**2005-2010 20m Land Cover Of Canada South Of Treeline**

**Overview**

The Government of Canada acquired a national image coverage from the Systeme Pour l'Observation de la Terre (SPOT 4-5) satellites that includes four multispectral bands in the visible to shortwave infrared region at 20m spatial resolution. Five years from 2005-2010 were necessary to image all of Canada under clear-sky conditions, while acquisition anniversary dates were less important provided the data were imaged during the snow-free period. These data were downloaded from the GeoBase Orthoimage 2005-2010 dataset (http://www.geobase.ca/geobase/en/data/imagery/imr/description.html) and used to map 2005-2010 land cover south of treeline. Northern Canada has not currently been remapped since circa-2000 due to technical challenges associated with land cover variability and image acquisition dates relative to short summers. This land cover product includes 16 generic classes based on plant functional type and a minimum mapping unit of 20m. Radiometric normalization was applied to balance images acquired near mid-summer during the 'peak-of-season' temporal window. The combined Enhancement and Classification by Progressive Generalization methods were used to classify large-area balanced mosaics over twenty mapping zones. Image interpretation was guided using high resolution imagery and other content in Google Earth. Knowledge of land cover spectral signatures, field experience and published reports were also used to assist interpretation in many regions. Remaining images acquired outside the peak-of-season window in early spring or late fall were subsequently classified using decision trees trained on data from overlapping classified peak-of-season images. Accuracy was assessed using ground truth data acquired during several field campaigns conducted with other government departments such as Parks Canada and the Geological Survey. This sample was enhanced using points interpreted in Google Earth as described above to provide a more even spatial coverage of Canada. Overall accuracy was assessed at 71% using 1566 reference points, more than half of which were acquired in the field. When assessed using only land cover that was homogeneous within 3 by 3 pixels to account for potential geolocation errors, accuracy increased to 85% for 349 points that were biased towards easily classified classes such as water.



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**Product details**

Data are available in 1:250k National Topographic System (NTS) tiles at 20m spatial resolution and an effective mapping scale of 1:50k. This dataset includes 631 tiles covering Canada south of treeline excluding agriculture. Land cover is mapped to 16 classes according to the classification legend is shown in Table 1. Tiles are available in 8-bit GeoTiff format with pseudo-colour tables applied. Tiles are generated in the Lambert Conformal Conic projection specified in Table 2. 1:250k NTS tiles are two degrees longitude by one degree latitude south of 68 degrees and four degrees longitude by one degree latitude north. Each NTS tile in LCC projection contains the lat / long NTS tile extent with extra data on all sides due to the orientation of the LCC NTS tile relative to the lat / long grid. A list of images that were used to map land cover is provided for each NTS tile, with corresponding acquisition timing as being either Peak-of-Season (PoS) near mid-summer, or Off-Peak (OP) during spring or fall. A quality flag image maps acquisition timing as well as topographic shadow calculated from the sun position during acquisition relative to Canadian Digital Elevation Data slope and aspect.

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| **Table1. Classification Legend** | | | | | | | | | | | | | |
|  | **tree crown closure** |  | **class** | **density** | **functional type 1** | **fractional cover 1** | **functional type 2** | **fractional cover 2** | Range % Tree Cover\* | | Average % Tree Cover\* | | |
|  | **code** | **Needleaved** | **Broadleaved** | **N** | **Needleaved** | **Broadleaved** |
| Forest | > 15% | 1 | Evergreen conifer forest | high | Trees A3 |  |  |  | >= 20 % | < 2.5 % | 184 | 42.78 | 0.11 |
|  |  | 2 | Evergreen conifer forest | medium | Trees A3 |  |  |  | >= 12.5 %,  < 20 % | < 2.5 % | 58 | 18.57 | 0 |
|  |  | 4 | Mixed forest |  | Trees A3 |  |  |  | > 2.5 % | >= 2.5 % | 106 | 14.68 | 19.18 |
|  |  | 5 | Deciduous forest |  | Trees A3 |  |  |  | <= 2.5% | >= 7.5 % | 73 | 0.44 | 38.27 |
| Non-forest | <= 15% | 3 | Evergreen conifer | low | Trees A3 |  |  |  | < 12.5% | < 2.5 % | 34 | 5.66 | 0.11 |
|  |  | 6 | Young forest |  | Shrubs A4 | >= 40% | Trees A3 | >= 30% |  |  |  |  |  |
|  |  | 7 | Recent disturbance |  | Trees A3 - refer to comments field |  |  |  |  |  |  |  |  |
|  |  | 8 | Erect shrub |  | Shrubs A4 | >= 60% |  |  |  |  |  |  |  |
|  |  | 9 | Herb - shrub |  | Herbaceous A2 | >= 40% | Shrubs A4 | >= 30% |  |  |  |  |  |
|  |  | 10 | Herbaceous |  | Herbaceous A2 | >= 60% |  |  |  |  |  |  |  |
|  |  | 11 | Bryoid |  | Lichens/ Mosses A7 | >= 60% |  |  |  |  |  |  |  |
|  |  | 12 | Barren |  | B16 - Bare Areas - unconsolidated A2 | >= 60% |  |  |  |  |  |  |  |
|  |  | 13 | Sparse conifer lichen |  | Lichens/ Mosses A7 | >= 40% | Trees A3 | >= 30% |  |  |  |  |  |
|  |  | 14 | Herbaceous wetlands |  | A24 - Nat. & Semi-Nat. Aquatic Veg. | >= 60% |  |  |  |  |  |  |  |
|  |  | 15 | Ice |  | B28 - Inland Waterbodies Snow & Ice - snow and ice A2 | >= 60% |  |  |  |  |  |  |  |
|  |  | 16 | Water |  | B28 - Inland Waterbodies Snow & Ice - water A1 | >= 60% |  |  |  |  |  |  |  |
| \*Tree Cover = tree crown closure X fractional cover | | | | | | | | | | | | | |

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| **Table 2. The parameters of the Lambert Conformal Conic (LCC) projection and Earth ellipsoid model used for 1:250k NTS tiles** | |
| **Parameter** | **Value** |
| *Earth ellipsoid* | GRS 1980 |
| Major semi-axis, a | 6378137 [m] |
| First eccentricity | 0.00669438002290 |
| Ellipsoid flattening, f | 0.00335281068118 |
| *Projection* | LCC |
| 1st parallel | 49.00 [degree] |
| 2nd parallel | 77.00 [degree] |
| Latitude of origin | 0 [degree] |
| Central meridian | –95.00 [degree] |
| Easting | 0 |
| Northing | 0 |
| Gridbox size, x | 20 [m] |
| Gridbox size, y | 20 [m] |

**Reading data**

Any image software that can open tiff file format can display these data without georeferencing information. Remote sensing software such as PCI, ENVI or ArcGIS can open these data and display them with associated georeferencing.

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