MARS – A REMARKABLY EARTH-LIKE PLANET

Colin Pain
Geoscience Australia, GPO Box 378, Canberra, ACT 2601

A diversity of data are now available for much of the Martian surface, including high resolution imagery, in some cases with pixels as detailed as 1.5m. The Mars Global Surveyor carries a high resolution camera (MOC) and a laser altimeter (MOLA). Mars Odyssey carries a thermal emission imaging system (THEMIS), a gamma ray spectrometer (GRS) and several neutron spectrometers. And by the time of AMEC V the Mars Reconnaissance Obiter may be on its way.

Many of these images show clear evidence for processes and landforms familiar to Earth-bound geomorphologists. Sand dunes and other aeolian features are common, as are slopes with cliffs and falling boulders. Alluvial forms such as gullies and fans are also present. Apparent lake shores, a delta, outflow channels and integrated channel networks all suggest the presence of both standing and running water in the Martian past. There are features that have been attributed to ice, perhaps still present on the surface. Mars also has a large number of volcanoes, including Olympus Mons, the largest in the Solar System. There is also evidence of a complex history of landscape evolution shown by changing valley morphologies, and many examples of inverted relief. And Spirit and Opportunity continue to send back images of features eerily reminiscent of small landforms and weathering features on Earth

There are also some forms on the Martian surface that have no obvious Earth analogues. Examples include the "Swiss cheese" features of the South Pole, Martian "banyan trees", "fortune cookies" and "spiders", and the "fried egg" terrains of the major valley floors.

Mapping of landform features on Mars has been somewhat inconsistent and largely geologically based. There is a role for systematic regolith-landform mapping of the Martian surface, for at least two reasons. First, such mapping provides consistent data for interpretation of landforms and processes, especially where high resolution information is available. Second, regolith-landform maps provide an indication of the surface conditions likely to be met by landers and rovers. These regolith-landform maps are more functional and have more applications than the current interpretive geology maps. They provide maps of real surface features which have been observed even if we do not know what materials they are composed of or how they formed. Landform maps provide a factual, descriptive base to which new information can be added as it is acquired, and may be interpreted by the observer rather than the map-maker. Such mapping can be carried out at both a regional scale, from orbital imagery, and the site-scale from landers and rovers.

The Columbia Hills in Gusev Crater, an area that would not look out of place in South America's Atacama Desert (NASA image 03-SS-02-hills-B133R1).

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