JAPOSAT Satellite Mapping · 199 rue Boulé, Saint-Constant, Québec J5A 2C8 Canada
Cell. : 514-449-5794 · bronislaw@japosat.com · www.japosat.com

Confidential

Report

By JAPOSAT Satellite Mapping

For Auxico Resources Canada Inc.

Satellite Study, Coltan Prospect AOI-1, Colombia.

December 7th, 2020

By Bronislaw Popiela, P.Geo. M.Sc.

Table of Contents

Table of Figures and Tables

SUMMARY

The following remote sensing study was undertaken by **Japosat Satellite Mapping** (Japosat hereafter) at the request of and completed for **Auxico Resources Canada Inc.**

The main goal of this mandate was to provide **Auxico Resources Canada Inc** with the satellite images and value added products regarding their **Coltan Prospect** located in Vichada State, Colombia, approximately 10 kilometers south from Puerto Carreño and the airport. The imagery acquired over the Coltan Prospect covers an area of about 4100 hectares or 41 sq. km.

The remote sensing work was mainly focused on delivering the very high resolution 50cm images and generating the specialised enhanced products and identifying locations of the original in situ rocks enriched in coltan mineralisation that are the source of the coltan occurrences in the enriched gravel and soil identified previously during the field program.

To achieve the goal of the mandate, the 50cm Pleiades 4-band data was acquired, processed in order to enhance the geologic, geomorphologic, land cover and geobotanical features. 50cm Natural Color, False InfraRed Color, 2m Geobotany (GeoBotLitho technology) and 30m Thermal InfraRed and SLOPE images and maps were produced and analysed.

Four hills probably composed of mafic/ultramific rocks and injected by pegmatite were identified on the satellite images. Some trenching activity in the surrounding area was also detected. One of the visited and previously sampled locations is also in the same area. The GeoBotLitho product shows dramatic changes of the soil signature (composition) at various locations of the prospect area. Hills should be visited, sampled and analysed for coltan contained at the site. The GeoBotLitho signatures should be also validated to detect the locations of coltan enriched soils and nature/origin of these signature changes.

Bronislaw Popiela, P. Geo. M.Sc, geologist and remote sensing expert, was in charge for this mandate.

The following report describes the remote sensing work completed by December 7th, 2020.

STUDY AREA

The **Coltan Prospect** is in Vichada State, Colombia, approximately 10 kilometers south from Puerto Carreño and the airport. The imagery acquired over the Coltan Prospect covers an area of about 4100 hectares or 41 sq. km. (**FIG. 1**)

Figure 1. Coltan Prospect location plan, Colombia

SPECIFICATIONS REMOTE SENSING DATA

The following raw data was acquired and processed for this mandate:

- Pleiades-1A, mono 50cm-200cm 1 panchromatic and 4 multispectral bands, acquired **January 7th, 2020** (**FIG. 2**)

Pleiades Data

AIRBUS Defence & Space Pleiades-1A satellite sensor was successfully launched on December 16, 2011 and provides 0.5m high resolution satellite image data. The Pleiades-1A satellite features four spectral bands (blue, green, red, and IR) for enhanced spectral analysis,

mapping and monitoring applications, land-use planning, disaster relief, exploration, defense and intelligence, and visualization and simulation environments, as well as image location accuracy of 3 meters (CE90) without ground control points.

Technical specifications:

Table 1. Pleiades data

Pleiades-1A Satellite Sensor Characteristics

Imagery Products	50-cm panchromatic 50-cm color (pansharpened) 2-meter multispectral Bundle: 50-cm panchromatic and 2-meter multispectral
Spectral Bands	P: 480-830 nm Blue: 430-550 nm Green: 490-610 nm Red: 600-720 nm Near Infrared: 750-950 nm
Preprocessing Levels	Sensor Ortho
Image Location Accuracy	With ground control points: 1m Without ground control points: 3m (CE90)
Imaging Capacity	Daily constellation capacity: 1,000,000 sq.km. Strip mapping (mosaic): 100 km x 100 km Stereo imaging: 20 km x 280 km Max. spots over 100 km x 200 km: 30 (crisis mode)
Imaging Swath	20 km at nadir
Revisit Interval	Daily (Pleiades-1A and 1B)

