McEwen, the instrument’s PI and one of the workshop’s invited speakers. A number of the talks discussed the limitations brought about by the inability to obtain frequent repeat-images and/or images at different times in the martian day – a critical point in distinguishing different formation processes, but something which will only partially be overcome in the near-future.

As per the title of this workshop: the benefits and limits of using terrestrial landforms and processes as analogues were addressed in the talks and discussed at length. Our first invited speaker,

Prof. William Dietrich (Berkeley), eloquently described the challenges faced on Earth in linking process and form and how this is exacerbated when transposed to other planets. The science talks highlighted the abundance of Earth analogues appropriate for studying gullies on Mars, ranging from the submarine, to desert, to glacial and to high-Arctic and Antarctic landscapes.

Our final invited speaker Anne Mangeney (IPGP) discussed how the physics of granular flow could help to understand key features of martian gullies. Her contribution added to the debates ongoing throughout the workshop concerning the processes which shape martian gullies, including: dry (granular flow), soggy (debris flow), wet (fluvial), or more exotic processes, such as CO2 sublimation gas-supported flows.

Finally the workshop underlined the breadth of approaches used to investigate gullies, including, but not limited to: climate modelling, laboratory work, hyperspectral, imaging and topographic remote sensing, geomorphology, and numerical modelling. But, why do gullies hold such interest? The possibility of liquid water forming gullies on Mars has enormous implications for Mars' climate and history and how it is recoded in its rocks, the alteration of Mars rocks and meteorites, the likelihood of viable martian life, and the availability of resources for human habitation. Understanding of martian gullies could therefore be important in the design of future space missions, and selection of landing sites. Although a consensus was not reached at the workshop, the general feeling was that present-day activity in martian gullies is likely to be driven by CO2 sublimation, but the door is still open for the action of water in the past. It will be interesting to find out if this view still holds by the next gullies workshop (hopefully we won't have to wait another 8 years)!

Feedback from the attendees was overwhelmingly positive – not only did they enjoy the scientific discussions and opportunities for collaboration, but they were impressed by the organisation and the setting for the meeting. As a result of the workshop, our contributions have been accepted for a Special Issue in the Journal of the Geological Society of London and 22 authors have already confirmed their participation.

The conference poster, oral presentations (featuring John Dixon) and an example of one of the landforms discussed (~2.5 km long gully on Matara dune Mars, HiRISE image ESP_022392_1300).

Budget Summary

OUTGOING		**INCOMING**	
Lecture hall fees	waived	**Total registration fees**	**£3,220.00**
Projectionist @ £154.50 per day (2 days)	£309.00		
Advertising (printing and design)	£465.16	**Sponsorship:**	
Abstract book (cover design and printing)	£415.00	RAS	£1,000.00
Speaker expenses	£545.56	BGS	£500.00
Speaker expenses (pending)	£3,500.00	BGA	£500.00
Catering	£2,032.94	EGU (1000 euros)	£842.73
		EAGE (1500 euros)	£1,264.06
		Total Sponsorship	**£4,106.79**
TOTAL EXPENDITURE	**£7,267.66**	**TOTAL INCOME**	**£7,326.79**
		SURPLUS / LOSS	**£59.13**