

A Metal Earth Atlas

of Seismic Reflection and Magnetotelluric Transects Across the Superior Province

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METAL EARTH

Supplement to 'A Metal Earth Atlas of Seismic Reflection and Magnetotelluric Transects Across the Superior Province'.

Metal Earth contribution number MERC-ME-2024-29

The seismic reflection and magnetotelluric conductivity sections published in 'A Metal Earth Atlas of Seismic Reflection and Magnetotelluric Transects Across the Superior Province' were generated from geophysical data archived by the Metal Earth project, a multidisciplinary research program that aimed to resolve the processes responsible for differential metal endowment between Archean greenstone belts of the Superior Province in Canada. This included the collection of new seismic reflection and magnetotelluric data along 18 transects across world-class mining camps and crustal-scale fault zones of the Abitibi, Wabigoon, and Uchi subprovinces. The processed geophysical data have been standardised and are published here to facilitate assessments between regions with differential metal endowment. The unprocessed SEG-Y seismic data and magnetotelluric transfer functions for each transect can be downloaded from the 'Metal Earth Hub'. This supplement to 'A Metal Earth Atlas of Seismic Reflection and Magnetotelluric Transects Across the Superior Province' consists of high-resolution seismic, MT, and composite geology-geophysical sections from each of the 18 transects discussed in the atlas.

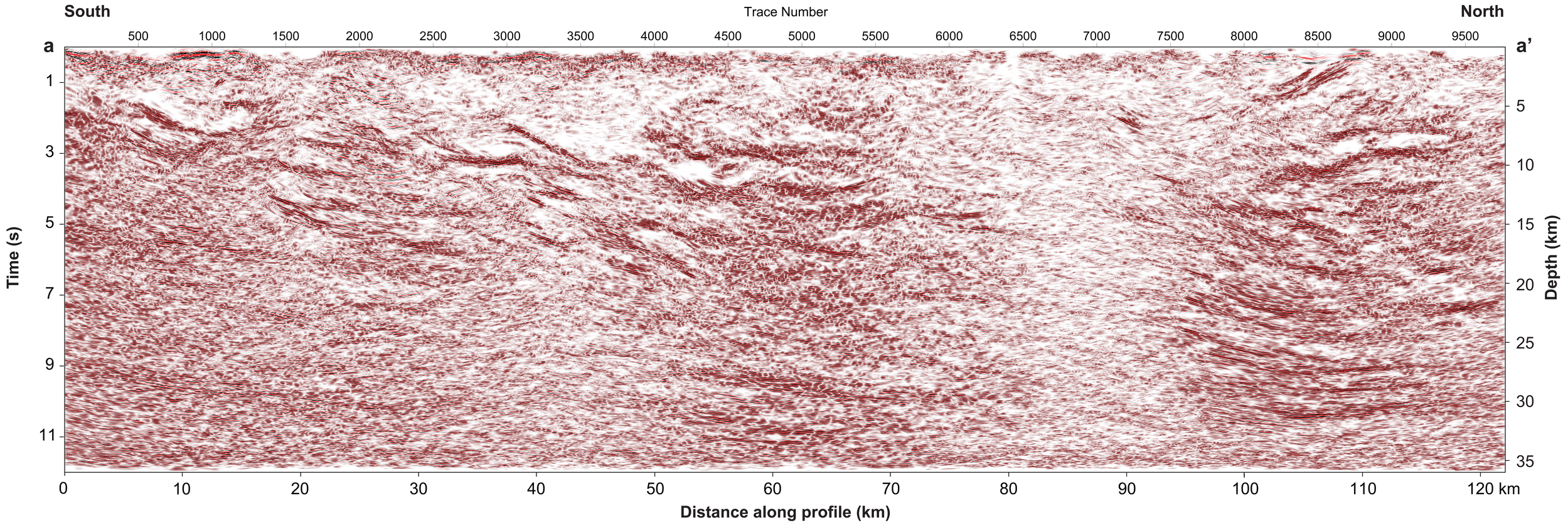
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Chibougamau R1 seismic section (LN111)