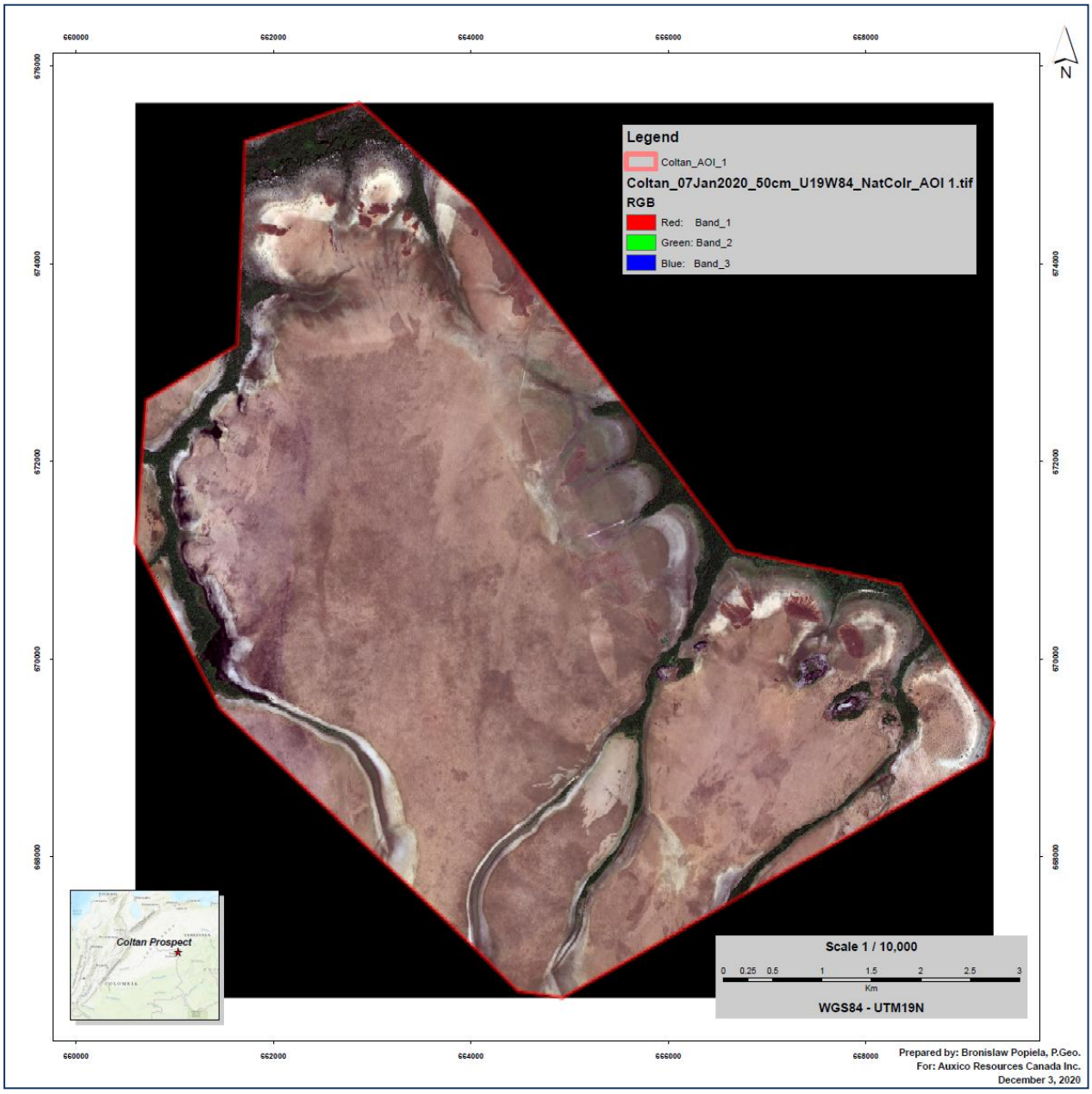


Figure 2. Pleiades Data acquired for Coltan Prospect

APPROACH AND METHODOLOGY

Technology and Method

The following sections present an overview of the methodology that was applied by Japosat in accordance with the project goals to generate the satellite value added remote sensing geology products.

Image Processing

All remote sensing data was first pre-processed and processed using Geomatica 2016 (PCI Geomatics) image processing software and then, imported into ArcGIS data base project for further examination. The **UTM 19 North** projection (UTM 19 N) and **WGS 1984** datum were used to register all images and layers.

GeoBotLitho

The GeoBotLitho technology (Multispectral Geobotany and Litho-Structural Mineral Targeting) is based on the multispectral geobotanical approach that can be adapted to project goals and the sector of interest. The method is built around the calculation of different vegetation indices, including those that target and/or enhance the vegetation chlorophyll content, anthocyanin, chlorophyll Red Edge, plant pigments, water content, and many other plant features. The output indices are then analysed for their main component and used to generate the GeoBotLitho image (geochemistry change within the vegetation/soil/rock).

The purpose of the method is the following:

1. To map the spectral variations/anomalies present in the geochemistry of the vegetative cover;
2. To map the litho-structural features/changes in the rock type/cover type;
3. To combine the geobotanical/soil results with the litho-structural interpretation and;
4. To extract/identify prospective mineral exploration target areas.

Natural Color 50cm Image

Pleiades' bands 1, 2, 3 enhanced for geology were used to produce a natural color composite image.

False InfraRed Color 50cm Image

Pleiades' bands 1, 2, 4 were used to produce a false infrared color composite image.

Thermal InfraRed 30m Image

Landsat's band 10 and 11 were used to produce a radiance image.

RESULTS

GeoBotLitho signatures 2m image

GeoBotLitho product shows dramatic changes of the soil signature (composition) at various locations of the prospect area. Hills should be visited, sampled and analysed for coltan contained at the site and to confirm the presence of mafics and pegmatite and coltan minerals. The GeoBotLitho signatures should be also validated to detect the locations of coltan enriched soils and nature/origin of these signature changes (**FIG. 3**)

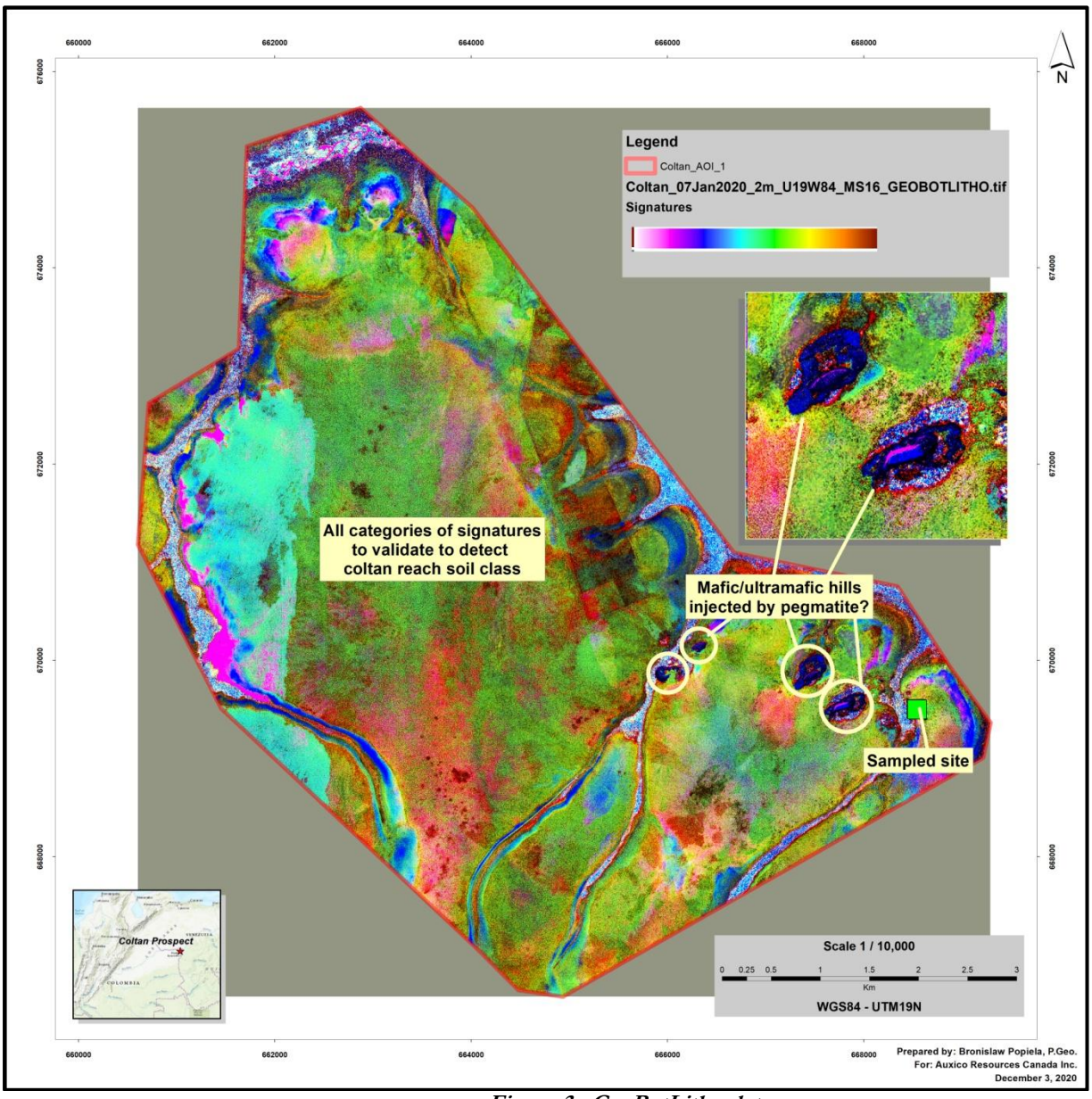


Figure 3. GeoBotLitho data

Natural Color 50cm Image

The outcropping hills and trenches are better defined and perceptible on 50cm image generated in the natural colour enhanced for geology (**FIG. 4**) Two sites of trenches are clearly visible (E, F). The outcropping rocky hills composed probably of mafic/ultramific rocks (dark magenta) and pegmatite (white to light grey) are also well defined and recognizable (A, B, C, D).

