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Ministry of Energy, Mines & Petroleum Resources
Mining & Minerals Division
BC Geological Survey

Assessment Report
Title Page and Summary

TYPE OF REPORT [type of survey(s)]: Quasi- 3D Analysis of Ground-Based Geophysical Data: **TOTAL COST:** $6,600.00

AUTHOR(S): Frederick A. Cook **SIGNATURE(S):** Frederick A. Cook Digitally signed by Frederick A. Cook DN: cn=Frederick A. Cook, o, ou, email=fcook@ucalgary.ca, c=CA Date: 2018.06.13 12:40:57 -07'00'

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S): **YEAR OF WORK:** 2018

STATEMENT OF WORK - CASH PAYMENTS EVENT NUMBER(S)/DATE(S): Event 5689846: Dates March 6-14, 2018

PROPERTY NAME: Spike's Big Adventure

CLAIM NAME(S) (on which the work was done): Spike's Big Adventure (984342), Spike's BA 02-12 (985682), Spike's BA 03-12 (98568
Spike's BA 04-13 (1020126)

COMMODITIES SOUGHT: Precious metals, massive sulphides

MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN:

MINING DIVISION: Ft. Steele **NTS/BCGS:** 082F

LATITUDE: 49 ° 12 ' 54 " **LONGITUDE:** 115 ° 49 ' 58 " **(at centre of work)**

OWNER(S):
1) D. E. LaVoie 2)

MAILING ADDRESS:
2290 DeWolfe Ave.
Kimberley, BC V1A1P5

OPERATOR(S) [who paid for the work]:
1) Kootenay Silver, Inc 2)

MAILING ADDRESS:
Suite 1820-1055 W. Hastings St.
Vancouver, BC V6E2E9

PROPERTY GEOLOGY KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralization, size and attitude):

Metasedimentary rock; Proterozoic; Middle Aldridge Formation, sedex deposits

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS: Kennedy, AR34178; Kennedy, AR34914;
Cook and Belton (AR36655)

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TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (IN METRIC UNITS)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
GEOLOGICAL (scale, area)			
Ground, mapping			
Photo interpretation			
GEOPHYSICAL (line-kilometres)			
Ground			
Magnetic			
Electromagnetic	VLF-EM; Enhanced processing	984342	$3,600.00
Induced Polarization			
Radiometric			
Seismic			
Other			
Airborne			
GEOCHEMICAL (number of samples analysed for...)			
Soil			
Silt			
Rock			
Other			
DRILLING (total metres; number of holes, size)			
Core			
Non-core			
RELATED TECHNICAL			
Sampling/assaying			
Petrographic			
Mineralographic			
Metallurgic			
PROSPECTING (scale, area)			
PREPARATORY / PHYSICAL			
Line/grid (kilometres)			
Topographic/Photogrammetric (scale, area)			
Legal surveys (scale, area)			
Road, local access (kilometres)/trail			
Trench (metres)			
Underground dev. (metres)			
Other	Report		$3,000.00
		TOTAL COST:	$6,600.00

Assessment Report:

Quasi- 3D Analysis of Ground-Based Geophysical Data: Spike's Big Adventure Property

MTO event 5689846

Approximate centre of property:
North 49° 12' 54"; West 115° 49' 58"
UTM Zone 11 585000E, 5452000N
Approximate centre of work:
North 49° 12' 54"; West 115° 49'58"
UTM Zone 11 585000E, 5452000N

NTS map sheet 082G
Fort Steele Mining Division
by

BC Geological Survey Assessment Report 37506

F. A. Cook, Ph.D., P.Geo.
Salt Spring Imaging, Ltd.
128 Trincomali Heights
Salt Spring Island, B.C.

Property Owner:

D. E. Lavoie
2290 DeWolfe Ave.
Kimberley, B.C. V1A1P5

Operator:

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May, 2018

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1.0 Summary

Ground-based electromagnetic (VLF-EM) data that were recorded in 2016 in the Sunrise and Sundown Creek area near Moyie in southeastern British Columbia have been analysed using a quasi-3D approach. Original processing and inversion were successful in identifying a series of apparent electrically conductive zones in the near-subsurface (upper 100-200m). The apparent conductors are located in the vicinity of exposures of Middle Aldridge strata that were previously interpreted to have evidence of sea-floor venting (e.g., 'fragmentals'), extensive alteration, and anomalous Pb and Zn mineralization.

2.0 Introduction and Terms of Reference

2.1 Introduction

The purpose of this report is to describe advanced quasi-3D analysis of VLF-EM data that were recorded on part of the Spike's Big Adventure (SBA) property located approximately 10 km south of Moyie, British Columbia (Figures 1 and 2; Cook and Belton, 2017). The area has been a focus of exploration activities for many decades, largely because it is near the Sullivan mine (about 40 km to the north), because the area has similar rocks, including exposed (meta-) sedimentary and igneous rocks of the Mesoproterozoic Middle and Lower Aldridge Formations, and because a number of strong showings with elevated Pb and Zn have been found. This report is a description of advanced analyses applied to the VLF-EM geophysical data in an effort to incorporate the results into a subsurface view.

2.2 Terms of Reference

Much of the descriptive information in Section 2.0 ('Introduction and Terms of Reference') through Section 6.0 ('Geologic Setting') is summarized from Cook and Belton (2017). All of the figures in this report were prepared by, or under the direction of, the author or adapted from previous figures prepared by, or under the direction of, the author. The sections of this report that discuss geophysical aspects of the Property rely in part on new analyses of data acquired in the region, and were processed with advanced techniques.

Included in this report are a description of the general geological setting of the Property, a description and analysis of geophysical data and results, an interpretation and reinterpretation of geological and geophysical relationships, and an evaluation of the merits of the relevant parts of the Property. Reports reviewed by the author are listed in the reference section at the end of this report.

The author is familiar with the geology and geophysics of the region, having been responsible for acquiring geophysical data in British Columbia since 1983 and as the transect leader for the Lithoprobe Southern Canadian Cordillera transect from 1985-1995 and Transect co-leader for the Lithoprobe Slave-Northern Cordillera transect from 1995-2005.

All measurement units used in this report are metric. The coordinate system in use on the Property and on all maps is UTM Zone 11 (NAD83).

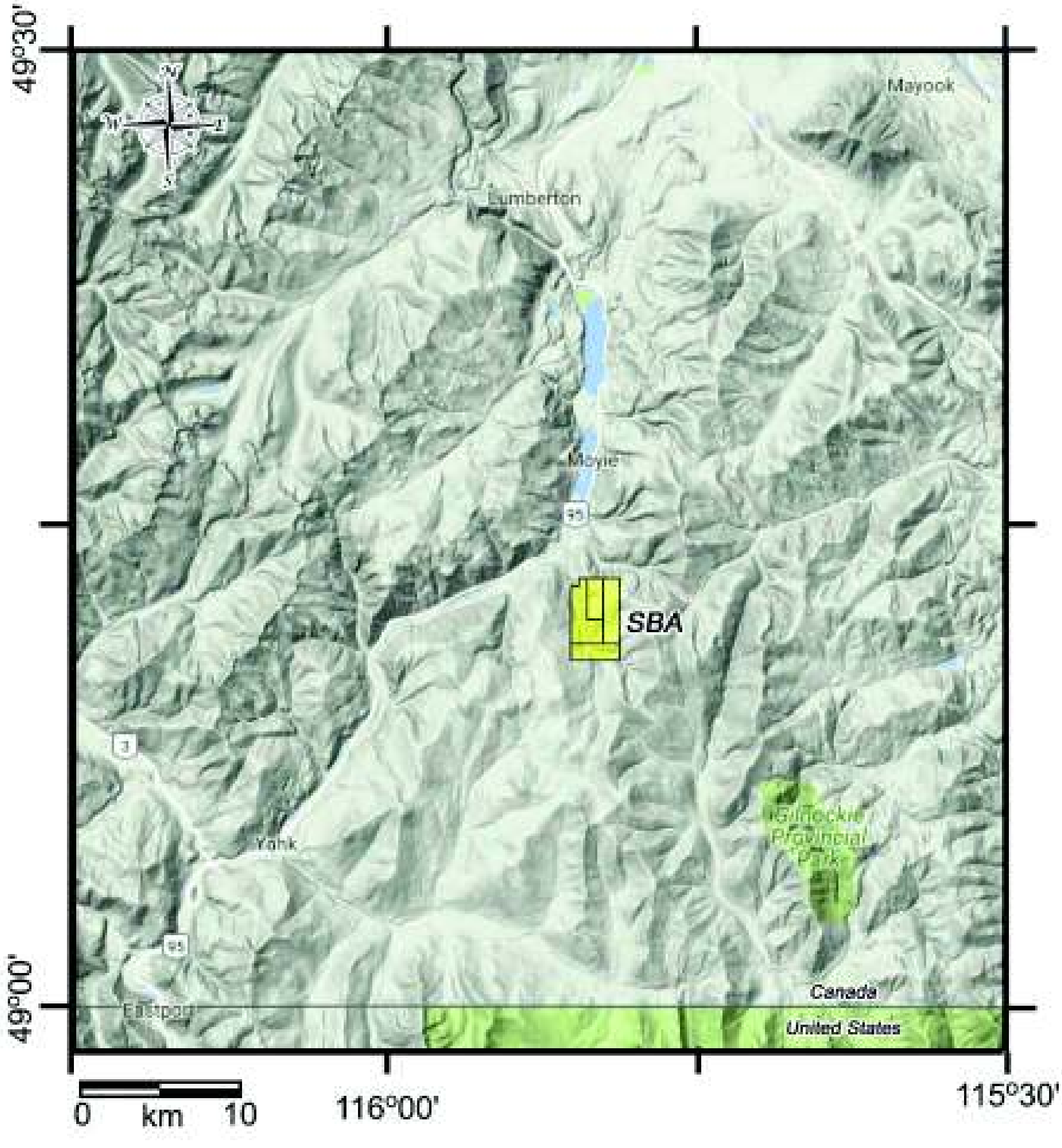


Figure 1. Image of the terrain near Spike's Big Adventure property (SBA) indicated by yellow shading.

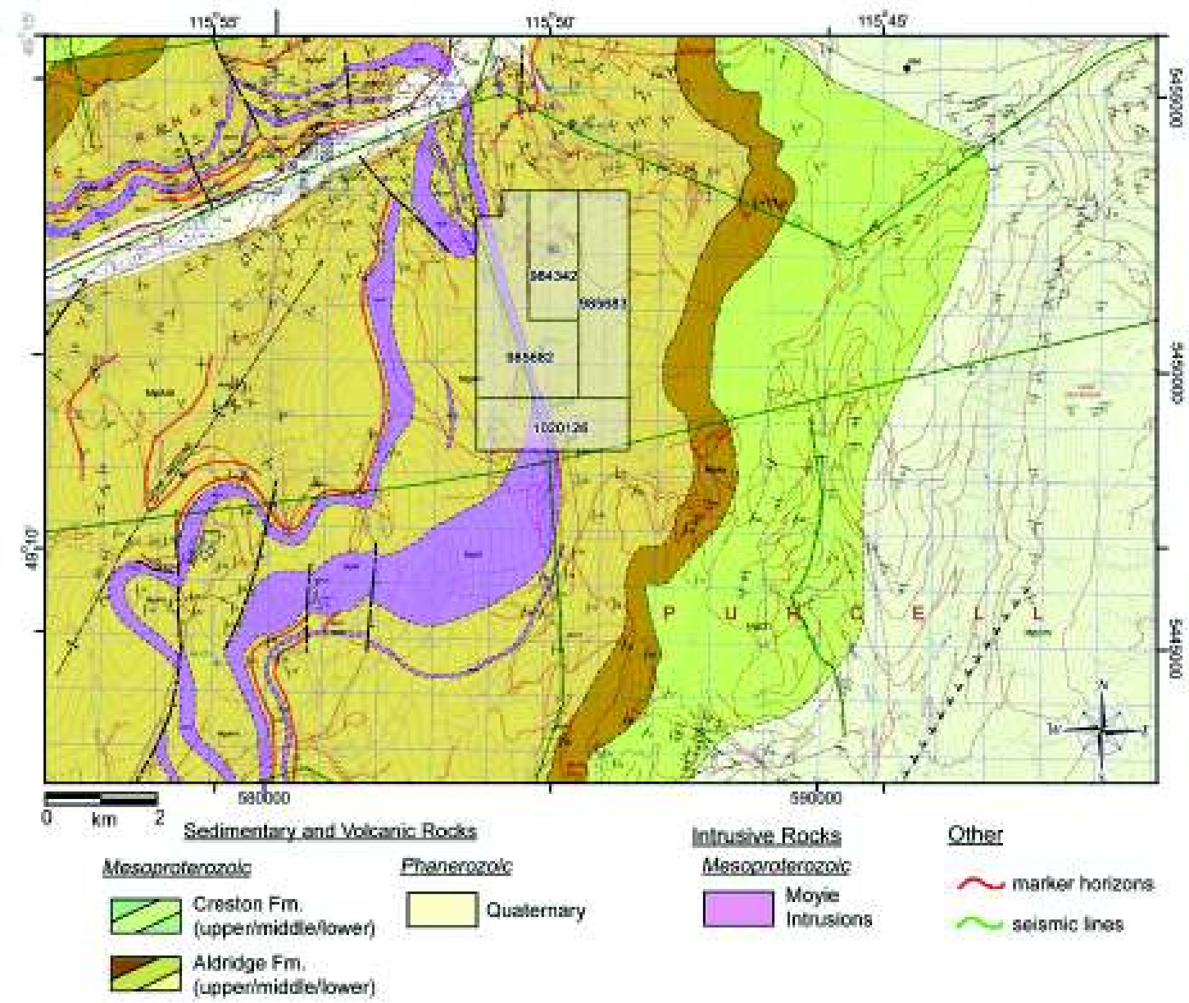


Figure 2. Geological map of part of the Moyie anticline with the SBA tenures superimposed (shaded). Modified from Brown et al (2011).

3.0 Mineral Tenure Description and Location

The SBA property is located in southeastern British Columbia approximately 25 km southwest of Cranbrook, BC (Figure 1). The property consists of four (4) mineral tenures containing approximately 1245.27 hectares (Table I). The mineral cell titles were acquired online and as such there are no posts or lines marking the location of the property on the ground. The property is wholly owned by Darlene Lavoie of Kimberley, BC and consists of four mineral title tenures: 984342, 985682, 985683, 1020126 (Table 1).

Table 1: Description of the Spike's Big Adventure mineral titles.

Title Number	Claim Name/Property	Issue Date	Good To Date	New Good To Date	# of Days For-ward	Area in Ha	Applied Work Value	Sub-mission Fee
984342	SPIKE'S BIG ADVENTURE	2012/MAY/07	2018/MAR/17	2018/Sep/22	189	211.02	$ 1639.01	$ 0.00
985682	SPIKE'S BA-02-12	2012/MAY/10	2018/MAR/17	2018/Sep/22	189	443.22	$ 3442.55	$ 0.00
985683	SPIKE'S BA-03-12	2012/MAY/10	2018/MAR/17	2018/Sep/22	189	337.67	$ 2622.74	$ 0.00
1020126	SPIKE'S BA-04-13	2013/JUN/07	2018/MAR/17	2018/Sep/22	189	253.36	$ 1683.25	$ 0.00

4.0 Accessibility and Physiography

The Spike's Big Adventure (SBA) Property is a rectangular block of four claims located approximately 10 km south of Moyie, BC (Figures 1 and 2). Primary access is available from Highway 3 south of Moyie to the Sunrise Creek Forest Service Road, then to the Sundown Creek Forest Service road.

The work described in this report consists of VLF-Em and magnetic data that were acquired in a grid that is located in the central portion of the property (Figure 3). In this area, the terrain is hilly with elevation differences of as much as 200m from the valley to the higher elevations.

5.0 Exploration History

The area in the vicinity of the property has been prospected since the 19th century when the St. Eugene deposit was discovered and then mined. However, although the tenures that now comprise the SBA property have been held more-or-less continuously for 25 years, the SBA property has only been seriously prospected since 2012 or so (Kennedy, 2013, 2014). Previous work has included geological mapping, rock sampling and soil geochemistry (Kennedy, 2013, 2014) as well as the geophysical data that are used in this work (Cook and Belton, 2017).

