Ormbäcken

Compilation of Results from Holes ORM-1 and ORM-2 (drilled Summer 2016) with available historical Information from the Geological Survey of Sweden (SGU)

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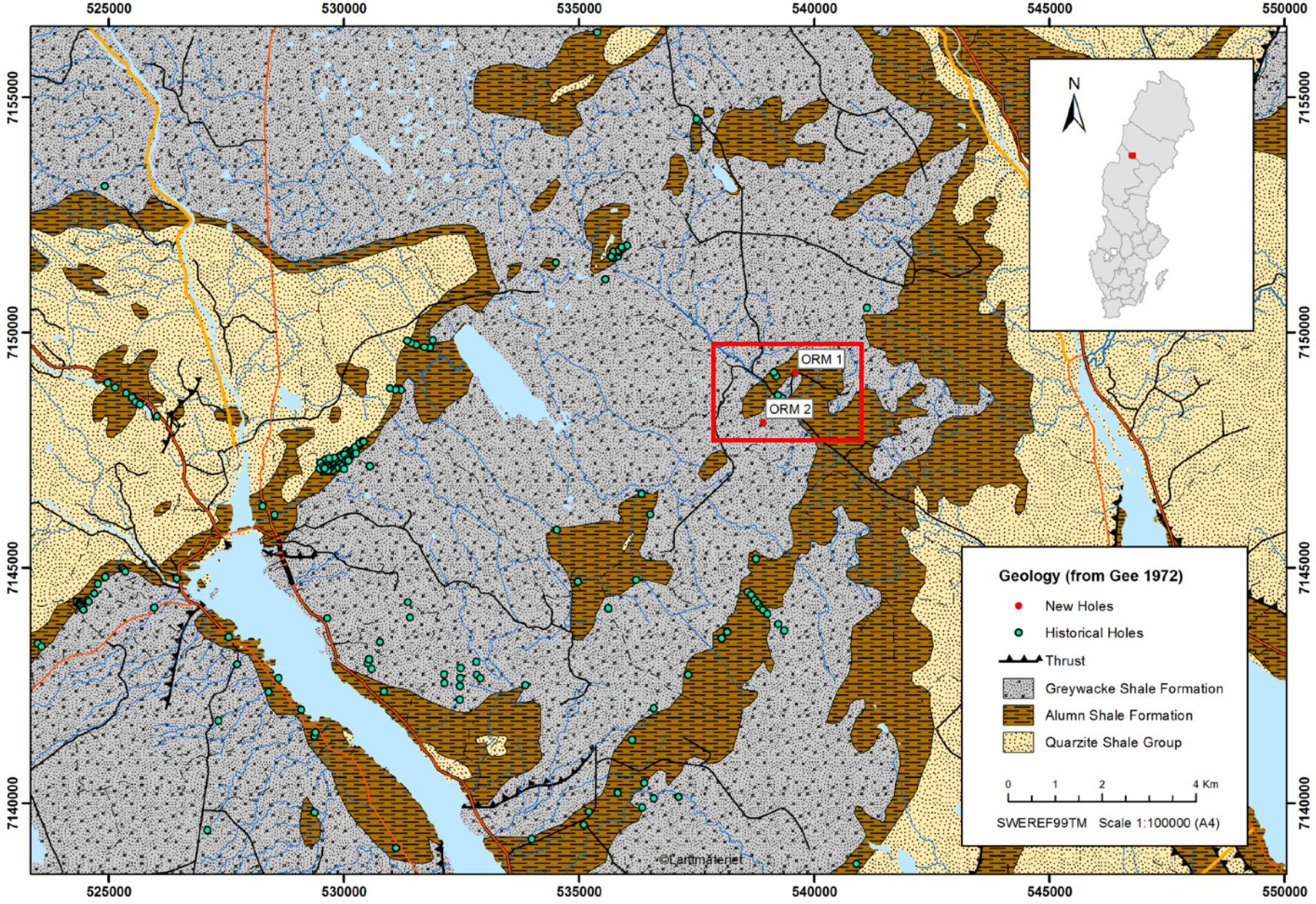
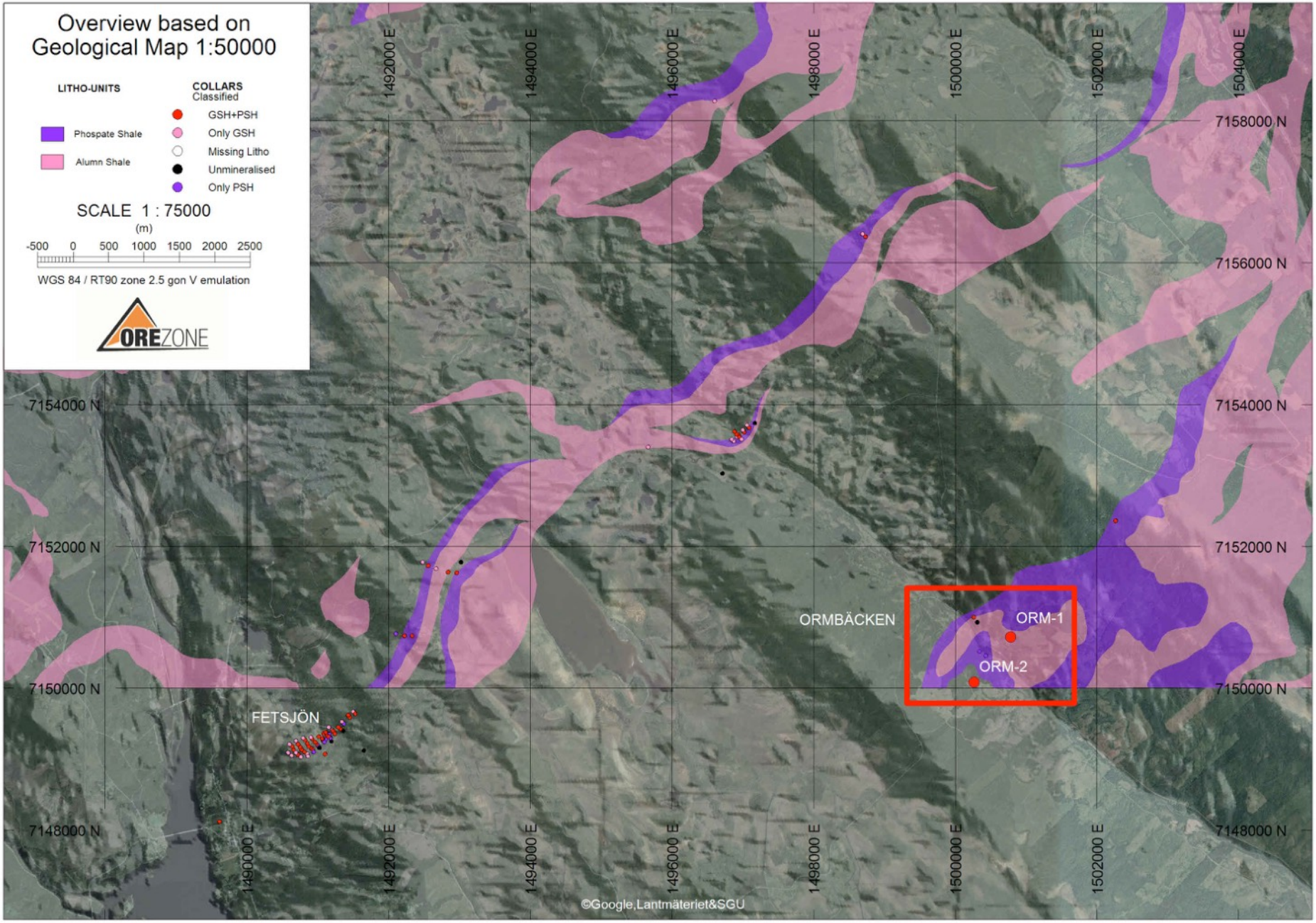
Base for the Geological Information of the region is the Geological Map published in Gee (1972) and the sheets 22F (Risbäck) and 22G (Vilhelmina) of the Geological Map 1:50000 from the Geological Survey of Sweden (SGU).