Abitibi and Opatica subprovinces, Superior Province

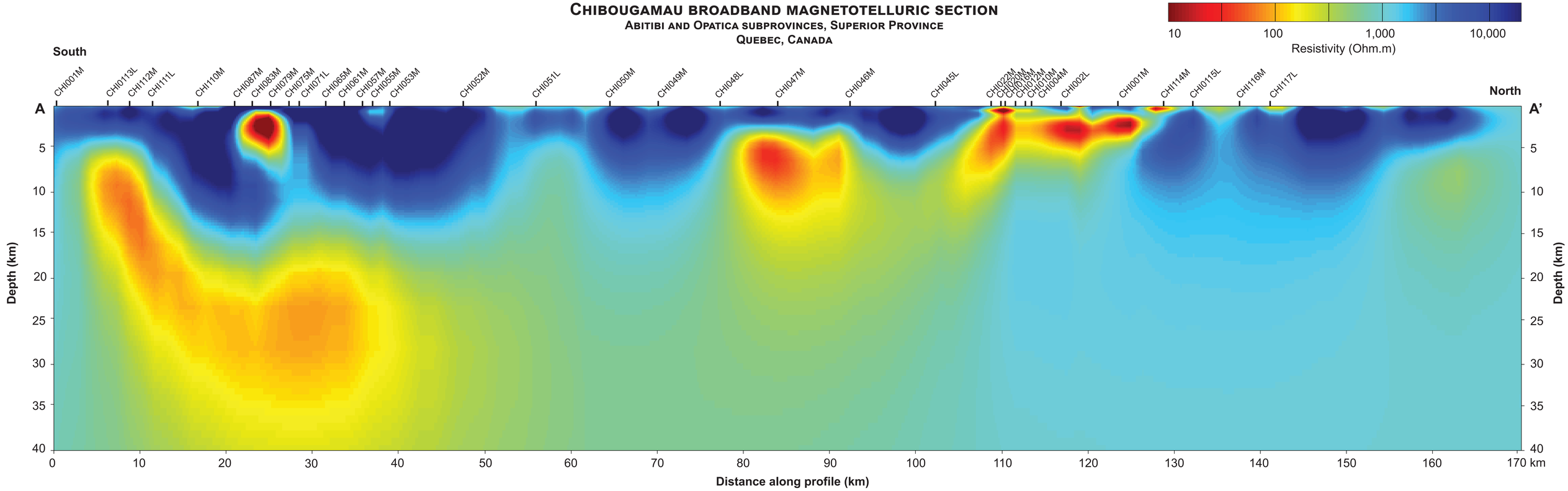
Quebec, Canada



Chibougamau broadband magnetotelluric section

Abitibi and Opatica subprovinces, Superior Province

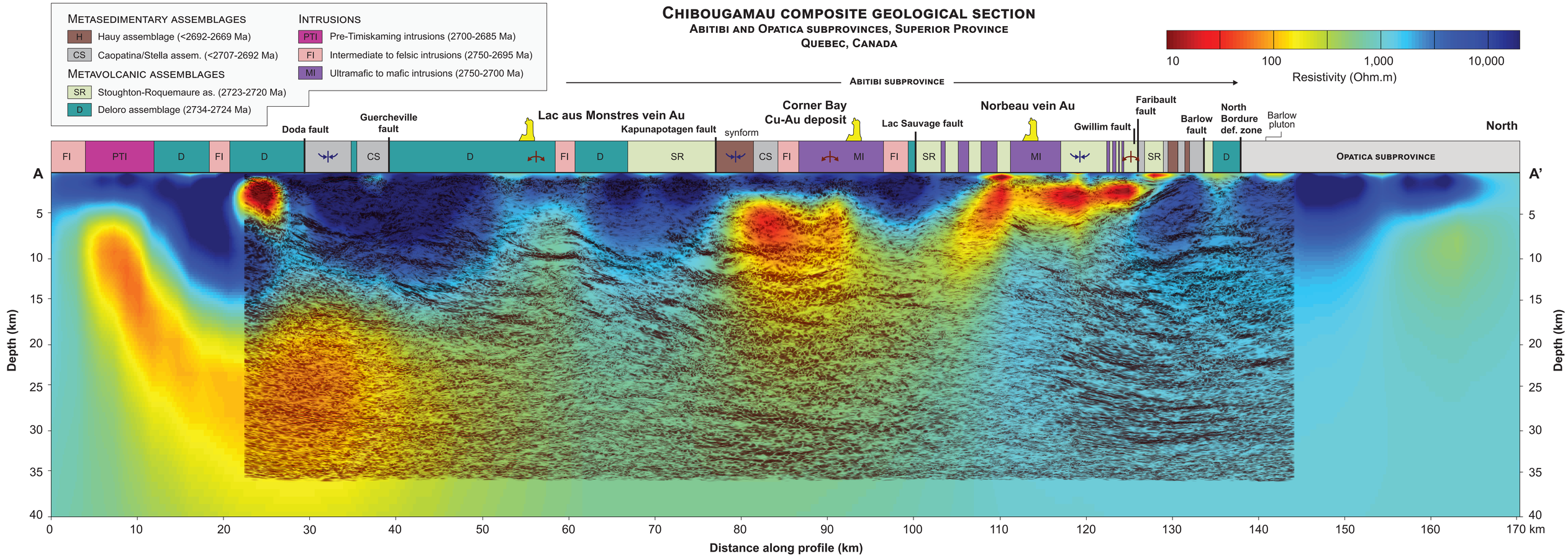
Quebec, Canada



Chibougamau composite geological section

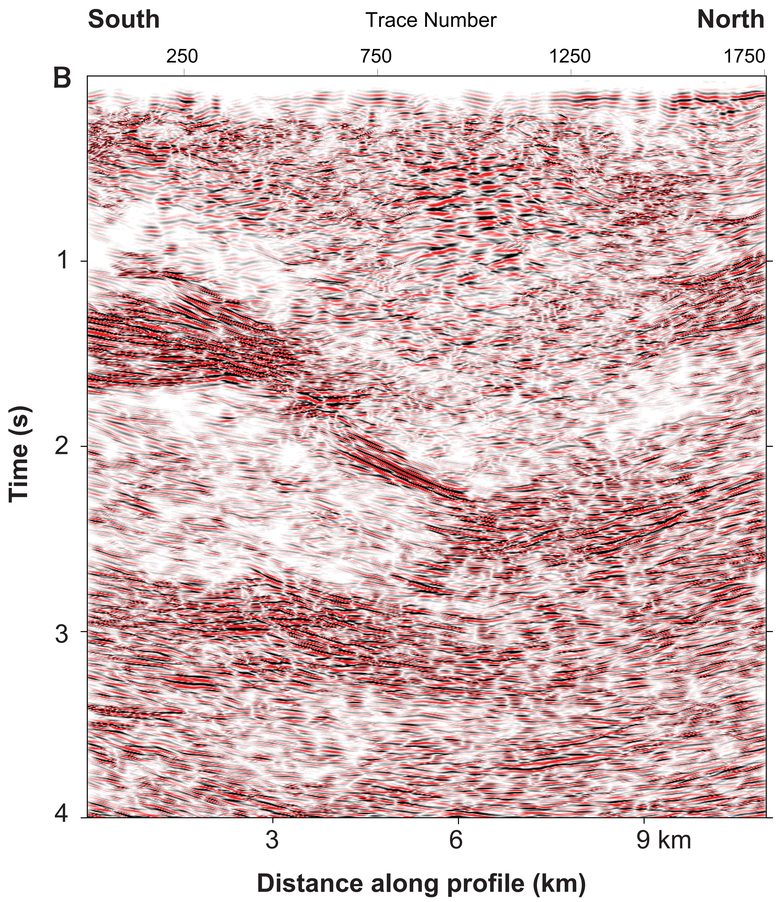
Abitibi and Opatica subprovinces, Superior Province

Quebec, Canada



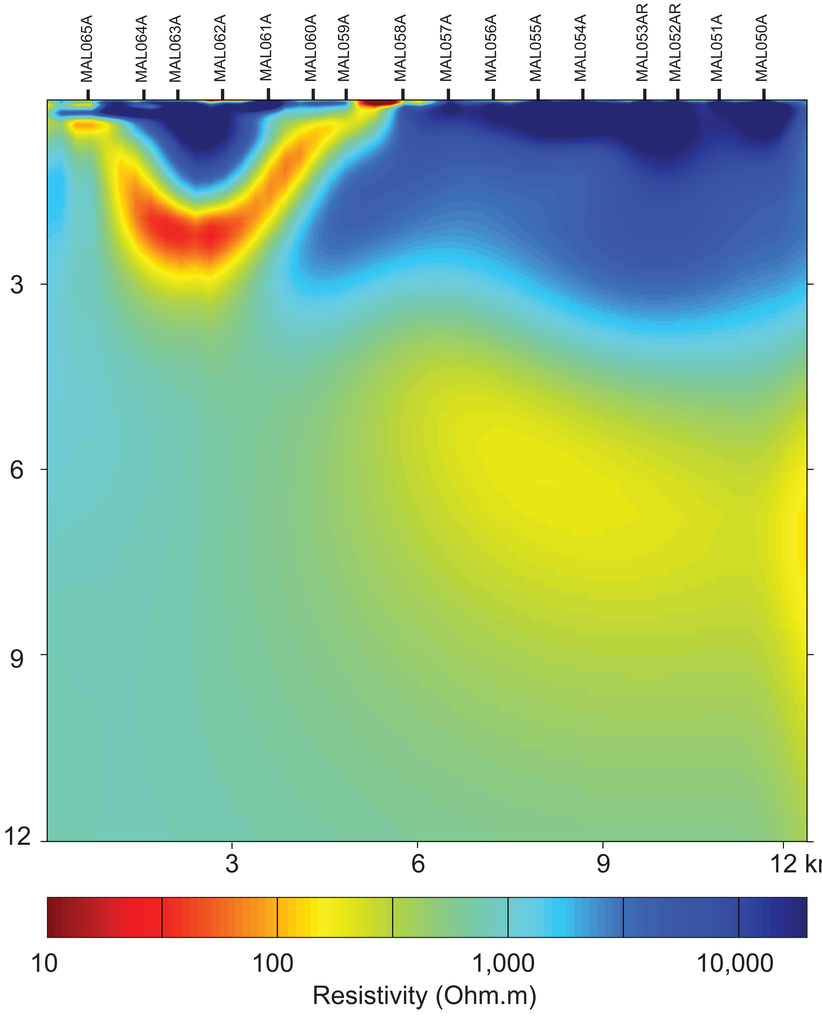
Chicobi R2 seismic section (LN372)

Abitibi Subprovince, Superior Province
Quebec, Canada



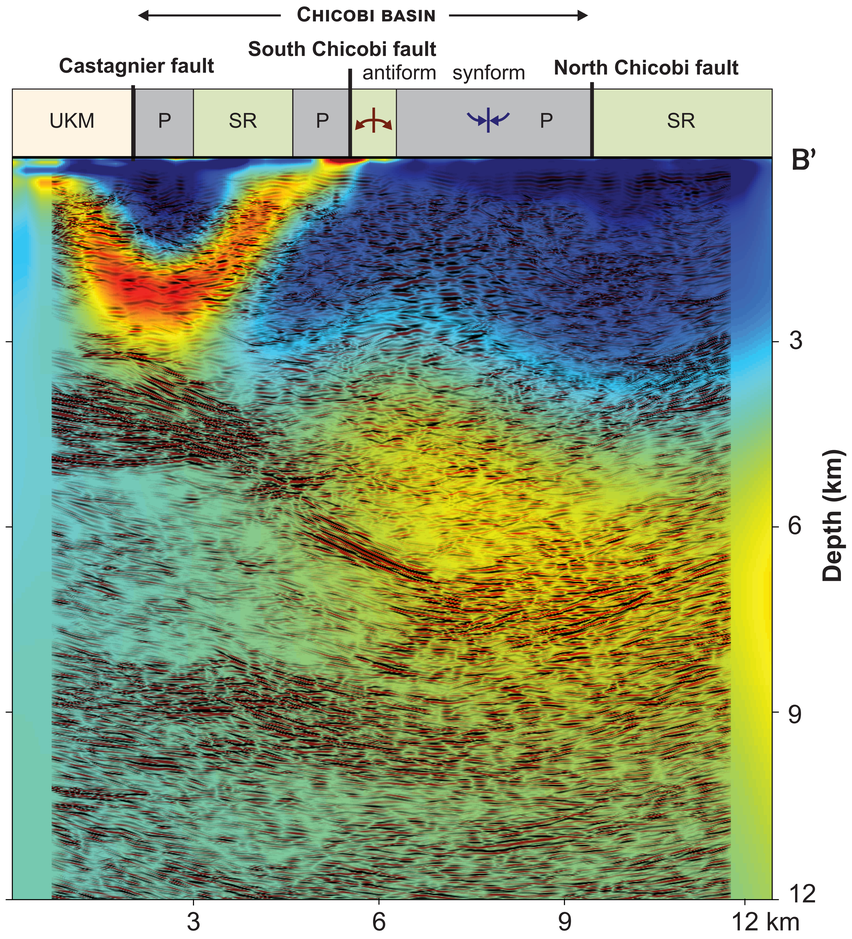
Chicobi audio-frequency magnetotelluric section

