AMENTHES RUPES AREA: A POTENTIAL SITE FOR ANCIENT FLUVIAL DEPOSITS. Ruslan Kuzmin[1] and Ronald Greeley[2], [1] Vernadsky Institute, Russian Academy of Sciences, Kosygin St. 19, Moscow, 117975, GSP-1 Russia, [2] Arizona State University, Dept. of Geology, Box 871404, Tempe, AZ 85287-1404.

Introduction: The channel system south of Amenthes Rupes is proposed to sample ancient fluvial environments on Mars. This area shows evidence for ponding in a 52-km diameter crater, similar to the Gusev Crater-Ma'adim Vallis system. The proposed study region suggests fluvial activity during Noachian-Hesperian times.

General geology. Amenthes Rupes includes a fluvial system in the Martian highlands. Much of the terrain in this area was modified by extensive resurfacing [1-3], and is mapped as a Noachian unit (unit Npld) dissected by multiple small channels, channels networks and troughs.

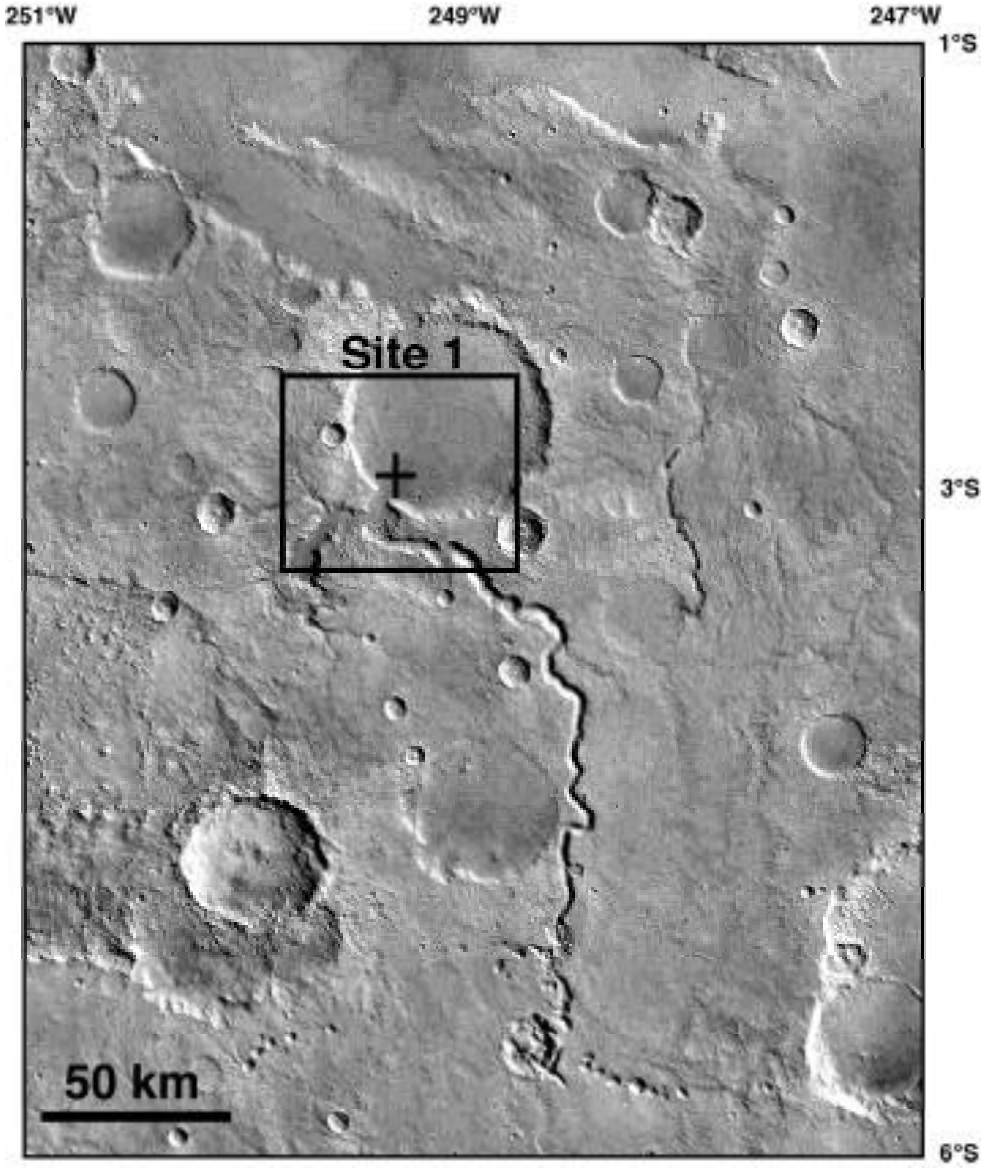
The area also contains a large population of flat-floored, rimless craters. Lower Hesperian age ridged plains (unit Hr) floor the large craters and form smooth surfaces on some of the surrounding highlands [2]. In places, units Npld and Hr are mantled by Amazonian smooth plains (unit Aps), which apparently consist of aeolian deposits. The proposed landing site is in a degraded impact crater (52-km in diameter) which received flow from a channel from the SW. The sinuous channel is 2-3 km wide and is similar to Nirgal, Nanedy, and Bahram Valles [2], whose origin is interpreted to involve sapping processes [5]. The NW part of the crater rim is breached by a gap 3-km wide, which could have formed by the release of water from a former lake within the crater.