Although there are differences between the maps and in relation to the drillhole-logs these maps can be seen as good guidance for the larger and regional style of the Geological Structures as they are mainly based on Airborne Geophysical Surveys.

The difficulties in correlation of the various units can mainly be related to the lack of outcrops in the region. In the following two slides the Ormbäcken-Area is marked with a red frame.

The ***Alumn Shale Formation*** from Gee (1972) can coarsly be correlated with ***Alumn or Graphite Shale (GSH)+Phosphate Shale (PSH)*** units based on Geological Maps 1:50000. These units have also been used for the Model of the Fetsjön-area and also for the interpretation of the Ormbäcken holes as follows. In the Ormbäcken-Area these units are surrounded of the
Greywacke Shale Formation from Gee (1972) which correspondents fairly with the ***Shale (SH)*** unit.


525000
530000
535000
540000
545000
550000
7155000
7150000
7145000
7140000
N
ORM 1
ORM 2
Geology (from Gee 1972)
New Holes
Historical Holes
Thrust
Greywacke Shale Formation
Alumn Shale Formation
Quarzite Shale Group
0
1
2
4 Km
SWEREF99TM Scale 1:100000 (A4)
©Lantmäteriet

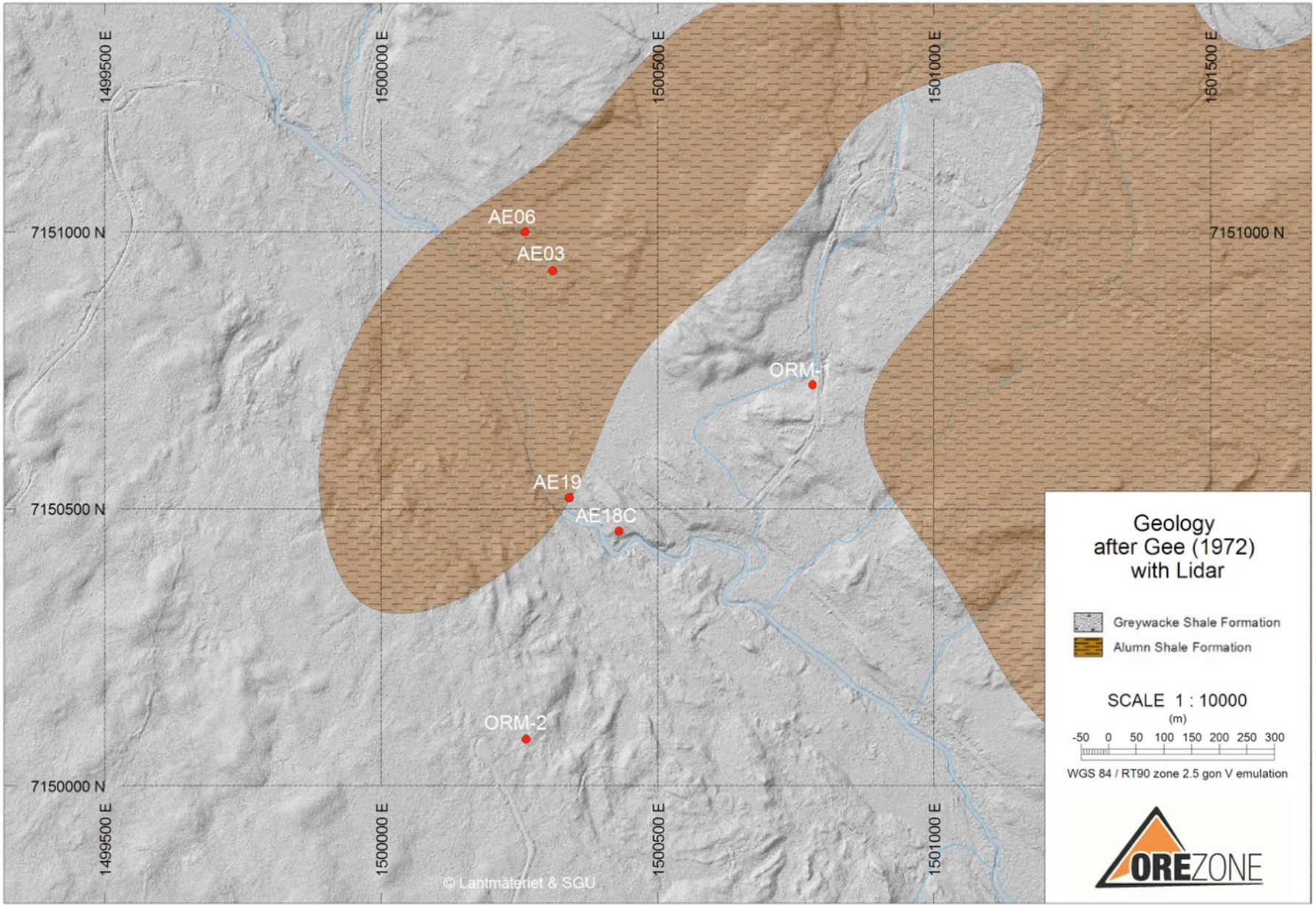

Overview based on
Geological Map 1:50000
LITHO-UNITS
Phospate Shale
Alumn Shale
COLLARS
Classified
GSH+PSH
Only GSH
Missing Litho
Unmineralised
Only PSH
SCALE 1 : 75000
(m)
-500 0 500 1000 1500 2000 2500
WGS 84 / RT90 zone 2.5 gon V emulation
OREZONE
1492000 E
1494000 E
1496000 E
1498000 E
1500000 E
1502000 E
1504000 E
7158000 N
7156000 N
7154000 N
7152000 N
7150000 N
7148000 N
ORMBÄCKEN
ORM-1
ORM-2
FETSJÖN
©Google,Lantmäteriet&SGU