Abitibi Subprovince, Superior Province
Quebec, Canada



Chicobi composite geological section

Abitibi Subprovince, Superior Province
Quebec, Canada



Metasedimentary assemblages

Porcupine assemblage (<2700-2685 Ma) P

Metavolcanic assemblages

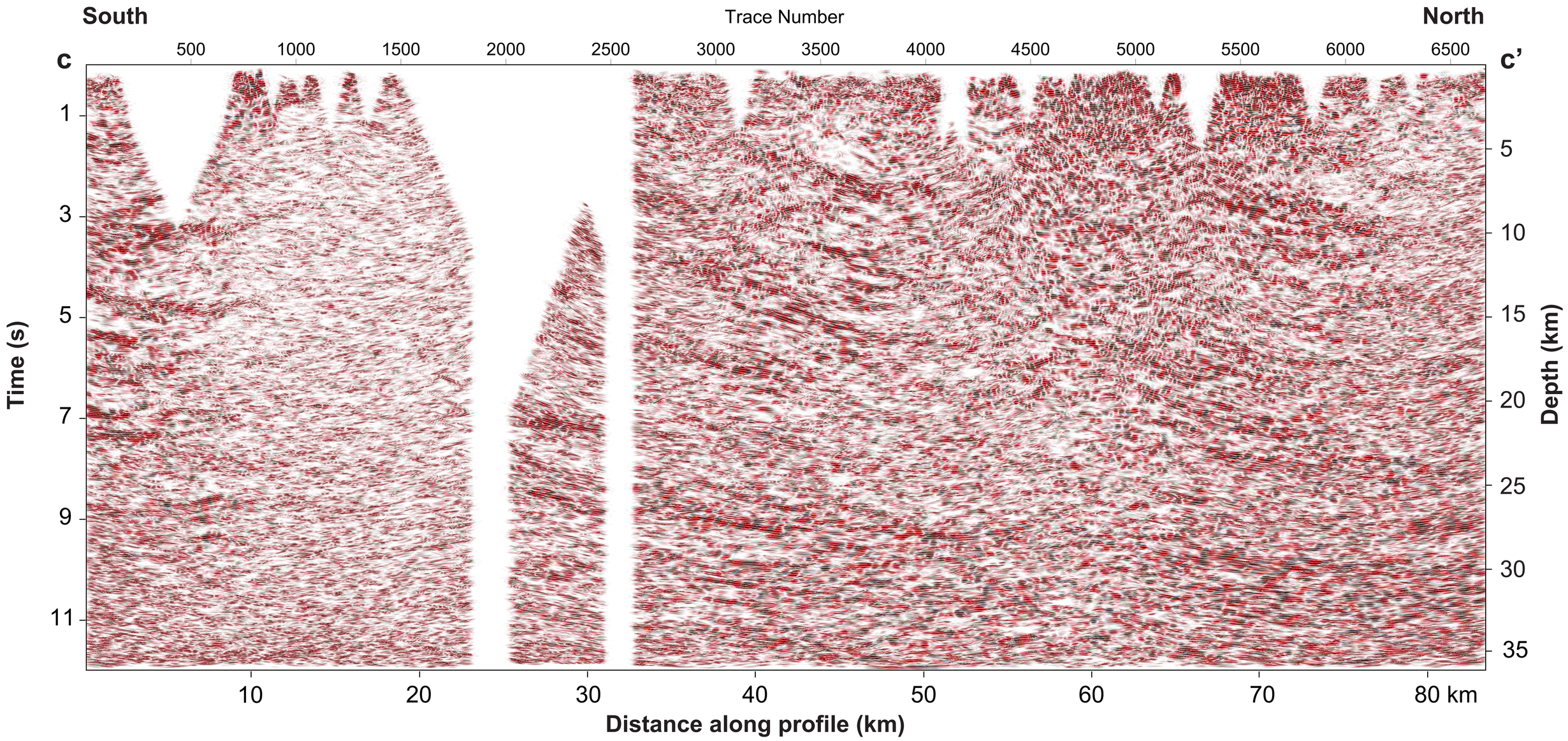
Upper Kidd-Munro assemblage (2717-2711 Ma) UKM

Stoughton-Roquemaure assemblage (2723-2720 Ma) SR

Malartic R1 seismic section (LN131)

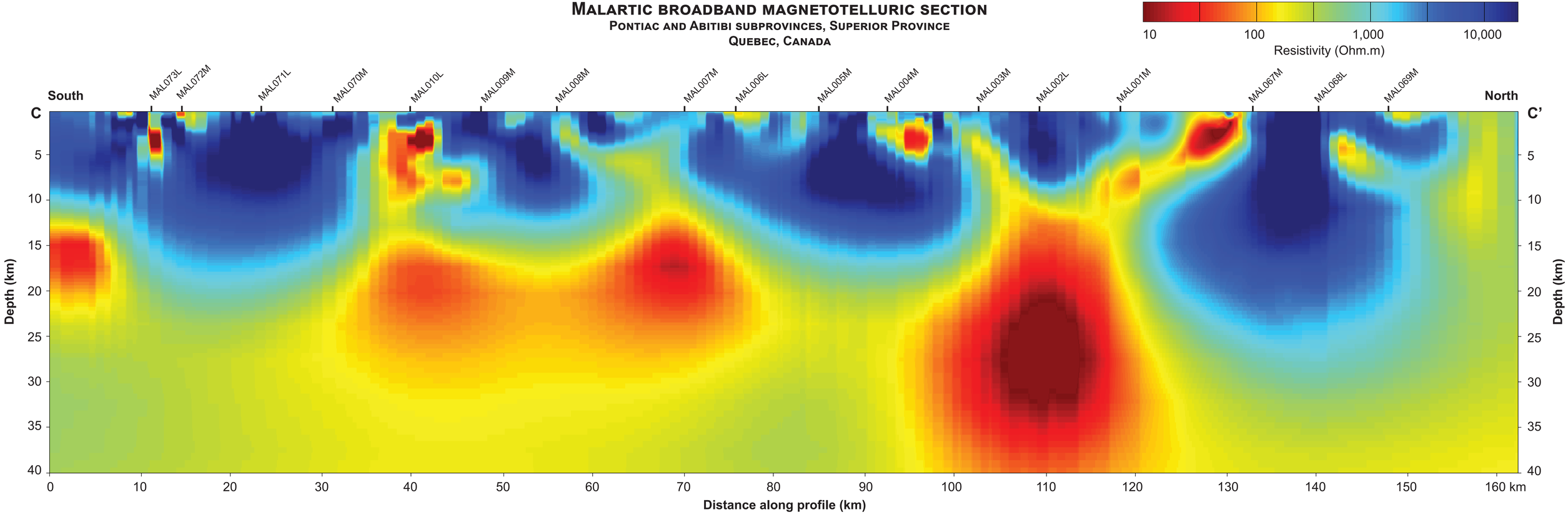
Pontiac and Abitibi subprovinces, Superior Province

