Clisbako 09 3c/09

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Grasswood Geoscience

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Tel. (604) 722-2239

April 13th, 1992

Mr. Dave Heberline
Minnova Inc.
3rd Floor, 311 Water Street
Vancouver
V6B 1B8

Dear Dave,

Re: Winter Landsat-MSS image of the Clisbako area, Nechako Plateau

A winter Landsat-MSS image of the Clisbako area of the Nechako Plateau is enclosed. The image was acquired on March 16th, 1990. At that time the ground was covered with snow, and the sun was 32° above the horizon.

I do not have the summer image in front of me, so I cannot compare the two images directly, however, I expect that this image provides much better expression of structural features, both linear and circular. If you feel that this image may be of some value in your exploration programs in the Nechako area, there are several options open to you. You could carry out a geological interpretation directly from the MSS image. On the other hand, if you need better spatial resolution, you may wish to consider using a Landsat-TM image; either a hard-copy image such as this one, or a digital image, which can be processed and enhanced.

I would be happy to assist you with any further remote sensing work in the Nechako Plateau or elsewhere.

Thank you for the opportunity to work on this project. My invoice is enclosed.

Yours sincerely,

Steven Earle

Winter Landsat-MSS image of the Clisbako area, Nechako Plateau

A Landsat Multi Spectral Scanner (MSS) image has been obtained for the Clisbako area, on the Nechako Plateau of central British Columbia. The image was acquired by the Landsat-V satellite during March of 1989, when the area was covered with snow. The objective of this project is to assess the potential of winter Landsat image data for the interpretation of geological features in this terrain. Winter imagery is especially suited for this purpose because some of the noise associated with variations in the vegetation is suppressed by the snow cover, and, more importantly, the subtle geological features are accentuated by the low sun angle.

A Landsat-MSS Band 2 image positive transparency has been purchased from Radarsat International. The image was acquired on the 16th of March, 1989, at 10:41 AM local time. At that time the sun was 32° above the horizon, at an azimuth of 149°. The pixel-size is 82 m along track (north-south) and 57 m across track. The image has been enlarged to a scale of 1:250,000. At this scale there are three pixels per mm in the along-track direction, and 4 pixels per mm in the across-track direction. The image has been printed as a negative rather than a positive because, in spite of the snow, the forest cover is sufficiently dense in this area to make the positive image very dark. Experience with this type of image in other areas has shown that geological features are more easily interpreted from a light coloured image than a dark image.

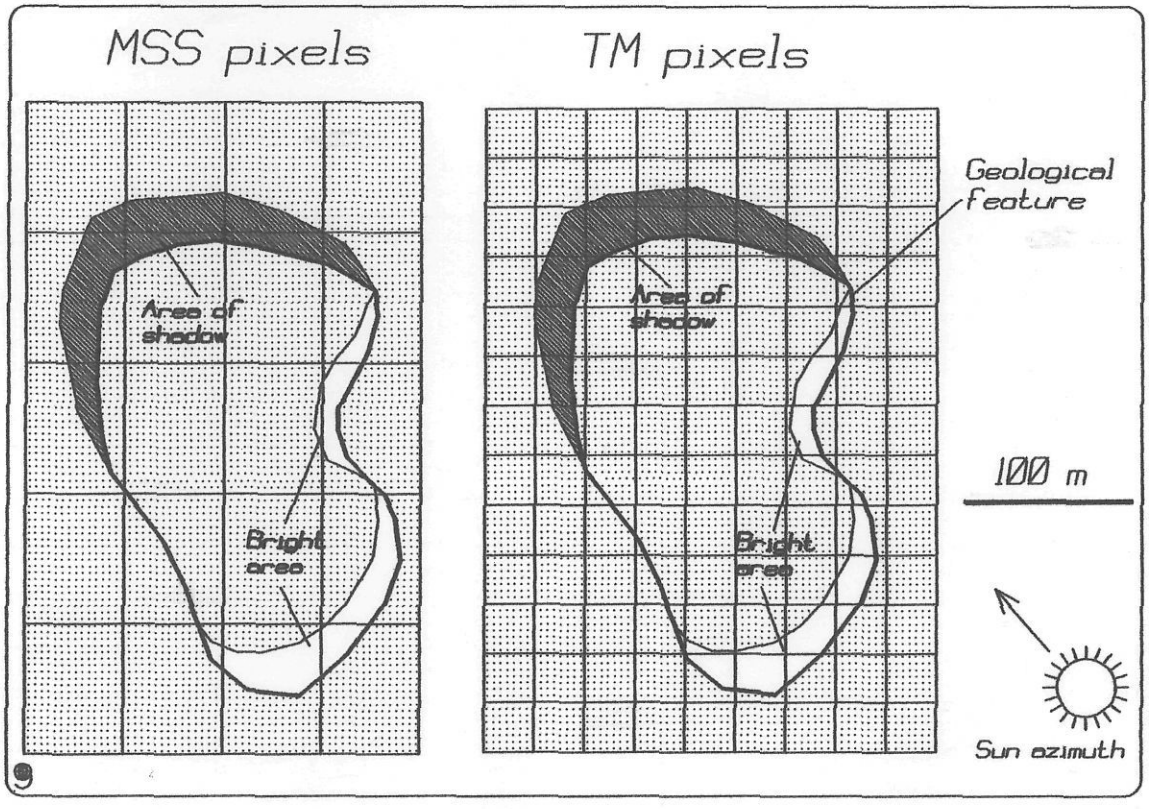
The most prominent dark features on this negative image are the snow-capped peaks of the Igalchuz and Itcha Ranges, in the southwestern part of the image. The snow-covered ground also shows through in logged areas, and these are evident as a patchwork of dark shapes throughout the northern two-thirds of the image area. The lakes, which are ice covered, also appear dark. The largest lake is Natalkuz Lake (part of the Nechako Reservoir) in the northwestern part of the image. The ice-covered Fraser River is evident in the northeastern corner of the image, with Highway 97 and several small towns towards the east.

