

Interactive comment on “Glacier-like forms on Mars” by B. Hubbard et al.

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Glacier-like forms on Mars By B. Hubbard, C. Souness, and S Brough Review by Michael Kuhn

For me as a terrestrial glaciologist, this paper is exciting. I am fascinated by the many similarities and analogies that exist in the glacier-like forms on Mars and glaciers on Earth, and by some of the differences between the two features. This paper is very carefully written, but it would gain from a brief summary of physical conditions on Mars relevant to the existence of glacier-like forms, their lifetime, movement, mass and energy balance. What are typical values of pressure, temperature, gravity, what are the daily and seasonal variations of solar irradiance and surface temperature? That would shed more light on the authors' remark on p 2974 that liquid water does not persist in a stable state while ice apparently does, or is it sublimating so slowly that it is quasi sta-

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ble? Even though this has been reported in earlier publications I feel that the present paper in some ways has the character of a review where redundant information is permitted. There are so many similarities of glacier-like forms and moraine-like ridges with their terrestrial counterparts that the reader is tempted to think in terms of glaciers and moraines without the cautious "-like". For instance, their length to width ratio would place most of them among relatively small slope glaciers on Earth, while some have long tongues or piedmont moraines. Their shear stress given on p 2966 is comparable to that of temperate alpine glaciers. All of them have dust or debris covers, rather fine material compared to Earth. As they mention boulders on top of the glacier-like forms I encourage the authors to make a short reference to terrestrial rock glaciers. Knowing how difficult it is to reconstruct glacial history in the Alps, those who attempt to do so on Mars have my admiration. In that context I would like to read more arguments for the statement on p 2962, line 6, and again in the summary 2977/14 "... current GLFs are the remnants of a once far larger ice mass. ...". Are they remnants or did they form after the large ice masses disappeared? (I would not call today's temperate alpine glaciers remnants of the Alpine Ice Sheet even though they are in the right place). The authors have taken great care to document their article with an impressive list of references from which it is obvious that a large part comes from planetary sciences and only few from terrestrial glaciology. For its scientific content and for the chance to bring martial and terrestrial glaciologists closer together I recommend publication of this paper with only minor modifications.

A few formalities 2964/10 use upper case for names 2977/11 Mars' Fig. 7c mark the bedrock protuberances in the figure Fig. 2 add color code Fig. 6 the colors of MLRs and Compressional ridges are difficult to distinguish Fig. 9 boulder instead of boulder Fig. 10 distance scales are not readable It is obvious that the authors of this paper (AOTPs) use many acronyms – this may be inconvenient to readers who are not so familiar with these terms.

Interactive comment on The Cryosphere Discuss., 8, 2957, 2014.

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