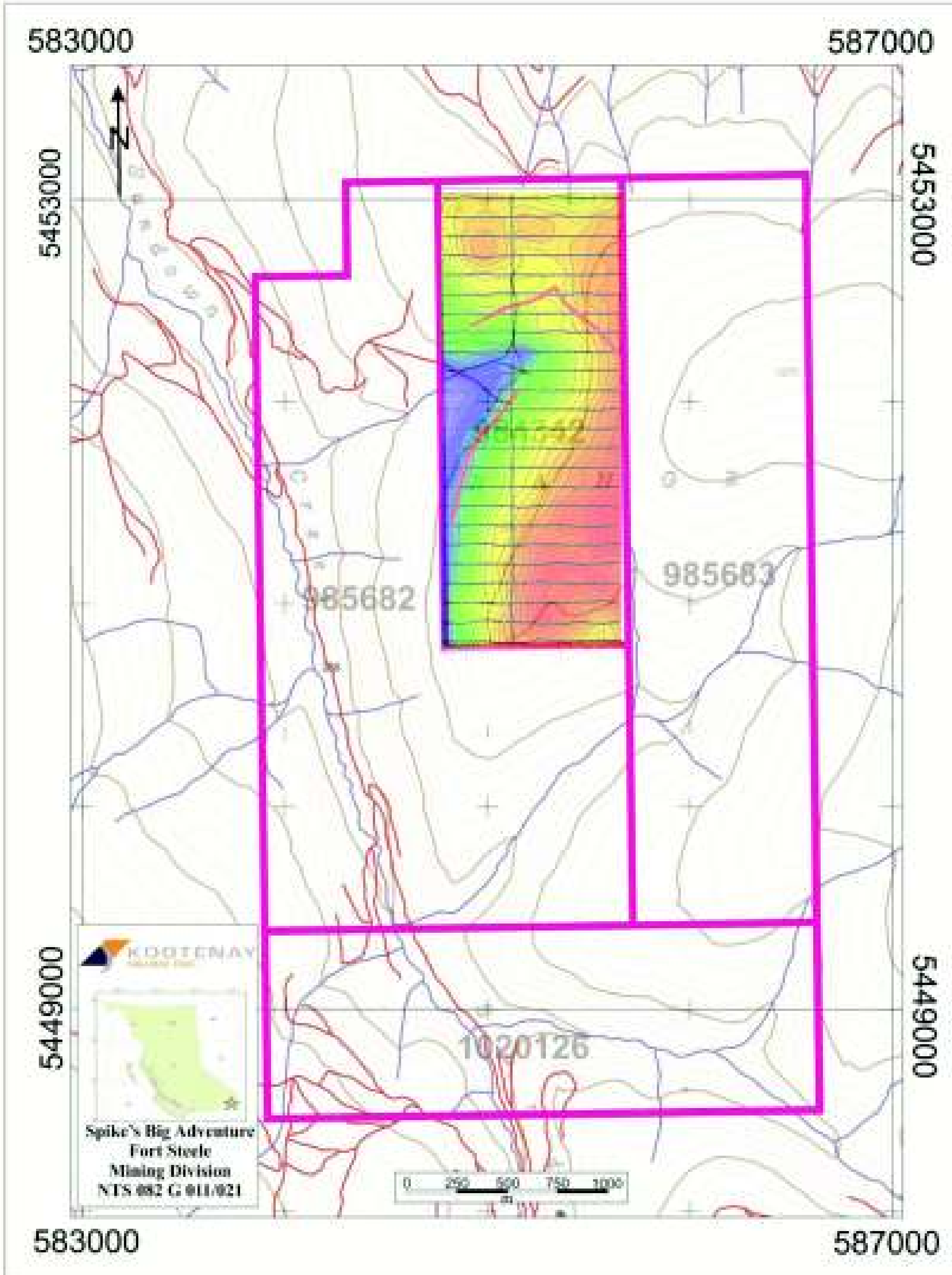


Figure 3. Map of the SBA tenures with the area of the ground geophysics, both reconnaissance and grid, indicated by the coloured topography.

6.0 Geological Setting

The area of this study is in the central part of the Purcell anticlinorium in Canada (Figure 2); it is located southwest of Cranbrook, B. C., and south of Moyie, B. C. The Purcell anticlinorium in this area can be subdivided into three major blocks that are separated from one another by transverse contractional faults. The lowest structural panel is the Moyie block that is dominated by the Moyie anticline, a structure that plunges to the northeast in Canada and to the southeast in Montana. The axis of the Moyie anticline is identified on the left side of the geological map in Figure 2 and is located about 3-6 km west of the SBA property (Figure 2).

The study area is covered by Geological Survey of Canada Yahk River 1:50000 sheet (Brown and Macleod, 2011), part of which is reproduced in Figure 2. The strata exposed on and near the Property are entirely within the Mesoproterozoic Middle Aldridge Formation, a succession of basinal clastic rocks that are intruded by syn-depositional mafic sills (collectively known as the Moyie sills). These sills intruded at ca. 1470-1445 Ma and are shown on the geological map in lavender colour.

Within the limits of the geological map (Figure 2), there are few faults, and the ones that are observed tend to have relatively small displacements. This contrasts with some large-scale regional detachment structures (e.g., Lewis thrust) that are exposed east of the Purcell anticlinorium and that have tens of km of east-directed displacement. Some of these structures can be seen in the subsurface beneath the Moyie anticline on seismic reflection data (e.g., Cook and van der Velden, 1995), but most of the displacement that is observed in the foreland is manifested as shallow-dipping detachment structures that passively carried the rocks of the Purcell anticlinorium (including the rocks of the Moyie anticline).

Accordingly, exploration activities have been focused on finding:

1) Stratabound deposits similar to the Sullivan deposit, either in the same stratigraphic interval (Lower Aldridge to Middle Aldridge transition), or in fragmental black smoker type deposits at other stratigraphic positions (e.g., Middle Aldridge), and
2) Polymetallic vein deposits associated with joints, fractures or faults (e.g., St. Eugene deposit).

The Spike's Big Adventure showing is considered to be a stratigraphically controlled sedimentary exhalative (Sedex) deposit (#1 above).

7.0 Geophysical Data

7.1 General

Two types of geophysical data were recorded and analysed in the 2017 work: ground-based magnetics and VLF-EM. The data were acquired in a rectangular grid that is 900m east-west by 2300m north-south (Figure 4). Two separate programs were undertaken: 1) a brief reconnaissance program of two VLF-EM profiles (lines SP-1 and SP-2 on Figure 4) that were recorded to test whether a large-scale effort was likely to be successful, and 2) a grid of 24 east-west lines (lines 700 through 3000 on Figure 4) and one long north-south line (line 4950 on Figure 4). Lines 700-3000 and 4950 were recorded with magnetic field measurements and VLF-EM at 12.5m intervals on a Gem Systems GSM-19 instrument. Only the grid data are used in this study; the reconnaissance lines are not included.

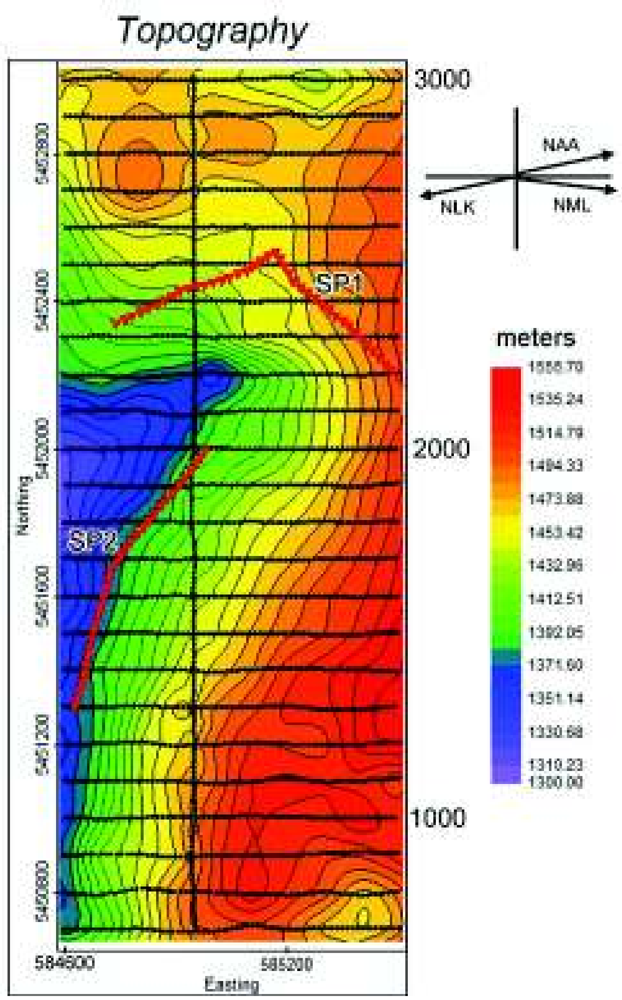


Figure 4. Topographic map of the area of the ground geophysics grid (black lines) and 2016 reconnaissance VLF-EM data (red lines). Only the east-west lines of the 2016 grid data are used for this study.

7.2 Data Recording and processing: 2016 Grid

The VLF-EM data were acquired, along with topographic and magnetic data, in 2016 as a means to test whether there are observable electrical conductors in the subsurface beneath the Spike's Big Adventure property (Cook and Belton, 2016). The data were recorded in a series of 24 east-west lines and a single north-south line. Following application of filters as deemed necessary, the results were then inverted on a line-by-line basis. The approach presented here is considered 'quasi-' three dimensional because the VLF results were inverted using a 2D inversion routine (Monteiro-Santos et al. 2006) and then combined into a 3D volume.

The results of the analyses are presented in two different ways. In the first, the results are presented as three-dimensional volumes with gridding accomplished in 3D so that images could be presented as block volumes enclosing isosurfaces of equal conductivity values. In the second, the results are presented in a series of 'slices' or 'slabs' in an effort to ascertain the map patterns of anomalies as a function of depth.

VLF recordings were made along 24 east-west lines and one north-south line. The east-west lines are spaced 100m apart and recordings were made at 12.5m stations intervals. GPS readings were made at 100m intervals and the 12.5 m station locations and elevations were interpolated from the 100m points. Readings were taken for three distant transmitters at each station: Cutler, Maine (NAA, 24000 Hz), Seattle, Washington (NLK, 24800 Hz), and LaMoure, North Dakota (NML, 25200 Hz). The signal from the NML transmitter was erratic and noisy, with occasional large swings (>200% in some cases) from one station to the next. For this reason, the data from the NML transmitter were not used.

7.3 Some Cautions and Considerations

The results should be considered and interpreted with some caution. Reasons for this are the following:

1. The inversion procedure is 2D. In other words, inversions are made assuming variations occur in depth and in lateral position along a line. No accommodation is made during the inversion procedure for variations that are in or out of the plane of the cross section;
2. VLF results may thus show variations from line to line that may not be easy to explain with 2D analyses. For example, topography that is not in the plane of section will not be accounted for in the inversions;
3. The results are subject to the same considerations as any electromagnetic (EM) geophysical technique. Specifically, detected conductors may be fluids (saline, wet clay) carbon (graphite, coal) and/or metals. In addition, elevated conductivity requires connected grains that allow current flow;
4. VLF data are generally high frequency (~24000-25000 Hz) which contrasts with most other EM techniques. This means that VLF data may be able to detect features with lower conductivity than other techniques are able to.

8.0 Observations

8.1 Previous Results

Once GPS and elevation values were determined for each station locations, the data were formatted for analyses in the inversion routines. Each of the lines was filtered as necessary to minimize obvious noise issues (particularly short wavelength). The results were then inverted assuming a background resistivity of about 1000 Ω-m. Inversions were compiled into displays of each cross section (Appendix 1), but no effort was made at that time to analyse three-dimensional variations.

The inversions for the east-west lines are shown in Figure 5; larger scale versions are provided in Cook and Belton (2017). In general, the 2D inversions show that the area in the southern part of the survey has more conductivity anomalies than the area in the north does. Apparent conductors typically dip at a shallow angle into the hill, commensurate with the dip of the stratigraphic layering (Figure 2; Brown et al. 2011).

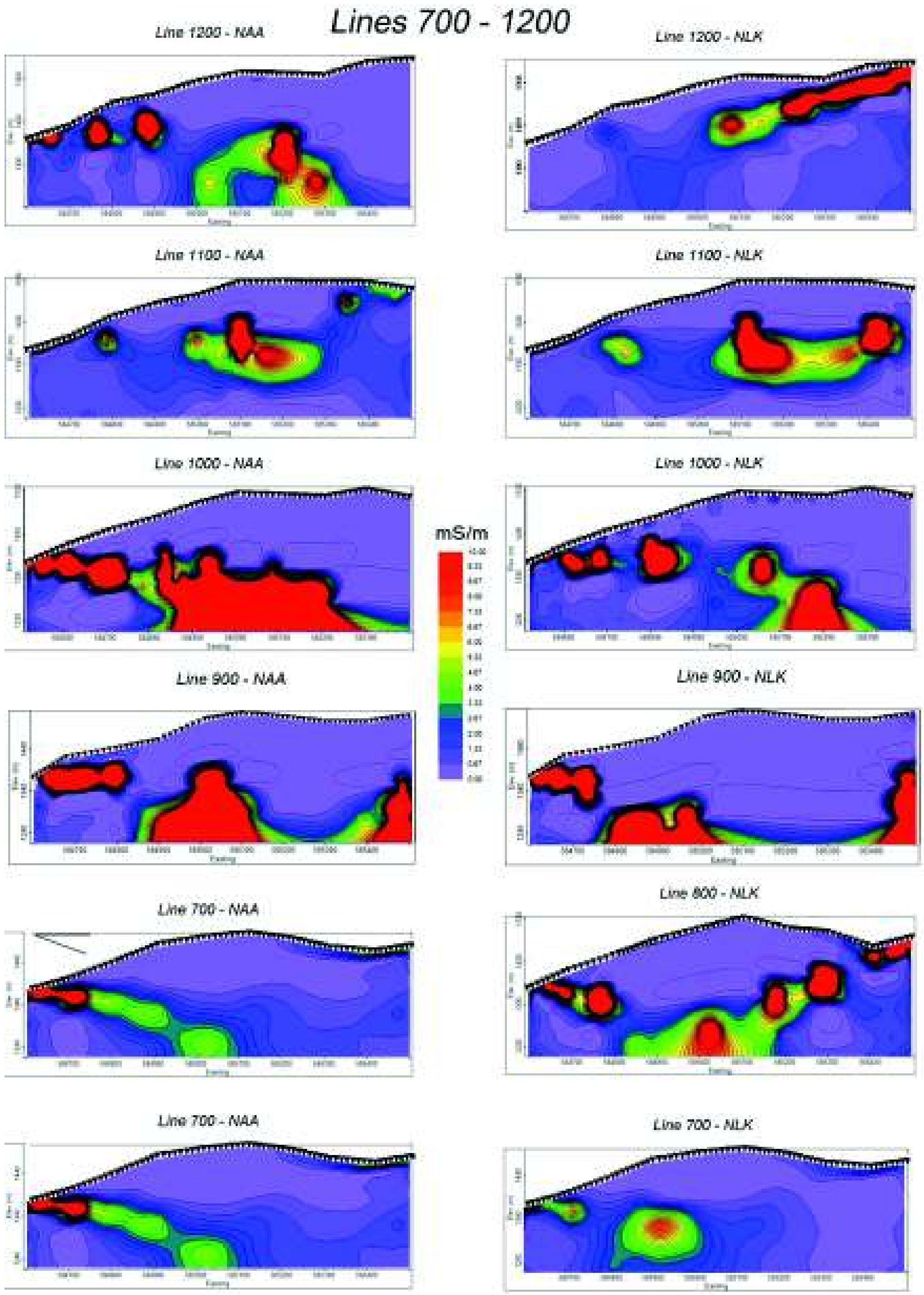


Figure 5a. Inversions for lines 700-1300 with results for Cutler, Maine (NAA, 24000 Hz) on the left and the results for Seattle, WA (NLK, 24800 Hz) on the right.