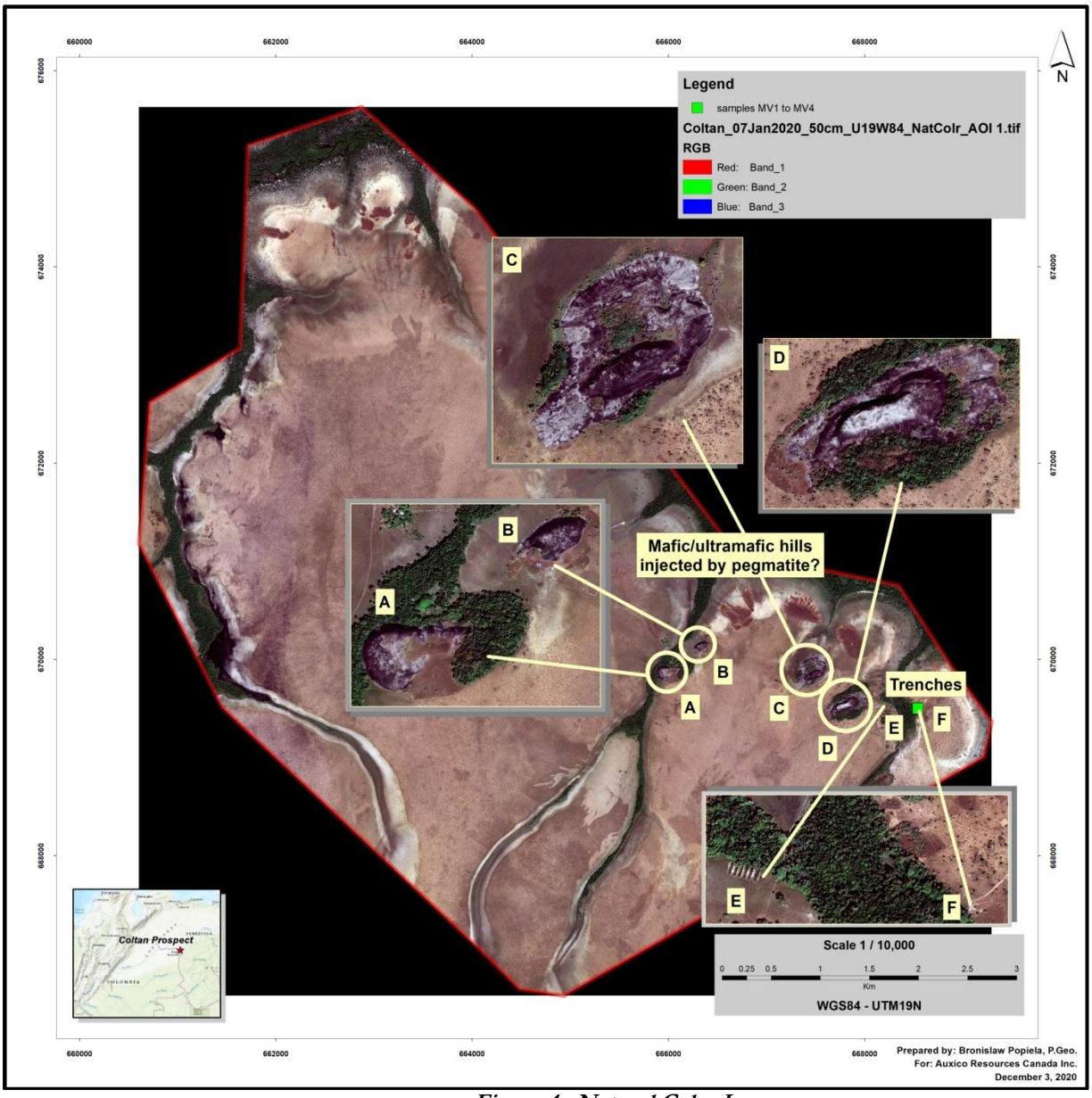


Figure 4. Natural Color Image

False InfraRed Color 50cm Image

In this band combination, the vegetation pops in red, with healthier vegetation being more vibrant. It is easier to tell about different types of vegetation apart than it is with a natural color image. The vegetation emerges in shades of red, soils vary from dark to light browns/greens. This is a very commonly used band combination in remote sensing when looking at vegetation, crops, and wetlands (**FIG. 5**)