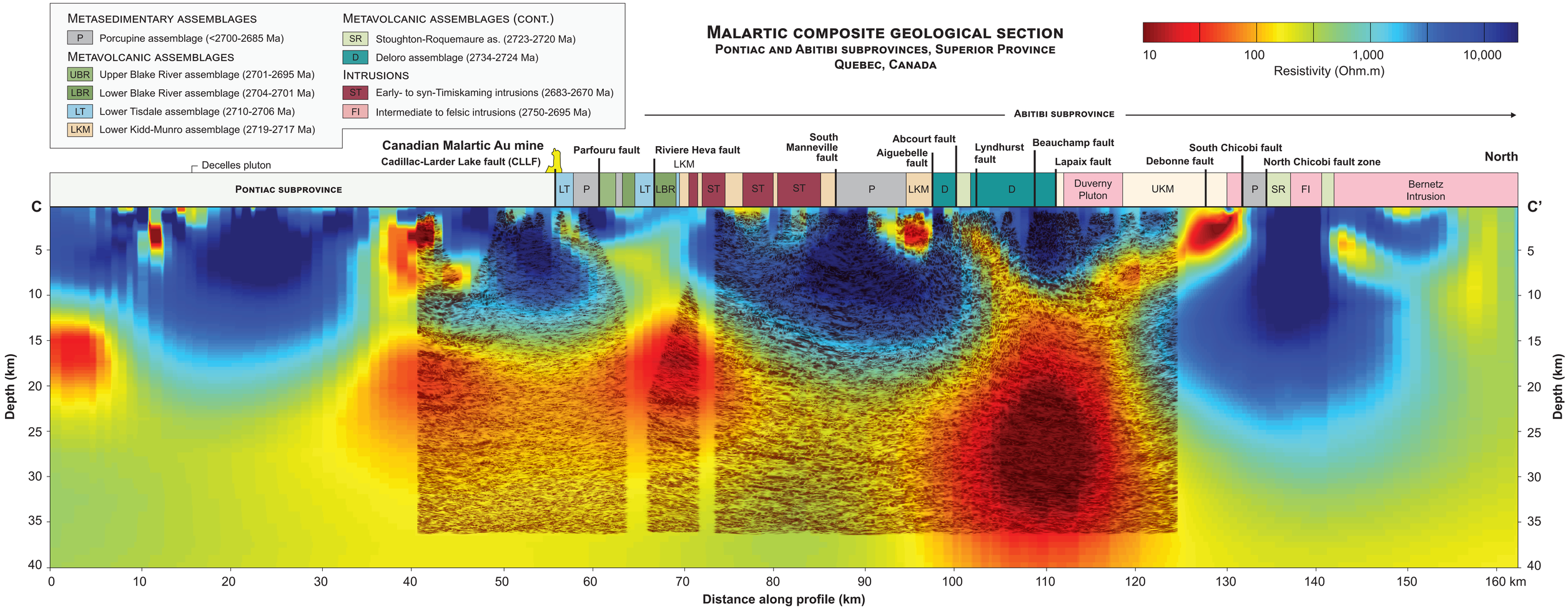
Quebec, Canada



Malartic broadband magnetotelluric section

Pontiac and Abitibi subprovinces, Superior Province
Quebec, Canada

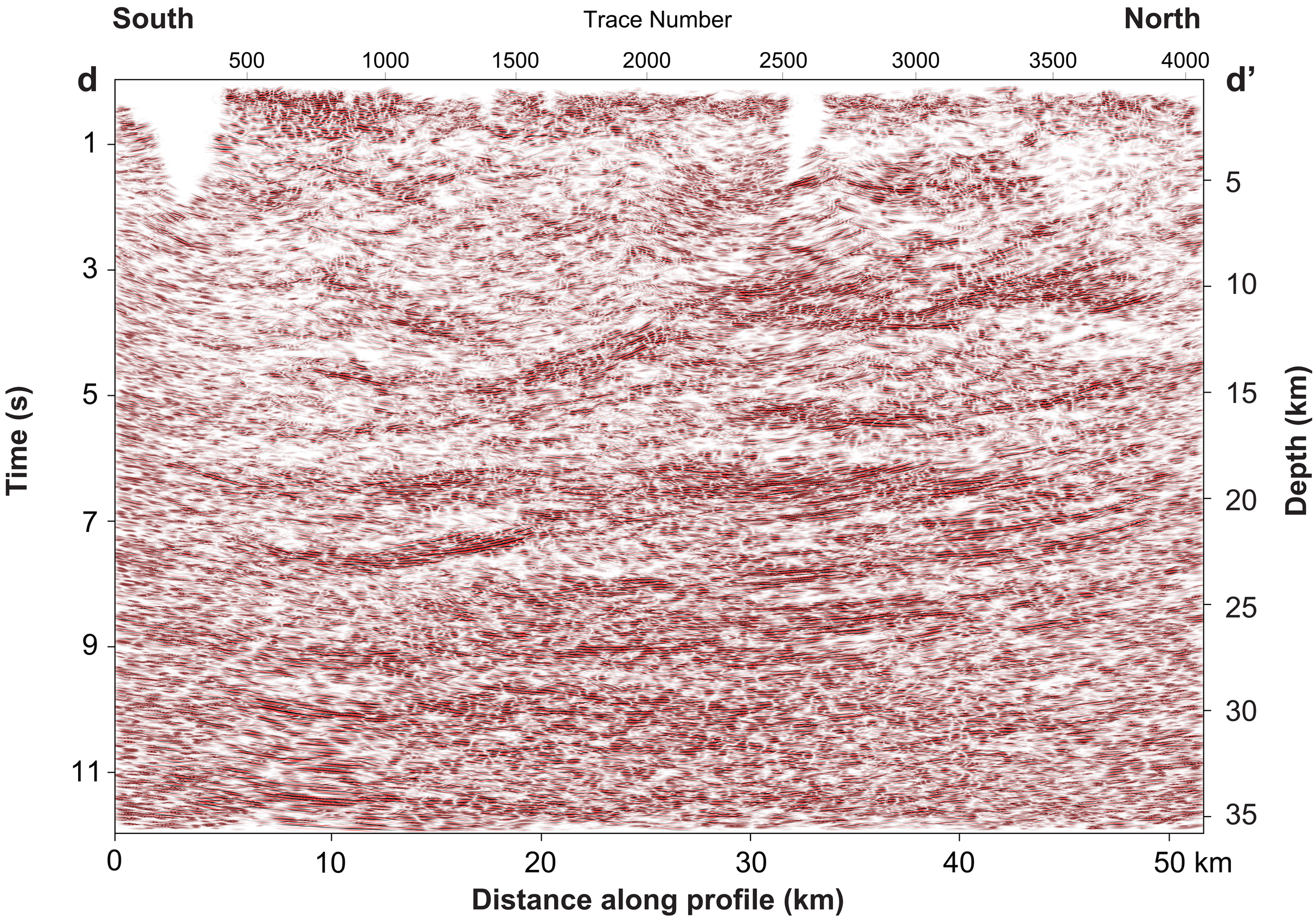



METASEDIMENTARY ASSEMBLAGES
P Porcupine assemblage (<2700-2685 Ma)
METAVOLCANIC ASSEMBLAGES
UBR Upper Blake River assemblage (2701-2695 Ma)
LBR Lower Blake River assemblage (2704-2701 Ma)
LT Lower Tisdale assemblage (2710-2706 Ma)
LKM Lower Kidd-Munro assemblage (2719-2717 Ma)
METAVOLCANIC ASSEMBLAGES (CONT.)
SR Stoughton-Roquemaure as. (2723-2720 Ma)
D Deloro assemblage (2734-2724 Ma)
INTRUSIONS
ST Early- to syn-Timiskaming intrusions (2683-2670 Ma)
FI Intermediate to felsic intrusions (2750-2695 Ma)
MALARTIC COMPOSITE GEOLOGICAL SECTION
PONTIAC AND ABITIBI SUBPROVINCES, SUPERIOR PROVINCE
QUEBEC, CANADA
10
100
1,000
10,000
Resistivity (Ohm.m)
ABITIBI SUBPROVINCE
Canadian Malartic Au mine
Cadillac-Larder Lake fault (CLLF)
Parfouru fault
Riviere Heva fault
South Manneville fault
Abcourt fault
Aiguebelle fault
Lyndhurst fault
Beauchamp fault
Lapaix fault
Debonne fault
South Chicobi fault
North Chicobi fault zone
North
Decelles pluton
PONTIAC SUBPROVINCE
LT P LT LBR LKM ST ST ST P LKM D D
Duverny Pluton
UKM
P SR FI
Bernetz Intrusion
C
C'
Depth (km)
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 km
Distance along profile (km)