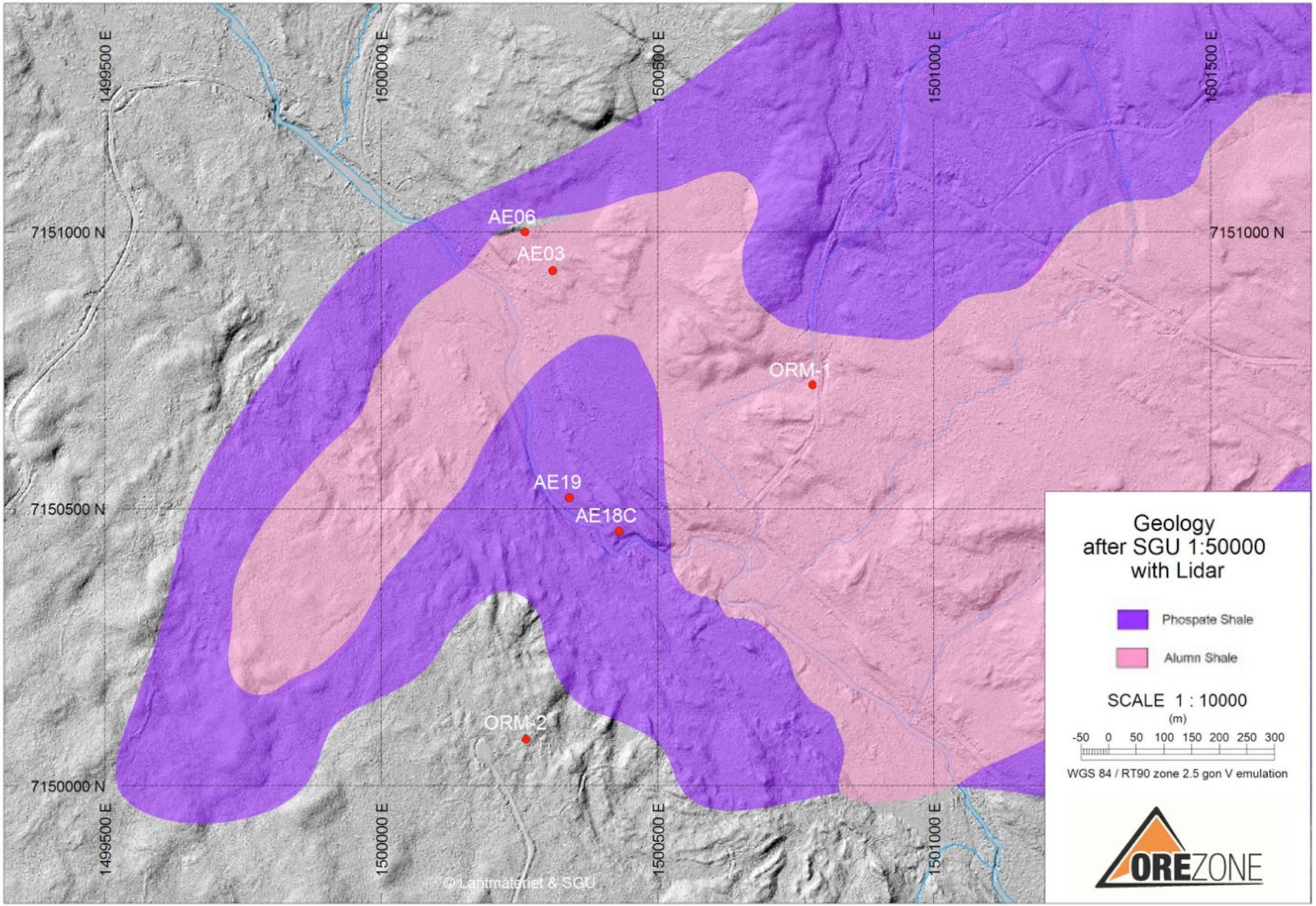
Detail Ormbäcken

Results from the recently drilled holes ORM-1 and ORM-2 have been combined with results of 4 historical holes nearby, drilled in the 60‘s from Atomenergi AB.
Drill-Logs from the new holes were interpreted to fit them into the nomenclature of historical- and Fetsjön-holes to enable a comparison to other projects e.g. Fetsjön.

Plan-Maps have been created in scale 1:10000 wheras sections have scale 1:5000. In the following two slides the Geological Maps from Gee and SGU have been focused on the region. The interpretation of the drill-logs from ORM-1 and ORM-2 show here a better correlation to Gee‘s map as both holes should start in the ***Shale (SH)-***unit (see enclosed drill-logs).

To show the relationship to topography maps are combined with Lidar (1x1m) and partly Satellite-fotos from Lantmäteriet – so for publishing an approval from Lantmäteriet and SGU is needed.


1499500 E
1500000 E
1500500 E
1501000 E
1601500 E
7151000 N
7150500 N
7150000 N
AE06
AE03
ORM-1
AE19
AE18C
ORM-2
© Lantmäteriet & SGU
Geology
after Gee (1972)
with Lidar
Greywacke Shale Formation
Alumn Shale Formation
SCALE 1 : 10000
(m)
-50 0 50 100 150 200 250 300
WGS 84 / RT90 zone 2.5 gon V emulation
OREZONE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1500000 E
1500500 E
1501000 E
1501500 E
7151000 N
7150500 N
7150000 N
AE06
AE03
ORM-1
AE19
AE18C
ORM-2
© Lantmäteriet & SGU
Geology
after SGU 1:50000
with Lidar
Phospate Shale
Alumn Shale
SCALE 1 : 10000
(m)
-50 0 50 100 150 200 250 300
WGS 84 / RT90 zone 2.5 gon V emulation
OREZONE

BH: 1	Ormbäcken	Logged by: Bodil Sihm	Date: 160727

Sample list		Hole Log		
Bag	Depth	Dip	Depth	Descriptions
			0-9,0 m	Overburden
			9,0-9,20	Sandstone, light red
		20N	9,20-53,57	Grey shale. Dark grey, finegrained with calcite veinlets, mmwide predominantly along cleavage but also crossing fabric. Occasional pyrite aggregates. Waxy surface on cleavage. Calcite veinlets occasionally shows both ductile and brittle deformation. Throughout whole section recurrent fracturing. Increasing amount of pyrite towards end of section.
				18.40-18.45, 18.95-19.0, 24.85-25.0, 28.71-29.60, 43.15-43.22, 49.20-49.25: Black shale, soft, intensly deformed, heavy, ev baryte as fracture filling?
				49.0-49.55 intensly fractured zone with graphitic luster on cleavage
				CL: 0.5 m at 18.27
		10	53.57-60.00	Sandstone, light grey and greene. Sharp contact to above. Undisturbed bedding. Recurrent black lamina. Occasional white/light grey porphyroblasts. Occasional calcite veinlets in various directions. Both dull and waxy luster on cleavage.
			60.00-65.85	Limestone/limerich sandstone. Light grey, with recurrent dm wide sections of black shale. Occasional, light, elongated,rounded cm size clasts. Calcite veinlets in various direction showing brittle deformation. Graphitic luster on cleavage. Visible bedding in limestone.
				Gradual transition to below
		45	65.85-94.00	Alumshale, black, finegrained, graphitic luster on cleavage, interbedded with layers of limestone. Calcite veinlets in various directions, showing brittle fracturing in limestone. Occasional grey rounded cm size clasts. Occasional pyrite aggregates.
				92.77-93.40 starkt radioaktiv alunskiffer med kalkinlagring
		35-40W	94.00-141.30	Alumshale, black, graphitic luster on cleavage. With pyrite aggregates. Calcite embedded and as veinlets crossing fabric. Occasional grey lenses 1-5 cm, stinkstones.
				130.60-130.74, 131.90-132.30, 132.45-132.70: limerich sandstone
				CL: 30 cm at 111.95, 45 cm at 117.40
				140.90-142: Intensly fractured zone.
				Gradual contact to below

BH: 1 Ormbäcken Logged by: Bodil Sihm Date: 160727

Sample list		Hole Log		
Bag	Depth	Dip	Depth	Descriptions
			141.30-153.50	Konglomerat, light grey matrix. Variating grainsize. Polymict. Clasts rounded, dark grey, mm-5 cm size. Both rounded and angular mmsize porphyroblasts, white to black colour. Dull luster on cleavage. Occasional calcite veinlets crossing fabric. Occasional strands of green clay mineral and pyrite filling. Gradual contact to below, rich in pyrite.
		40W	153.50-162.20	Alumshale as above
			162.20-166.45	Konglomerat, as above, exept richer in metals. Frequent pyrite veinlets, pressure solution?
			166.45-168.40	Granitoid, light grey, porphyritic - white porphyroblasts 1-3 mm. Sligtly banded
				End of hole at 168.40 m