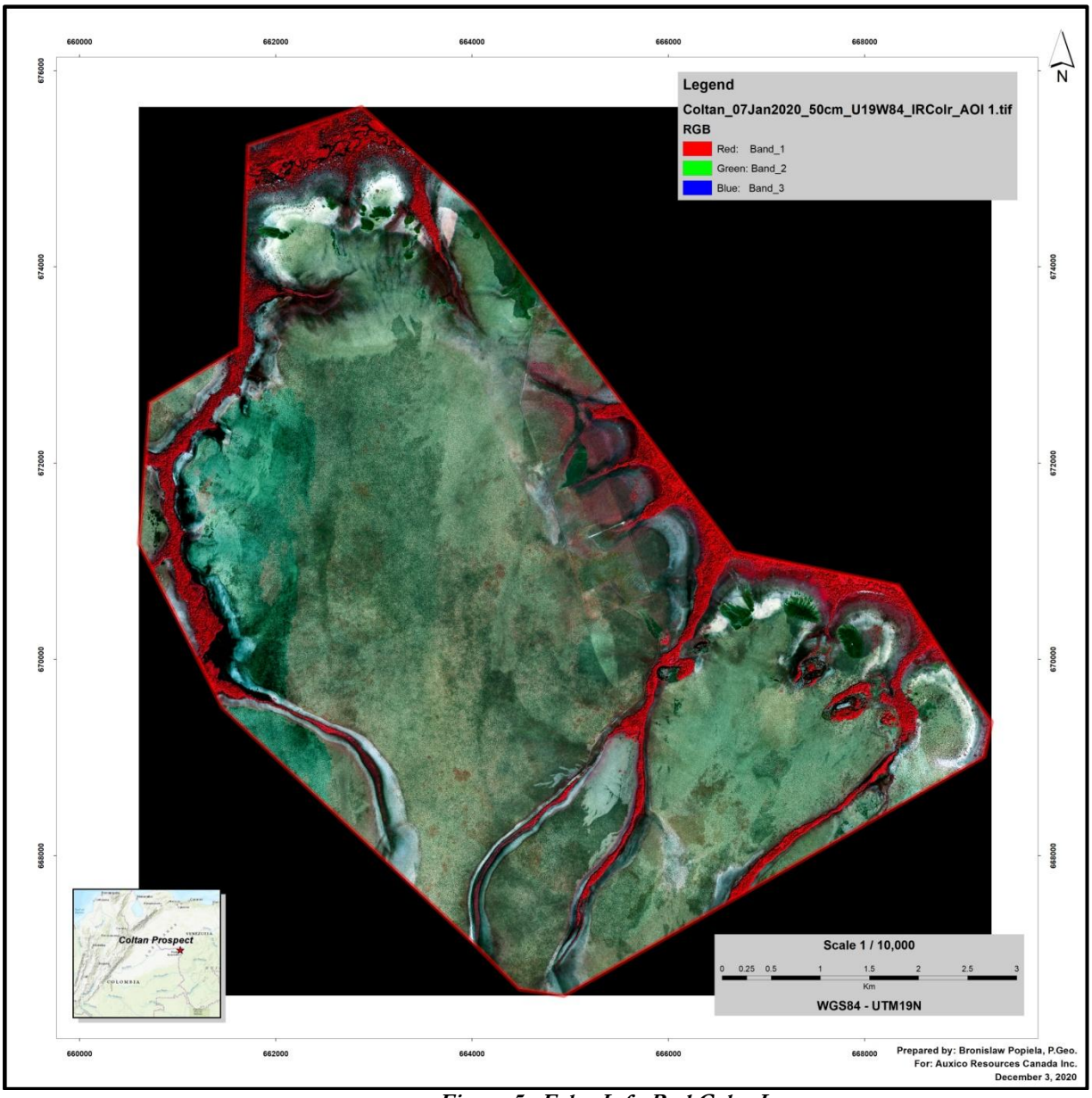


Figure 5. False InfraRed Color Image

TIR Radiance

The thermal infrared (TIR) bands are commonly used to calculate the temperature of Earth's surface. In our case, we have used these bands to calculate the thermal infrared radiance of the study areas. In our view, a change in radiance may indicate a lithological / mineralogical change or a presence of faults or fractures system. Two important lineaments oriented SWW-NEE are detected and cutting the study area. Some other minor lineaments (secondary faults or fractures) are also mapped (**FIG. 6**). The major and secondary fractures might be the feathers of the mineralisation and in some cases the potential ore traps.

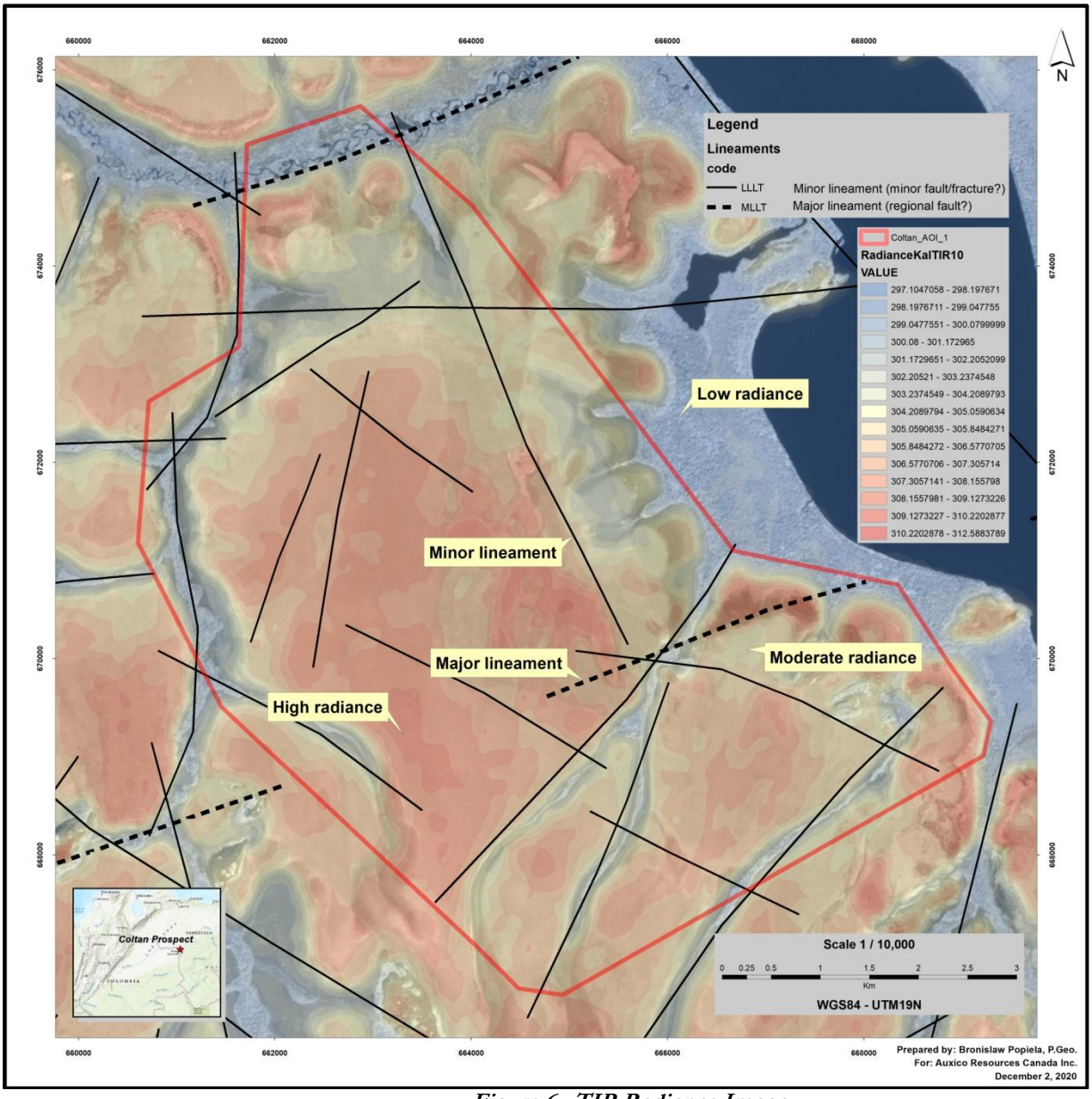


Figure 6. TIR Radiance Image

Conclusions and Recommendations

Japosat strongly recommends investigating immediately four hills and all geobotany signatures, especially these close to or in the trend orientation of the four hills (C, D first and A, B if possible). The samples should be taken from the selected in the field sites from all hills, both from ultramific rock and pegmatite (**FIG. 7 and 8)** and soil surrounding the hills. The geologist in charge of the sampling program have to select the best locations from these proposed.