Rouyn-Noranda R1 seismic section (LN141)

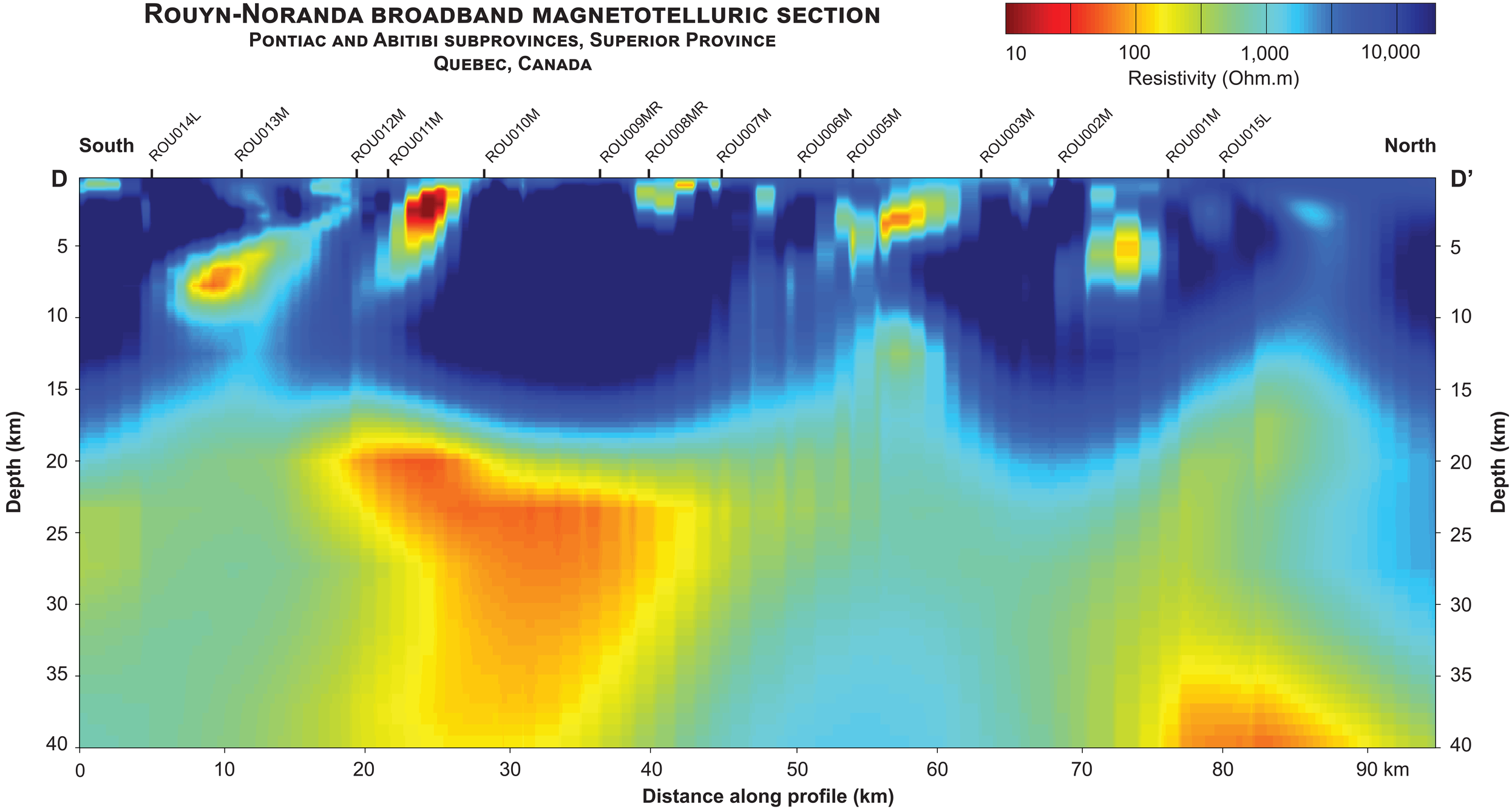
Abitibi subprovince, Superior Province

Quebec, Canada



Rouyn-Noranda broadband magnetotelluric section

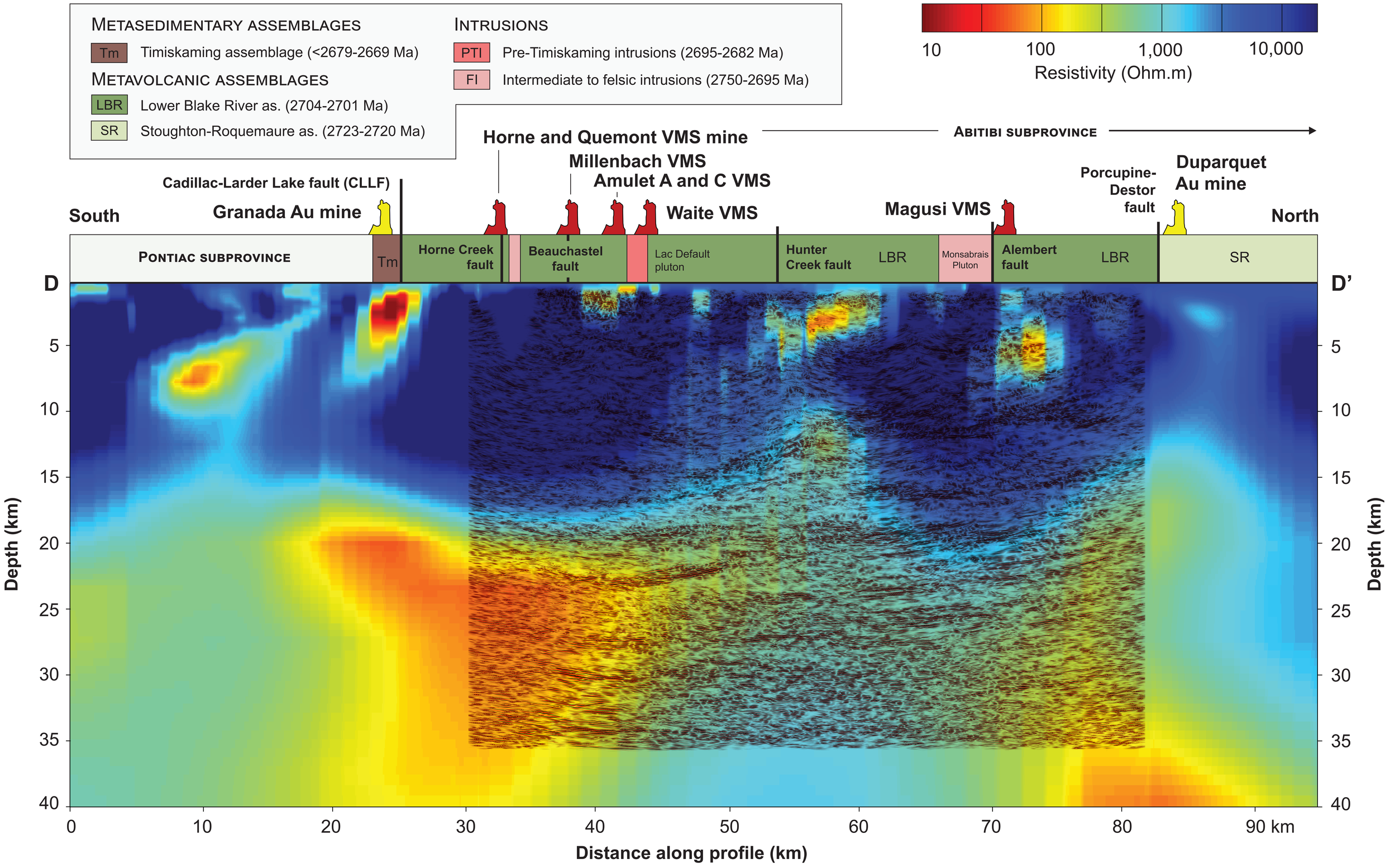
Pontiac and Abitibi subprovinces, Superior Province
Quebec, Canada



