Suppressing Error Terms for Planetary and Terrestrial Topographic Remote Sensing

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DATE: June 14, 2016 – Tuesday – 2:00 PM

LOCATION: Conference Room 2.806, WPR Building, 2nd Floor 3925 W. Braker Lane, Suite 200, Austin, Texas 78759

ABSTRACT: Today, in-orbital imagery and reliable 3D topographic data, digital terrain models, for example, have become widely available for objects of our Solar System from Mercury to Pluto, as well as for terrestrial surfaces. Such data are the product of international efforts during recent decades to develop instrumentation and space-science technology, which have significantly improved the reliability and spatial resolution of remotely sensed data of the surfaces of Earth and other planets. As a consequence, simple visual interpretation of Earth and planetary surfaces has swiftly been complemented by sophisticated modeling and morphometric measurements. However, the greatest barrier to making full use of quantitative analyses of remotely sensed data of Earth and planetary topographies are the effects of various error components caused by, for example, inaccurate sensor models, deficient ground control, and propagation delays of electromagnetic waves.

In response, this talk focuses on case studies that can guide the construction of precise 3-D topographies, observations of Earth, and planetary surface migrations using in-orbital optical or microwave sensors integrated with hierarchical geodetic control strategies, multi sensor data fusion, and a numerical model in order to overcome geometric and radiometric error components. Seamless Martian surface stereo modeling and interferometric/differential interferometric Synthetic Aperture Radar (InSAS–DInSAR) will be reviewed along with practical scientific applications, including the observations of aeolian processes, the modeling of hydrological processes, and both volcanic and glacial geomorphological research.

Coffee & cookies will be served
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