A review on hyperspectral remote sensing for homogeneous and heterogeneous forest biodiversity assessment

Abstract

This review paper evaluates the potential of hyperspectral remote sensing for assessing species diversity in homogeneous (non-tropical) and heterogeneous (tropical) forest, an increasingly urgent task. Existing studies of species distribution patterns using hyperspectral remote sensing have used different techniques to discriminate different species, in which the wavelet transforms, derivative analysis and red edge positions are themost important of them. The wavelet transform is used based on its effectiveness and determined as the most powerful technique to identify species. Furthermore, estimations of relationships between spectral values and species distributions using chemical composition of foliage, tree phenology, selection of signature training sites based on field measured canopy composition, selection of the best wavelet coefficient and waveband regions may be useful to identify different plant species. This paper presents a summary on the feasibility, operational applications and possible strategies of hyperspectral remote sensing in forestry, especially in assessing its biodiversity. The paper also reviews the processing and analysis of techniques for hyperspectral data in discriminating different forest tree species.