

High-resolution mapping of the Palos outflow channel: Preliminary results.

A.I. Rauhala, S. Kukkonen, and V.-P. Kostama

Astronomy Division, Department of Physics, P.O. Box 3000, FI-90014, University of Oulu, Finland (anssi.rauhala@oulu.fi).

Abstract

We have begun a high-resolution geomorphic mapping of the "Palos outflow channel" in order to further characterize the paleofluvial activity in the Amenthes region. Preliminary findings, such as multiple instances of hanging valleys, suggest a complex history of flooding.

1. Introduction

The ~350 km long Palos outflow channel (POC) seems to originate from Palos Crater (2.7°S, 110.8°E), a candidate open-basin paleolake site in the northern Tyrrhena Terra [1]. The general morphology of the POC is similar to outflow channels found elsewhere on Mars and it is consistent with fluvial origin [1].

The generally northwest trending POC incises the smooth plains of Amenthes Planum. After leaving Palos Crater, the upstream section of the channel is defined by a ~15–20 km wide, NW-trending trough. After reaching the main parts of the Amenthes plains, POC has almost straight edges and a width of ~12 km. Some 80 km to the northwest, the midstream section of POC is superposed by a ~7 km impact crater and its ejecta field, after which the appearance of the channel changes from a shallow and sheetlike into a more deeply entrenched and braiding (see Fig. 1).

Some 80 km further to the northwest, the POC divides into two sections. The northern downstream section continues through a ridge of highland material and eventually blends into the Amenthes plains. The northwestern downstream portion continues northwest where it eventually terminates as an alluvial fan.

2. Preliminary results

We are currently producing a geomorphic map of the POC using high-resolution CTX and HiRISE imagery. The aim of the project is to further characterize the history of fluvial activity in the Amenthes region. Al-

though still considered as a work in progress, some preliminary notions can be made.

Especially the midstream section of the POC seems to be defined by a large number of mesas, some of which can be considered as streamlined islands, while others are more irregular in shape. It is yet to be resolved which (if any) of the mesas are depositional in nature and which are erosional remnants. The apparently high tendency for braiding could be partly explained by ice-dams which are diverging the flow.

Multiple instances of hanging valleys and nested inner channels suggest a complex history of floods and discharge variations. Possible, multiple, subsequent flooding events would have implications concerning the source of water, and would also give some confirmation for the previously hypothesized successive overspills from Palos Crater [1].

Many of the properties of POC, such as the intense outburst floods, low slope, and the high tendency for braiding and island forming, are consistent with Siberian outburst rivers [2], which might provide a good analogy for the POC, and vice versa. Due to the promising results we plan to further continue our mapping with crater counting and topographical analysis.

Acknowledgements

The authors acknowledge the support from Magnus Ehrnrooth Foundation (A.I.R., S.K.) and Jenny and Antti Wihuri Foundation (S.K.).

References

- [1] Erkeling, G. et al.: The stratigraphy of the Amenthes region, Mars: Time limits for the formation of fluvial, volcanic and tectonic landforms, *Icarus*, 215, pp. 128–152, 2011.
- [2] Costard, F. et al.: Siberian rivers and Martian outflow channels: an analogy. *The Geology of Mars*, Cambridge University Press, 2007.

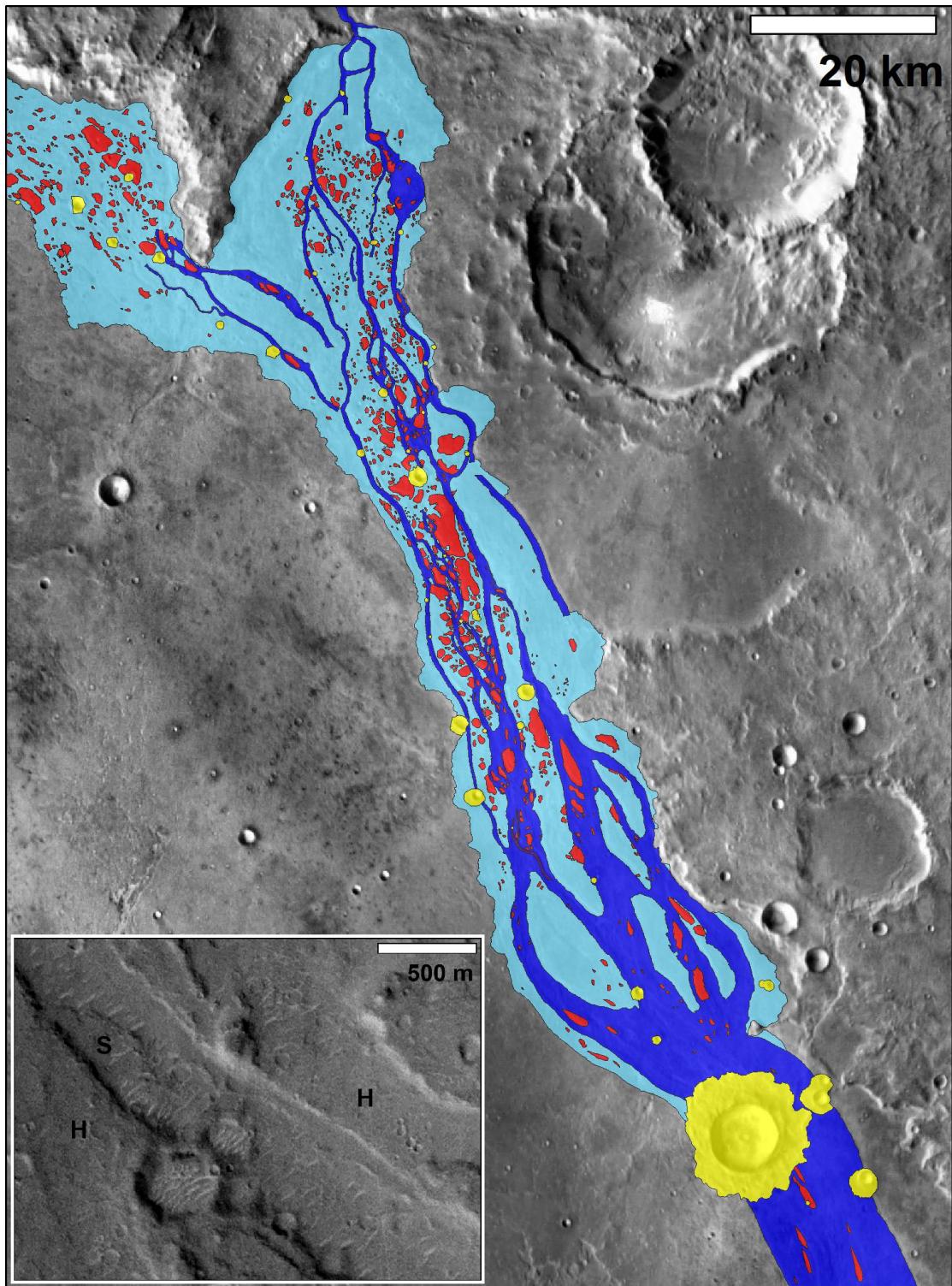


Figure 1: Preliminary geomorphic map of the midstream section of the Palos outflow channel (Blue = channel, light blue = fluvial plains, yellow = crater materials, red = mesa, background: THEMIS day-IR.) The detail image (CTX) provides examples of hanging valleys (H) and possible fluvial sediments (S).