Morphometric Characterisation of Eskers Associated with an Extant Mid-Latitude Glacier on Mars

Conference or Workshop Item

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Eskers are diagnostic of glacial melting.
- Eskers are ridges of sediment deposited by meltwater in ice-walled, typically subglacial drainage conduits, and subsequently exposed by glacier retreat (Fig 4).
- Their morphometry is strongly controlled by the geometry of their parent meltwater conduits which, in turn, is controlled by hydraulic conditions within them [e.g. 2].

**Plan-view geometry**

<table>
<thead>
<tr>
<th>Segments</th>
<th>Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min</td>
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<tr>
<td>Median</td>
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<tr>
<td>Mean</td>
<td>1.05</td>
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<tr>
<td>Max</td>
<td>1.22</td>
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</tbody>
</table>

**Cross-sectional morphology**

- **Zone 1**: Similar to Icelandic eskers (~1 - 14 m [6]) (Fig 8a).
- **Zone 2**: Widths more similar to terrestrial eskers (~10 m - 2 km [2,4]) than Dorsa Argentea [4] (Fig 8b).
- **Zone 3**: Lower side slopes than terrestrial eskers could result from fundamental differences in subglacial hydrology between Earth and Mars, which should be explored further.

**Ongoing work**

Phlegra Montes candidate esker morphometry
- Tests for esker-like response of ridge height to longitudinal bed slope.

NEW DCG-linked candidate esker in a similar graben setting
- Abstract #1234, this conference.
- Supports the hypothesis that elevated geothermal heat was a prerequisite for recent basal melting of mid-latitude glaciers on Mars [1].

Modelling environmental conditions required for basal melting in Phlegra Montes
- Exploring atmospheric temperature and geothermal heat scenarios using the JPL/University of California Ice Sheet System Model (ISSM) [8].

References:

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