

NEF09-2009-020011

Abstract for an Invited Paper
for the NEF09 Meeting of
the American Physical Society

The Oscillating History in the Exploration of the Red Planet

SUZANNE M.M. YOUNG, Phoenix Mission Science Plan Integrator

The oldest, and very vague, map of Mars was drawn in 1659 by Christiaan Huygens, who like Galileo, was pointing his telescopes to nearly anything the sky presented him. In the 1700s, William Herschel, followed by Johann Hieronymus Schroeter, observed Mars extensively and attempted to map its features. In the mid-1800s, Warren De la Rue refined the features on maps of Mars enough to first display, unknowingly, the north and south polar glaciers of Mars. In 1877 Giovanni Virginio Schiaparelli observed a dense network of linear structures on the surface of Mars which he called “canali” (Italian: meaning “channels”, but mistranslated as “canals”). Schiaparelli also named the “seas” and “continents” of Mars. With canals and seas, massive speculation began about water and life on Mars, perhaps even a civilization responsible for the canals (and, one might hope, with gondolas and singing gondoliers). Percival Lowell was captivated by the implications of these purported canals and spent much of his life trying to prove the existence of intelligent life on the red planet in the early 1900s. On October 30, 1938, Orson Welles broadcast on radio an adaptation of H.G. Wells’ novel “War of the Worlds”. This caused some listeners to panic. The assumption that Martians were benevolent was severely dented. With NASA’s early exploration of Mars - Mariner Missions in the 1960s, and the Viking Missions in the 1970s - Mars was returned to a desolated place, although it now seems possible that the Viking landers were literally inches away from discovering water ice on Mars, finally encountered in abundance over 30 years later by the Phoenix Mission. With the detection of water by the Odyssey Orbiter, geological evidence for ancient water found by the Rovers, the highest resolution images ever taken of Mars by the Mars Reconnaissance Orbiter, and the most recent discoveries by the Phoenix Lander, theories have almost come full circle in returning Mars to a place with water, and possibly microbial (presumably unintelligent) life. The Phoenix Mars Scout landed on 25 May 2008 at the northern polar latitude of 68°N. Analyses included excavating the Mars regolith with a robotic arm and delivering samples to payload instruments including a scanning calorimeter-mass spectrometer (TEGA) and an electrochemical analyzer, (WCL). The work reported here addresses the implications of the Phoenix observations for the prospects of Mars bihabitability. TEGA confirmed the presence of water ice in the regolith, not bound as a chemical ligand. The salts by WCL offer evidence for the presence in the past of liquid water on Mars. Sources of bio-energy, key bioelements and ions, and environmental toxicity and pH will also be discussed with our current understanding of the red planet.