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A THEORETICAL APPROACH TOWARDS DETECTING GLOBAL DECREASE IN DENSE FOREST COVER USING REFLECTED GNSS SIGNALS

Abstract

Over the past decade, the Global Navigation Satellite System Reflectometry (GNSS-R) principle has been extensively used to study ocean characteristics, ice topography and the electron content in the ionosphere. This paper will focus on studying the biomass above earth's surface.

GNSS signals cannot pass through dense forest cover and concrete buildings and most of it gets reflected off the surface and scatters around in different directions. There is no possible method of obtaining GPS signals while navigating through dense forests because the signals are very weak. However, the reception of these reflected signals prove to be useful for the study of depletion of forest covers around the globe through an experimental CubeSat/Small Satellite in the LEO. The CubeSat is integrated with a receiver and a left hand circular polarised (LH) antenna capable of receiving the reflected signals.

Since dense forests are continuous in nature, any areas being depleted due to forest fires or a large clearing by humans makes the Signal to Noise Ratio (SNR) spread of the received signal significantly more as less power is lost by the reflected signals due to the formation of more even surfaces. On the other hand, the peaks in the SNR spread of signals reflected off the dense forest cover is much less as more power is lost in the process.

These facts have been discussed and established using mathematics and small scale experiments and therefore, the paper focuses on an effective method for analysing the dense forest cover above the earth's surface. The idea also has a prospect of being implemented in the future series of our RVSAT nano-satellites and is under deliberation. Overall, the method turns out to be cost efficient, requires less computational needs and has the ability to provide essential earth observational data under a reduced information bandwidth and hence, enables faster response to rapid depletion of forest covers across the globe, which is a major concern in the modern day scenario.