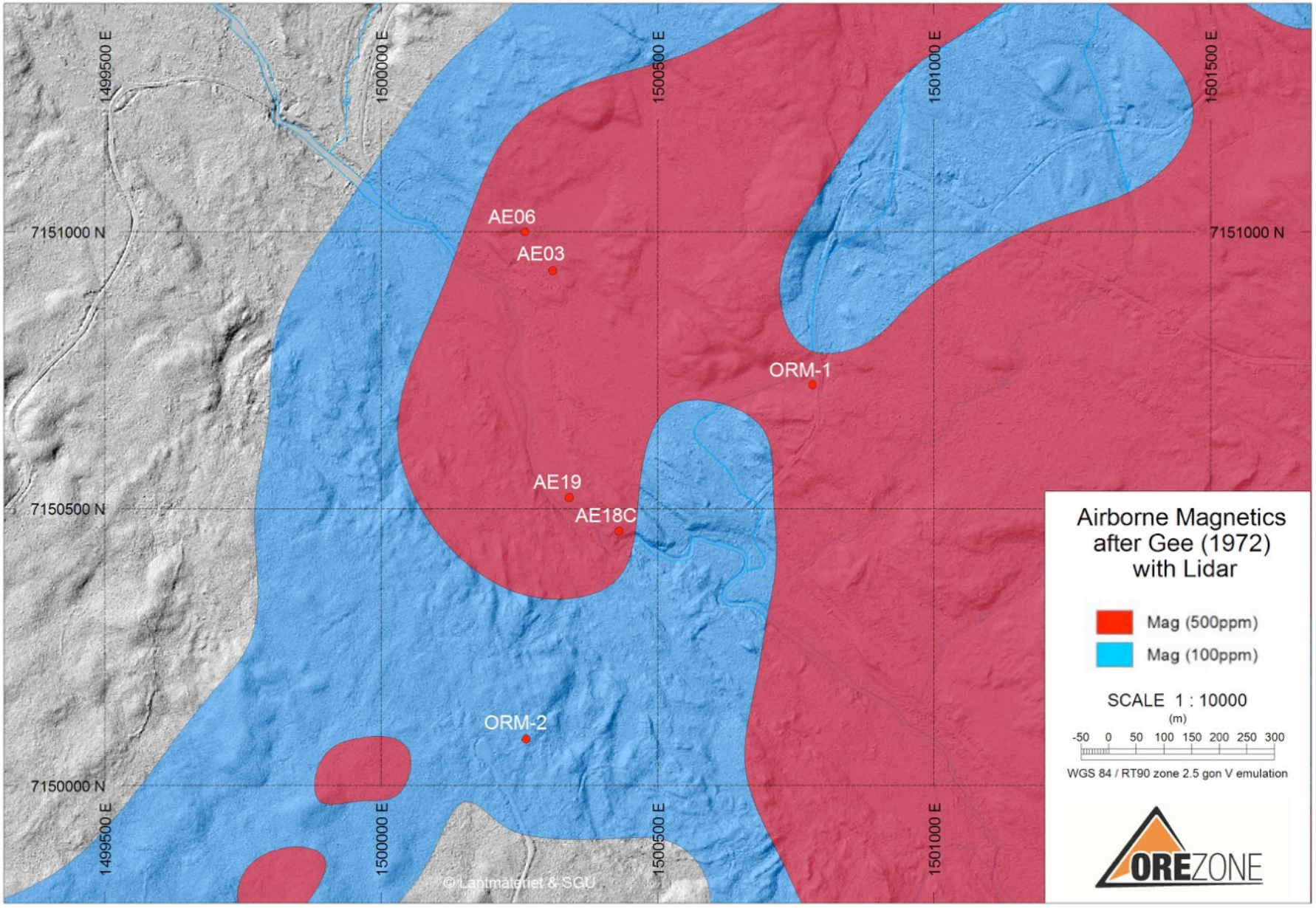
BH: 2	Ormbäcken	90 degrees	Logged by: Bodil Sihm	Date: 160727

Sample list		Hole Log		
Bag	Depth	Dip	Depth	Descriptions
			0-6.20	Overburden
			6.20-6.35	Sandstone, light grey
		20	6.35-47.47	Grey shale. dark grey. Calcite veinlets crossing in various directions, often showing brittle deformation. waxy, green luster on cleavage. At some places visible bedding with green clay mineral. Whole section more or less fractured. Increasing amount of pyrite througout section 6.90-7.10 graphitic luster on cleavage 28-40 m several dmwide zones with graphitic luster, rich in calcite and possibly baryte. 43.95-44.20 Sandstone, light grey-greene colour, visible bedding CL: 1 m at 16.50, 0.4m at 25.40, 0.5m at 28.40, 0,3m at 33.10.
		20W	47.47-49.45	Sandstone, light green and grey. Laminated bedding. Yellowish at top and bottom. recurrent rounded, elongated clasts white/light grey, mm-cmsize orientated along bedding. Sharp upper and lower contact.
		20	49.45-63.45	Grey shale. Dark grey with calcite veinlets and pyrite aggregates. Waxy luster on cleavage, occasional graphitic luster on cleavage. Sharp contact to below
			63.45-64.90	Sandstone, light green and grey, laminated bedding. Occasional elongated white/light grey clasts.
		20	64.90-75.00	Limestone/limerich sandstone alternating with cm to dm wide sections of black shale. Metallic luster on most cleavages. High density.
			75.00-101.28	Alumshale, black, calcite both embedded and as veinlets crossing fabric. Pyrite agreggates and occasional stinkstones. Graphitic luster on cleavage. End of hole at 101.28

Geophysical Surveys

Gee (1972) published also a **Airborne Magnetic Map** from SGU‘s surveys from the 50‘s and 60‘s which shows that all holes in the region are situated within the anomaly.

