A NEW ATLAS OF MARS. K. S. Coles[1], K. L. Tanaka[2], P. R. Christensen[3], J. M. Dohm[4], C. M Fortezzo[2], J. A. Skinner, Jr.[2], T. M. Hare[2], J. S. Blue[2]. [1]Geoscience Dept., Indiana U. of PA, Indiana, PA, 15705, kcoles@iup.edu, [2] U.S. Geological Survey, Flagstaff, AZ, [3] Arizona State U., Tempe, AZ, [4]U. Arizona, Tucson, AZ.

Rationale: We plan a new atlas of Mars. This will be the first atlas of Mars to incorporate geology, geophysics, and interactions of the surface with the atmosphere and interior of the planet. THEMIS (Thermal Emission Imaging System, [1]) imagery, merged with the MDIM (Mars Digital Image Model 2.1, [2]) and MOLA (Mars Orbiter Laser Altimeter, [3]) datasets, provides a new, more detailed map base. Revision of the global geologic map of Mars is nearing completion and illuminates the history and origin of the Martian surface. Other data sets add to the picture of Mars, including MOC (Mars Orbiter Camera, [4]), HiRISE (High Resolution Imaging Science Experiment, [5]), and HRSC (High Resolution Stereo Camera, [6]), all showing landforms, composition, and processes on Mars in unprecedented detail. We anticipate writing the text sections at a level accessible to the interested non-scientist - our main audience.

We conceive of the atlas as a printed product, published in coordination with digital supplements. These will include full-resolution versions of images, alternate projections of maps, and pointers to the images, datasets, and customizable digital maps that are available online from the U.S. Geological Survey, NASA, the THEMIS site, and elsewhere.

One atlas covering all of Mars [7] is long out of print. It relied on Mariner 9 and some Viking orbiter imagery. Mars is now mapped at considerably better

