Detecting differences between vegetation growth on sloped terrains with different inclination using spaceborne synthetic aperture radar

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Differences in vegetation between adjacent areas can be detected using SAR remote sensing techniques. This may be done for testing and demonstrating that natural sloped terrains have different vegetation covers.

Spaceborne SAR (Synthetic Aperture Radar) has been used extensively to map and monitor vegetation since the 1990s, when the first SAR missions were launched. SAR sensors are active systems that transmit a coherent radar signal to the Earth's surface and measure the characteristics of the response backscattered from the target area. The interaction of the radar signal with vegetation is a function of the vegetation type and of the radar wavelength. Studies of forest biomass are typically carried out using longer wavelengths such as L-band (e.g. Le Toan et al., 1992) as the signal is able to penetrate the canopy and interact with the branches and trunks of the forest. Shorter wavelengths (e.g. X- and C-band) are less able to penetrate vegetation as they interact with leaves and smaller branches.

SAR techniques can be exploited to identify variations in vegetation characteristics and biomass in adjacent areas and survey large track of land in preparation to earth moving and slopes construction. For applications in arid areas, where it is necessary to characterize the north-slope effect, the difference in ground response between bare or lightly vegetated areas of ground surface and more heavily vegetated north-facing slopes is significant and can be measured.

Coherence maps, obtained by comparing the radar signal backscattered from different portions of the grounds surface and generated from repeat-pass SAR imagery, will provide relevant information. Radar amplitude data will add a further informative layer.

SAR data layers will be coupled with information on the local topography, which is required to precisely determine slope aspect (direction), will be obtained from

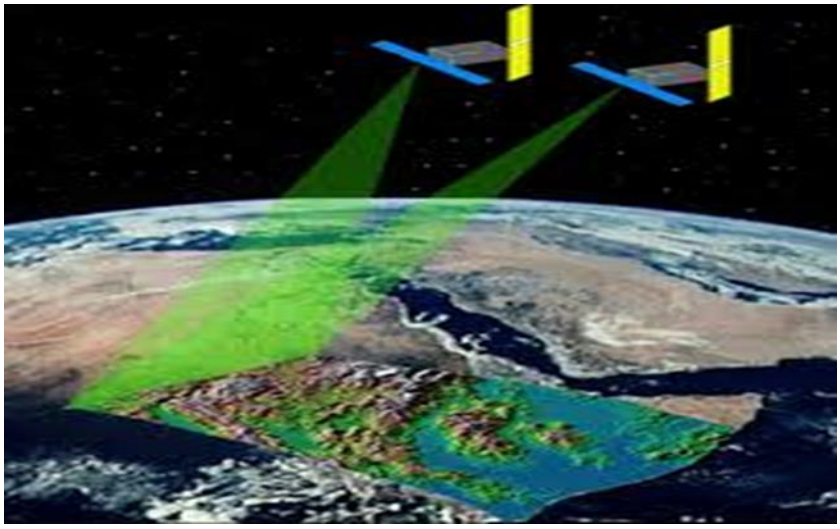

Figure 7: Rendering of spaceborne synthetic aperture radar (SAR), of Tele-Rilevamento Europa (TRE) Canada Inc.

available global DEMs, such as that produced by the SRTM (Shuttle Radar Topography Mission) mission (Rabus et at., 2003).

References

Le Toan, Thuy, et al. "Relating forest biomass to SAR data." Geoscience and Remote Sensing, IEEE Transactions 30.2 (1992): 403-411.

Rabus, Bernhard, et al. "The shuttle radar topography mission—a new class of digital elevation models acquired by

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