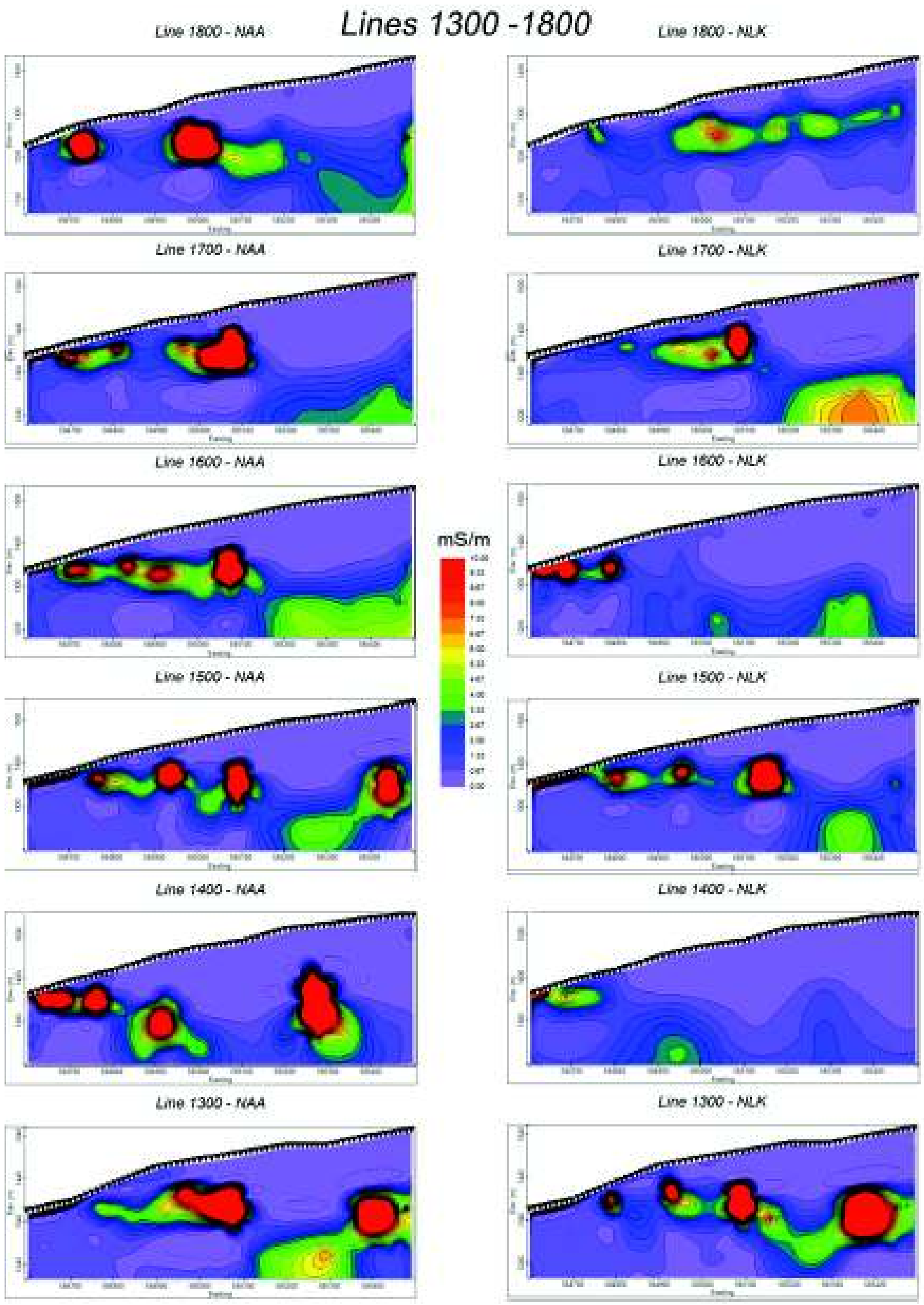


Figure 5b. Inversions for lines 1200-1800 with results for Cutler, Maine (NAA, 24000 Hz) on the left and the results for Seattle, WA (NLK, 24800 Hz) on the right.

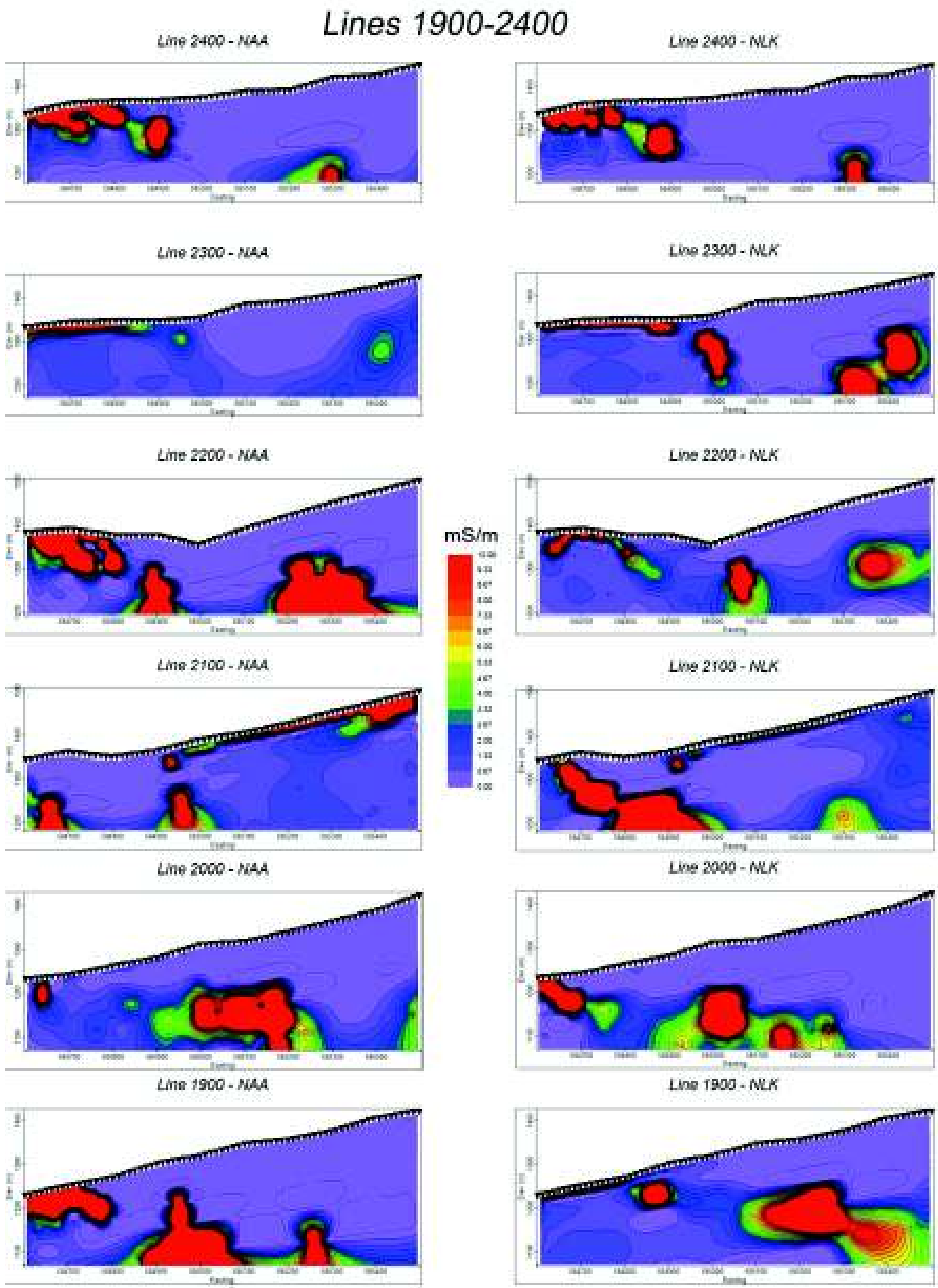


Figure 5c. Inversions for lines 1900-2400 with results for Cutler, Maine (NAA, 24000 Hz) on the left and the results for Seattle, WA (NLK, 24800 Hz) on the right.

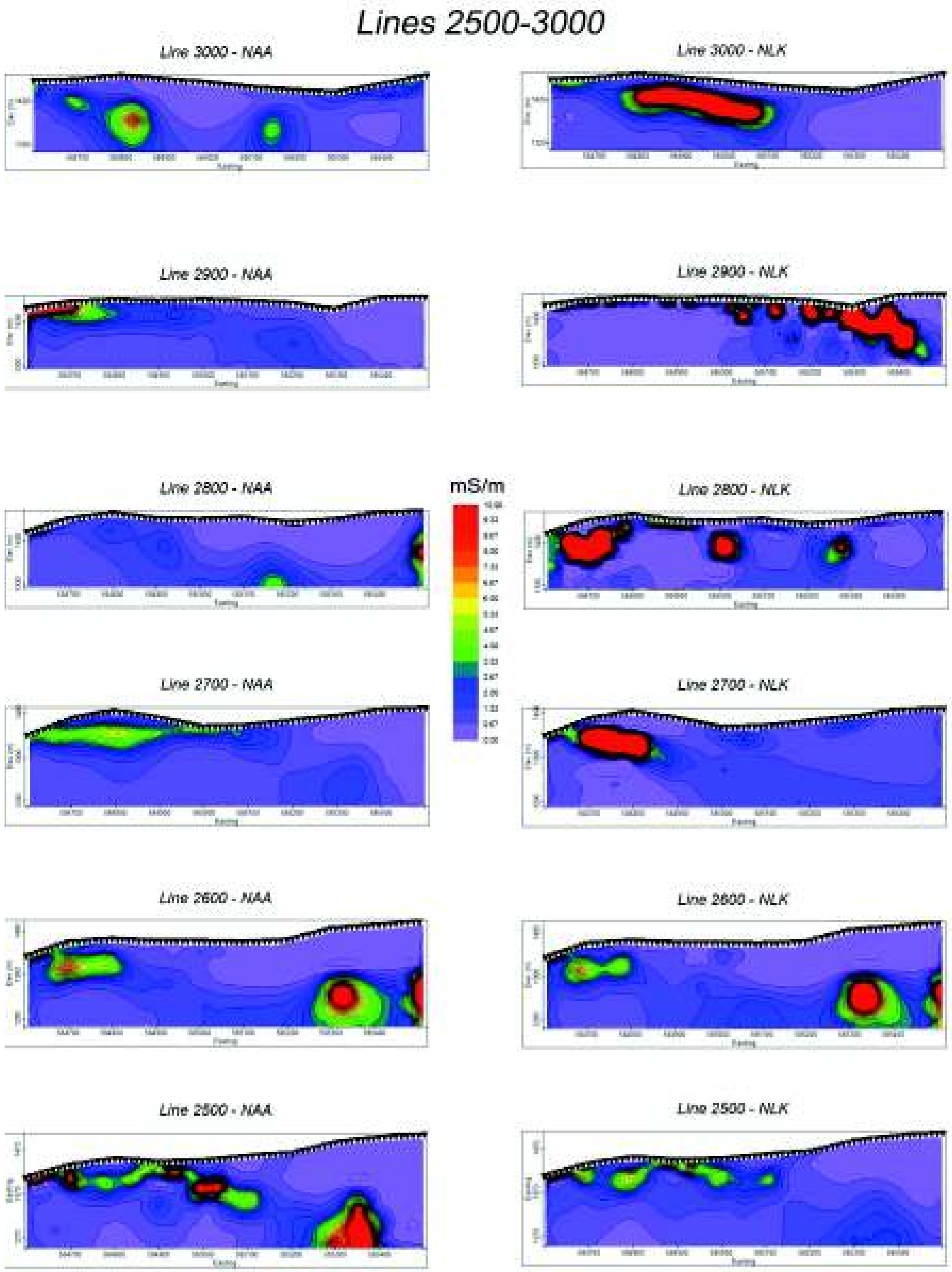


Figure 5d. Inversions for lines 2500-3000 with results for Cutler, Maine (NAA, 24000 Hz) on the left and the results for Seattle, WA (NLK, 24800 Hz) on the right.

8.2 Three- Dimensional Analyses

The analyses of three-dimensional variations are addressed here in two different ways. In the first, the data were combined into volumes (X, Y, Z, Value) which then allowed 3D gridding and isosurfaces to be calculated and displayed to analyse their volumetric structure. In the second, the data were combined into 3D-volumes for each transmitter (Seattle, NLK, and Cutler, Maine, NAA) and a series of 'slices' were calculated for different depth ranges to examine how the calculated conductivity variations change with depth and lateral position.

Three-dimensional volumes were calculated by combining all of the inversion results for each line and for a specific transmitter (NLK or NAA). This, of course, resulted in two 3d volumes: one for points with X, Y, Z, NLK-value (Figures 3 through 5), and one for points with X, Y, Z, NAA-value (Figures 6 through 8). The results were then contoured in 3D and displayed as a 3D volume with different inversion values. For ease of comparison, each volume was displayed in three ways:

1) View from southwest to northeast (Figure 3for NAA, and Figure 6 for NLK);
2) Looking from vertically above (Figure 4 for NAA and Figure 7 for NLK), and,
3) View from west to east (Figure 5 for NAA and Figure 8 for NLK).

For each of the 3D contoured volumes, isosurfaces were calculated for 5 mS/m and 10 mS/m. Conductivity anomalies that have high values are enclosed within the 5 and 10 mS/m isosurfaces.

In early 2016, a separate reconnaissance survey of two VLF lines was undertaken to test the possibility of detecting conductors in this area. Although the line locations are shown (red lined in Figures 1and 2, the data were not used here in the calculations of 3D volumes.

9.0 Observations – 3D Volumes

Although the data for both transmitters display variations that can be interpreted (inverted) as conductors, the anomalies have some important similarities as well as some important differences for the results from each of the transmitters.

9.1 Similarities Between Data From the Two Transmitters

Results from both transmitters appear to indicate a number of point source like features (Figures 3 through 8). There are several possibilities for this appearance. For example, there may indeed be localized point source features that are conductive but that are isolated (in an electrical sense) from other points.

Alternatively, the appearance of point sources could also be caused by signal variations from line to line. Signal variation could be caused by variations in the source (transmitter) signal from line to line (e.g., variations in signal from the source, polarity, topography, etc; Bozzo et al. 1994) as well as local near-surface conductivity variations. Although attempts are made during data processing to mitigate some of these effects (e.g., signal polarity from line to line; Cook and Belton, 2017), some may not be thoroughly addressed due to the 2D nature of the measurements and inversions.

9.2 Differences Between Data From the Two Transmitters

The key difference between the NLK volume and the NAA volume is that the NAA volume appears to display more prominent conductivity anomalies in the southern half of the grid (Figures 6 through 8). The zone of elevate conductivity on the NAA inversions appears to be arcuate and convex eastward. However, whether these together represent a single conductor that appears discontinuous due to variations that are unrelated to changes in conductivity of the subsurface zone, or whether it represents a series of unconnected conductors is not known at this time.

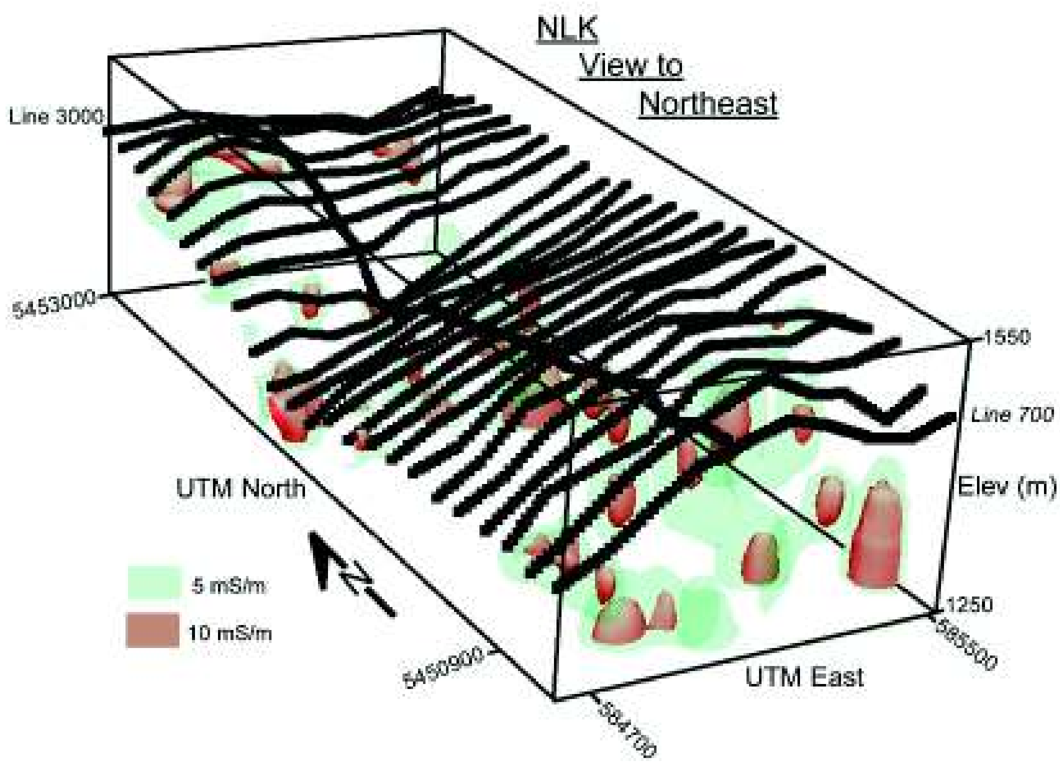


Figure 6a. 3D volume (looking to the northeast) for the inversions results for the NLK (Seattle) transmitter. The heavy black lines are the recording line locations.