Potential site. A proposed landing site is located in the southern part of the crater floor on smooth plains at 4°S; 249.5°W, near the mouth of the channel. The geologic setting is similar to Ma'adim Vallis and Gusev Crater, but on a smaller scale. The upstream 100 km part of the channel is narrow and shallow then widens and deepens downstream. Deep layers of rock were eroded during the latest stages of channel activity and the products of erosion could be deposited in the crater as lacustrine sediments. The transition between the upper and lower parts of the channel is complicated by a chain of collapsed pits 2-4 km across that could represent karstic processes.

A short (40 km) wide (3-4 km), branch channel intersects the mouth of the main channel. The upper part of the branch is partly blocked by mass-wasted material. Small amphitheater-headed tributaries along the branch channel walls might be evidence for ground water seepage, or sapping processes. Crater floor deposits merge with the highland plains through the gap in the N-NW crater rim. Apparently the crater lake served as a reservoir for the channel system and "fed" sediments to the surrounding plains. Faint erosional features on the crater floor might represent the last stage of fluvial activity.

Scientific rationale. The landing site is characterized by sedimentary facies formed in ancient fluvial and lacustrine environments and may enable sampling of rocks and sediments of Early Noachian to Late Hesperian ages. Such samples could provide information on the: 1) early climatic environments, 2) ground water regime and associated mineralization and, 3) fluvial-lacustrine processes.

References: [1] Scott, D.H. and S. Tanaka, 1986. Geologic map of the western equatorial region of Mars, scale 1:15,000,000, U.S.G.S. Misc. Inv. Series Map I-1802-A. [2] Greeley, R. and J.E. Guest, 1987. Geologic map of the eastern equatorial regional of Mars, U.S.G.S. Misc. Inv. Series Map I-1802-B. [3] Craddock, R.A. and T.A. Maxwell, 1990. Resurfacing of the Martian highlands in the Amenthes and Tyrrhena region, J. Geophys. Res., 95, 14,265-14,278. [4] Baker, V.R., M.H. Carr, V.C. Gulick, C.R. Williams, and M.S. Marley, 1992. Channels and valley networks, in Mars, H.H. Kieffer et al., Eds., Univ. of Arizona Press, Tucson, Arizona, 493-522. [5] Carr, M.H., 1996. Water on Mars, Oxford Univ. Press, New York, NY, 229 pp.



Viking Orbiter mosaic of the Amenthes Rupes region of Mars. The landing site is located at 2.9°S, 249.5°W, and lies between +1 and +2 km.