

AN EXAMINATION OF MULTI-BAND MULTI-POLARIZATION RADAR DATA FOR FORESTED WETLAND IDENTIFICATION IN NEW HAMPSHIRE

Susan E. Campbell[†], Mark J. Ducey, William A. Salas

Introduction

The ability to identify forested wetlands across the landscape is becoming increasingly important for land managers. They provide habitat for numerous wildlife species and present operational challenges if they can be logged. This poster examines the potential of multi-band, multi-polarization radar data to identify forested wetlands in New Hampshire.

Light based satellite sensors, like Landsat TM, are only able to “see” the uppermost layer of objects. Forested wetlands present a challenge because the forest canopy will hide the water beneath. Red maple (*Acer rubrum*) swamps and upland red maple forests are spectrally similar. Similarly, a forested spruce (*Picea spp.*) wetland would not be spectrally different from a spruce upland forest. The New Hampshire Land Cover Assessment: Final Report (Justice et al. 2002) used the National Wetland Inventory, as a mask to split forested wetlands from upland forest. This method resulted in a producer’s accuracy of 74.3% and a user’s accuracy of 86.7% for forested wetlands identification.

Radar has been found to be useful to study forest biomass (Dobson et al. 1995), inundated floodplains (Townsend, 2002), and swamps (van Zyl et al. 1990). Many studies, like Dobson and Townsend, focused on forested areas that have homogeneous forest canopy types and/or reasonably flat terrain.

In April and October 1994 the Shuttle Imaging Radar-C/X-band Synthetic Aperture Radar (SIR-C/X-SAR) missions were flown, generating a multi-band, multi-polarization dataset. The data swathes for New Hampshire are being examined for ease in finding forested wetlands. It is expected that the structural and ground information provided by radar may make a radar based classification of forested wetlands at least as accurate as the New Hampshire Land Cover Assessment method.

Methodology

The New Hampshire forested landscape is heterogeneous containing patches of pure conifer, pure hardwood, and mixed conifer-hardwood forest. The data swathes also cover a varied terrain. Known forested wetlands are being used as training data for the image processing. These are paired with known uplands of the same forested cover-type. These areas will be identified on Landsat TM imagery and the SIR-C imagery. The Landsat TM and SIR-C/X-SAR imagery will then be classified for cover types and the wetlands identified.

Because of the small size of the sample and the region studied the unknown and newly identified wetlands and like upland forest will be located on the ground and confirmed in person. An error matrix (Congalton and Green 1999) will then be created and compared with the error matrix from the New Hampshire Land Cover Assessment: Final Report. If this method proves to be accurate, radar datasets generated by future satellite-based platforms may provide repeated coverage. Multi-temporal studies could then allow not only easy identification of forested wetlands, but also change detection in those wetlands.

[†]Graduate Student (SC) University of New Hampshire, Durham, NH; Associate Professor (MD) Department of Natural Resources, University of New Hampshire, Durham, NH; President and Manager (WS) Applied Geosolutions, LLC, Durham, NH. SC is corresponding author. To contact, call (603) 759-5737 or email at scampbell@chimeron.net.

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