Rouyn-Noranda composite geological section

Pontiac and Abitibi subprovinces, Superior Province

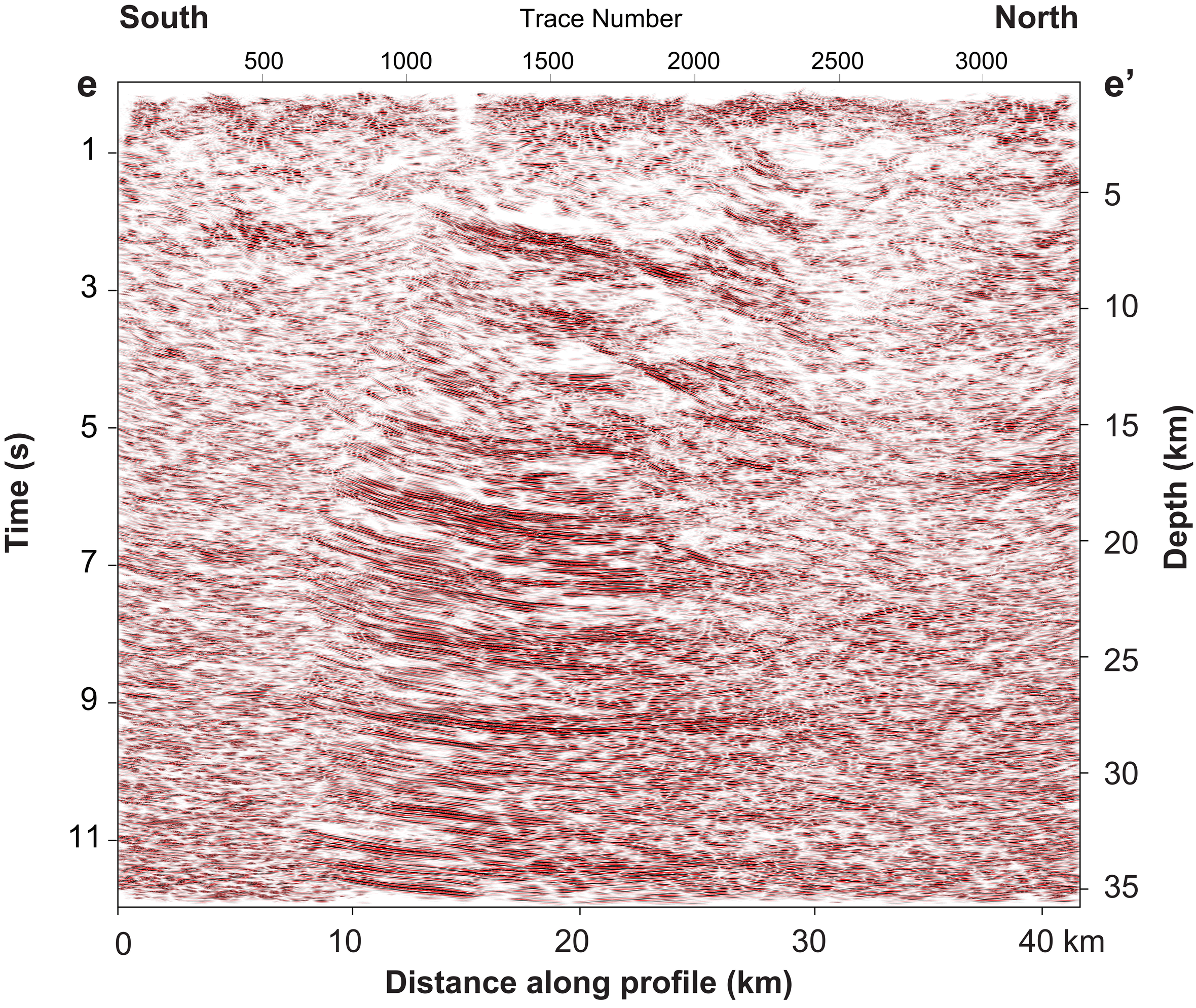
Quebec, Canada



Larder Lake R1 seismic section (LN321)