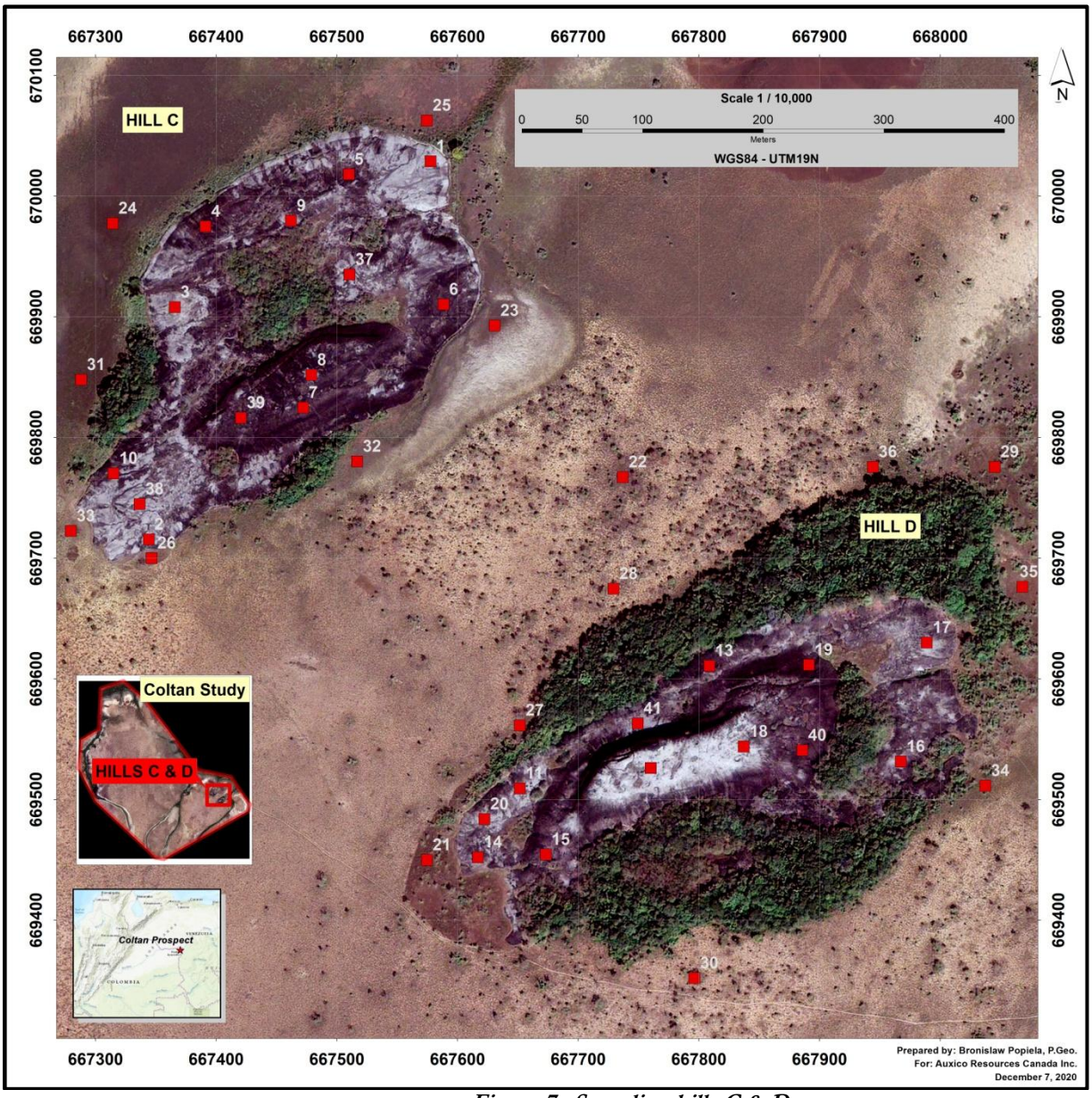


Figure 7. Sampling hills C & D

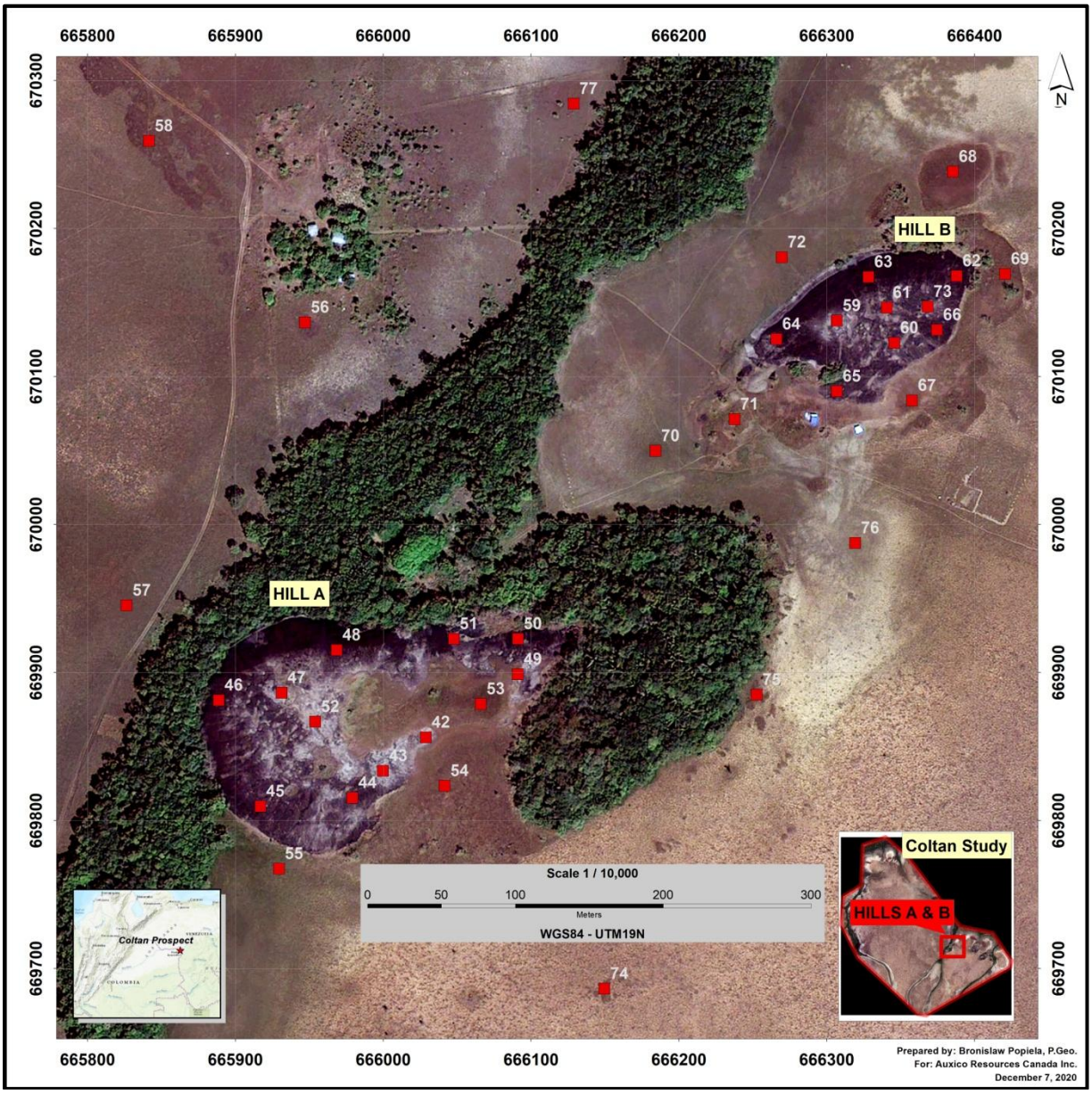


Figure 8. Sampling hills A & B

To better understand the geobotany signatures and then focus on these related to coltan soil enriched sediments/deposits, all proposed soil sampling sites should be sampled and documented (**FIG. 9)**. Once again, the geologist in charge of the sampling program has to select the best locations to sample inside the circle areas proposed.

