

MICHIGAN MICROWAVE CANOPY SCATTERING MODELS (MIMICS)

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ABSTRACT

MIMICS is a radiative-transfer model for radar backscattering from forest canopies. It was developed to cover the 1-10 GHz frequency range and the angular range from 15°-70°, relative to normal incidence. It accounts for both like- and cross-polarized scattering in the canopy. The canopy is divided into three regions: Region 1 represents the crown layer, Region 2 is the trunk layer, and Region 3 is the underlying surface. The crown layer is characterized by the average height and diameter of a tree's crown and size, shape, and dielectric constant distributions of the leaves and branches. The trunk region is characterized by the number density of trunks and the trunk diameter, height, and dielectric constant. The ground region is characterized by its roughness parameters and dielectric constant. MIMICS accounts for two types of scattering mechanisms: (1) direct backscattering, such as from individual leaves and branches and from the ground surface, and (2) multiple scattering involving two scattering points that are not both members of the same region. These include trunk-ground scattering, leaf-ground scattering, etc.

This paper presents an overview of MIMICS, describes its salient features, and compares its results with experimental data.

Keywords: Microwave, backscatter, model, vegetation, forests