

# In situ evidence for continental crust on early Mars

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## Gale crater, geological context of the rover traverse and samples studied

The Curiosity rover landing site is located at  $-4.59^{\circ}$  S,  $137.44^{\circ}$  E). **Fig. S1a** shows a portion of the THEMIS IR nighttime mosaic of Bradbury Rise. The landing site is marked by a black cross within the landing ellipse. It is located at a distal portion of the alluvial fan stretching below Peace Vallis on the northern rim of Gale crater.

Mafic and light-toned igneous float rocks were initially observed by the Curiosity rover close to the Bradbury landing site from sol 1 to 55 in the Hummocky plain unit. After *Curiosity* left the fluvio-lacustrine deposit of Yellow Knife Bay (sol 55-326), it traversed back across the hummocky unit (**Fig. S1b**). An increasing number of light-toned rocks dominated by feldspars (porphyritic, felsic coarse-grained, felsic fine-grained) together with three groups of mafic rocks were observed along the traverse from sol 326 to sol 550. The mafic rocks are described in detail in Cousin et al. (2015)<sup>43</sup> and Sautter et al. (2014)<sup>45</sup>. The rocks selected for the present study are summarized in **Table S1**.

## Laser-Induced Breakdown Spectrometer (LIBS) spectra

ChemCam's laser-induced breakdown spectrometer (LIBS) uses a pulsed laser to ablate targets up to  $\approx 7$  m from the rover. The size of the laser interaction varies with distance, ranging from  $350 \mu\text{m}$  at 1.5 m to  $550 \mu\text{m}$  at 7 m<sup>36</sup>. The light emitted by the ablated plasma spark is collected by the same telescope used to transmit the laser beam, and is analyzed by three spectrometers which record the atomic emission spectrum over the ultraviolet (UV: 240.1-342.2nm), violet (VIO: 382.1-469.3 nm), and visible to near-infrared (VNIR: 474.0-906.5 nm) ranges<sup>21, 22</sup>. The ChemCam LIBS spectra consist of 6144 channels covering the above wavelength range in wavelength with typically several hundred emission peaks covering all of the major elements and many minor and trace elements.

A typical ChemCam LIBS observation involves the analysis of multiple locations on the target: common geometries for LIBS observations are square grids (e.g.  $3 \times 3$ ,  $4 \times 4$ ) and

