MARS GLOBAL GEOLOGIC MAPPING: ABOUT HALF WAY DONE. **K.L. Tanaka[1], J.M. Dohm[2], R. Irwin[3], E.J. Kolb[4], J.A. Skinner, Jr.[1], and T.M. Hare[1].** [1]U.S. Geological Survey, Flagstaff, AZ, ktanaka@usgs.gov, [2]U. Arizona, Tucson, AZ, [3]Smithsonian Inst., Washington, DC, [4]Google, Inc., CA.

Introduction: We are in the third year of a five-year effort to map the geology of Mars using mainly Mars Global Surveyor, Mars Express, and Mars Odyssey imaging and altimetry datasets. Previously, we have reported on details of project management, mapping datasets (local and regional), initial and anticipated mapping approaches, and tactics of map unit delineation and description [1-2]. For example, we have seen how the multiple types and huge quantity of image data as well as more accurate and detailed altimetry data now available allow for broader and deeper geologic perspectives, based largely on improved landform perception, characterization, and analysis. Here, we describe mapping and unit delineation results thus far, a new unit identified in the northern plains, and remaining steps to complete the map.

Unit mapping progress: Each mapper is compiling information for each of their map units in a spreadsheet, which contains fields for: *unit name, symbol, unit group, region, type locality, primary* and *secondary characteristics, adjacent units* and their *contact and superposition relations, relative age, interpretation, other comments* (including how previously mapped), and *references*. Tanaka is compiling and organizing the map units. Thus far, we have collectively identified and mapped 29 units (5 highland units, 2 apron units, 1 crater unit, 2 channel floor units, 1 chaotic terrain unit, 3 boundary plains units, 3 northern plains units, 4 polar units, and 8 volcanic units). The number of units will increase, as some volcanic sequences, Noachian/Hesperian basin materials, and other units will be subdivided based on distinctive age and primary morphologic characteristics.

Our mapping progress is shown in Figure 1. To simplify the map, we grouped the units by age and do not show the various types of contacts and structures. It is evident that northern plains mapping, including Elysium, has largely been updated from [3]. New mapping is shown for younger materials in most parts of the highlands. Many of the flow units in Tharsis are only partly mapped, as more challenging sections need greater scrutiny.

New northern plains unit: A new unit we have discovered is a subtle, younger Vastitas Borealis unit that appears to superpose older, more typically-identified Vastitas Borealis units and covers a substantial area of 3.7 million km^2. This unit was identified by combining surface appearance and apparent burial of underlying materials in MOLA altimetry and THEMIS infrared and visible image data sets. It appears to be tens of meters thick, similar in thickness of the pedestals underlying pedestal craters in the same region [4-5]. Thus, the unit appears to have retreated from a former extent. Preliminary analysis of crater counts and stratigraphic relations suggests that the unit is long-lived, likely emplaced over multiple episodes. These and other observations and interpretations are the topic of a paper in preparation by Skinner and Tanaka, to be submitted in summer of 2009.

Remaining work: Mapping tasks that remain include: (1) delineating and describing Noachian and other unfinished younger units and structures and completing the unit description spreadsheet, (2) confirming the accuracy of all contact and structure linework using the most recent THEMIS IR and VIS images (and, to a lesser degree, HRSC and CTX images), (3) identifying and detailing descriptions of type locality unit surfaces (some units may have multiple type localities), (4) finalizing the merging of units as well as cleaning and smoothing linework, (5) determining the relative ages of map units based on superposition relations and interpretation of detailed crater counts of units, including their type localities, and summarizing results in tables and a correlation chart, (6) writing the map text, including notes on data and methodologies, unit descriptions, and summary geologic history of the map units and structures, and (7) preparing the map for review, responding to reviews, and formatting the GIS products for USGS editing and publication (including the organizing of mapping layers and creating metadata). Tanaka, Skinner, and Hare, under the guidance of the NASA PGG GEMS committee, are presently updating guidelines for planetary geologic map formatting in GIS. This map will serve as an example of a final product.

References: [1] Tanaka K.L. et al. (2007) *7th Intl. Conf. Mars* Abs. #3143. [2] Tanaka K.L. et al. (2008) *LPSC XXXIX*, Abs. #2130. [3] Tanaka K.L. et al. (2005) *USGS Map SIM-2888*. [4] Skinner J.A. et al. (2006), *LPSC XXXVII*, Abs. #1476. [5] Kadhish S.J. et al. (2009) *LPSC XV,* Abs. #1313.

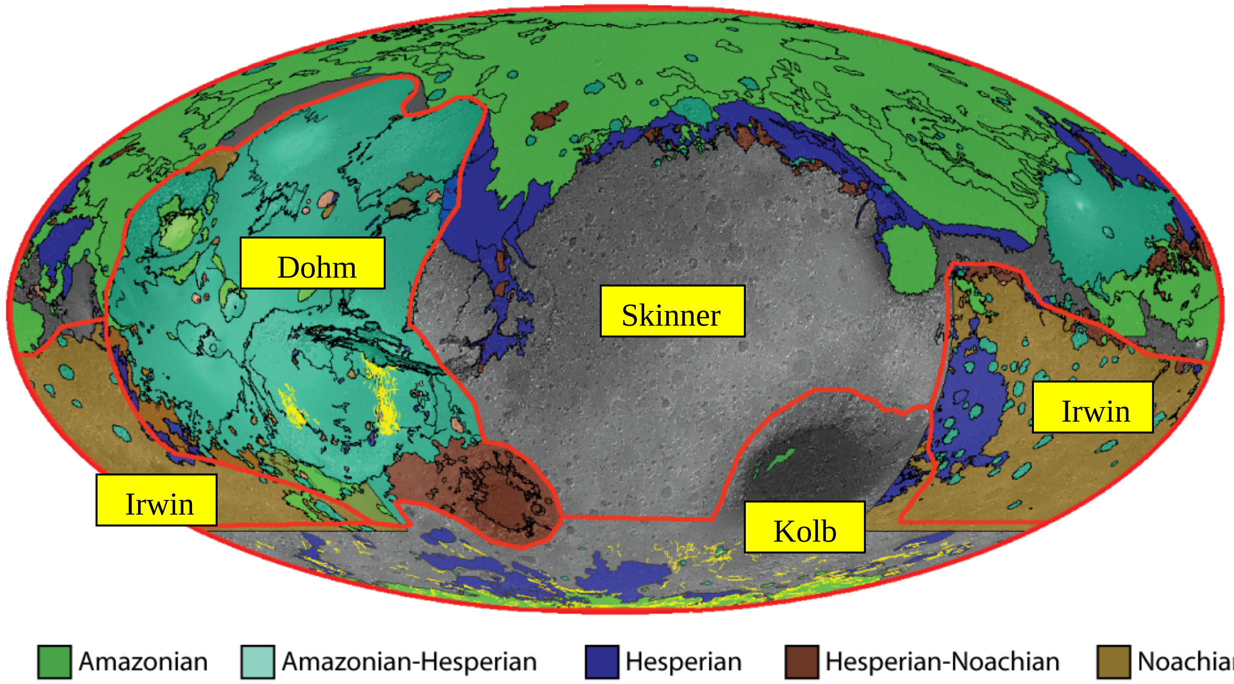

Figure 1. Progress in geologic mapping of Mars (generalized). Red outlines show regions assigned to mappers. Diverse units are grouped and colored by age. Yellow lines show structures. Note that many tentative contact lines in the Tharsis region remain unclosed, and colored highland areas require further subdivision. Unmapped areas are largely Noachian highlands. (Map compiled with assistance of C. Fortezzo, USGS.)