The **Airborne Uranium Map** from SGU reflects a distinct structural pattern.
Combined with Lidar-data from Lantmäteriet the relation to topography comes out very clear. The Uranium bearing ***Phosphate Shales (PSH)*** seem to be related to the lower parts.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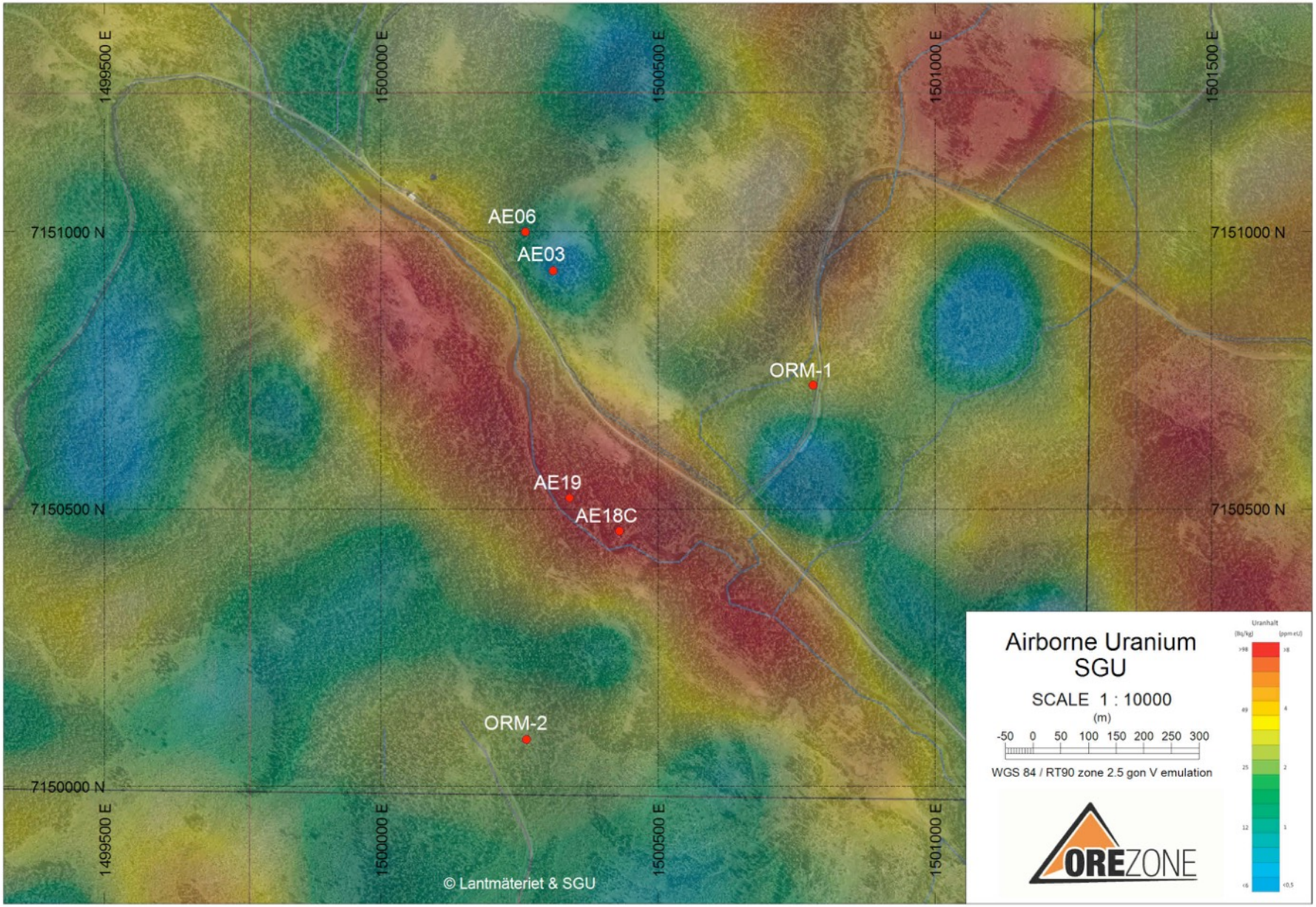
1500000 E
1500500 E
1501000 E
1501500 E
7151000 N
7150500 N
7150000 N
AE06
AE03
ORM-1
AE19
AE18C
ORM-2
© Lantmäteriet & SGU
Airborne Magnetics after Gee (1972) with Lidar
Mag (500ppm)
Mag (100ppm)
SCALE 1 : 10000
(m)
-50 0 50 100 150 200 250 300
WGS 84 / RT90 zone 2.5 gon V emulation
OREZONE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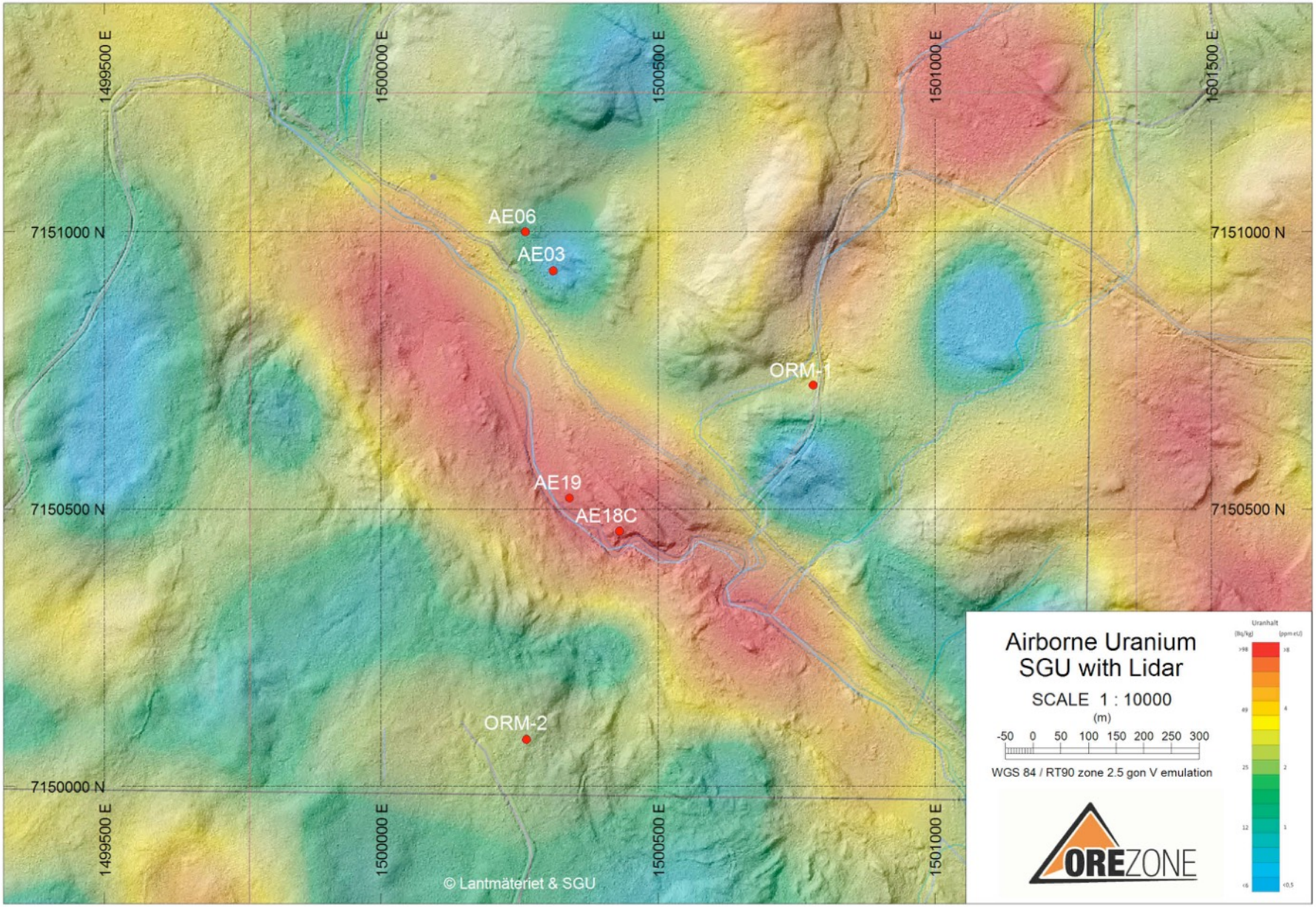
1500000 E
1500500 E
1501000 E
1501500 E
7151000 N
7150500 N
7150000 N
AE06
AE03
ORM-1
AE19
AE18C
ORM-2
© Lantmäteriet & SGU
Airborne Uranium
SGU
SCALE 1 : 10000
(m)
-50 0 50 100 150 200 250 300
WGS 84 / RT90 zone 2.5 gon V emulation
OREZONE
Uranhalt
(Bq/kg)
(ppm eU)
>98
49
25
12
<6
>8
4
2
1
<0,5