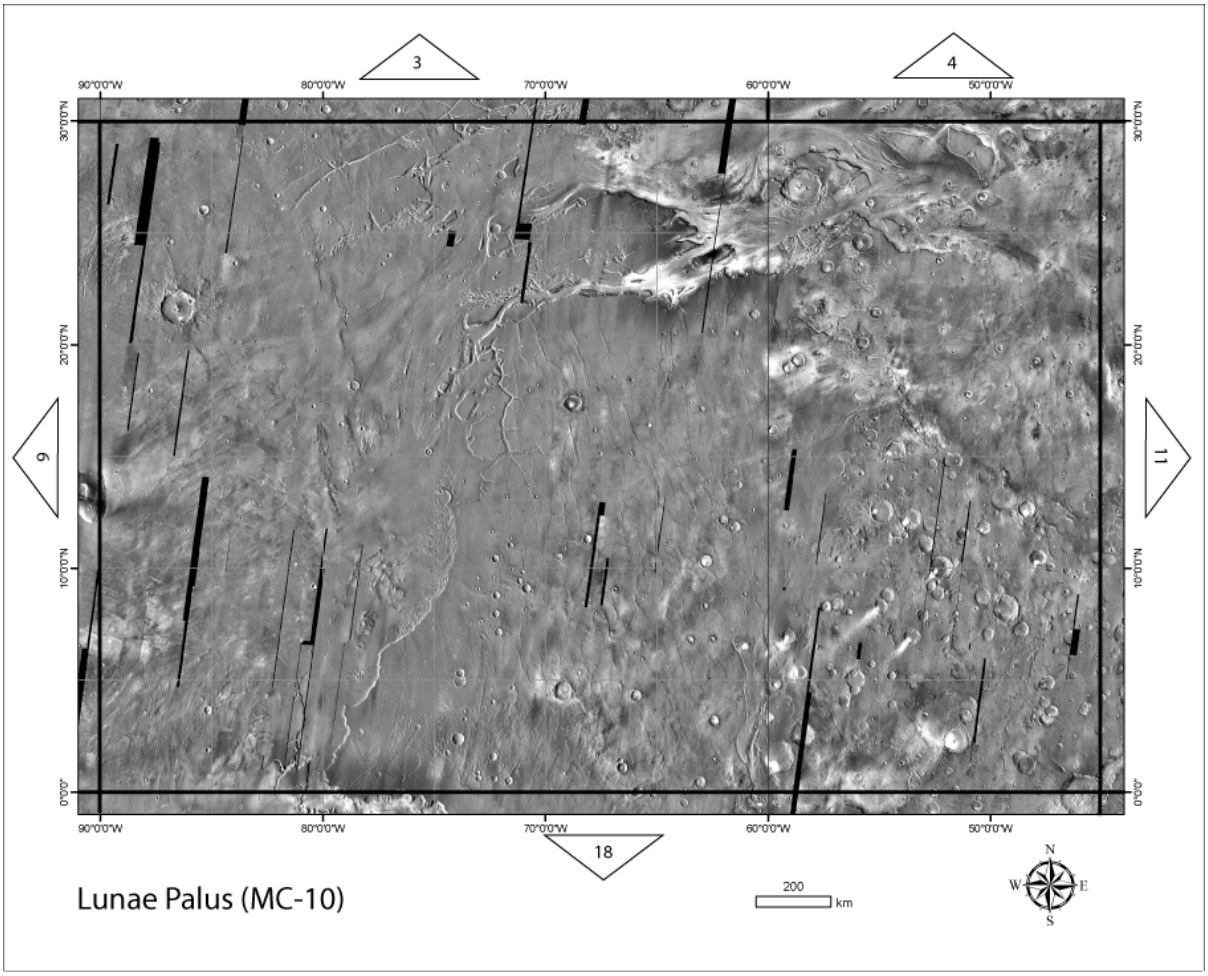

Figure 1: Base map using the 100-meter resolution THEMIS IR imagery, with lon/lat grid. A margin one degree wide and pointers to adjacent maps are included. The old version of THEMIS IR is used here to give an idea of the layout. The atlas will have a new, merged base from THEMIS, MOLA and MDIM with gaps filled.

resolution, and new datasets such as elevation give a more detailed picture of the planet. "The NASA Atlas of the Solar System" [8] presented shaded relief (airbrush) maps of Mars in 10 sheets and the Viking MDIM in 6 sheets, both at 1:10,000,000 scale. Geology was shown in two hemispheric views. We employ a single base map that merges MDIM (~200 m) with the THEMIS 100-m IR and MOLA grayscale altimetry (460 m) datasets.

Readership and Level: We envision this atlas as a reference work, rather than a text or monograph. *General readers* will benefit from the summary of Mars exploration, the introduction to history and geology of Mars, and the map sheets that place noteworthy features in a regional and global context. *Science/technical readers* will consult summaries of the geology, geography, and the processes operating on Mars. *Planetary science professionals* will use this atlas as a basic reference to locate features and for a quick overview of properties (for example, elevation or mineralogy) on a global scale.

Design Principles: 1) All images to include longitude and latitude. 2) A global index map or reference to a map sheet included wherever possible. 3) Base maps will use the 30-sheet Mars Chart (MC) system and projections at a scale of 10,000,000, similar to [7], with planetocentric coordinates (shown at reduced scale in Figure 1).

Outline:

Chapter 1: Introduction. This presents the organization of atlas, including the scale, projections, and layout of the map sheets.

Chapter 2: History of Exploration of Mars. This section emphasizes the spacecraft era of Mars exploration in a brief overview for the reader unfamiliar with this history. Other works [e.g., 9, 10] cover in detail both the modern era and earlier work and ideas. Illustrations will include examples of improvement in resolution from Mariner 4 to the present.

Chapter 3: Global Character of Mars. Hemispherical or global views, one page each, present various datasets of Mars (e.g., albedo, thermal inertia, magnetization, selected minerals and elements).

Chapter 4: Regions of Mars. Regional geography is illustrated in brief text summaries and images of major regions of Mars. We also summarize the landscapes explored by surface landers to date.

Chapter 5: Geology of Mars. This section features a generalized version of the new Geologic Map of Mars in several sections and synoptic view, along with the geologic time scale for Mars. Brief text and illustrations cover significant geologic processes and features, meteorites of probable Mars origin, and chemical evolution of the environment. Based on the geologic map, we will construct global maps of Mars through time, analogous to the plates in [11].

Atlas Map Sheets. The Map Sheets include, for each of the 30 MC maps, a page-sized base map (merged THEMIS_IR/MDIM/MOLA, layout in Figure 1), a page-sized nomenclature map on color MOLA base, and several pages highlighting significant geologic and geographic features on each map sheet.

References: [1] Christensen, P.R. et al. (2004) *Space Sci. Rev.*, *110*, 85–130. [2] USGS. (2012) http://astrogeology.usgs.gov/products/Mars-Global-Digital-Mosaic-MDIM-2.1. [3] Smith, D.E. et al. (2001) *JGR*, *106*, 23689–23722. [4] Malin, M. C. et al. (2010) *Mars, 5*, 1–60. [5] NASA. (2012) http://marsoweb.nas.nasa.gov/HiRISE/. [6] Jaumann, R. et al. (2007) *Planetary and Space Sci.*, *55*, 928-952. [7] Batson, R. M., Bridges, P. M., and Inge, J. L. (1979) NASA Spec. Pub. 438. [8] Greeley, R. and Batson, R. (1997) *The NASA Atlas of the Solar System*, Cambridge U. Press. [9] Sheehan, W. (1996) *The Planet Mars: A History of Observation and Discovery*, U. of Arizona. [10] Morton, O. (2002) *Mapping Mars: Science, Imagination, and the Birth of a World*, Picador. [11] Wilhelms, D. E. (1987) *Geologic History of the Moon*, USGS Prof Paper 1348.