Abitibi subprovince, Superior Province

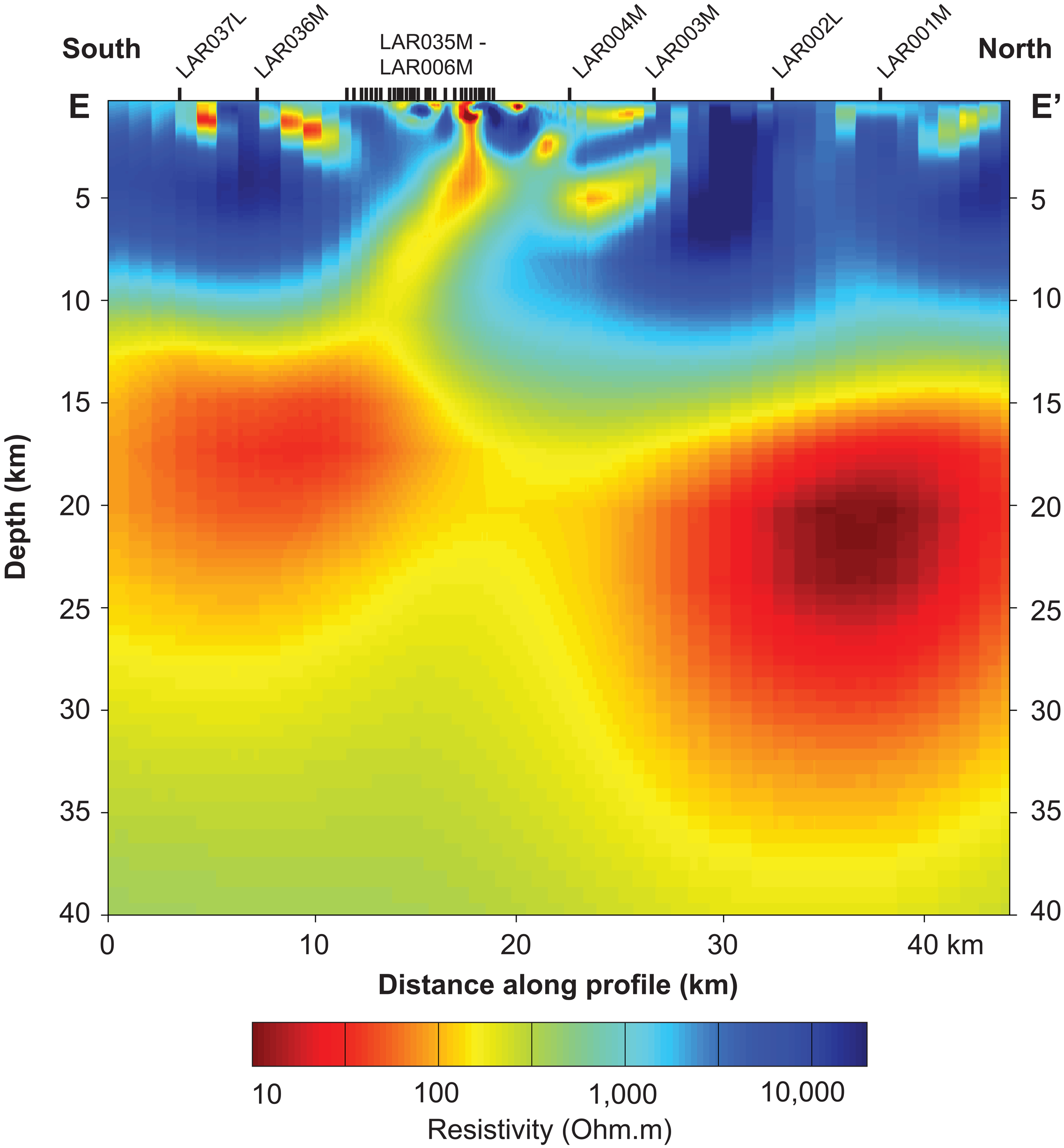
Ontario, Canada



Larder Lake broadband magnetotelluric section

Abitibi subprovince, Superior Province

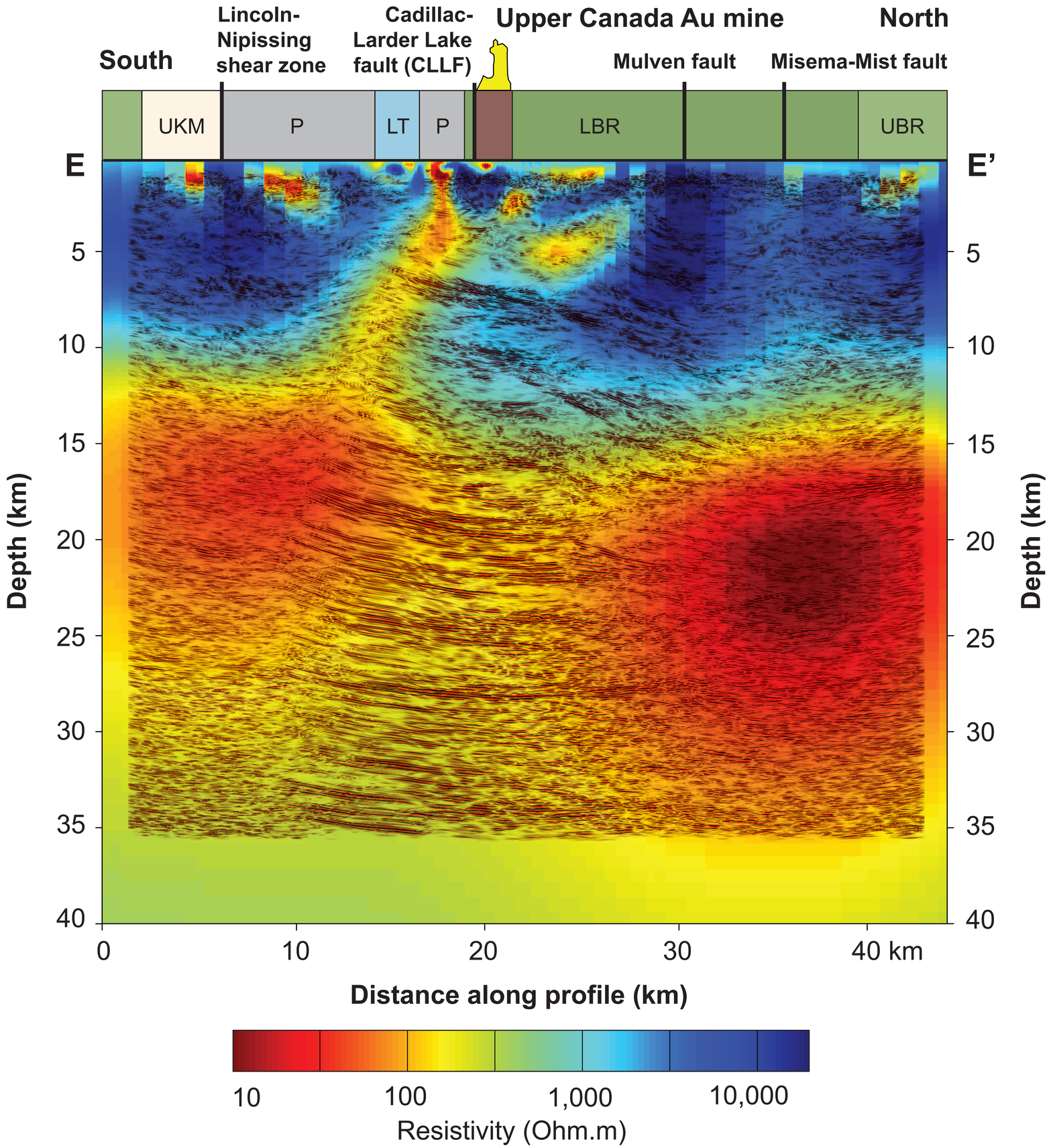
Ontario, Canada



Larder Lake composite geological section

Abitibi subprovince, Superior Province

Ontario, Canada



Metasedimentary assemblages

- Tm — Timiskaming assemblage (<2679-2669 Ma)
- P — Porcupine assemblage (<2700-2685 Ma)

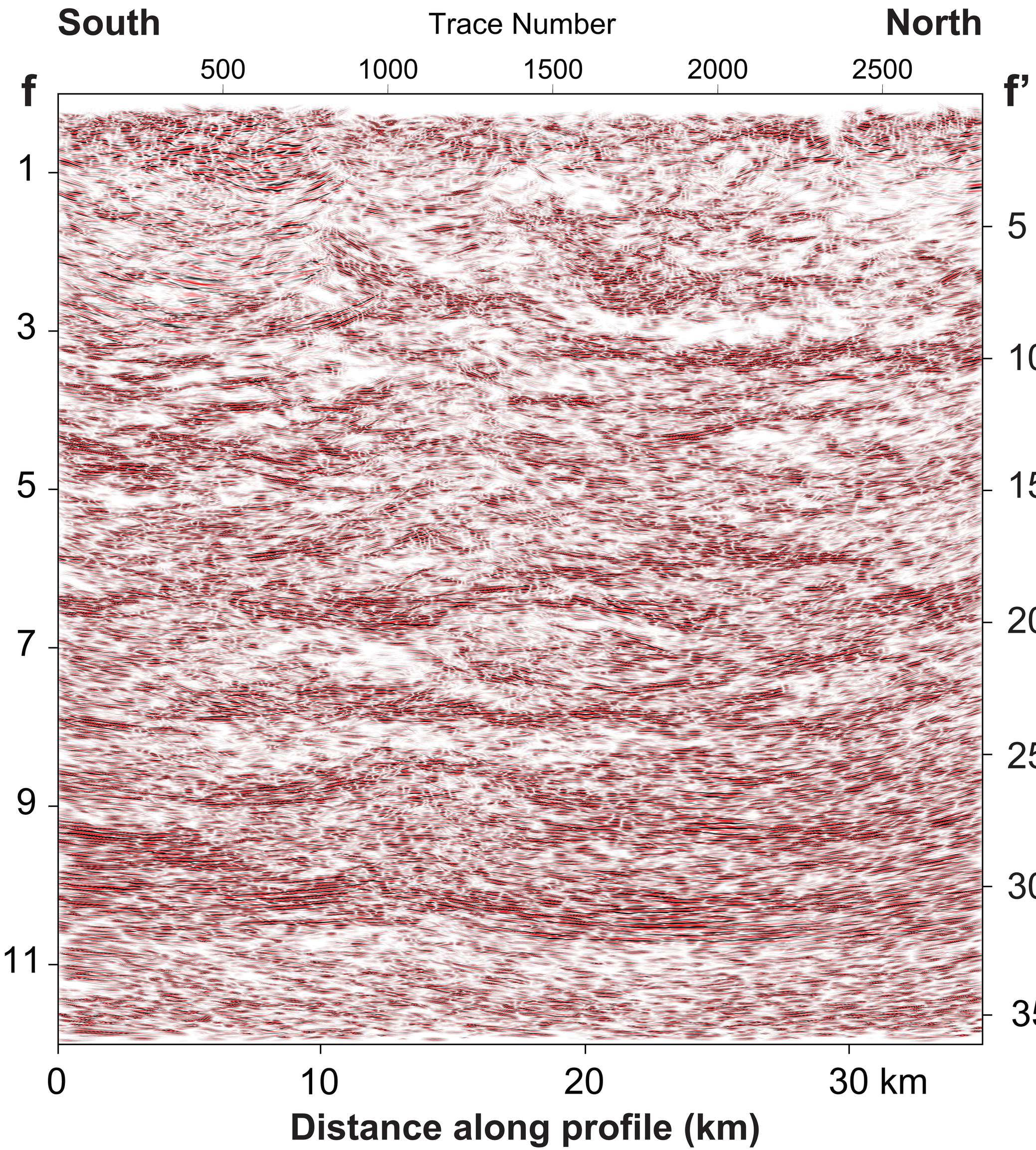
Metavolcanic assemblages

- UBR — Upper Blake River assemblage (2701-2695 Ma)
- LBR — Lower Blake River assemblage (2704-2701 Ma)
- LT — Lower Tisdale assemblage (2710-2706 Ma)
- UKM — Upper Kidd-Munro assemblage (2717-2711 Ma)

Cobalt R1 seismic section (LN391)