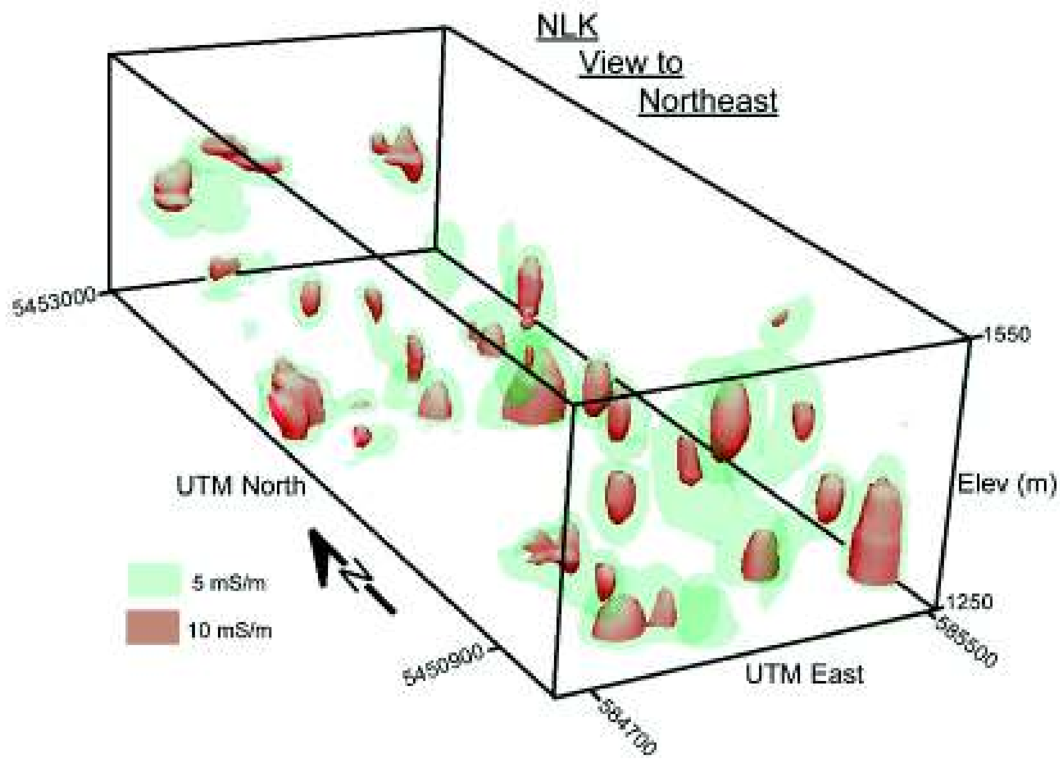


Figure 6b. Same as Figure 6a without the recording lines shown.

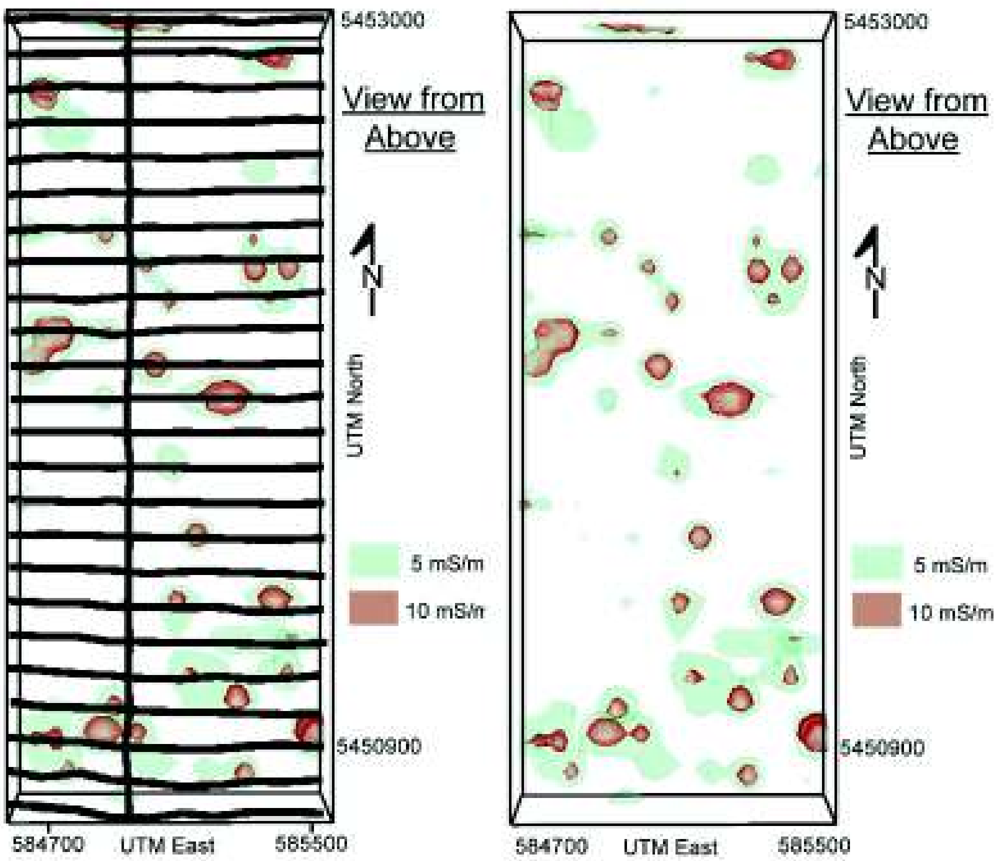


Figure 7. The same volume as in Figure 6a with a view from vertically above. (left) with the recording lines and (right) without the recording lines.

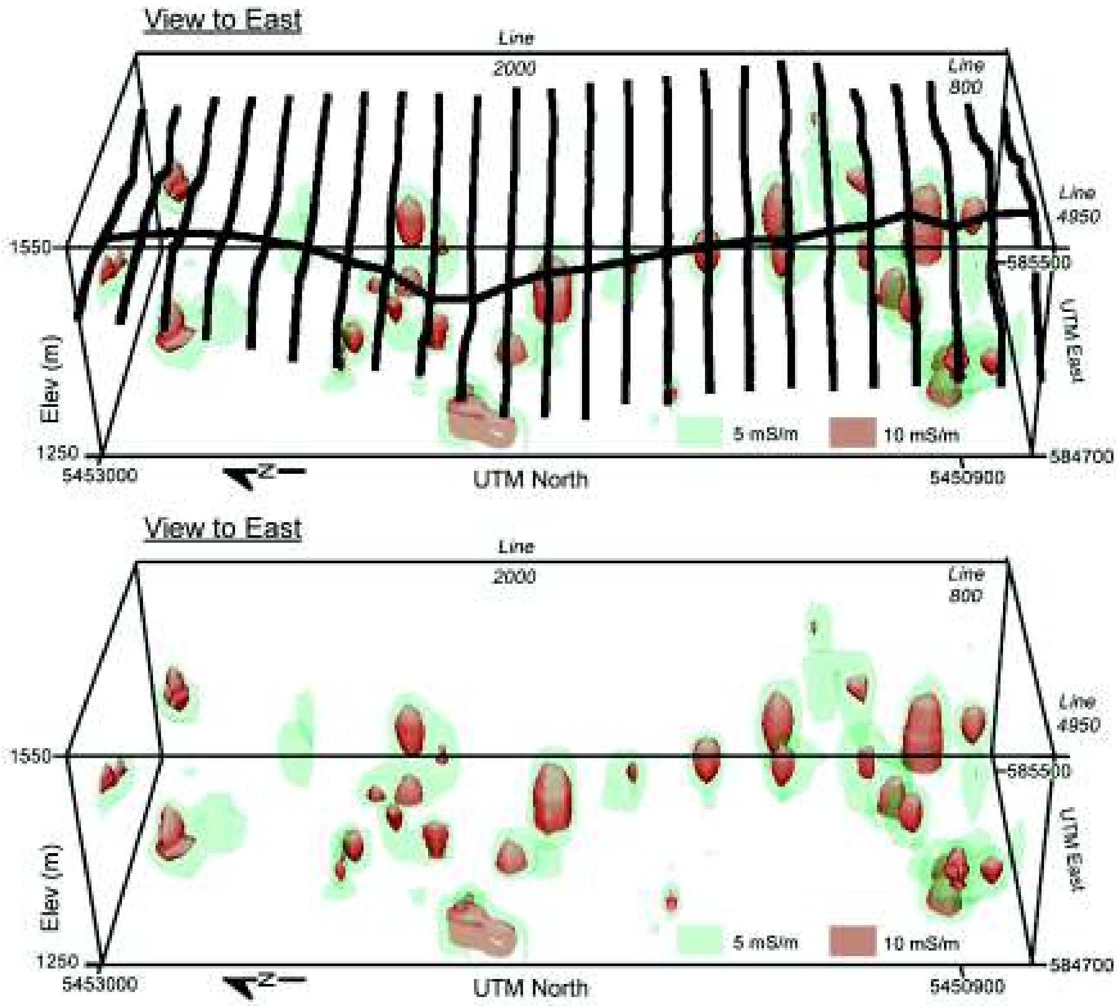


Figure 8. The same volume as in Figure 6 with a view looking eastward, with the recording lines (top) and without the recording lines (bottom). Note that, although the apparent conductors appear as localized points, there does appear to be a slight concentration of them in the southern part of the volume.

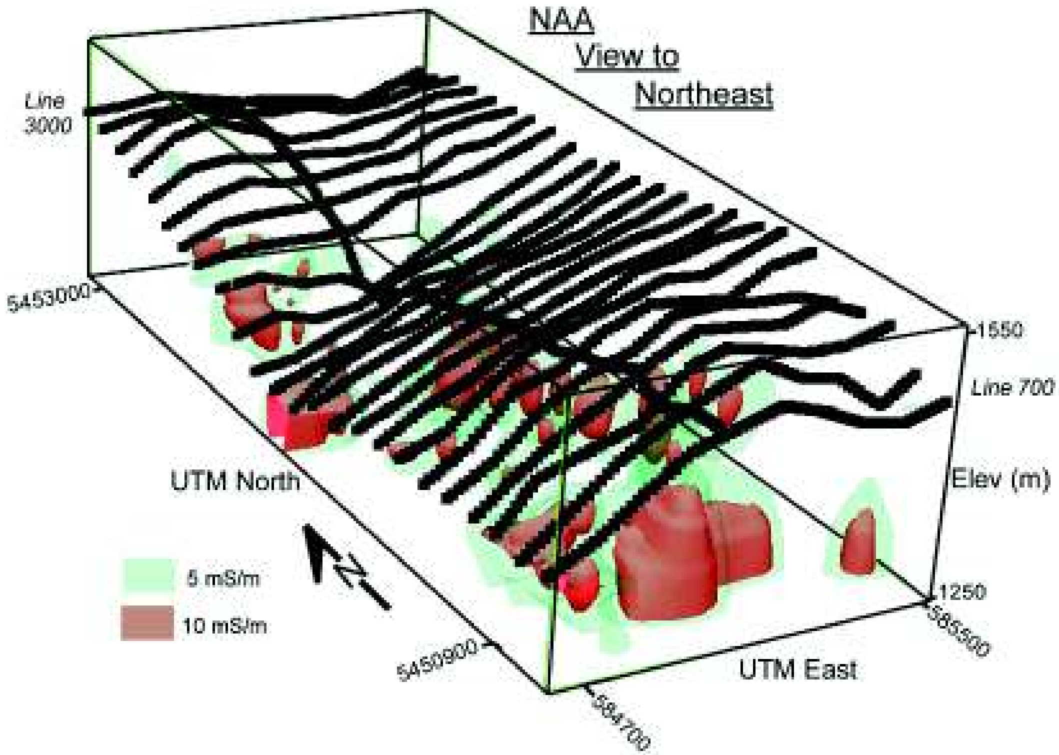


Figure 9a. 3D volume (looking to the northeast) for the inversions results for the NAA (Maine) transmitter. The heavy black lines are the recording line locations.

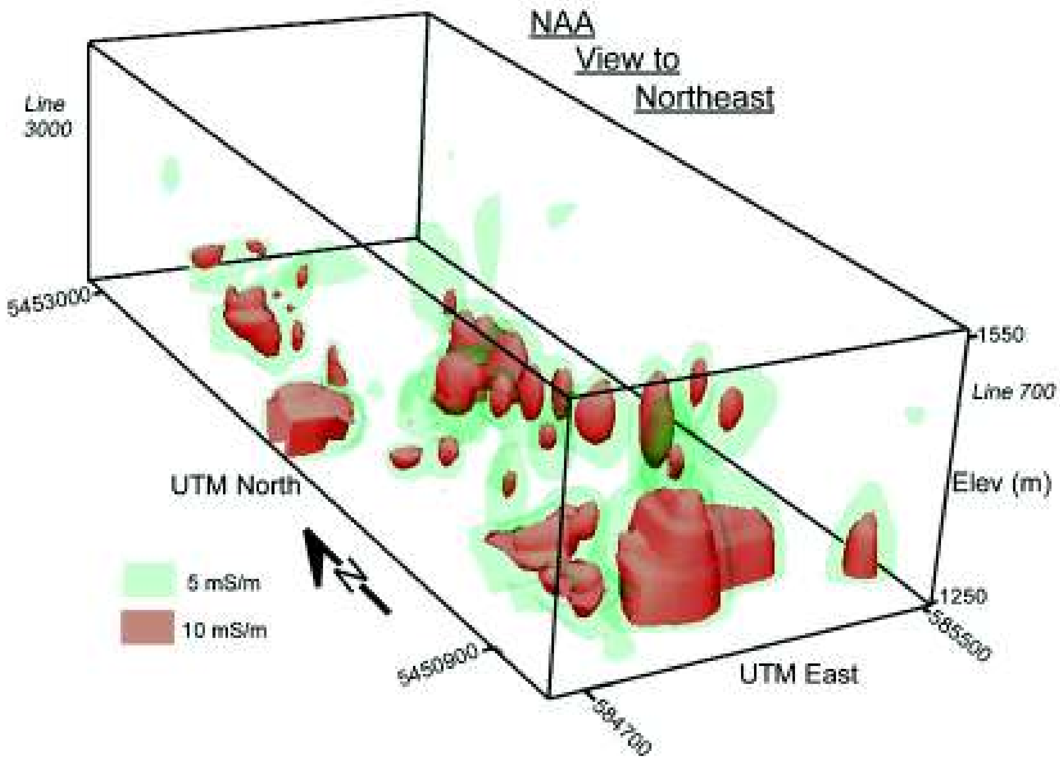


Figure 9b. Same as Figure 9a without the recording lines shown.

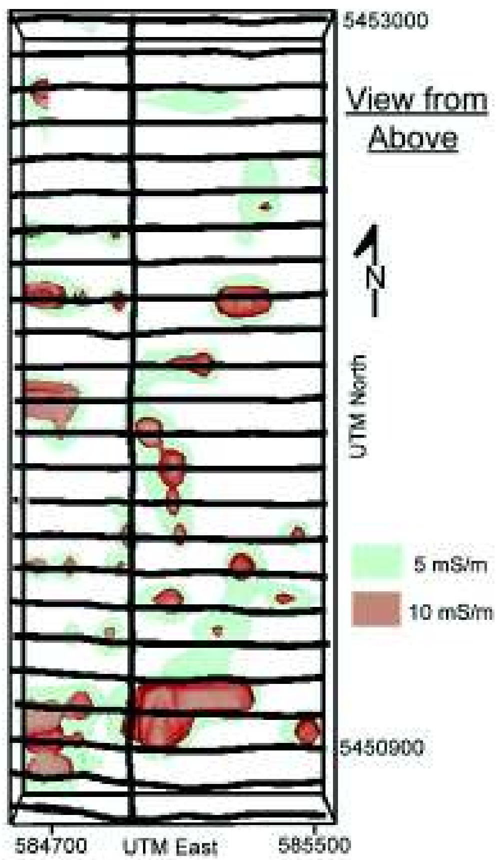


Figure 10. The same volume as in Figure 9 with a view from vertically above; (left) with the recording lines and (right) without the recording lines.

