SEDIMENT DEPOSITION FROM OUTFLOW CHANNELS AT THE MARS PATHFINDER LANDING SITE, MARS. *D.M. Nelson[1], R.O. Kuzmin[2], and R. Greeley[1].* 1. Department of Geology, Box 871404, Arizona State University, Tempe, Arizona 85287-1404, USA. 2. Vernadsky Institute of Geochemistry and Analytical Chemistry, Russian Academy of Sciences, Kosygin St., 19 Moscow, 117975, GSP-1, Russia. E-mail: nelson@atlas.la.asu.edu

Summary: New geologic mapping of the Chryse Planitia watershed on Mars enables refinement of the geologic history of this region. The area mapped at 1:2M scale covers 35°N to 15°S and 10° to 67°W (corresponding to eastern MC-10, MC-11, and north MC-19). Fluvial outflow processes of the Ares/Tiu/Simud channels were initiated with sheet floods over the tectonically modified Noachian cratered terrain. Subsequent erosion and transportation of sediments from multiple floods throughout the Hesperian period led to extensive deposits at the Mars Pathfinder Landing Site (MPLS). Four areas of potential sediment contributions are identified: those composed of predominantly Noachian, Hesperian/Noachian, and Hesperian age materials, plus a few small areas contributing reworked outflow materials of unknown ages. A mantle of sand and dust deposited during the Amazonian also contributes a large component of the soil to be measured by Sojourner.

Introduction: Mars Pathfinder, scheduled to reach Mars in July, 1997, will land at the mouth of Ares and Tiu Valles at the southern margin of the Chryse Planitia basin (19.5°N, 32.8°W). Pathfinder will deploy the rover, Sojourner, which will measure the elemental abundance of rocks and soil at MPLS [1]. A geologic/ geomorphic map of the entire watershed was produced to identify the probable extent of terrain and materials which may have contributed sediments to the MPLS. This map provides insight into the context of the compositional measurements to be obtained from Mars Pathfinder.

Mapping and Sediment Contribution: Six outflow channels and their tributaries, which are of probable fluvial origin [2], define a complex watershed to the north and east of Valles Marineris. Each of these channels extends over 1000 km in length and debauches into the Chryse Planitia basin. From west to east, these include: Kasei, Maja, Shalbatana, Simud, Tiu, and Ares Valles. Geologic units crossed by the channels are considered to be potential sources for sediments at MPLS. Possible contributing sediments were identified from mapping the watershed for each channel.

Unit descriptions of Scott and Tanaka [3] and Tanaka et al [4], serve as the basis for geologic mapping. Detailed mapping using 1:2M photomosaics and Viking Orbiter images allowed further subdivisions of some of the units, notably Npl1 and Npl2, into facies related to erosion and deposition of the outflow channel materials. Seven new units were defined and used in conjunction with the previously mapped units to describe the sequence of channel formation.

Correlation between the outflow channel watersheds and the related geologic units indicate four principal sources of sediment contributions (Fig. 1): (1) *Noachian materials*--oldest geologic units to have been reworked by earliest flooding events. This includes Npl2 [2], which, in the mapped area, experienced sheet floods over surfaces yet to be incised by defined outflow channels [5]. These materials may be located at MPLS, but are most likely buried by younger sediments. (2) *Hesperian/Noachian* and (3) *Hesperian materials*--geologic units closest to the outflow channels which have been most recently eroded by fluvial processes. Sediments from these units would be the last "highland" materials to be deposited in Chryse Planitia, although sediments eroded from Hesperian/Noachian units are more likely buried than those from Hesperian units. (4) *Reworked outflow materials*--sediments which were previously deposited in Chryse Planitia by a channel(s), such as Kasei Valles [6], and later reworked and redeposited by other channel outflow processes. The origins of these materials are least predictable, but the sediments are probably among the youngest. All other geologic units, which lie outside of fluvial influence, are not considered to have contributed sediments to MPLS.

After flooding of the Chryse basin ended, aeolian activity was the only active geologic process. The fluvially eroded and transported materials were reworked during the Amazonian and a mantle of sand and dust, with grain sizes from 500-2300 µm, was deposited [7]. The extent and depth of this mantle is uncertain, although it is probably a main component of the soil found at the landing site.

