

Geological Society of America Annual Meeting – 2009  
Submitted 29 July 2009

Harrison, T. N., M. C. Malin, and K. S. Edgett (2009) Present-day activity, monitoring, and documentation of gullies with the Mars Reconnaissance Orbiter (MRO) Context Camera (CTX), Abstract 97-12, *Geological Society of America Abstracts with Programs* 41(7), 267.

**PRESENT-DAY ACTIVITY, MONITORING, AND DOCUMENTATION OF GULLIES WITH THE MARS RECONNAISSANCE ORBITER (MRO) CONTEXT CAMERA (CTX).** HARRISON, Tanya N., MALIN, Michael C., EDGETT, Kenneth S., Malin Space Science Systems, P.O. Box 90148, San Diego, CA 92191-0148.

Covering up to 9390 km<sup>2</sup> in a single image, CTX provides large areal coverage at a resolution (6 m/pixel) capable of observing > 95% of the middle- and high-latitude gullies on Mars. We use CTX to cover entire gullied landforms (craters, pits, etc.) to remove the sampling bias in previous Mars Global Surveyor Mars Orbiter Camera (MOC) coverage, allowing relations between gully occurrence and insolation, geographic location, and climate influences to be addressed. The gullies are imaged during appropriate illumination and seasonal conditions for maximum visibility. We acquire CTX stereopairs to aid in quantitative geomorphic studies, and we recommend targets for higher-resolution (0.3 m/pixel) imaging by the MRO HiRISE based on our previous decade of observations of these landforms. CTX is used to routinely monitor 617 locations to look for changes in gullies. From these efforts, we found further evidence that some gullies are active today, with 6 new gully flows discovered using CTX (adding to the 2 found by MOC) that formed since 2001. Examination of HiRISE images of these 6 landforms indicates a debris flow origin (requiring liquid); this interpretation is based on the patterns of flow around obstacles, ponding in and subsequent overtopping of topographic depressions, super-elevation of deposits on channel banks where the channels change direction, anastomoses in distal reaches, and lobate terminations. Of the 6 new flows, 3 have formation dates constrained to within a single Mars year; these 3 formed during autumn to early spring, demonstrating that summer warming is not participating in creating the liquid involved in their formation. We have also found similar gully flow features for which there is no "before" image; these are interpreted to be relatively recent but we cannot constrain their age. All gullied locations imaged by MOC and CTX have been cataloged; as of July 2009, > 43% of Mars has been imaged and > 4,000 separate gullied landform sites (tens of thousands of individual gullies) have been identified. These observations confirm that gullies are confined to 27°S to 83°S and 28°N to 76°N. Regional clustering is observed in Terra Sirenum and Cimmeria, Acidalia, Utopia, and around Argyre. These efforts are focused on understanding how the gullies formed, how they have been degraded, and where they are active today.

Keywords: Mars, gullies, debris flows, MRO, water