Paper ID: 14399
student

SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Part 2 (3B)

Author: Mr. Raymond Francis
Western University, Canada

Dr. John Moores
Western University, Canada
Dr. David Choi
NASA, United States
Dr. Kenneth McIsaac
Western University, Canada
Dr. Gordon Osinski
The Institute for Earth and Space Exploration, Canada

OBSERVATIONS OF WIND DIRECTION BY AUTOMATED ANALYSIS OF IMAGES FROM MARS AND THE MSL ROVER

Abstract

Past missions to Mars have revealed the presence of clouds in the atmosphere, visible both from the surface and from orbit. Where atmospheric sounding instrumentation is not available, the motion of such clouds can be used as a proxy for wind observations. Such observations aid in the study of the martian climate, as well as of mass and moisture transport in the atmosphere. An understanding of the water cycle on Mars has important implications for models of the transport, distribution, and preservation of any biomarkers which might exist from past or present life on the planet.

The present work describes an algorithm for automated image analysis, the function of which is to identify clouds in sequences of images of the martian sky, and to track their movement across frames in the sequence to allow a calculation of the wind speed. The system is currently under development using imagery from previous surface missions, particularly the Phoenix lander, for reference and test. Past work has used these images for manual tracking of clouds and wind estimation; the current effort aims to automate the process to allow faster and more accurate analysis. The work will be finalized with the availability of data from an improved imager aboard the Mars Science Laboratory (MSL) rover, due at Mars in August 2012. Once tested with the MSL imagery, the system will be used for regular observations of the wind in the atmosphere near the MSL landing site.

The image-analysis strategy used in the algorithm is presented, and its performance to date in recognizing the types of clouds expected on Mars is described. The tracking performance between frames in the reference data is shown, and the future utility of the system is described.

The work is undertaken under a NASA Participating Scientist project, with support from the Canadian Space Agency.