B4.1-0036-18 SLOPE STREAKS SEGMENTATION USING WAVE ATOMS AND MORPHOLOGICAL OPERATORS

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Slope streaks are a form of down-slope mass-movements that typically occur on the surface of Mars. The study of slope streaks has become a hot topic in recent years, motivated especially by scientists and astronomers who seek to understand this phenomenon and its hypothetical relationship with transient water activity on Mars. Since detecting slope streaks plays an important role in most computer vision systems and cartographic products, in this work we propose a new approach to detect and segment slope streaks in Mars images. We combine a recent harmonic analysis tool called wave atoms with classical morphology operators as an effective and concise framework. The wave atoms-driven model is a variant of 2D wavelet packet that improves the sparse representation of specific stripe-like features in the image when compared to more popular expansions such as wavelets, Gabor atoms and curvelets. In fact, the wave atoms package has two main advantages when compared against others texture analysis tools: first, the ability to systematically capture a certain pattern at pre-selected scales, and second, it ensures high anisotropy when representing image features such as stripes and oscillatory textures. We show that the designed framework produces high scores in terms of quantitative quality metrics when assessed on various data sets of Mars surface.

B4.1-0037-18 SURFACE GEOLOGY AND PHYSICAL PROPERTIES INVESTIGATIONS OF THE INSIGHT LANDING SITE

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Although the prime focus of the InSight lander is determining the interior structure of Mars, it will also carry out geology and physical properties investigations that will test surface materials and subsurface structure predicted by interpretations of remote sensing data used to select the landing site in western Elysium Planitia near 4.5°N, 135.9°E [1]. Mapping of platy and smooth lava flows indicates the plains surface on which the InSight ellipse is located is composed of Early Hesperian volcanics about 2 km thick [2]. A surficial layer of fragmented regolith 3-17 m thick is indicated by the presence of rocks in the ejecta of fresh craters 30-200 m in diameter (but not smaller craters), and exposures of relatively fine-grained regolith that grades with depth into coarse blocky breccia over strong, jointed bedrock in nearby Hephaestus Fossae in southern

Utopia Planitia [3]. The surface is dominated by smooth terrain with a homogeneous thermal inertia of 200 J m−2 K−1 s−1/2 consistent with a surface composed of dominantly cohesionless, fine sand (0.17 mm) or sandy soils with low cohesion (<few kPa). Rock abundance is very low (<6%) except near sparsely distributed rocky ejecta craters where it can be as high as 35%. The albedo and dust cover index of the landing site are similar to dusty and low-rock abundance portions of the Gusev cratered plains, and both sites have been dominantly shaped by impact and eolian processes [1,4].

The geology and physical properties investigations will also provide critical information for both placing the instruments

(seismometer and heat flow probe with mole) on the surface after landing and for understanding the nature of the shallow subsurface and its effect on transmitted seismic waves [2]. Two color cameras on the lander will obtain multiple, wideangle stereo images of the surface and its interaction with the spacecraft and instruments.

Images will identify the geologic materials and features present, quantify their areal coverage, help determine the basic geologic evolution of the area, and provide ground truth for orbital remote sensing data. Continuous measurements of wind speed and direction offer a unique opportunity to correlate dust devils and high winds with eolian changes imaged at the surface and to determine the threshold friction wind stress for grain motion on Mars. A radiometer will determine the hourly temperature of the surface in two spots, which will allow derivation of the thermal inertia of the surface materials present and their particle size and/or cohesion. During the first two weeks after landing, these investigations will support the selection of instrument placement locations that are relatively smooth, flat, free of small rocks and load bearing. Location of the lander in high-resolution orbital images and direct-to-Earth spacecraft tracking will yield the best located position on Mars in both inertial and cartographic space. Soil mechanics parameters and elastic properties of near surface materials will be determined from experiments with the arm and scoop of the lander (indentations, scraping/trenching, and piling), passive monitoring of seismic waves, mole penetration and thermal conductivity measurements from the surface to 3-5 m depth, and the measurement of seismic waves during mole hammering [2].

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B4.1-0038-18 ANALYSIS OF GEOMORPHOLOGY OF ARSIA-MONS USING MCC, VIKING, HIRISE AND MOLA DATASET

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In this investigation we use MCC, Viking, HiRISE and MOLA elevation data to understand the geomorphology of Arsia Mons. Arsia Mon is located in the Tharsis rise. The features identified as 1) scrap, which is considered to be the displacement of the land surface due to the movement along faults during tectonic events; 2) lobate facies which are convex lobes and resembles like rock-glacier on earth; 3) Knobby Facies, this sedimentary deposition often interpreted as a sublimation till which is resulted from downwasting of ash-rich glacier ice; 4) shield of Arsia Mons; 5) Caldera Floor, which represents the surface of the bowl-like depression inside the magma chamber ; and 6) Caldera Wall, it represents the surrounding walls Arsia Mons volcano.