

## FOREST MODELING OF JACK PINE TREES FOR BOREAS

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As part of the intensive field campaign (IFC) for the Boreal forest ecosystem-atmosphere research (BOREAS) project in August 1993, the NASA/JPL AIRSAR covered an area of about 100 km x 100 km in the Prince Albert National Park in Saskatchewan, Canada. At the same time, ground-truth measurements were made in several stands which have been selected as the primary study sites, as well as in some auxiliary sites. This paper focuses on an area including Jack Pine stands in the Nipawin area in the park. Upon examining the SAR data from stands of old and young Jack Pine (OJP and YJP) it is observed that the OJP stand produces HH backscatter at P-band which is significantly (about 9 dB) higher than that from YJP. The OJP trees are taller and have larger radii, but are much more sparse than the YJP trees. The YJP trees, on the other hand, have denser and greener crown layer. The radar backscatter values for VV polarization and at other frequencies do not manifest such a large difference, and for HV polarization, although L-band return is again larger than C- and L-bands, the difference is not as marked. To explain this distinct signature of OJP stands, a forest scattering model is used in conjunction with the ground-truth measurements. The forest model includes the major scattering mechanisms (volume, double-bounce, and single-bounce) by taking the forest component interactions into account. The contribution from each of the scattering mechanisms to the total backscatter is calculated and their differences for OJP and YJP stands are evaluated. The results are used to discuss the effect of the physical properties of the forest components in each stand on radar backscatter, in particular, for HH polarization at P-band.

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