1499500 E
1500000 E
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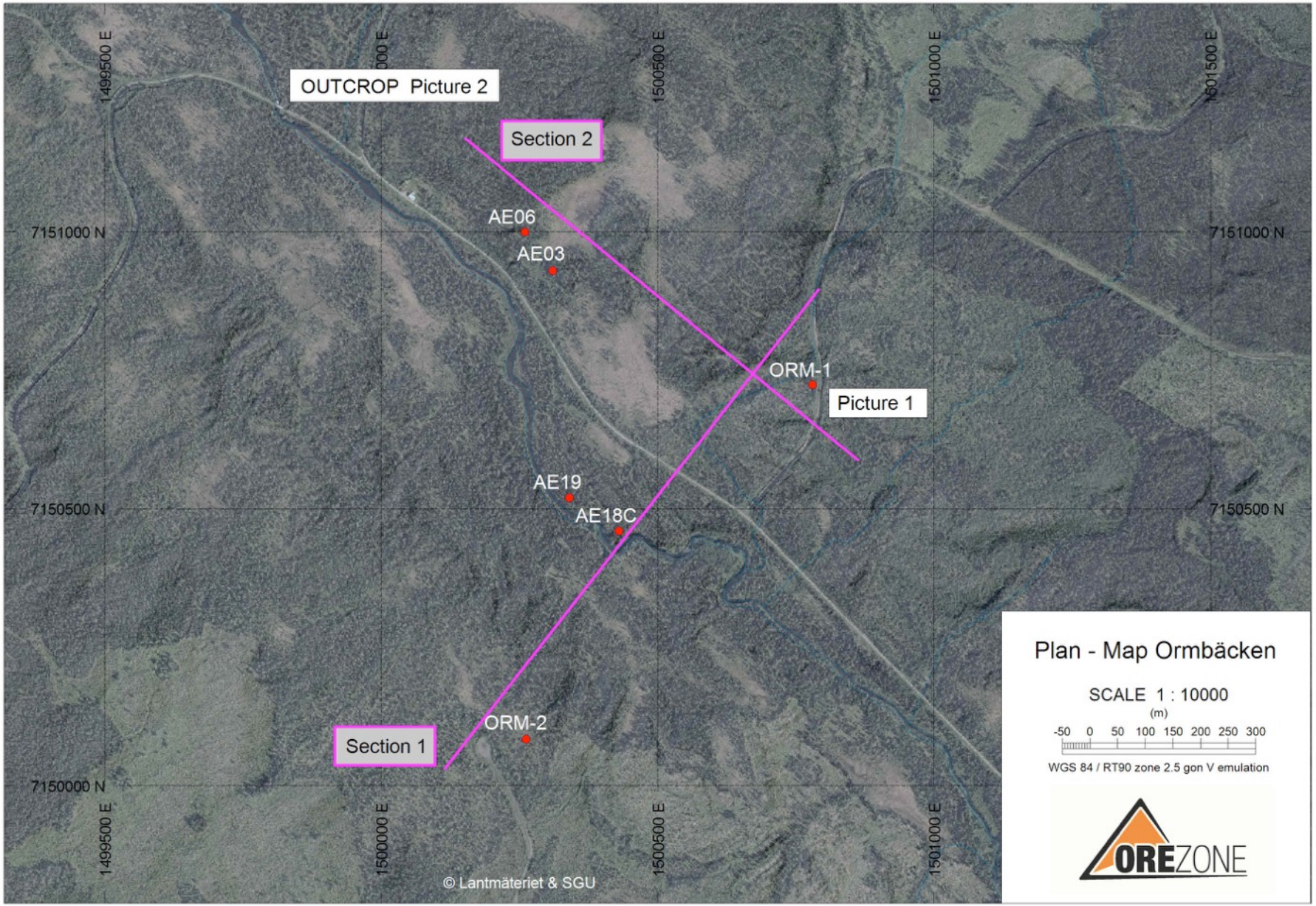
1501000 E
1501500 E
7151000 N
7150500 N
7150000 N
AE06
AE03
ORM-1
AE19
AE18C
ORM-2
© Lantmäteriet & SGU
Airborne Uranium
SGU with Lidar
SCALE 1 : 10000
(m)
-50 0 50 100 150 200 250 300
WGS 84 / RT90 zone 2.5 gon V emulation
OREZONE
Uranhalt

Drilling

The Plan-Map 1:10000 shows positions of drillholes, pictures and sections.

The best outcrop could be observed in the brook bed in the NW-corner of the map-area (picture 2). Here we have the Shale (SH) unit exposed, which is also represented by intercalated sand- and silt-stones.


OUTCROP Picture 2
Section 2
AE06
AE03
ORM-1
Picture 1
AE19
AE18C
ORM-2
Section 1
1499500 E
1500000 E
1500500 E
1501000 E
1501500 E
7151000 N
7150500 N
7150000 N
© Lantmäteriet & SGU
Plan - Map Ormbäcken
SCALE 1 : 10000
(m)
-50 0 50 100 150 200 250 300
WGS 84 / RT90 zone 2.5 gon V emulation
OREZONE

Picture 1: Drilling at ORM-1 , 6.07.2016

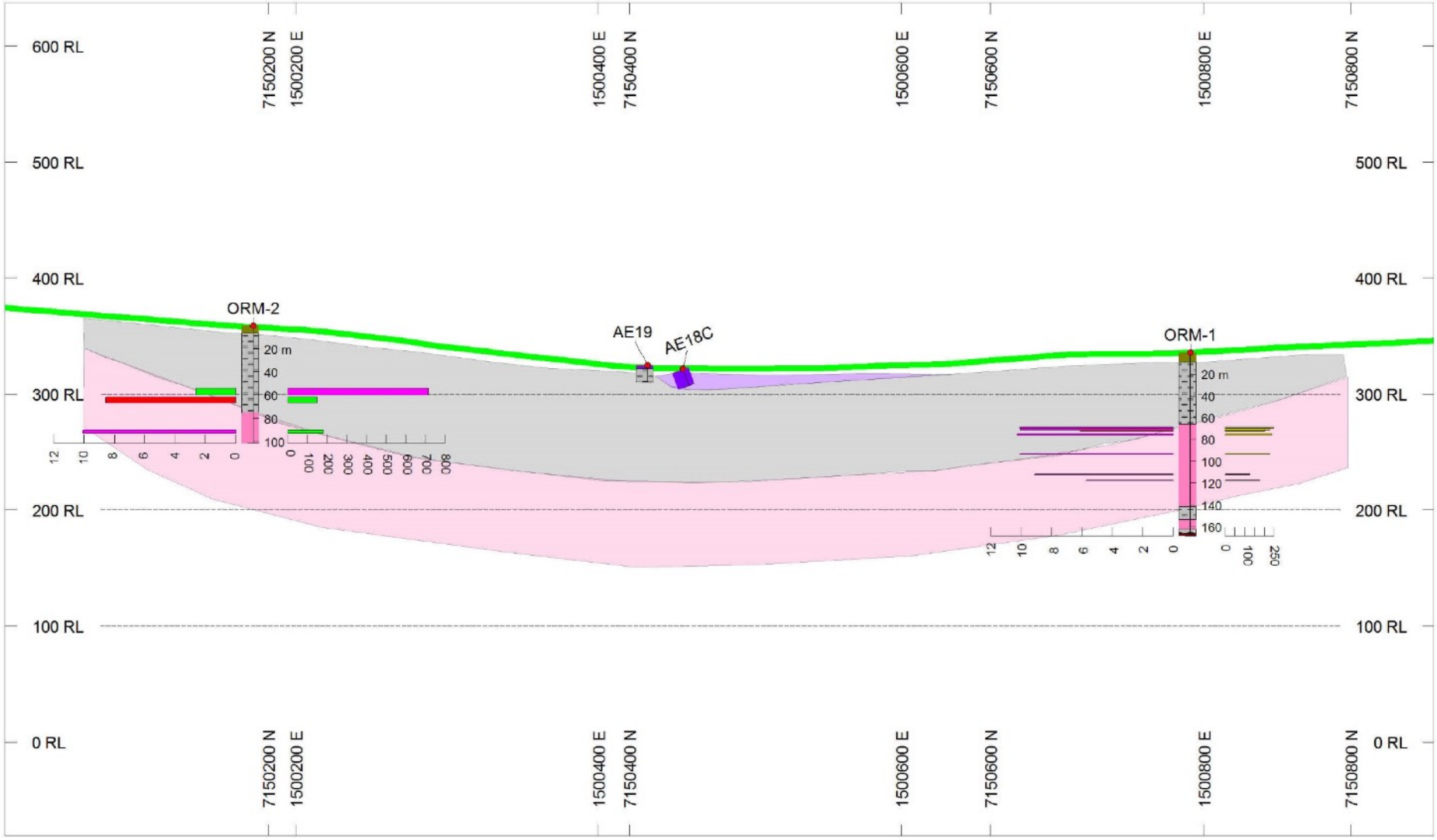
Picture 2: Outcrop in Sand/Silt-stones from the Shale-unit, view to N and dip to NW

Sections and Strip-logs

A SW-NE Profile (Section 1) and a SE-NW Profile (Section 2) have been interpreted from the available data. Even if the data-situation is not very comfortable we can at least state that the thickness of Alumn/ Graphite Shale (GSH) is around 80m – if we add the conglomerate we have more than 100m. That corresponds fairly good to the results at Fetsjön.