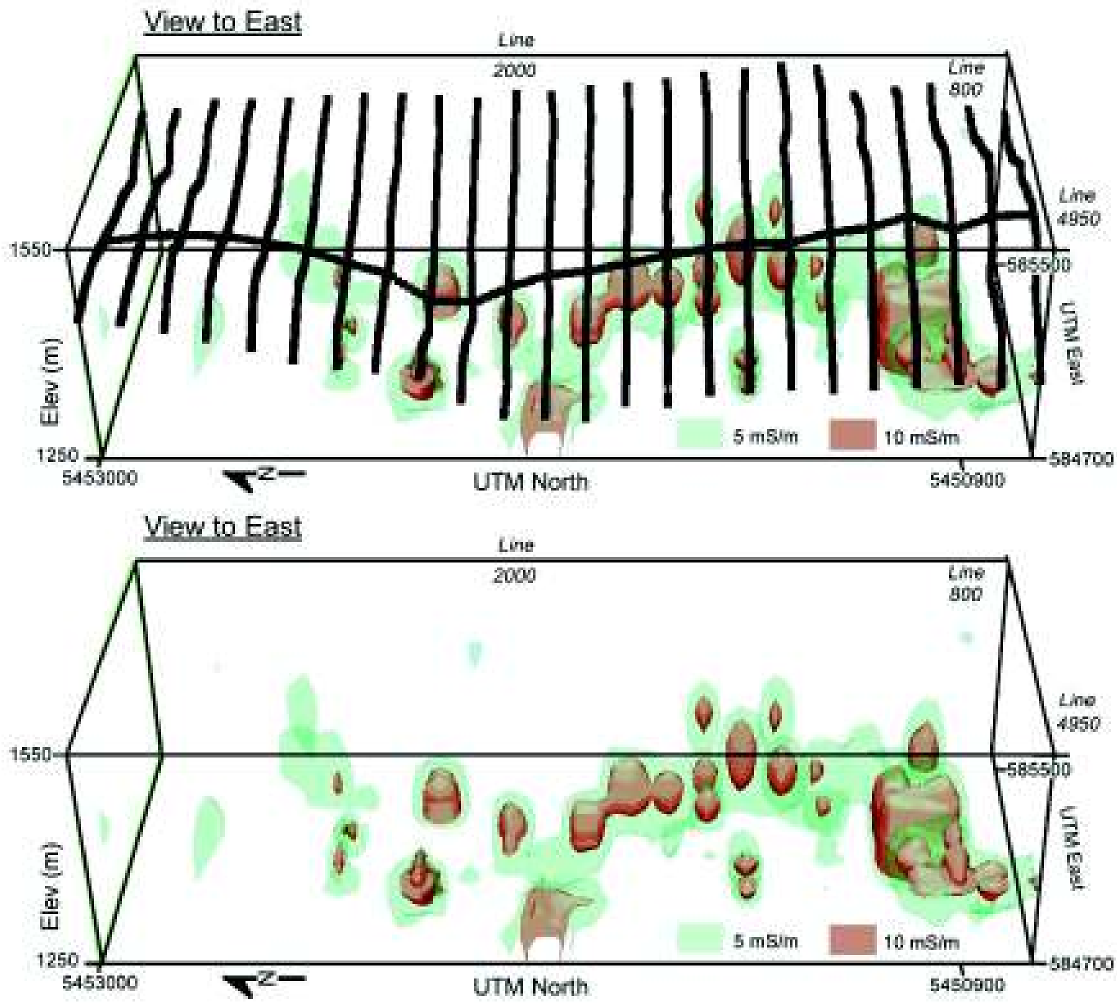


Figure 11. The same volume as in Figure 9 with a view looking from west to east, (top) with the recording lines and (bottom) without the recording lines. Note that the possible concentration of conductors in the southern part of the volume is more pronounced than it is for the NLK signal (Figure 6).

10.0 Observations: Slices and Slabs

If the topography were flat, it would be a simple matter to calculate the conductivity value at each horizontal coordinate for any depth of interest. This produces a series horizontal 'slices' at each depth of interest so that conductivity variations can be observed with horizontal position at each chosen depth.

However, the topography on SBA is not flat (Figure 3). As a result, horizontal slices at a single elevation will, in most cases have a significant fraction of the slice above the topography surface and thus provide little useful information. This effect is illustrated in Figures 12 and 13. Here, horizontal slices are chosen at 1346m (Figures 12a and 13a) and 1394m (Figures 12b and 13b). Although the slices are visually effective for showing the conductors, there is a large fraction of the slices (especially the shallow slices at 1394m) that is above the topography. This is particularly true in the western part of the grid, where a creek valley deepens and widens westward. Hence this approach is not effective for visualizing subsurface conductivity variations in areas of irregular topography.

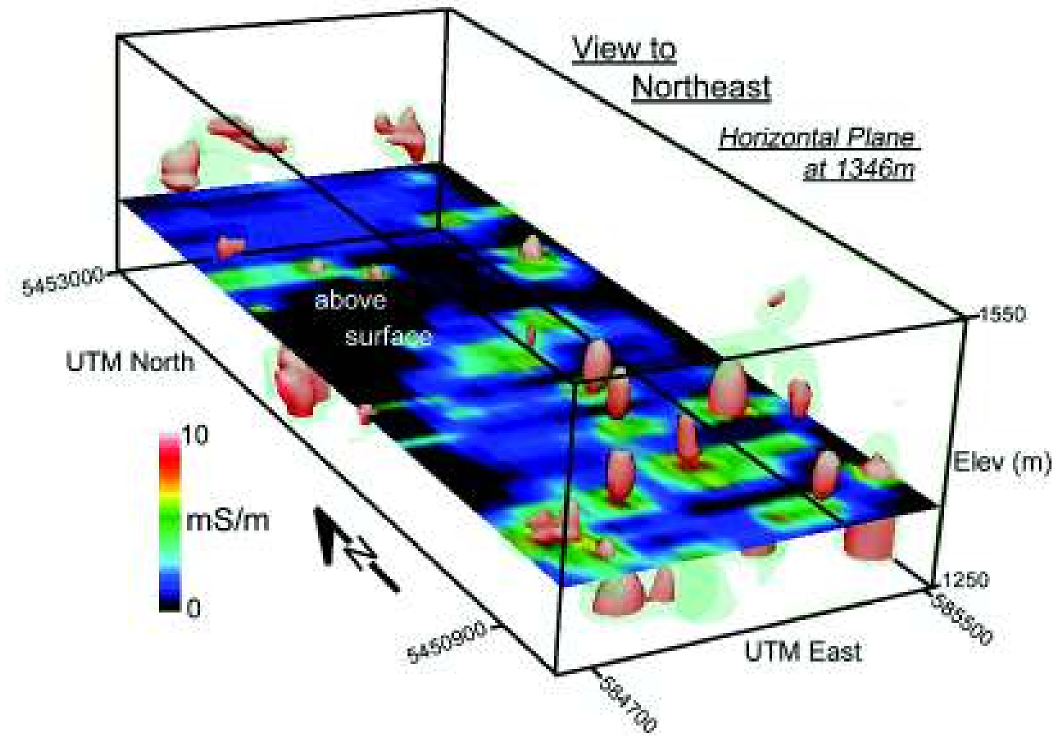


Figure 12a. Horizontal slice at 1346m elevation (NLK volume).

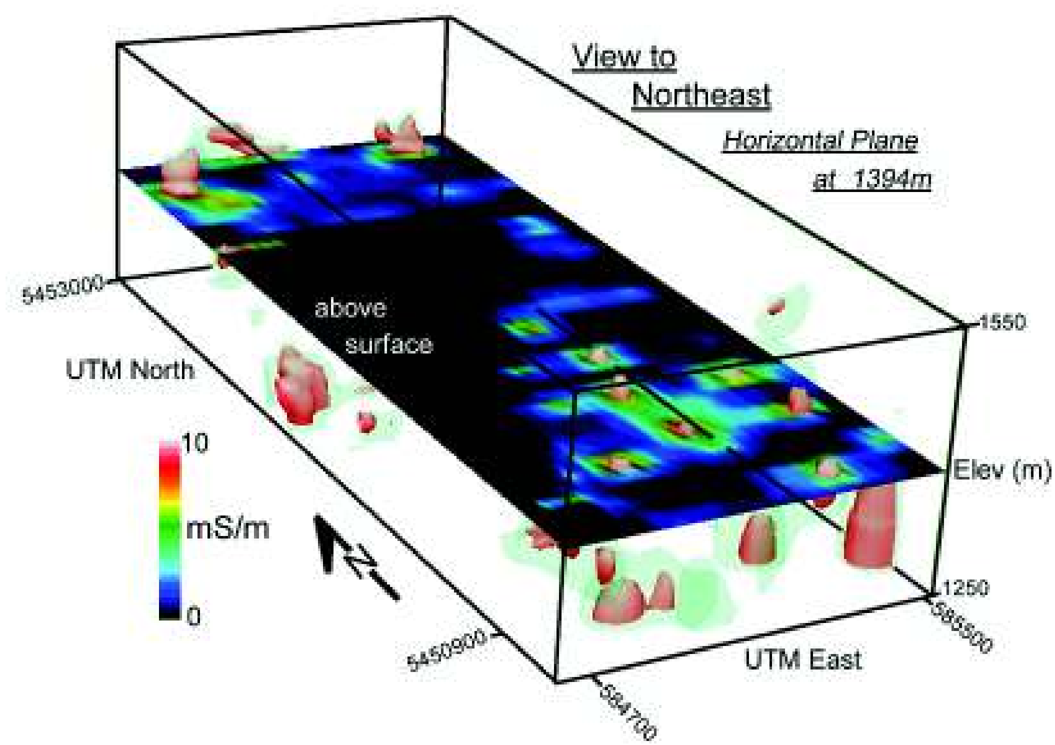


Figure 12b. Horizontal slice at 1394m elevation (NLK volume). The wide, black area is above the topography.

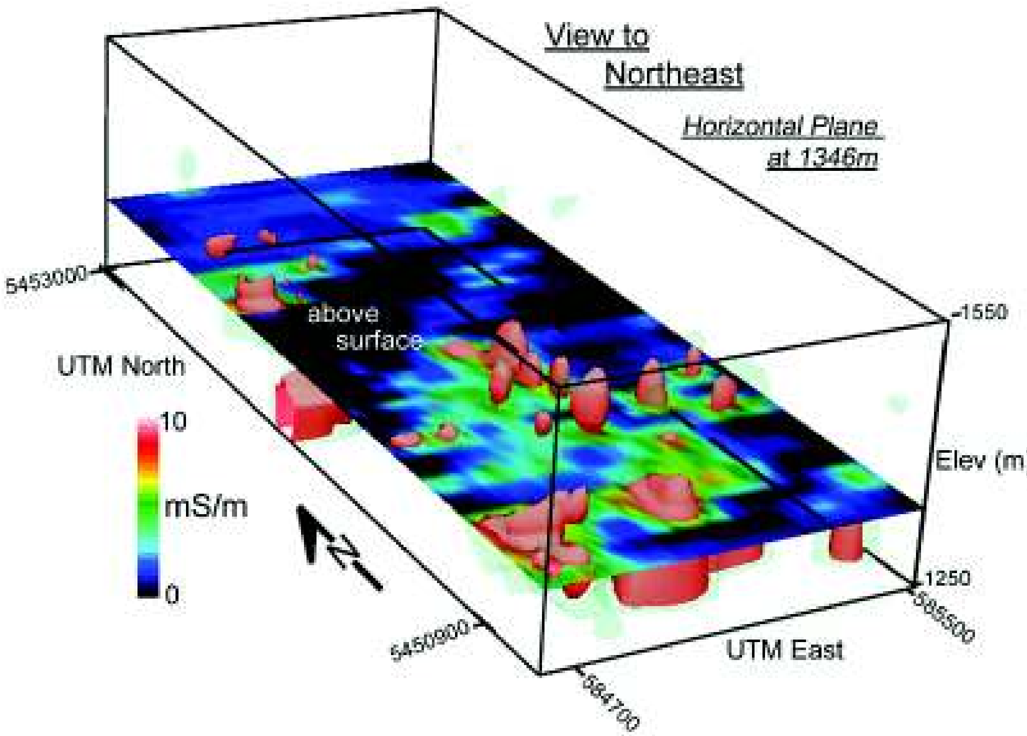


Figure 13a. Horizontal slice at 1346m elevation (NAA volume).

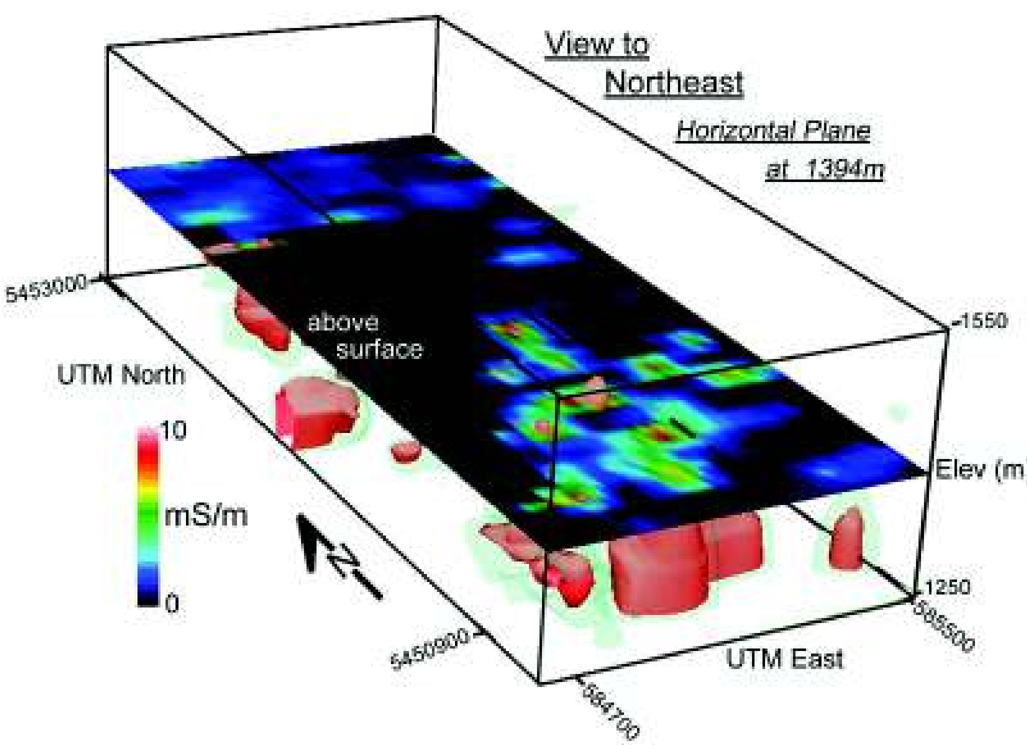


Figure 13b. Horizontal slice at 1394m (NAA volume).

To circumvent the issue with horizontal slices cutting across irregular topography, 'slices' were calculated first by taking surfaces that are parallel to the topography. Although this could be done for any single depth below the surface, to enhance the visible conductors, conductivity values were averaged over different depth ranges at each X-Y point. For this study, three depth ranges were chosen: 10-50m, 50-100m, and 100-150m. (The map for the shallow depths was chosen to start at 10m to minimize effects of near-surface noise.) Thus, at a particular spatial coordinate, all of the conductivity values between 10 and 50m depth were averaged for that point for the 10-50m depth range, all values were averaged for 50-10m and then for 100-150m. This approach produced three maps (10-50m, 50-100m, and 100-150m) for each of the two transmitter stations (NLK, NAA). As a result, each map is more of a 'slab' with thicknesses of 40m for the 10-50m range, and 50m for the 50-100 and 100-150m ranges, rather than a 'slice' at a specific elevation.

Figure 14 shows the result from the NLK transmitter for the 10-50m 'slab'. In Figure 14a, the result is shown with the recording lines superimposed and Figure 14b is the same map without the recording lines. One of the features that is apparent is that there is a strong correlation between the high frequency signal and line direction. This is not uncommon for gridded data that were recorded as a series of lines, and it is generally a concern for low amplitude signal, or 1-2 mS/m in this case.

One way to minimize this effect is to apply a low pass filter (Figure 14c). Some long wavelength (low frequency) linear patterns remain (e.g., near UTM north = 5452100), but the high frequency, low amplitude 'chatter' is attenuated. The longer wavelength, low frequency signal that appears to be associated with line direction is probably due to one (or more) of the effects such as line to line variations in conductivity, signal quality, topography, or 3D effects not addressed with the 2D inversions, etc.

Figures 15 through 20 show the unfiltered and lowpass filtered versions of the maps. Figures 15 (NLK) and 16 (NAA) are for the 10-50m depth range; Figures 17 (NLK) and 18 (NAA) are for the 50-100m depth range, and Figures 19 (NLK) and 20 (NAA) are for the 100-150m depth range. In each of Figures 15 through 20, the left (a) image is the unfiltered map and the right (b) image is the lowpass filtered version. Two features stand out from this approach:

1. Overall, a zone conductivity anomalies appears to deepen eastward. Although there are some individual line anomalies near the surface on the east side of the 10-50m maps (Figures 12 and 13), most of the elevated conductivity appears to be concentrated on the west. In contrast, the deeper 'slabs' indicate that the zone of high conductivity is several hundred metres farther east. This observation is consistent with the measured dips of 10-25^{o} northeastward (Kennedy, 2013), and,
2. As noted in the description of the 3D volumes and isosurfaces, these 'slab' maps also appear to show that there are more conductivity anomalies in the southern half of the grid than in the northern half, particularly on the maps of the deep (100-150m) range.