Although this winter image does not provide information on lithological variations, it does give a clear picture of regional geological structures, both linear features, and circular features. Linear features are evident throughout the image area, and, based on a brief examination, it would appear that a majority of these features are in the north-south and east-west directions. (Note that the image is skewed from north by approximately 14°.) The most prominent of the circular features is a 15 km diameter ring in the central part of the image, adjacent to Narcosli Lake and about 10 km north of the Clisbako property.

Although this image provides a clear picture of the regional geological structures in the area, it may not provide as much detailed information as would be useful in a property-scale program. Landsat-TM images are much better suited for detailed structural mapping than Landsat-MSS images, because of their much better spatial resolution. A TM pixel is 30 by 30 m, compared to the 82 by 57 m of this image. The area of one MSS pixel is occupied by more than 5 TM pixels, or, in other words, a 100 by 100 m feature on the ground is represented by 11 TM pixels but only 2 MSS pixels.

A comparison of the spatial resolution of Landsat-TM versus Landsat-MSS is given in Figure 1. A positively weathering intrusive body with a diameter of approximately 200 m might be characterized by shaded and bright areas as shown. In this hypothetical example there are several cases where the 30 by 30 m TM pixels would be either almost entirely within shadow or almost entirely bright. These pixels would thus have either low or high reflectance values, and this geological feature would probably be visible on a TM image. On the other hand there is unlikely to be any situation where a 57 by 82 m MSS pixel would be largely within shadow or largely bright, hence none of these pixels would have particularly high or low reflectance, and this geological feature would not be visible on an MSS image.

Figure 1 Comparison of the spatial resolution of Landsat MSS and TM



In summary, a winter Landsat-MSS image of the Clisbako area has provided a significant amount of structural geological information. Winter images are well suited for this purpose in this terrain, largely because the subtle topographic variations related to geological features are accentuated by the low sun angle. Although the 1:250,000 scale image shown here gives a comprehensive picture of regional geological features, the spatial resolution of Landsat-MSS data is probably not sufficient to identify relatively small features. Landsat-TM data, which are available for this winter scene, could be used to provide a more detailed picture of geological structures in the Clisbako area.

Steven Earle
Grasswood Geoscience

April 1992

LANDSAT-5 MSS
BAND 2

RADARSAT INTERNATIONAL
-MOSAICS-

SYSTEMATIC GEOREF
WRS D049-023/114

SCENE ID: 51841-184149 ORBIT: 26811 HEADING: 193.6 SUN EL/AZ: 31.57/149.26
ACQUIRED: 1989-03-16

CENTRE N/W: 52.92/124.13
PROJECTION: UTM ZONE: 10/N27

+W125-00-00 +W124-00-00 +W123-00-00

+N53-30-00 +N53-00-00 +N52-30-00

+W125-00-00 +W124-00-00

A1-018528

RADIOMETRIC: CAL2 LIN ENHANCEMENT: HISTOGRAM GEOMETRIC CORRECTION: SYS GEOREF RESAMPLING KERNEL: DSB 1992-04-01

MOSAICS WORK ORDER: 00184411

0 10 20 30 40 50km 08:49

F A C S I M I L E

From: Steven Earle Date: Feb. 21st, 1992

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Tel: (604) 722-2239, Fax: (604) 722-2239 (phone ahead)

To: Mr. Alex Davidson, Minnova Inc.

Re: Winter Landsat image for the Nechako area

Further to our conversation of yesterday, I would be pleased to look into the application of winter Landsat imagery to project area on the Nechako Plateau. In order to get the most appropriate image I would first get a listing of all available images, and then look at the microfiche copies of several potential images to find the one with the best geological information. I would then order the transparency, and have a 1:250,000 enlargement made (the same scale as the image on Dave's wall). The costs would be as follows:

Image transparency	$160.00
Printing	$ 45.00*
Consulting time (1/2 day @$375/day)	$187.50
Couriers and other expenses	$ 25.00

*(this price is tentative until I check out the lab which gave me the quote)

The total would be $417.50 (plus GST). I would also provide a brief report giving you my assessment of the image (but no geological interpretation), and my recommendations concerning further work of this nature.

→ Dave Feb 24
This sounds good.
I met with Steve
Please call him + go
ahead with this
Alex