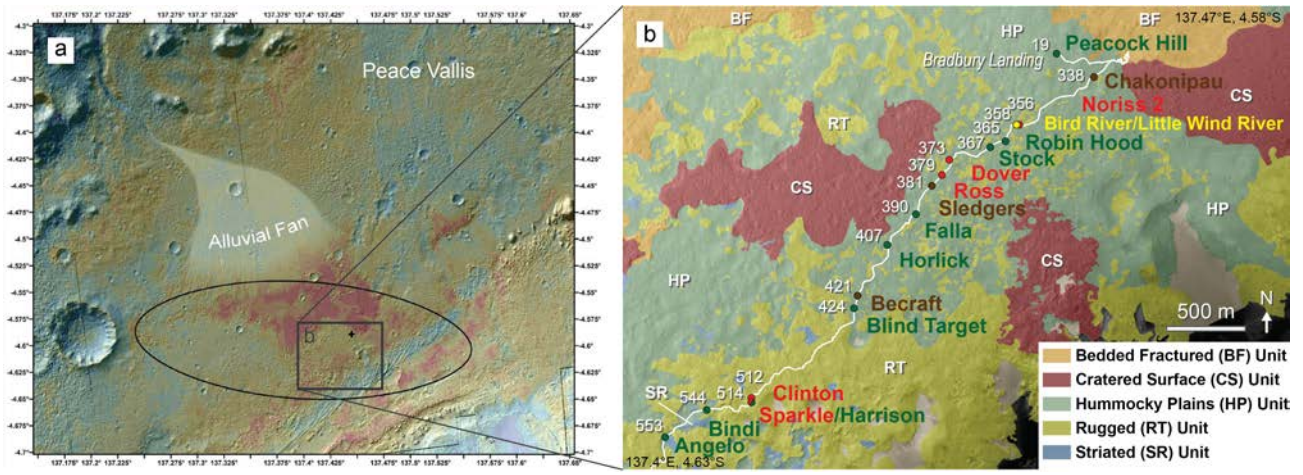


Figure S2

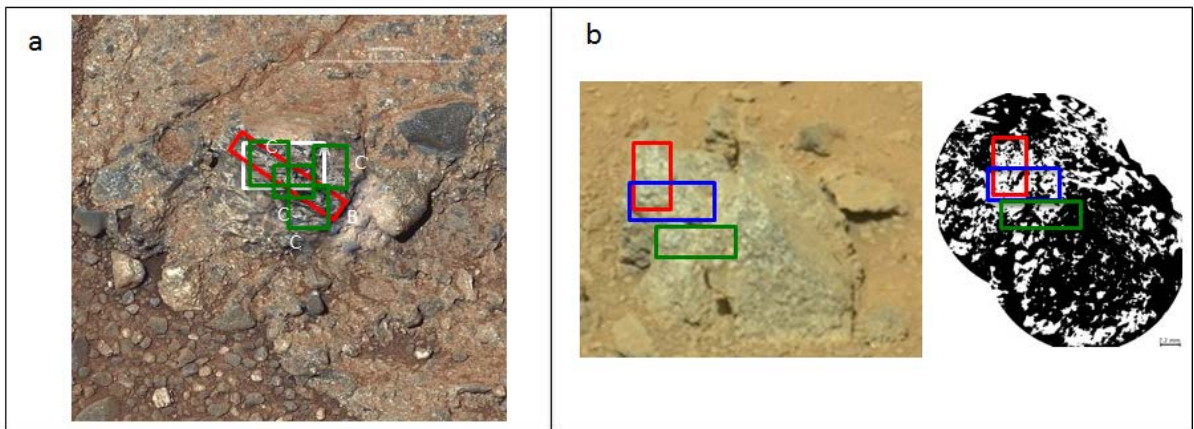


Figure S3

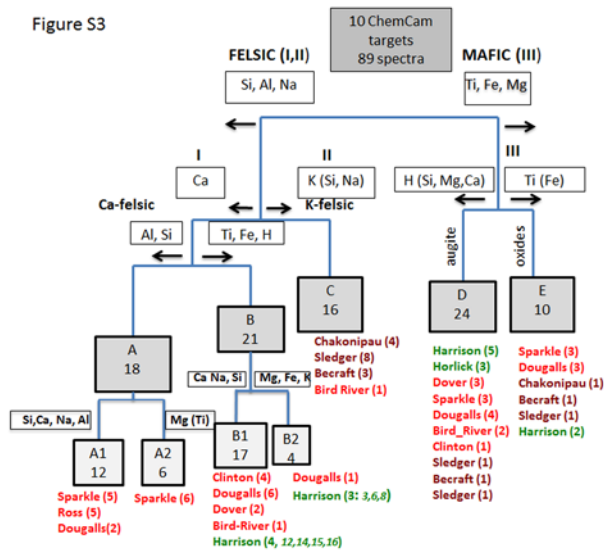


Figure S4

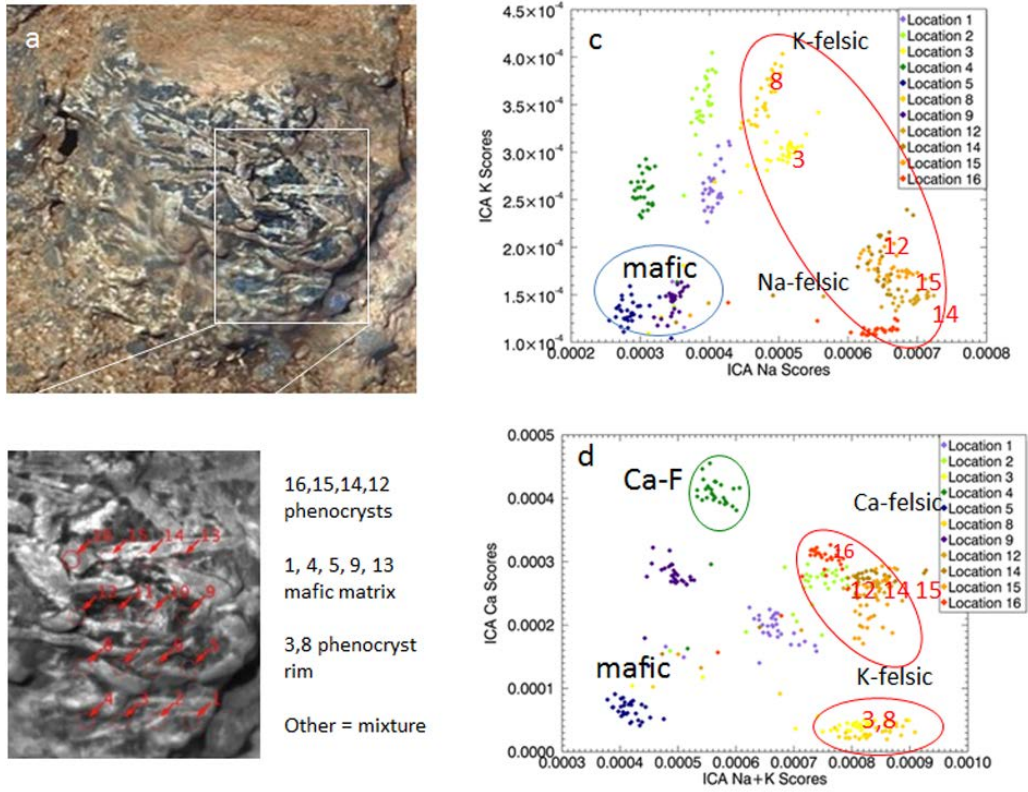


Figure S5