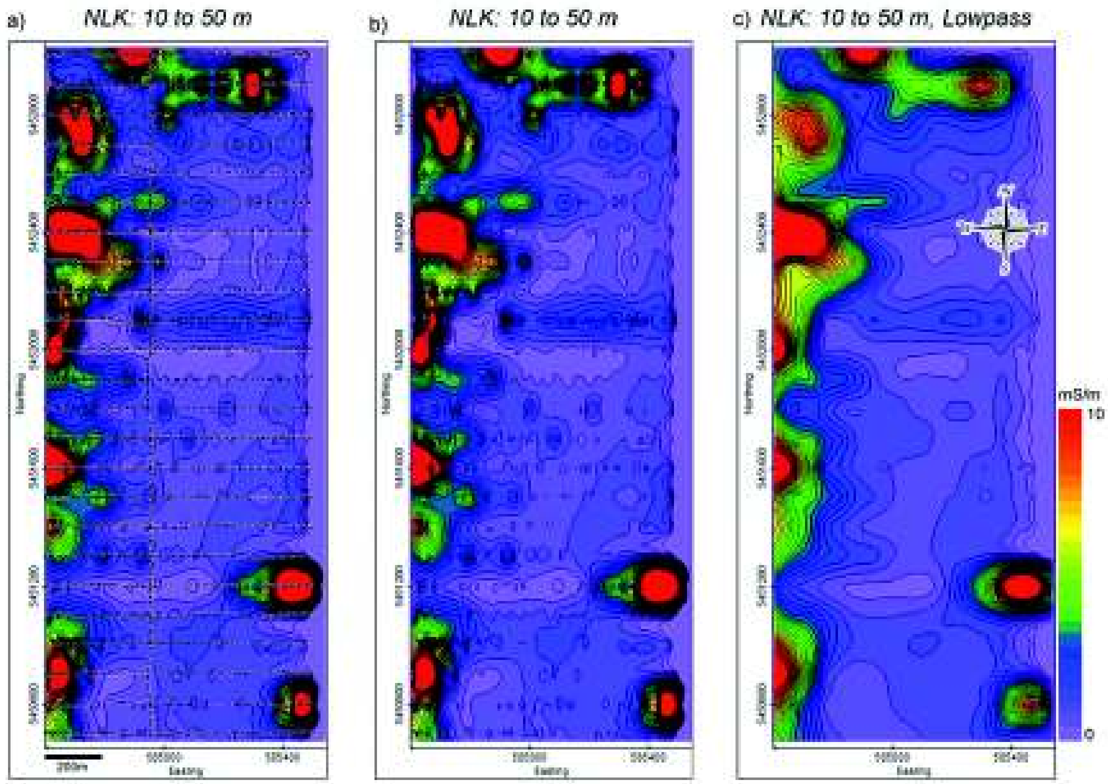


Figure 14. (a) Map of the grid area for the results from the NLK transmitter and for conductivity averaged between 10 and 50m at each coordinate; (b) same as (a) without the recording lines; (c) same as (b) after applying a low pass filter to minimize the high frequency chatter.

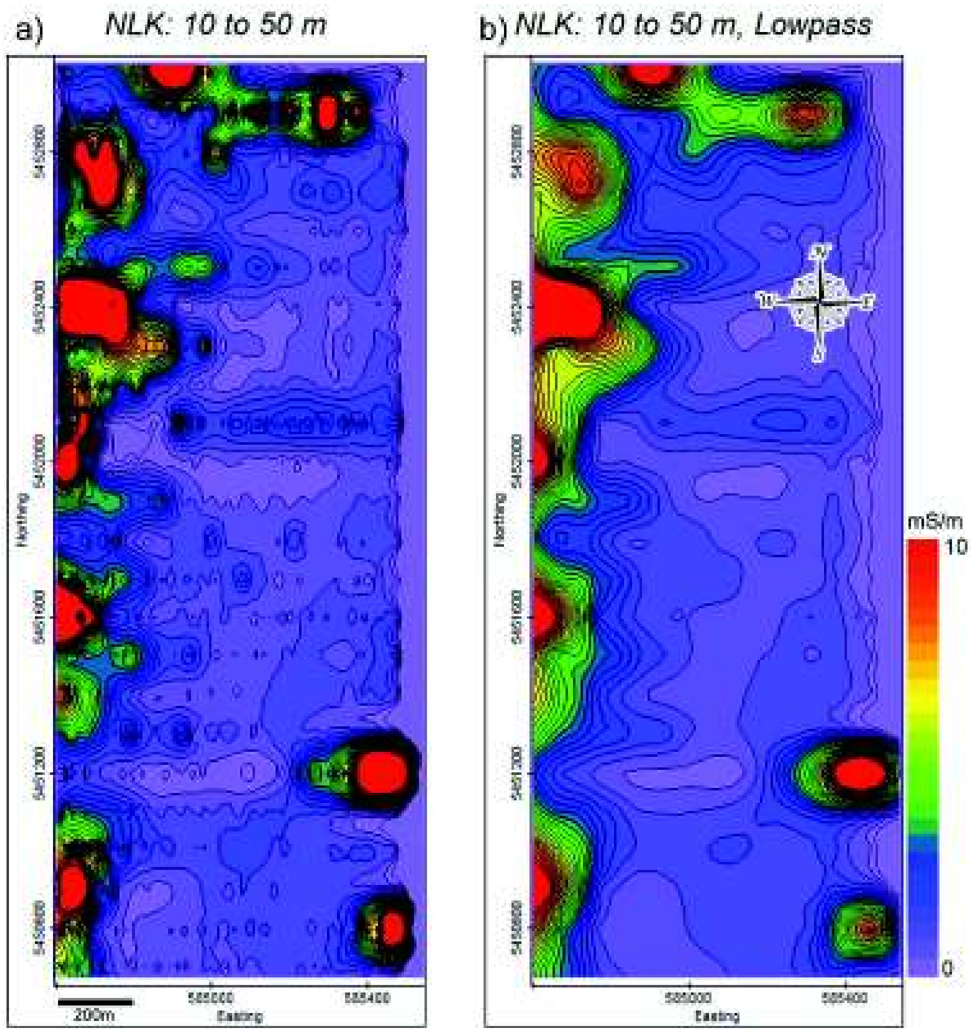


Figure 15. (a) unfiltered and (b) low pass filtered maps for the NLK transmitter and for the 10-50m depth range.

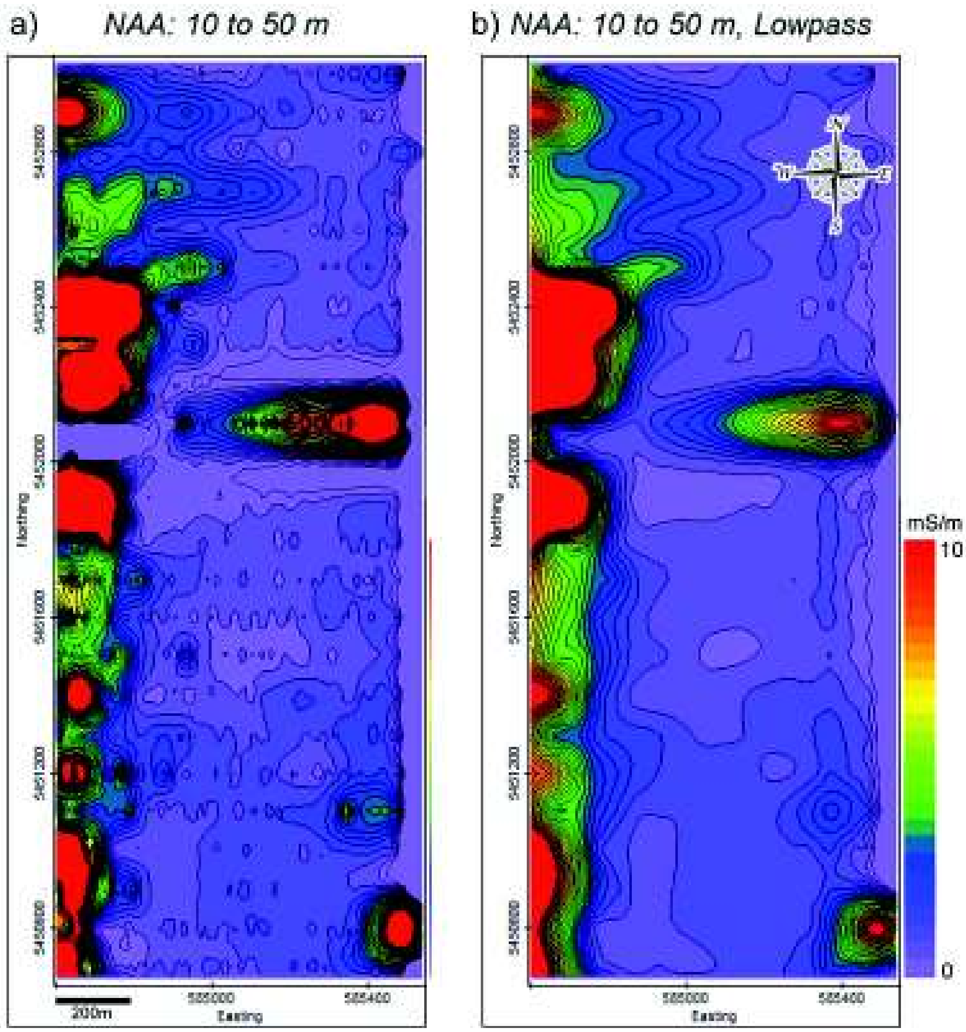


Figure 16. (a) unfiltered and (b) low pass filtered maps for the NAA transmitter and for the 10-50m depth range.

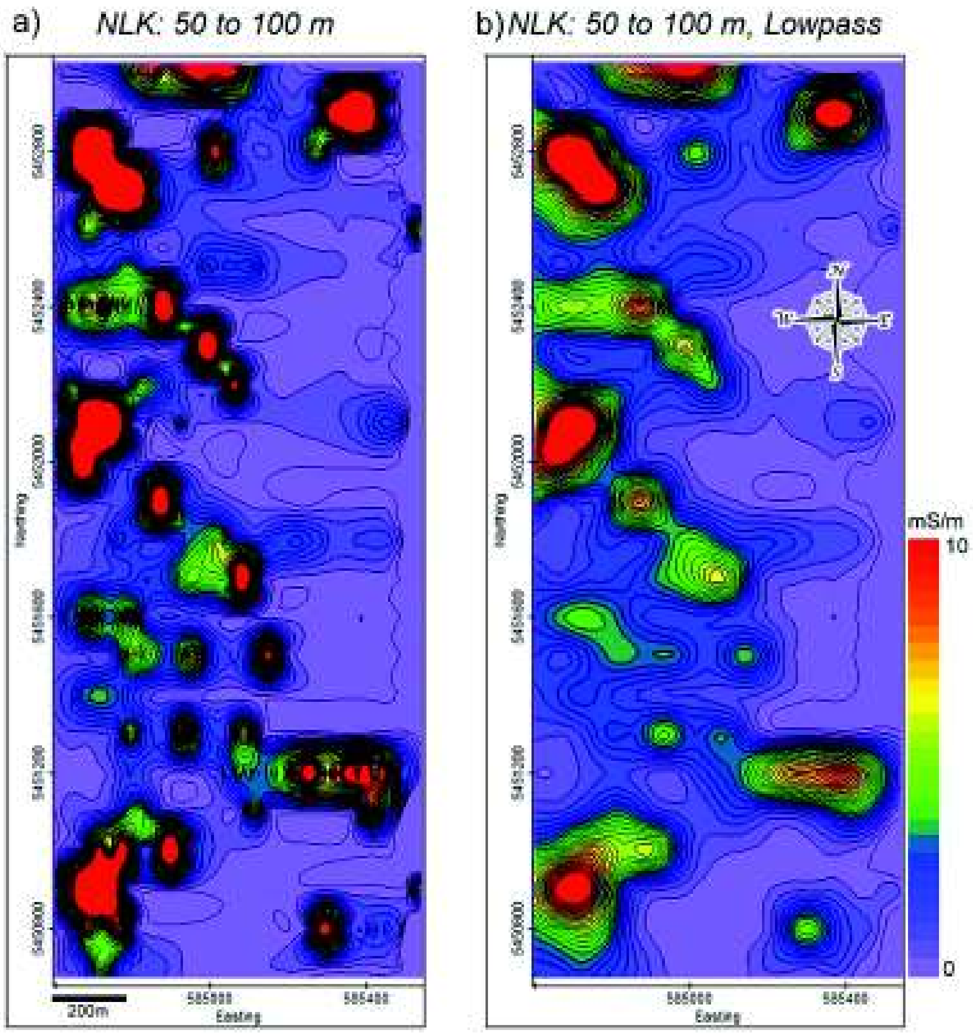


Figure 17. (a) unfiltered and (b) low pass filtered maps for the NLK transmitter and for the 50-100m depth range.

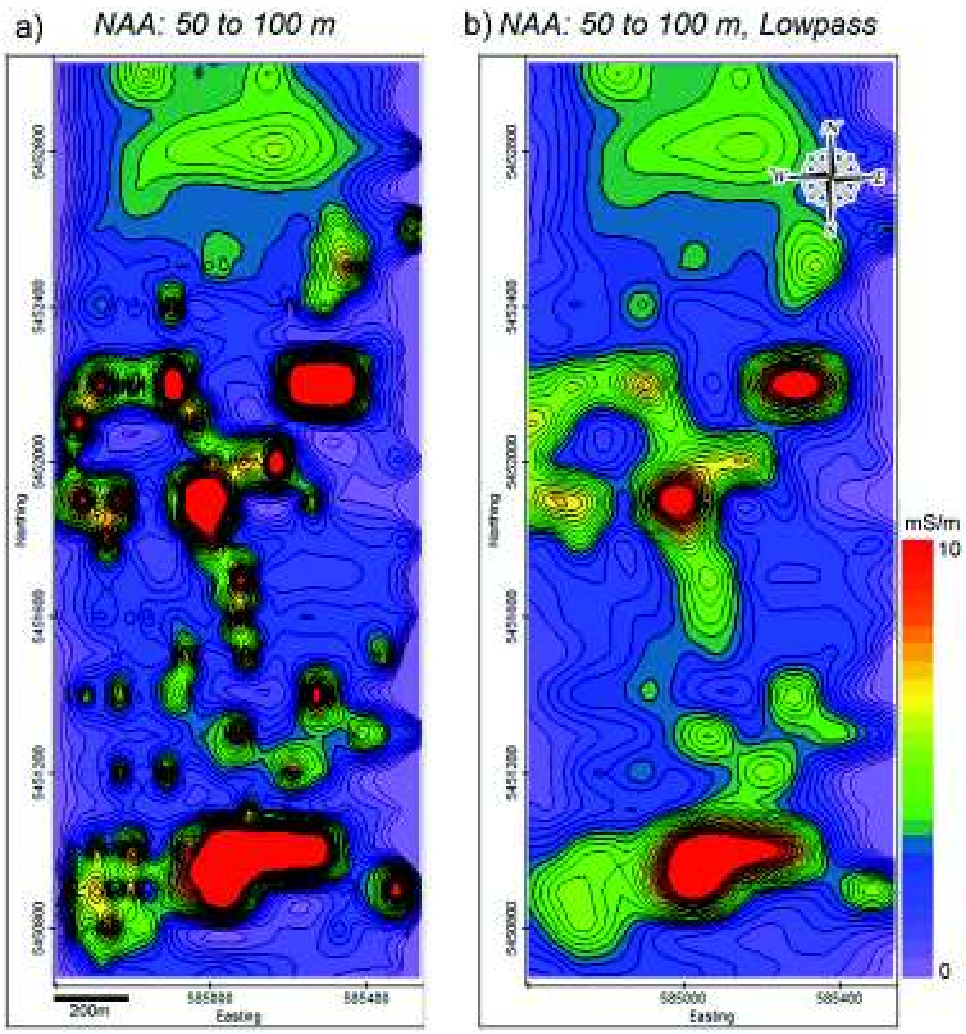


Figure 18. (a) unfiltered and (b) low pass filtered maps for the NAA transmitter and for the 50-100m depth range.

