Evaluation of Radar Images for Updating Geo-Forestry Information

Abstract

As part of the annual program of the forestry accounting service of the Department of Forestry of Quebec, several hundred thousand dollars are allocated to the acquisition of air photos for the management of forest inventories. With a view to reducing the costs of this operation, alternative solutions are being explored. To this end, the use of remotely sensed satellite images could lead to significant savings in data acquisition.

Currently, optical images (Landsat-TM or SPOT) are used in operations for certain aspects in the processing of geo-forestry information. However, optical images are subject to the weather conditions prevailing from year to year, such that the managers of the program cannot be assured of good images every year for all parts of Quebec. This is a major limitation, as the managers can hardly tolerate random absences of images in the process of updating forest inventories.

Recent research in the field of RADAR images suggests a potentially advantageous application in the updating of geo-forestry information. RADAR is able to penetrate cloud cover and is unaffected by poor weather conditions. We know that airborne SAR images allow rapid detection of major disturbances (burns, clear cuts and strip cuts). However, there are still a number of unanswered questions about the potential for detecting partial disturbances in the forest cover (such as diameter-limit cutting and selection cutting).

The objectives of this study are (1) to evaluate the potential of airborne SAR images (SAR C/X of CCRS in C-band) for the annual updating of geo-forestry information; (2) to evaluate the potential of hybridizing airborne SAR images with satellite optical images in the forest environment; and (3) to evaluate the potential of certain satellite SAR images of the ERS-1 and J-ERS-1 types. The airborne SAR images and SPOT and Landsat-TM images used in this project are ortho-images resulting from rigorous geometric correction developed at the Canada Centre for Remote Sensing.

A first interpretation of the images reveals that the scenes taken in winter provide a clearer distinction of forest cut boundaries than do images taken when snow is absent. The snow cover smooths and masks regeneration in cutovers, making them easier to distinguish from nearby forest cover.