



**Figure 9.** Mosaic of Siula Grande, taken on sol 142 with target in full shadow. Note embedded spherules (arrows) and laminae running through the target from lower left to upper right. Clast fragments lie within the topographic low at upper right.

unlikely that the cause of these errors will be found, as they are very infrequent.

#### 4. Overview of Results

[20] The scientific results of MI observations acquired by Opportunity through sol 900 are summarized in this section. Results of the MI investigation during the first 90 sols of the Opportunity mission were summarized by *Herkenhoff et al.* [2004b] and have been discussed in several other publications [e.g., *Squyres et al.*, 2004a, 2004b; *Soderblom et al.*, 2004; *Grotzinger et al.*, 2005; *McLennan et al.*, 2005; *Sullivan et al.*, 2005; *Yen et al.*, 2005]. Observations of rocks on Meridiani Planum are discussed in section 4.1, followed by a discussion of soil observations. The locations at which the MI images shown in this paper were acquired are illustrated in Figure 8. In addition, the MI observed Opportunity’s filter (F) and capture (C) magnets on sols 154 (F,C), 167 (F,C), 273 (F), 279 (C), 328 (C), 337 (C), 341 (F), and 538 (F). The MI was also used to image Opportunity’s solar panels to assess contamination by dust and sand (see Table A1).

[21] As the MI was designed to mimic a geologist’s hand lens, MI target surfaces were examined and analyzed using an approach similar to that used when observing hand samples in the field. Targets were characterized in terms of overall appearance (including location, context and color), lithology (mineralogy/composition as may be inferred by appearance, crystal form, cleavage, or unique mineral shape), surface texture (grain morphology and

appearance, size, sorting and fabric, including orientation), and a description of any sedimentary structures present. We divide our observations into soil targets and rock targets, where the term “target” refers to a specific point at which MI images were taken, and the term “feature” indicates a larger object (in the case of rocks) or region (in the case of soils) that may include several discrete targets.

##### 4.1. Rock Observations and Classification

[22] During Opportunity’s first phase of operation on Meridiani Planum, in Eagle and Endurance craters and points in between, the MER team established that the regional outcrop consists of sulfate-rich sandstones, deposited by wind, reworked locally by surface water, and cemented by minerals precipitated from acidic groundwater brines that percolated through accumulating sediments [*Squyres et al.*, 2004a, 2004b; *Squyres and Knoll*, 2005; *Clark et al.*, 2005; *McLennan et al.*, 2005; *Grotzinger et al.*, 2005]. Analyses of MI data played a major role in these discoveries, establishing that layered rocks consist of cemented sand grains, showing that many laminae in outcrop rocks are one or a few grains thick (a feature characteristic of eolian deposition), verifying that small-scale angles in bedding detected in Pancam images indeed reflect festoon cross-bedding, establishing the spatial and temporal relationships among sediment grains and diagenetic mineral phases, and characterizing the nature of critical microtextural features such as millimeter-scale spherules, grain sizes/shapes and secondary porosity. Early exploration also demonstrated that isolated cobbles and