ORM-1 has hit the granitic basement already at the depth of 166m, which is remarkable because the sections of the Geological Map 1:50000 suggest more than 500m !

The Strip-Logs show lithological interpretation and assay-results for ORM 1+2, unfortunately no assay-results from the historical holes could be found. Enclosed we see concentrations for Carbon (Graphite) in % and Total Rare Earth Elements (TREE), Vanadium (V) and Molybdenum (Mo) in ppm.
So far are the amounts about half of the Maximum-amounts in the whole Fetsjön-projekt, but we have to take into account that the number and density of assays and the number of holes is hardly comparable to Fetsjön.



SECTION 1

SCALE 1 : 5000

(m)

-40 0 40 80 120

WGS 84 / RT90 zone 2.5 gon V emulation

C (%)

10
8
6
4

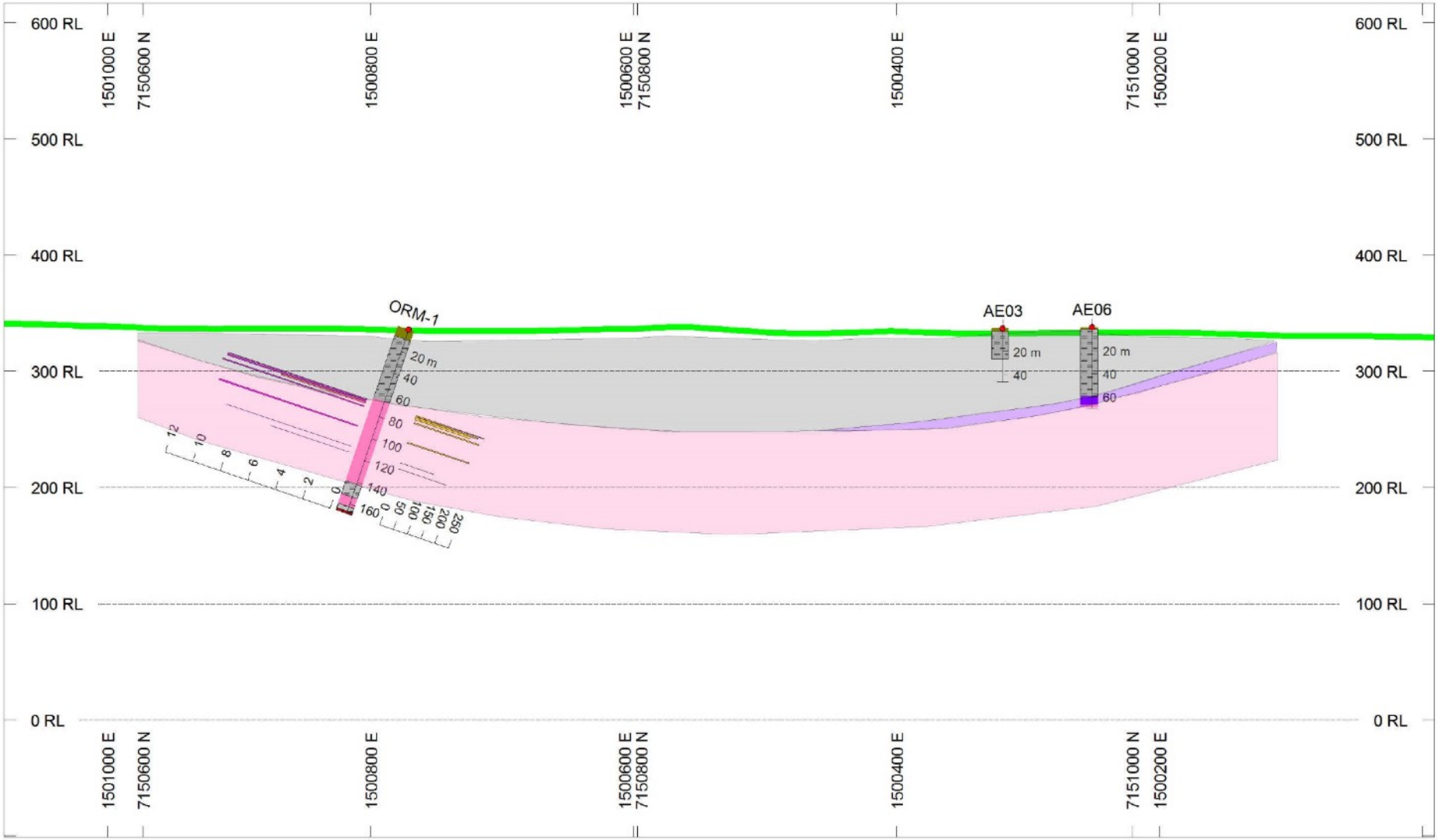
TREE (ppm)

500
300
250
200

ROCK CODES

GR	Granite
GSH	Graphite Shale
OVB	Overburden
PSH	Phosphate Shale
SH	Shale

OREZONE



SECTION 2

SCALE 1 : 5000

(m)

-40 0 40 80 120

WGS 84 / RT90 zone 2.5 gon V emulation

C (%)