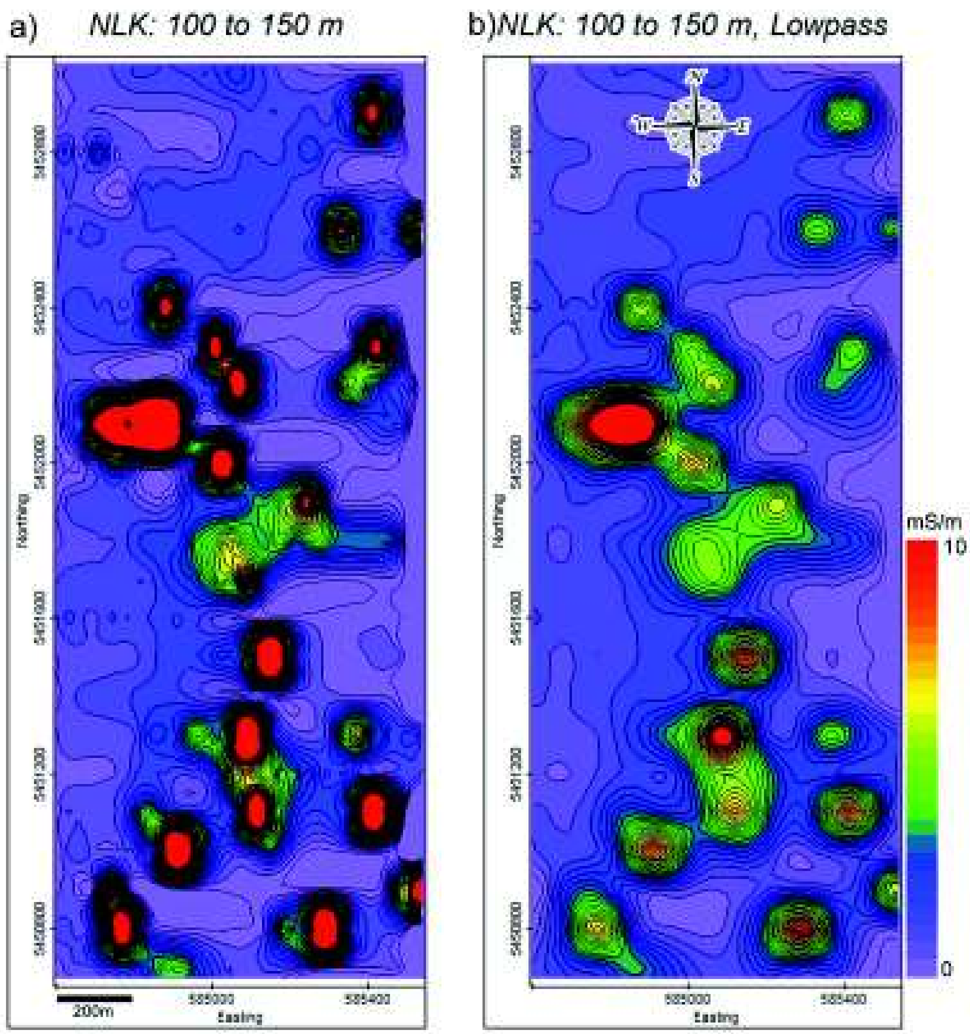


Figure 19. (a) unfiltered and (b) low pass filtered maps for the NLK transmitter and for the 100-150m depth range.

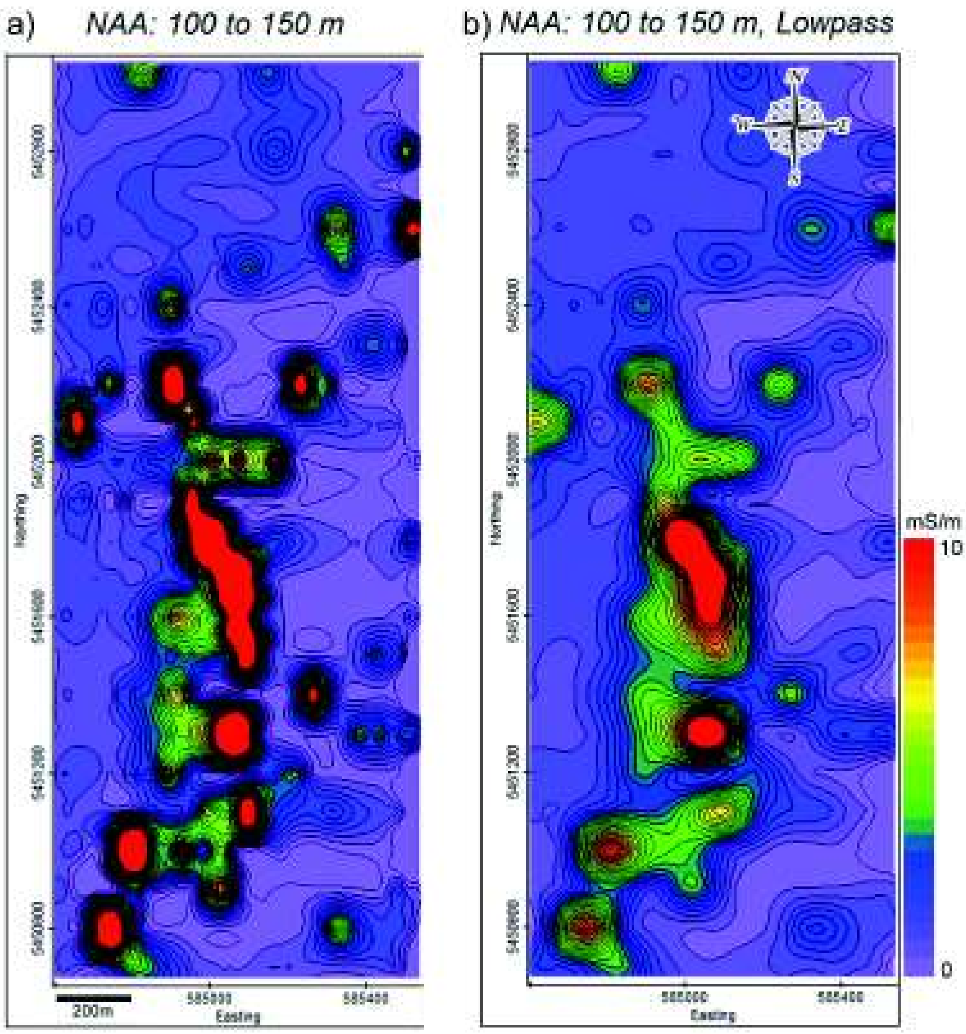


Figure 20. (a) unfiltered and (b) low pass filtered maps for the NAA transmitter and for the 100-150m depth range.

11.0 Summary and Conclusions

Analyses of gridded VLF results from the Spike's Big Adventure property in southeastern B. C. has provided a new perspective on the three-dimensional configuration of near-subsurface conductivity anomalies. Two approaches were undertaken. IN the first, the inversion results were combined into 3D volumes of data that could be contoured in 3D to display isosurfaces of conductivity values. In the second, maps of the areal distribution of conductivity anomalies were constructed by averaging conductivity values over ranges of depths (10-50m, 50-100m, and 100-150m).

Each of these approaches appears to indicate that, 1) zones of elevated conductivity appear to dip eastward, consistent with geological dips, and 2) there appears to be a greater concentration of deep calculated conductivity anomalies in the southern half of the grid area.

12.0 References

Bozzo, E., Lombardo, S., and Merlanti, F. 1994. VLF prospecting: observations about field experiments, Annali Di Geofisica, v. 37. p. 1215-1227

Cook, F. A. and Belton, B. A. 2017. Integration of Geophysical and Geological Data in the Upper Moyie River Area: Spike's Big Adventure Property, British Columbia Department of Energy and Mines Assessment Report, 51pp.

Kennedy, S., 2013. Report on geology, prospecting, rock and soil geochemistry, Spike's Big Adventure property, BC Geological Survey Assessment Report 34178, 50pp.

Kennedy, S., 2014. Rock and soil geochemistry report, Spike's Big Adventure Mineral Claims, BC Geological Survey Assessment Report 34914, 40pp.

Monteiro-Santos, F., A. Mateus, J. Figueiras, and M. Goncalves. 2006. Mapping groundwater contamination around a landfill facility using the VLF-EM system, J. Applies Geophysics, v. 60, 115-125.

13.0 Statement of Costs

Property:	Spike's Big Adventure	
Event #	5689846	
Start - End Date:	March 6, 2018 – March 14, 2018.	
Tenure work done on:	984342	
Type of work done:	Geophysical –VLF; Reprocessing and 3D imaging	
Fred Cook	4.5 man days@ 800.00	3,600.00
	Report and maps	3,000.00
Total		**$ 6,600.00**

14.0 Statement of Qualifications

I, **Frederick A. Cook** do hereby certify that:

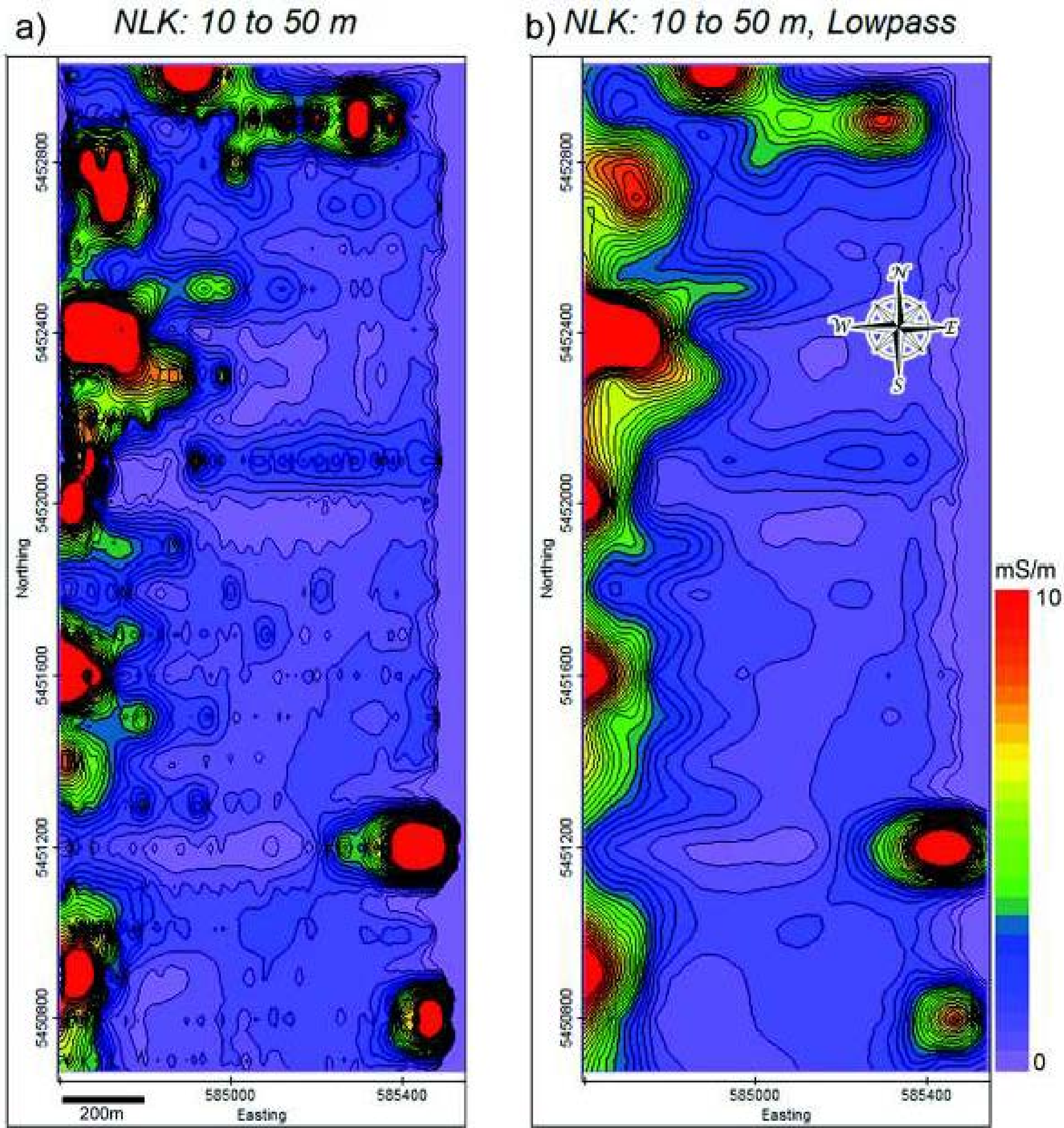
I attained the degree of Doctor of Philosophy (Ph.D.) in geophysics from Cornell University in Ithaca, New York in 1981.
I have a B.Sc. in geology (1973) and an MSc. in Geophysics (1975) from the University of Wyoming in Laramie, Wyoming.
I am a registered member of the Association of Professional Engineers and Geoscientists of British Columbia (P. Geo. 2009). Previously, from 1984-2009, I was registered with the Association of Professional Engineers, Geologists and Geophysicists of Alberta as both a P. Geol. and a P. Goph.
I am a member of the American Geophysical Union and the Geological Society of America.
I have worked as a geophysicist/geologist for a total of 36 years since my graduation from university. I have worked for the Continental Oil Company (1975-1977) and the University of Calgary (1982-2010).
I was the Director of the Lithoprobe Seismic Processing Facility at the University of Calgary from 1987-2003.
I have recently (2011) been appointed an International Consultant for the Chinese SinoProbe project.
I have a thorough knowledge of the geology and geophysics of southern British Columbia based on extensive geological and geophysical fieldwork.
I have authored more than 125 scholarly publications in peer-reviewed journals and books.
I am the author of this report.
I am not aware of any material fact or material change with respect to the subject matter of this report, which is not reflected in this report.

"signed and sealed" at Salt Spring Island, B.C.

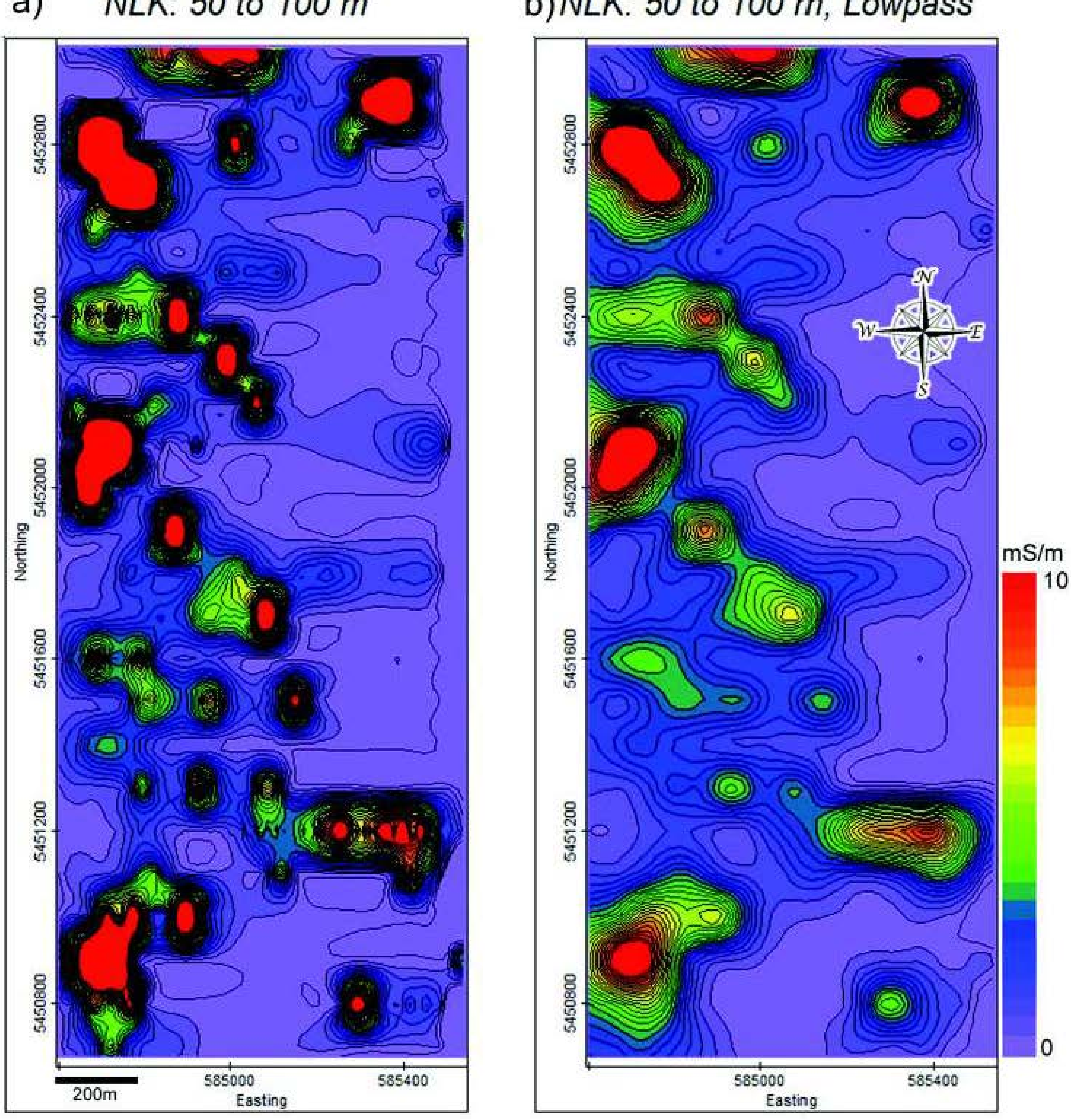
Frederick A. Cook, P. Geo.
Salt Spring Imaging, Ltd
128 Trincomali Heights
Salt Spring Island, B.C. V8K1M8
Dated at Salt Spring Island, B.C. this 25th day of May, 2018