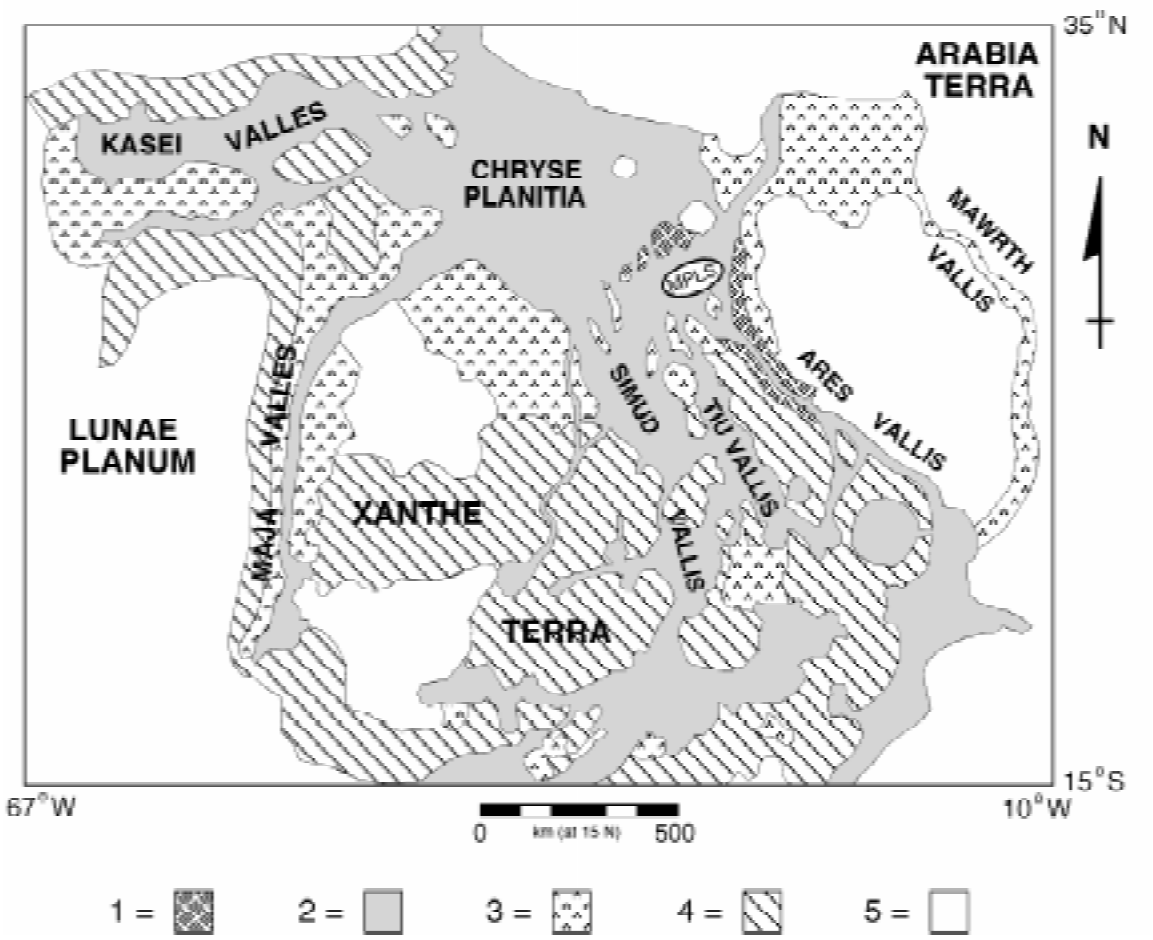

Figure 1. Diagram of materials from Chryse Planitia and surrounding outflow channels contributing to MPLS. Zones indicate (1) most recently contributed sediment, (2) sediments predominantly derived from Hesperian materials, (3) sediments predominantly derived from Hesperian/Noachian materials (mostly buried), (4) oldest contributing sediments (now buried), and (5) units which did not contribute sediments to MPLS.

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