10
8
6
4

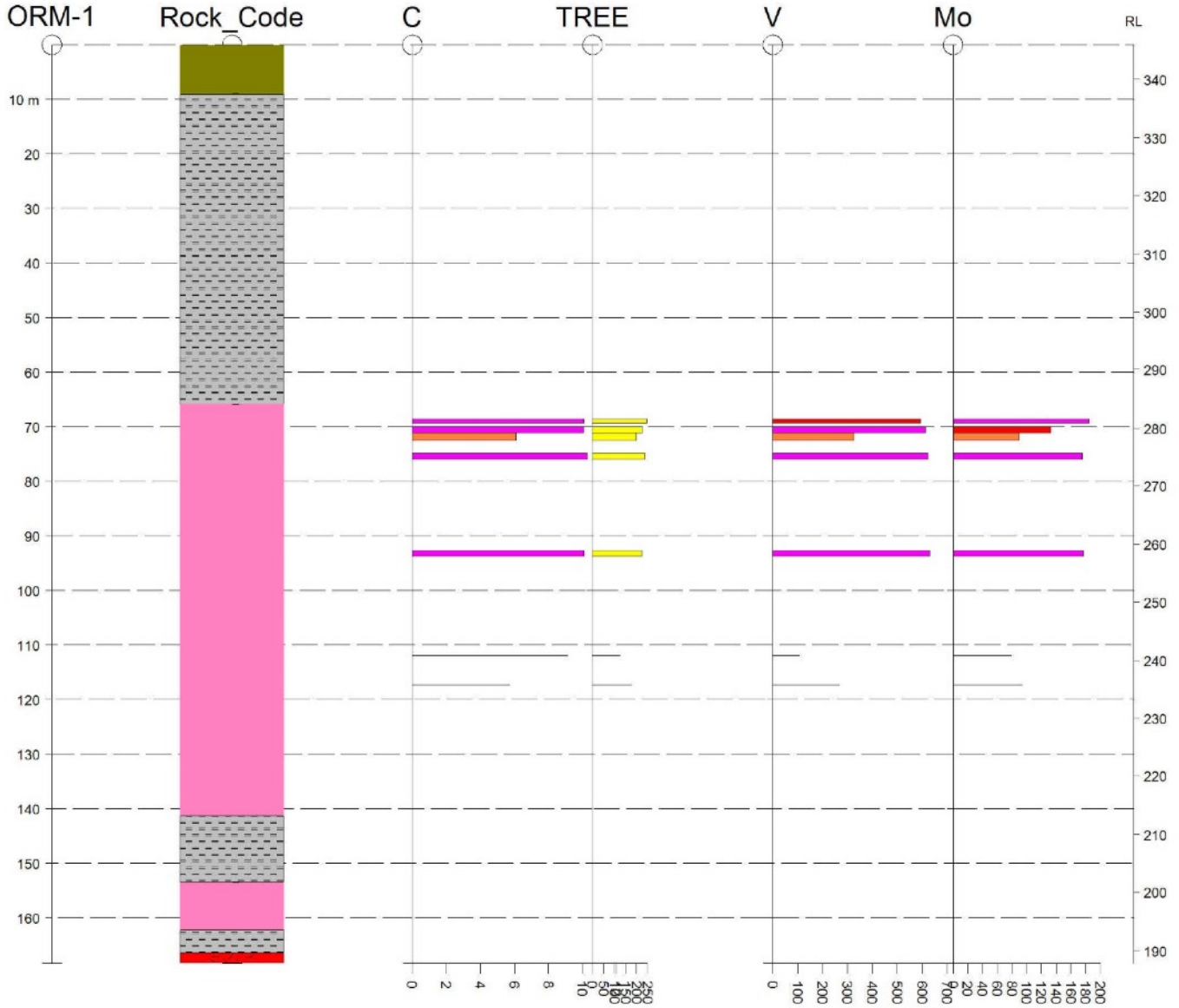
TREE (ppm)

500
300
250
200

ROCK CODES

GR	Granite
GSH	Graphite Shale
OVB	Overburden
PSH	Phosphate Shale
SH	Shale

OREZONE



STRIP LOG: ORM-1

Easting	Northing	RL	Azimuth	Dip	Depth
1500780.0	7150724.0	346.0	140.0	-70.0	168.4

STRIP

1 Rock_Code

PAT	LABEL	DESCRIPTION
	GR	Granite
	GSH	Graphite Shale
	OVB	Overburden
	SH	Shale

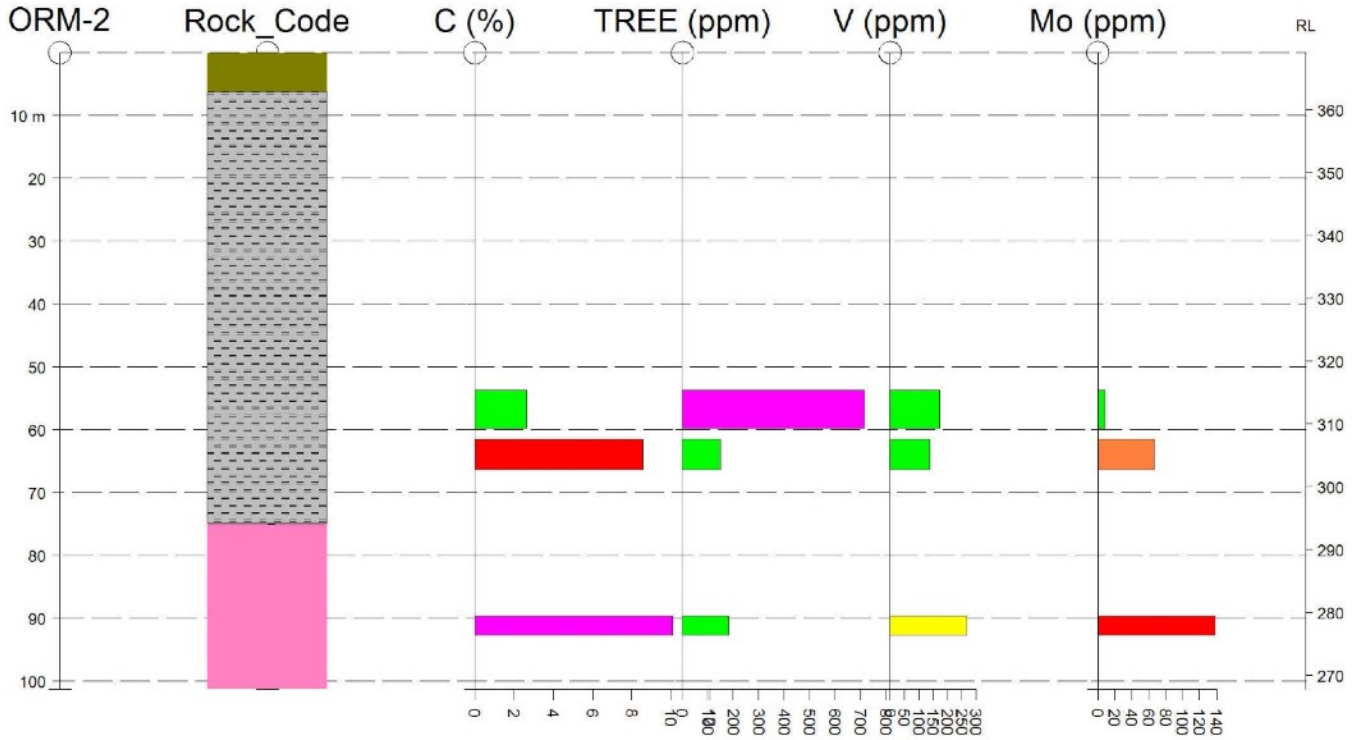
2 C — BAR PLOT: 10, 8, 6, 4

3 TREE — BAR PLOT: 500, 300, 250, 200

4 V — BAR PLOT: 600, 500, 300, 200

5 Mo — BAR PLOT: 150, 100, 50, 20

OREZONE



STRIP LOG: ORM-2

Easting	Northing	RL	Azimuth	Dip	Depth
1500262.0	7150084.0	369.0	0.0	-90.0	101.3

STRIP

1 Rock_Code

PAT	LABEL	DESCRIPTION
	GSH	Graphite Shale
	OVB	Overburden
	SH	Shale

2 C (%) BAR PLOT

10
8
6
4

3 TREE (ppm) BAR PLOT

500
300
250
200

4 V (ppm) BAR PLOT

600
500
300
200

5 Mo (ppm) BAR PLOT

150
100
50
20

OREZONE

Conclusions

Alumn/Graphite Shale has been hit in both holes in a comparable thickness and the unit was also mineralised. Nevertheless were the few assay-results lower than the Maximum-values of the Fetsjön-projekt, which has 52 holes with 856 assay-results.

So for a meaningful comparison assay-results from more holes are needed.

Furthermore it is worth to mention that ORM-2 also shows mineralisation in the ***Shale (SH)***-unit and if we look to the core from the conglomerate-unit (162,20-166.45m) from ORM-1 there is also potential for sulphide-mineralisation.

Picture 3: Drillcore from Conglomerate unit (162.20-166.45m) within ORM-1