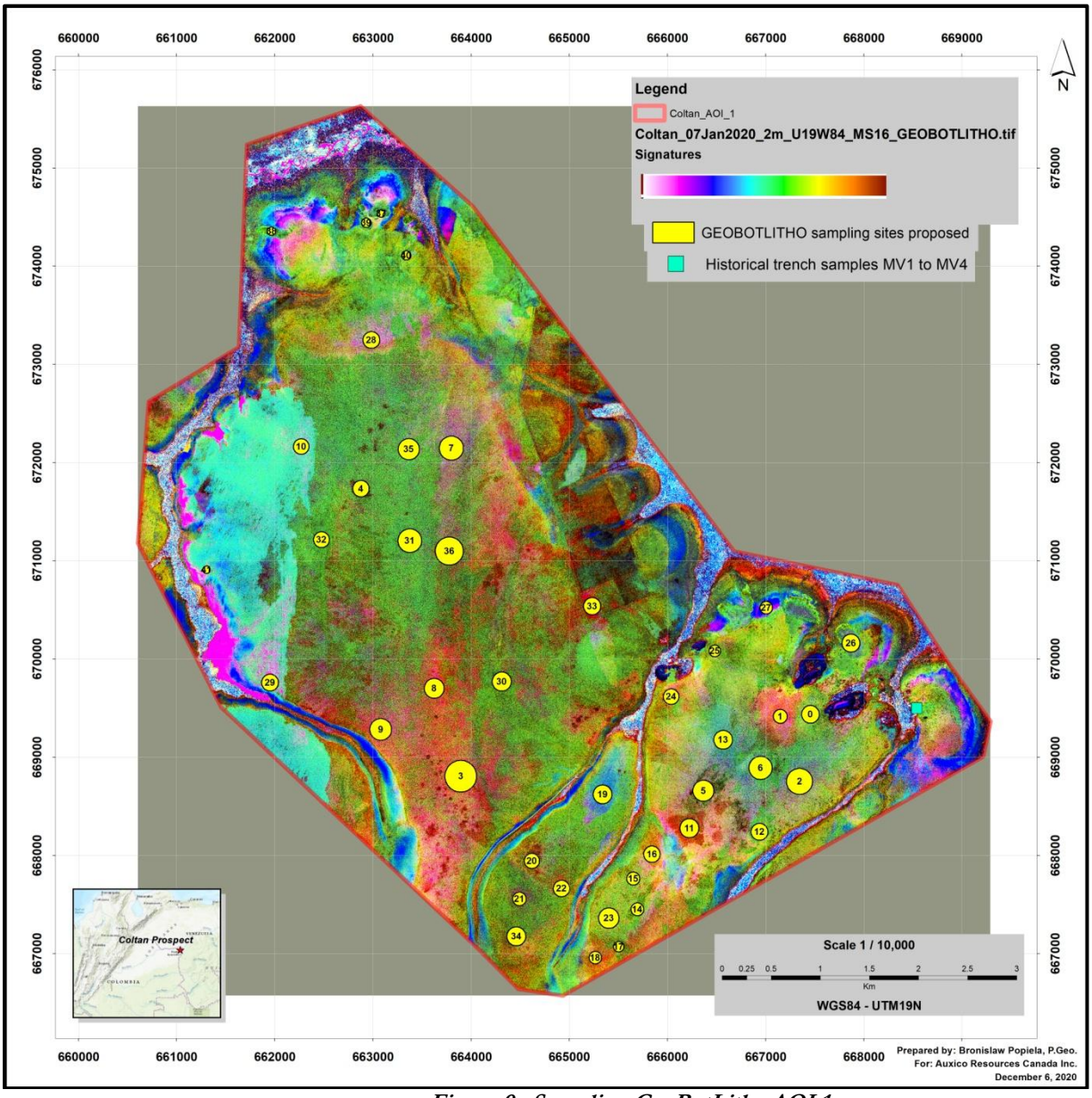


Figure 9. Sampling GeoBotLitho AOI 1

Sampling site location coordinates - GeoBotLitho

GEOBOTLITHO sampling sites proposed

FID	Shape	Id	sample	Cent_X	Cent_Y
0	Polygon	0	GEOBOTLITHO	667456.038	669437.7927
1	Polygon	1	GEOBOTLITHO	667148.9972	669416.6175
2	Polygon	2	GEOBOTLITHO	667344.8681	668754.8917
3	Polygon	3	GEOBOTLITHO	663893.3064	668807.8297
4	Polygon	4	GEOBOTLITHO	662876.8956	671735.3046
5	Polygon	5	GEOBOTLITHO	666365.5139	668659.6032
6	Polygon	6	GEOBOTLITHO	666947.8326	668892.5306
7	Polygon	7	GEOBOTLITHO	663798.0179	672148.2215
8	Polygon	8	GEOBOTLITHO	663623.3223	669702.483
9	Polygon	9	GEOBOTLITHO	663078.0602	669284.2723
10	Polygon	10	GEOBOTLITHO	662268.1079	672164.1029
11	Polygon	11	GEOBOTLITHO	666222.5811	668278.4491
12	Polygon	12	GEOBOTLITHO	666937.245	668241.3925
13	Polygon	13	GEOBOTLITHO	666566.6786	669178.3962
14	Polygon	14	GEOBOTLITHO	665693.2005	667452.6153
15	Polygon	15	GEOBOTLITHO	665650.8501	667764.9499
16	Polygon	16	GEOBOTLITHO	665841.4271	668013.7588
17	Polygon	17	GEOBOTLITHO	665502.6235	667071.4613
18	Polygon	18	GEOBOTLITHO	665264.4022	666960.2914
19	Polygon	19	GEOBOTLITHO	665338.5155	668622.5465
20	Polygon	20	GEOBOTLITHO	664618.5579	667944.9393
21	Polygon	21	GEOBOTLITHO	664491.5065	667558.4915
22	Polygon	22	GEOBOTLITHO	664920.3048	667664.3676
23	Polygon	23	GEOBOTLITHO	665402.0412	667362.6206
24	Polygon	24	GEOBOTLITHO	666037.2979	669617.7821
25	Polygon	25	GEOBOTLITHO	666481.9777	670083.637
26	Polygon	26	GEOBOTLITHO	667868.9549	670163.0441
27	Polygon	27	GEOBOTLITHO	667006.0645	670523.023
28	Polygon	28	GEOBOTLITHO	662982.7717	673249.3332
29	Polygon	29	GEOBOTLITHO	661950.4795	669760.7149
30	Polygon	30	GEOBOTLITHO	664311.5171	669771.3025
31	Polygon	31	GEOBOTLITHO	663374.5134	671205.924
32	Polygon	32	GEOBOTLITHO	662474.5663	671216.5116
33	Polygon	33	GEOBOTLITHO	665232.6394	670538.9044
34	Polygon	34	GEOBOTLITHO	664459.7437	667177.3374
35	Polygon	35	GEOBOTLITHO	663363.9258	672137.6339
36	Polygon	36	GEOBOTLITHO	663776.8427	671100.0478
37	Polygon	37	GEOBOTLITHO	663083.2663	674536.7257
38	Polygon	38	GEOBOTLITHO	661965.8421	674356.8015
39	Polygon	39	GEOBOTLITHO	662931.7512	674442.0287
40	Polygon	40	GEOBOTLITHO	663338.9481	674110.5893
41	Polygon	41	GEOBOTLITHO	661302.9633	670909.8318

