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DIGITAL ASTRONAUT PHOTOGRAPHY: A DISCOVERY DATASET FOR ARCHAEOLOGY

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Astronaut photography acquired from the International Space Station (ISS) using commercial off-the-shelf cameras offers a freely-accessible source for high to very high resolution (4-20 m/pixel) visible-wavelength digital data of Earth. Since ISS Expedition 1 in 2000, over 373,000 images of the Earth-Moon system (including land surface, ocean, atmospheric, and lunar images) have been added to the Gateway to Astronaut Photography of Earth online database (http://eol.jsc.nasa.gov). Handheld astronaut photographs vary in look angle, time of acquisition, solar illumination, and spatial resolution. These attributes of digital astronaut photography result from a unique combination of ISS orbital dynamics, mission operations, camera systems, and the individual skills of the astronaut.

The variable nature of astronaut photography makes the dataset uniquely useful for archaeological applications in comparison with more traditional nadir-viewing multispectral datasets acquired from unmanned orbital platforms. For example, surface features such as trenches, walls, ruins, urban patterns, and vegetation clearing and regrowth patterns may be accentuated by low sun angles and oblique viewing conditions (Fig.1). High spatial resolution digital astronaut photographs can also be used with sophisticated land cover classification and spatial analysis approaches like Object Based Image Analysis, increasing the potential for use in archaeological characterization of landscapes and specific sites.

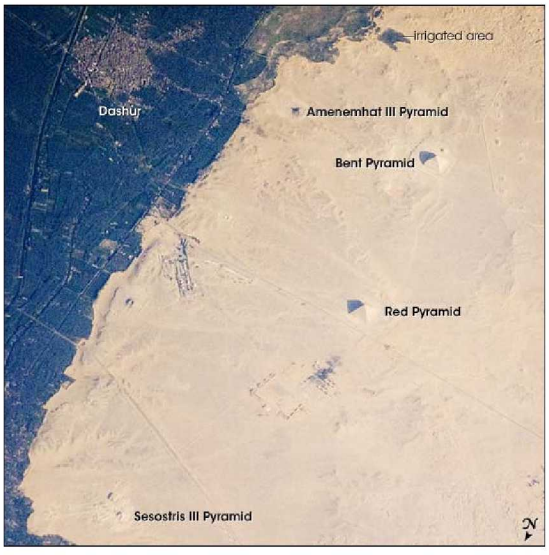

Figure 1. Astronaut photograph ISS017-E-8285 of the necropolis near Dashur, Egypt. Several large pyramid complexes are identified, but many other manmade surface features are also visible. The image was acquired from the ISS on May 30, 2008 using a Nikon D2Xs digital camera and an 800 mm lens.