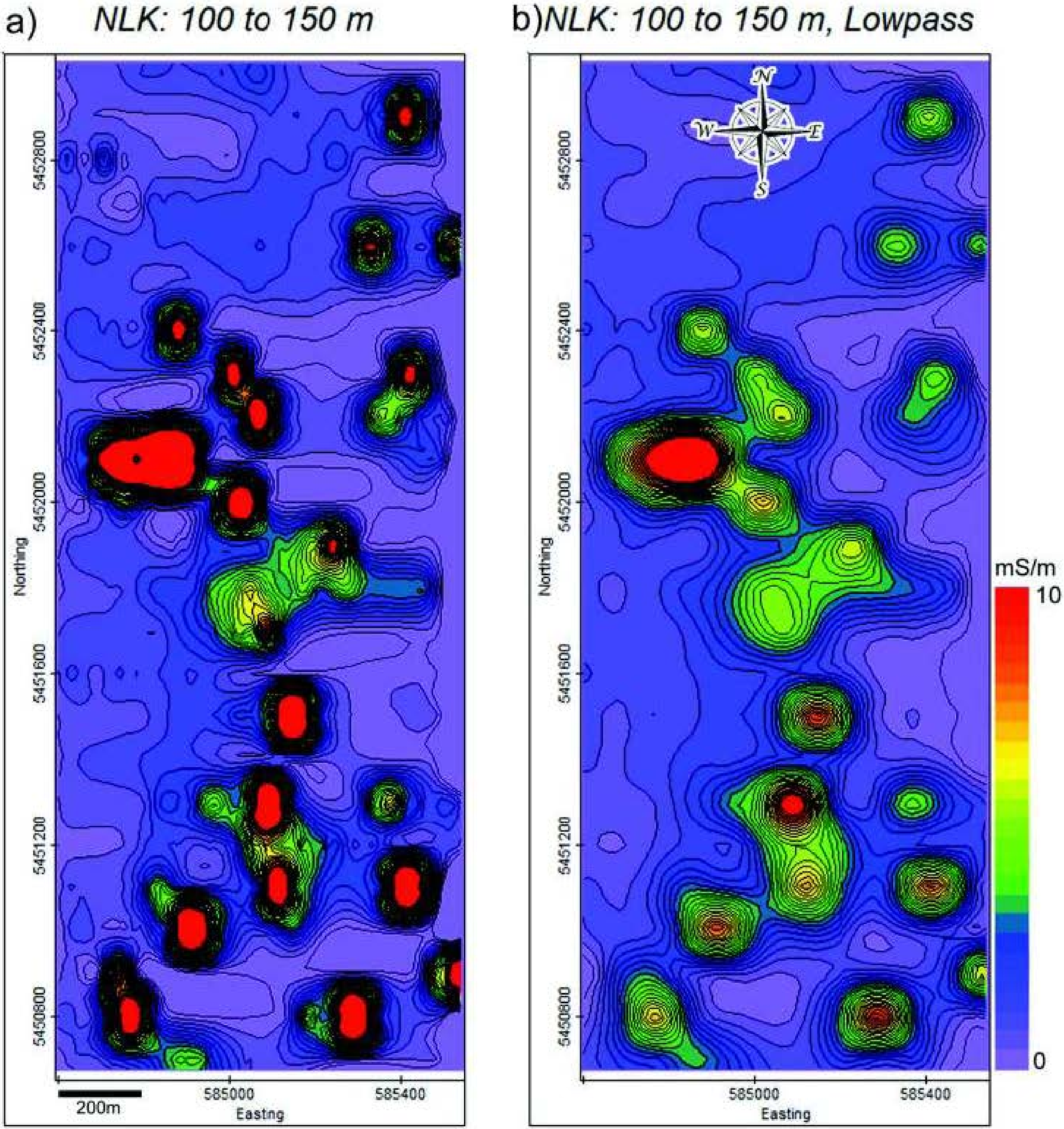
Registration License No. 34585
Association of Professional Engineers and Geoscientists of British Columbia

Appendix 1. NLK Maps
Scale 1:5000

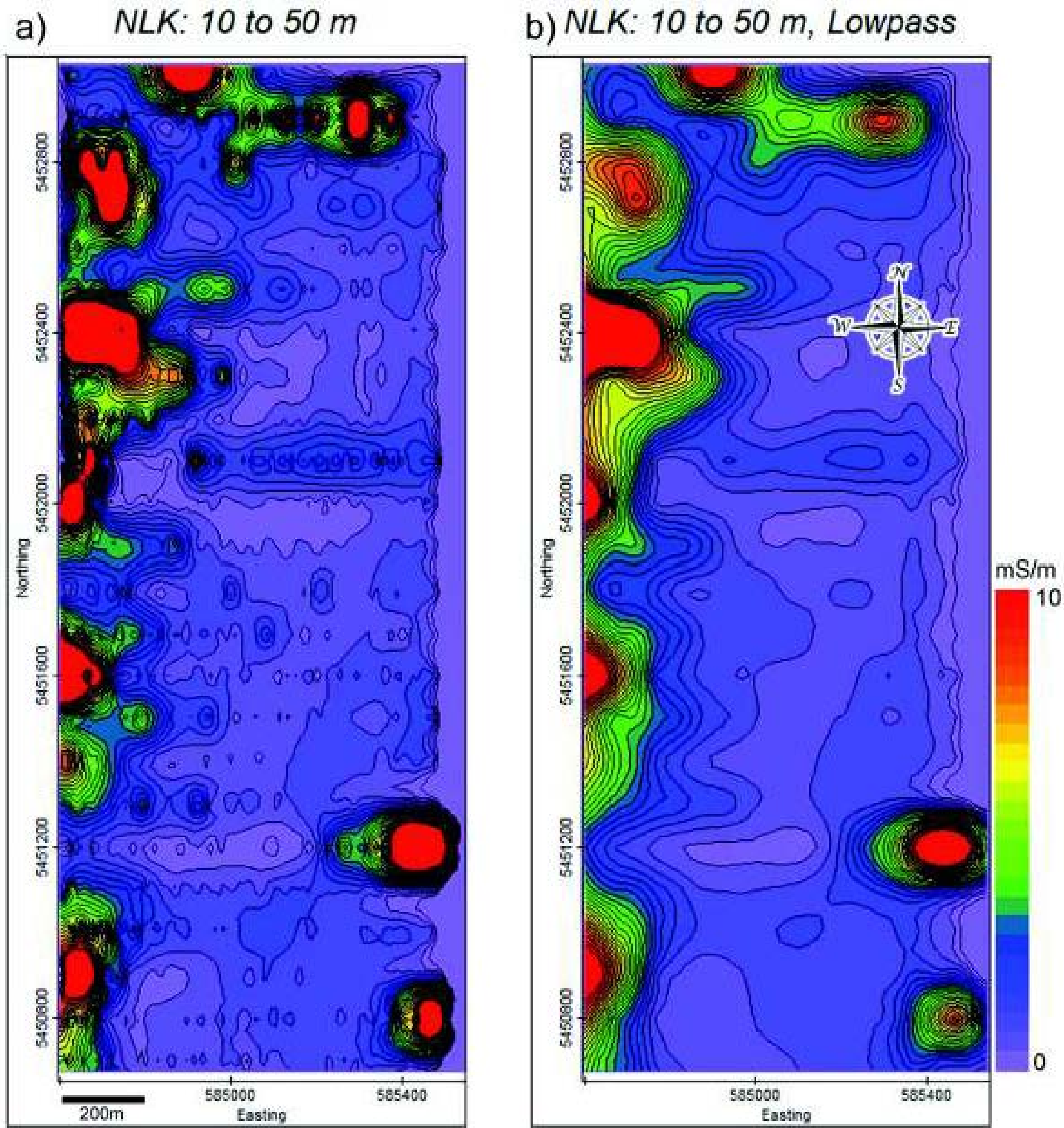


a)
NLK: 10 to 50 m
b)
NLK: 10 to 50 m, Lowpass
Northing
5452800
5452400
5452000
5451600
5451200
5450800
Easting
585000
585400
200m
N
E
S
W
mS/m
10
0

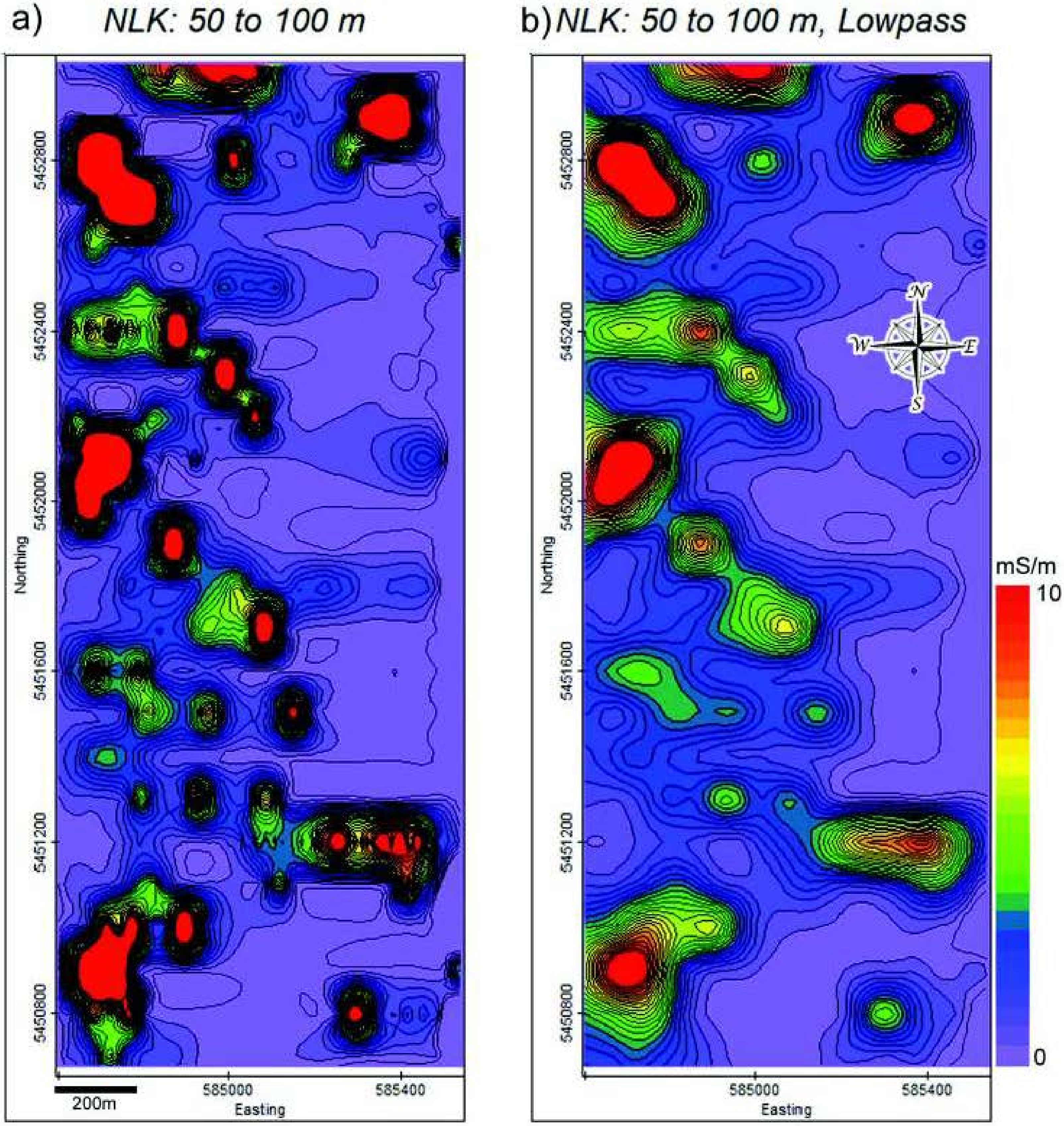

a) NLK: 50 to 100 m
b) NLK: 50 to 100 m, Lowpass
Northing
5452800
5452400
5452000
5451600
5451200
5450800
Easting
585000
585400
200m
N
W
E
S
mS/m
10
0

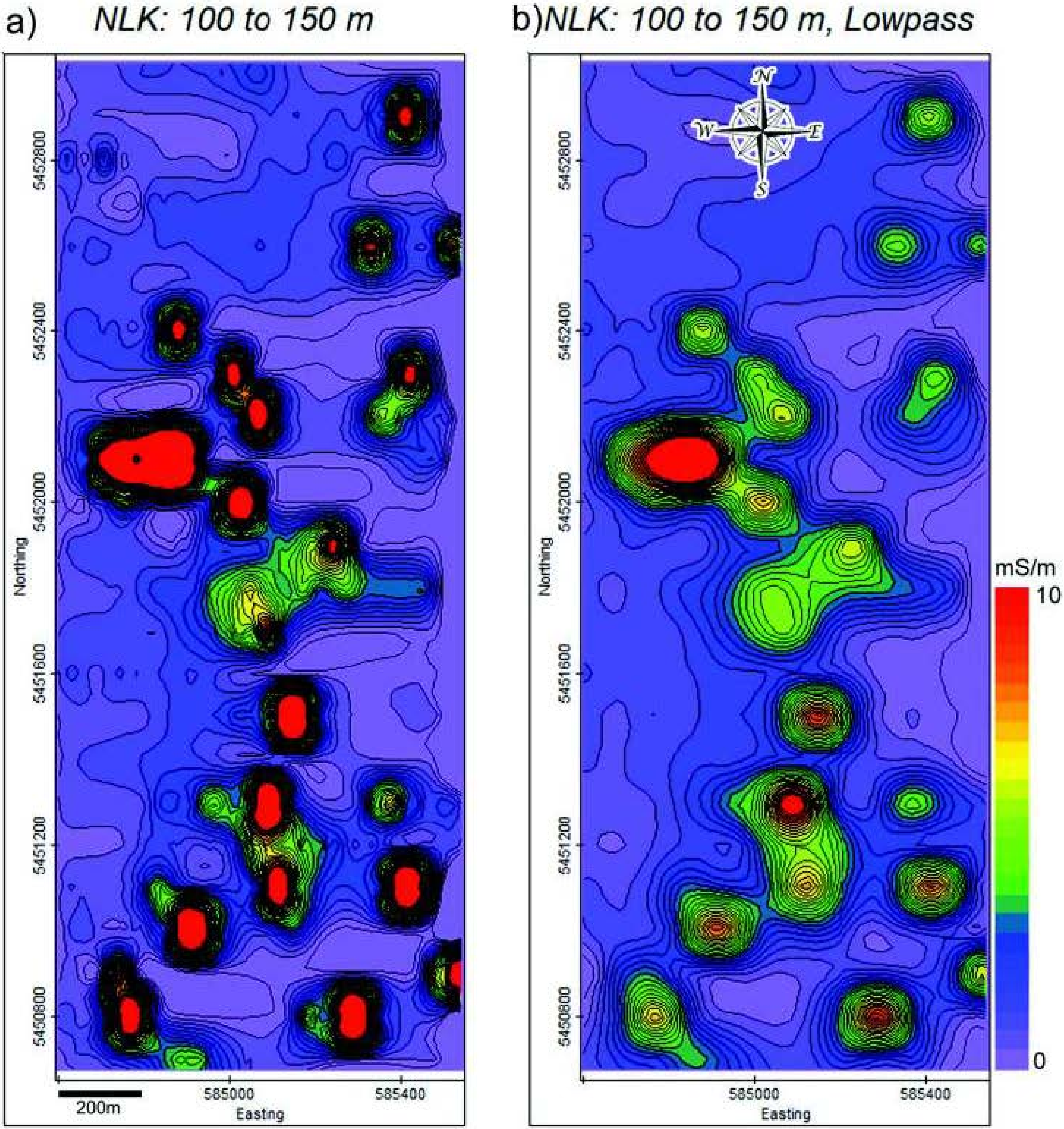

a) NLK: 100 to 150 m
b)NLK: 100 to 150 m, Lowpass
5452800
5452400
5452000
5451600
5451200
5450800
Northing
585000
585400
Eastng
Easting
200m
N
S
W
E
mS/m
10
0

Appendix 2. NAA Maps
Scale 1:5000



a) NLK: 10 to 50 m
b) NLK: 10 to 50 m, Lowpass
Northing
5452800
5452400
5452000
5451600
5451200
5450800
585000
585400
Easting
200m
N
W
E
S
mS/m
10
0


a)
NLK: 50 to 100 m
b)
NLK: 50 to 100 m, Lowpass
Northing
5452800
5452400
5452000
5451600
5451200
5450800
Easting
585000
585400
200m
N
E
S
W
mS/m
10
0


a) NLK: 100 to 150 m
b)NLK: 100 to 150 m, Lowpass
5452800
5452400
5452000
5451600
5451200
5450800
Northing
585000
585400
Eastng
200m
N
W
E
S
mS/m
10
0