Sampling site location coordinates – Hills CD

Sampling sites proposed

FID	Shape	Id	sample_ID	X_Coord	Y_Coord	Longitude	Latitude
0	Point	1	Hill C	667577.5015	670029.0495	-67.485792	6.059621
1	Point	2	Hill C	667344.0977	669715.5335	-67.487908	6.056792
2	Point	3	Hill C	667365.6664	669908.1109	-67.487708	6.058533
3	Point	4	Hill C	667391.0866	669975.1278	-67.487477	6.059138
4	Point	5	Hill C	667509.7143	670018.2652	-67.486404	6.059526
5	Point	6	Hill C	667588.2859	669910.4218	-67.485697	6.058548
6	Point	7	Hill C	667471.9691	669824.9175	-67.48675	6.057778
7	Point	8	Hill C	667478.9019	669851.8783	-67.486687	6.058022
8	Point	9	Hill C	667461.9551	669979.7497	-67.486837	6.059178
9	Point	10	Hill C	667314.826	669770.2255	-67.488171	6.057287
22	Point	23	Hill C	667630.6529	669892.7047	-67.485315	6.058387
23	Point	24	Hill C	667314.0557	669977.4388	-67.488173	6.059161
24	Point	25	Hill C	667574.4203	670062.9431	-67.485819	6.059928
25	Point	26	Hill C	667346.4087	669700.1273	-67.487887	6.056653
30	Point	31	Hill C	667287.8651	669848.0267	-67.488413	6.057992
31	Point	32	Hill C	667516.6471	669780.2395	-67.486348	6.057373
32	Point	33	Hill C	667279.3917	669722.4663	-67.488492	6.056856
36	Point	37	Hill C	667510.4846	669935.0717	-67.486399	6.058773
37	Point	38	Hill C	667336.3946	669744.8053	-67.487977	6.057057
38	Point	39	Hill C	667420.3584	669816.444	-67.487216	6.057703
10	Point	11	Hill D	667651.4513	669509.0905	-67.485137	6.054917
11	Point	12	Hill D	667760.0649	669526.0373	-67.484155	6.055068
12	Point	13	Hill D	667808.5944	669610.7714	-67.483714	6.055833
13	Point	14	Hill D	667616.7873	669452.0876	-67.485451	6.054403
14	Point	15	Hill D	667673.0199	669454.3985	-67.484943	6.054422
15	Point	16	Hill D	667967.2782	669531.4295	-67.482283	6.055112
16	Point	17	Hill D	667988.8469	669630.0291	-67.482086	6.056003
17	Point	18	Hill D	667837.0959	669543.7544	-67.483459	6.055226
18	Point	19	Hill D	667891.0176	669611.5417	-67.48297	6.055838
19	Point	20	Hill D	667622.1795	669483.6703	-67.485402	6.054688
20	Point	21	Hill D	667574.4203	669449.7767	-67.485834	6.054383
21	Point	22	Hill D	667736.9556	669767.1442	-67.484358	6.057249
26	Point	27	Hill D	667651.4513	669561.4716	-67.485135	6.055391
27	Point	28	Hill D	667729.2525	669674.7071	-67.48443	6.056413
28	Point	29	Hill D	668045.0795	669775.6176	-67.481574	6.057318
29	Point	30	Hill D	667796.2695	669351.9473	-67.483832	6.053493
33	Point	34	Hill D	668037.3764	669511.4014	-67.48165	6.054929
34	Point	35	Hill D	668068.1888	669676.2477	-67.481368	6.056419
35	Point	36	Hill D	667944.1689	669775.6176	-67.482486	6.05732
39	Point	40	Hill D	667885.6254	669540.6732	-67.48302	6.055197
40	Point	41	Hill D	667749.2806	669563.0122	-67.484251	6.055403

Sampling site location coordinates – Hills AB

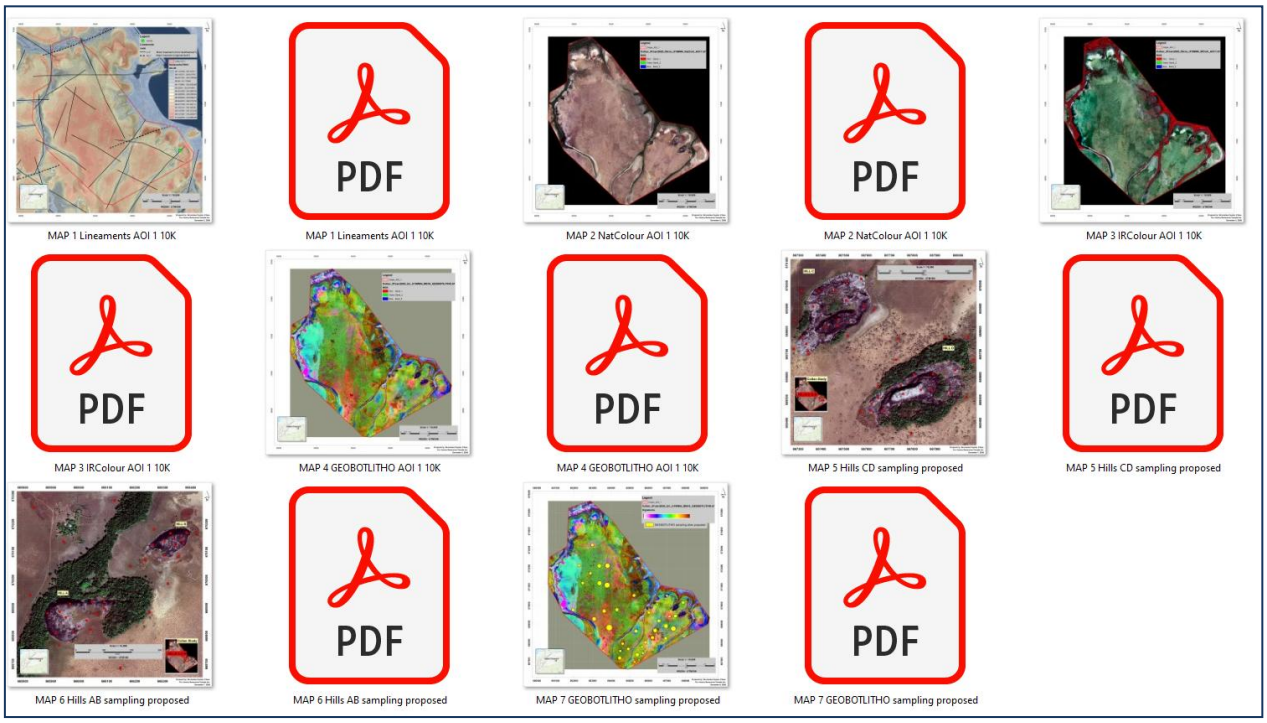
Sampling sites proposed

FID	Shape	Id	sample_ID	X_Coord	Y_Coord	Longitude	Latitude
41	Point	42	Hill A	666028.7743	669856.0975	-67.499787	6.058096
42	Point	43	Hill A	665999.8498	669833.4609	-67.500049	6.057892
43	Point	44	Hill A	665979.0996	669815.2258	-67.500236	6.057728
44	Point	45	Hill A	665916.8489	669809.5667	-67.500799	6.057678
45	Point	46	Hill A	665888.5532	669881.2493	-67.501053	6.058327
46	Point	47	Hill A	665931.3112	669886.2796	-67.500666	6.058372
47	Point	48	Hill A	665968.4101	669915.2042	-67.500331	6.058632
48	Point	49	Hill A	666091.025	669898.8555	-67.499223	6.058481
49	Point	50	Hill A	666091.025	669922.7497	-67.499223	6.058697
50	Point	51	Hill A	666047.6382	669922.7497	-67.499615	6.058699
51	Point	52	Hill A	665953.9478	669866.787	-67.500462	6.058195
52	Point	53	Hill A	666065.8732	669878.7341	-67.499451	6.0583
53	Point	54	Hill A	666041.3502	669823.4002	-67.499674	6.0578
54	Point	55	Hill A	665929.4248	669767.4375	-67.500686	6.057297
55	Point	56	Hill A	665947.0311	670136.5398	-67.500518	6.060634
56	Point	57	Hill A	665826.3025	669945.3863	-67.501614	6.058909
57	Point	58	Hill A	665841.3936	670259.1547	-67.501469	6.061746
73	Point	74	Hill A	666149.5029	669686.323	-67.4987	6.056558
58	Point	59	Hill B	666306.7015	670137.7974	-67.497269	6.060637
59	Point	60	Hill B	666345.6867	670122.7063	-67.496917	6.060499
60	Point	61	Hill B	666340.6564	670146.6005	-67.496962	6.060716
61	Point	62	Hill B	666387.8159	670167.9795	-67.496535	6.060908
62	Point	63	Hill B	666328.0805	670167.3507	-67.497075	6.060903
63	Point	64	Hill B	666265.8298	670125.2215	-67.497638	6.060524
64	Point	65	Hill B	666306.7015	670090.009	-67.49727	6.060205
65	Point	66	Hill B	666374.6113	670131.5094	-67.496656	6.060578
66	Point	67	Hill B	666357.6338	670083.7211	-67.49681	6.060146
67	Point	68	Hill B	666385.3008	670238.4045	-67.496556	6.061545
68	Point	69	Hill B	666420.5133	670169.2371	-67.49624	6.060918
69	Point	70	Hill B	666184.0866	670049.7662	-67.498379	6.059844
70	Point	71	Hill B	666237.5341	670071.1452	-67.497895	6.060036
71	Point	72	Hill B	666269.6026	670180.5554	-67.497603	6.061024
72	Point	73	Hill B	666368.3233	670147.2293	-67.496712	6.060721
74	Point	75	Hill B	666252.6252	669885.022	-67.497764	6.058352
75	Point	76	Hill B	666319.2774	669987.5155	-67.497159	6.059277
76	Point	77	Hill B	666128.7527	670284.3065	-67.498873	6.061966

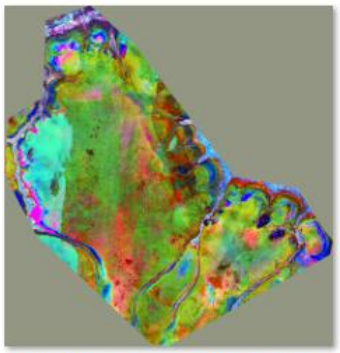
Delivery

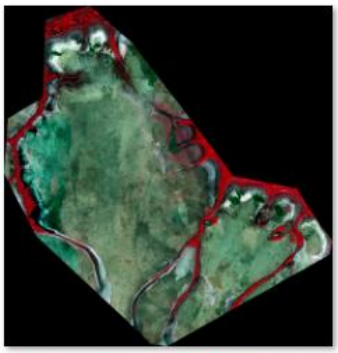
The ArcGIS files, report and following maps in PDF and JPEG were delivered to **Auxico Resources Canada Inc** via Dropbox:

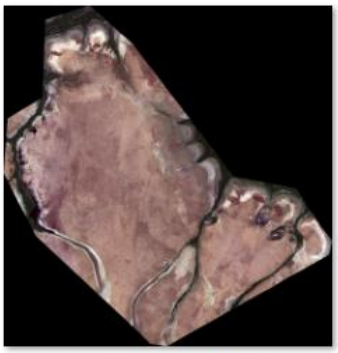
MAPS



IMAGES

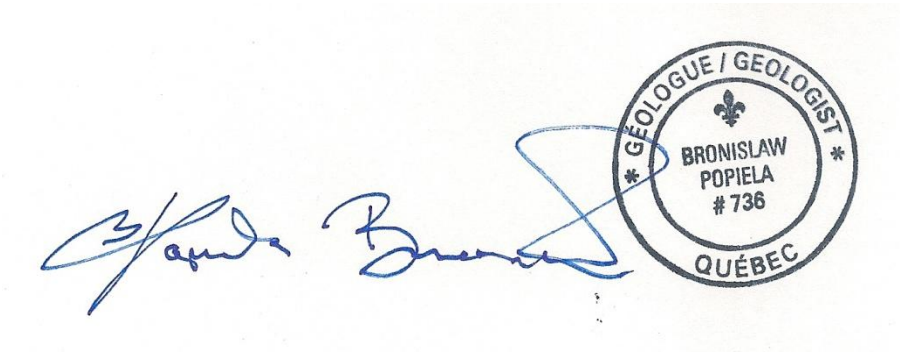

Coltan_07Jan2020_2m_U19W84_MS16_GEOBOTANY


Coltan_07Jan2020_50cm_U19W84_IRColr_AOI 1


Coltan_07Jan2020_50cm_U19W84_NatColr_AOI 1

SIGNATURE

Saint-Constant, December 7th, 2020



Bronislaw Popiela, P.Geo., M.Sc., (OGQ #736)
Member of l'Association Québécoise de Télédétection