Cobalt Embayment, Southern Province

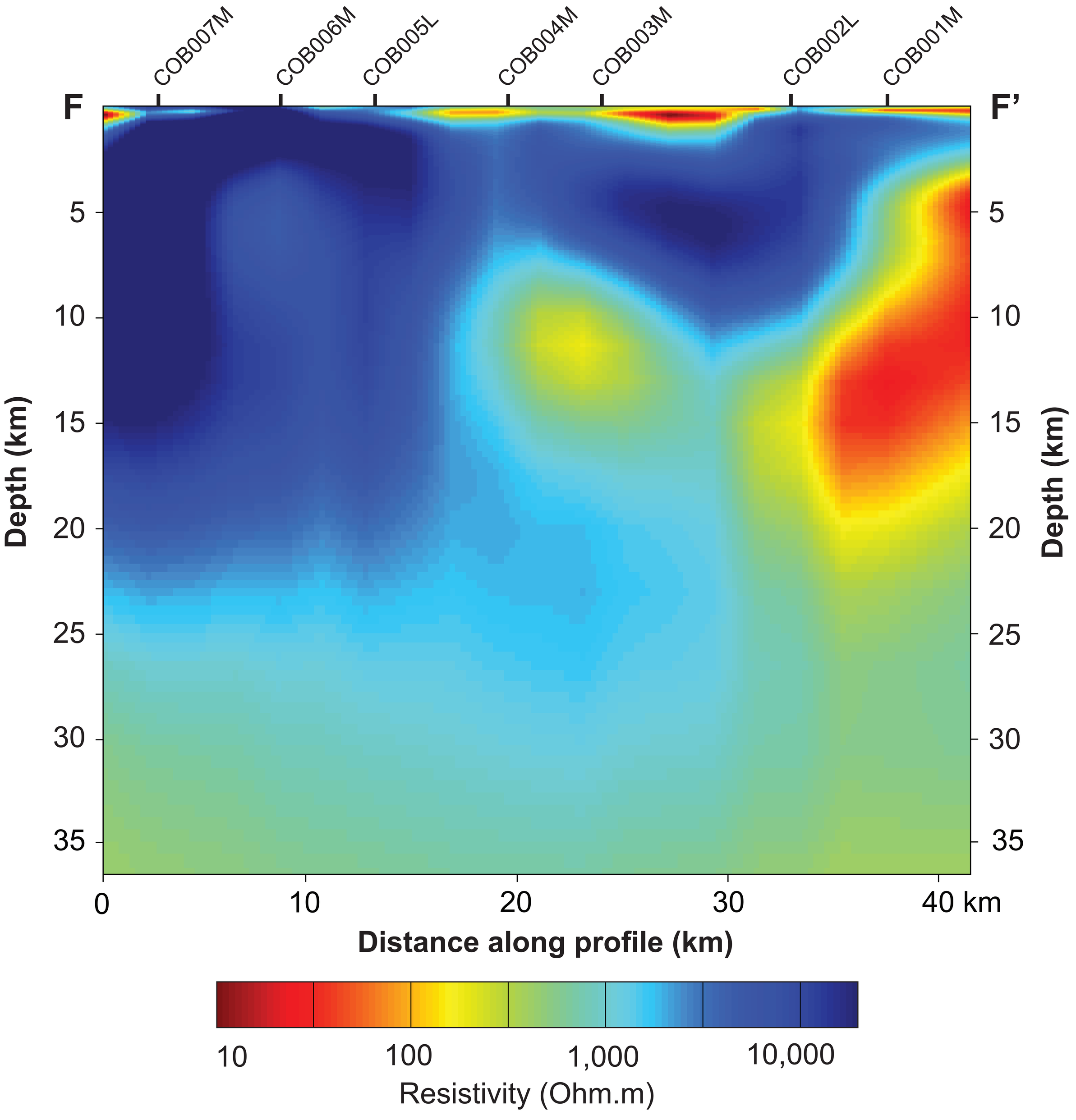
Ontario, Canada



Cobalt broadband magnetotelluric section

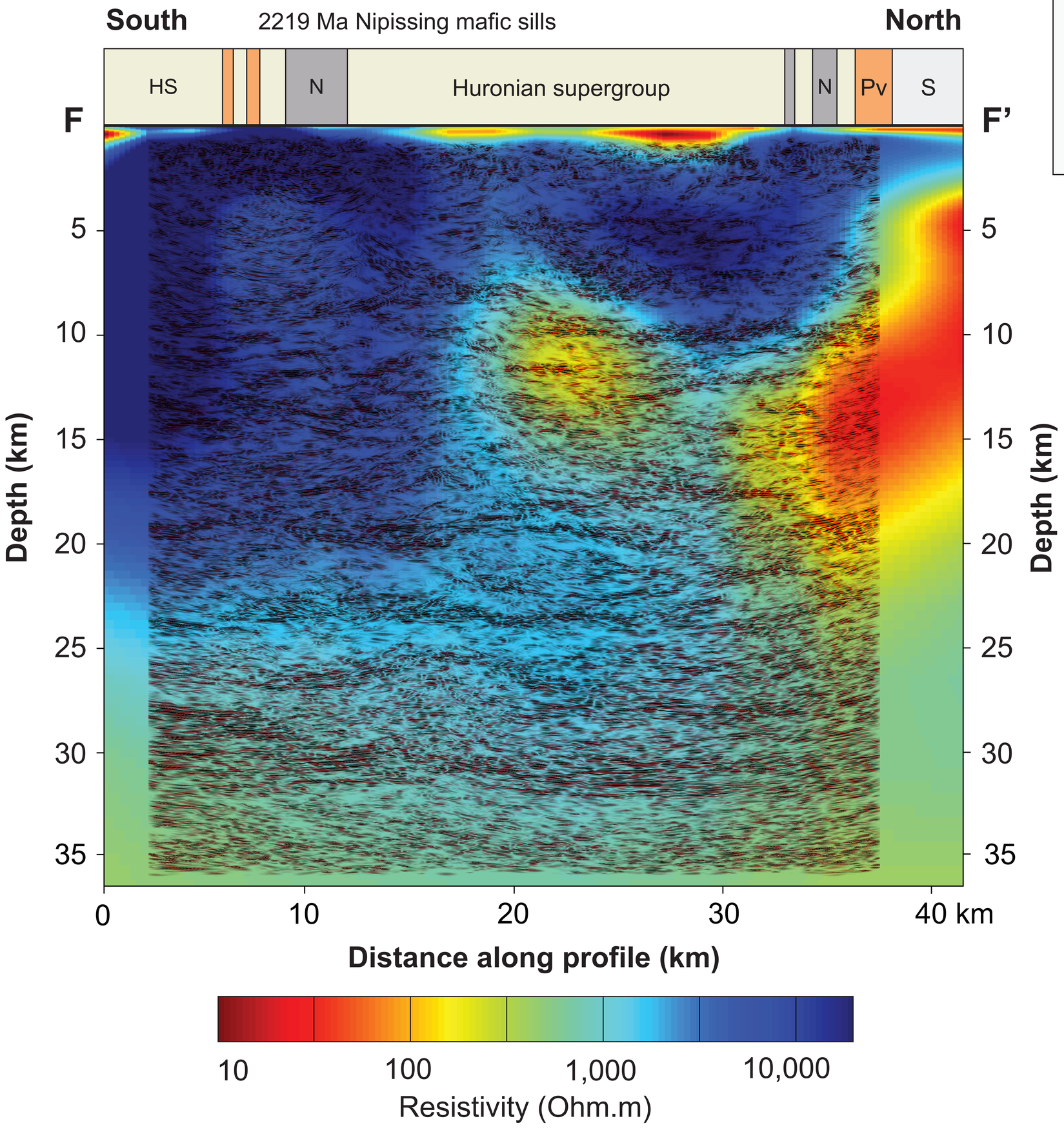
Cobalt Embayment, Southern Province

Ontario, Canada



Cobalt composite geological section

Cobalt Embayment, Southern Province
Ontario, Canada



S — Phanerozoic (<488-443 Ma) sediments

Southern Province

N — Nipissing mafic sills (2219 Ma)

HS — Huronian supergroup (<2480-2219 Ma)

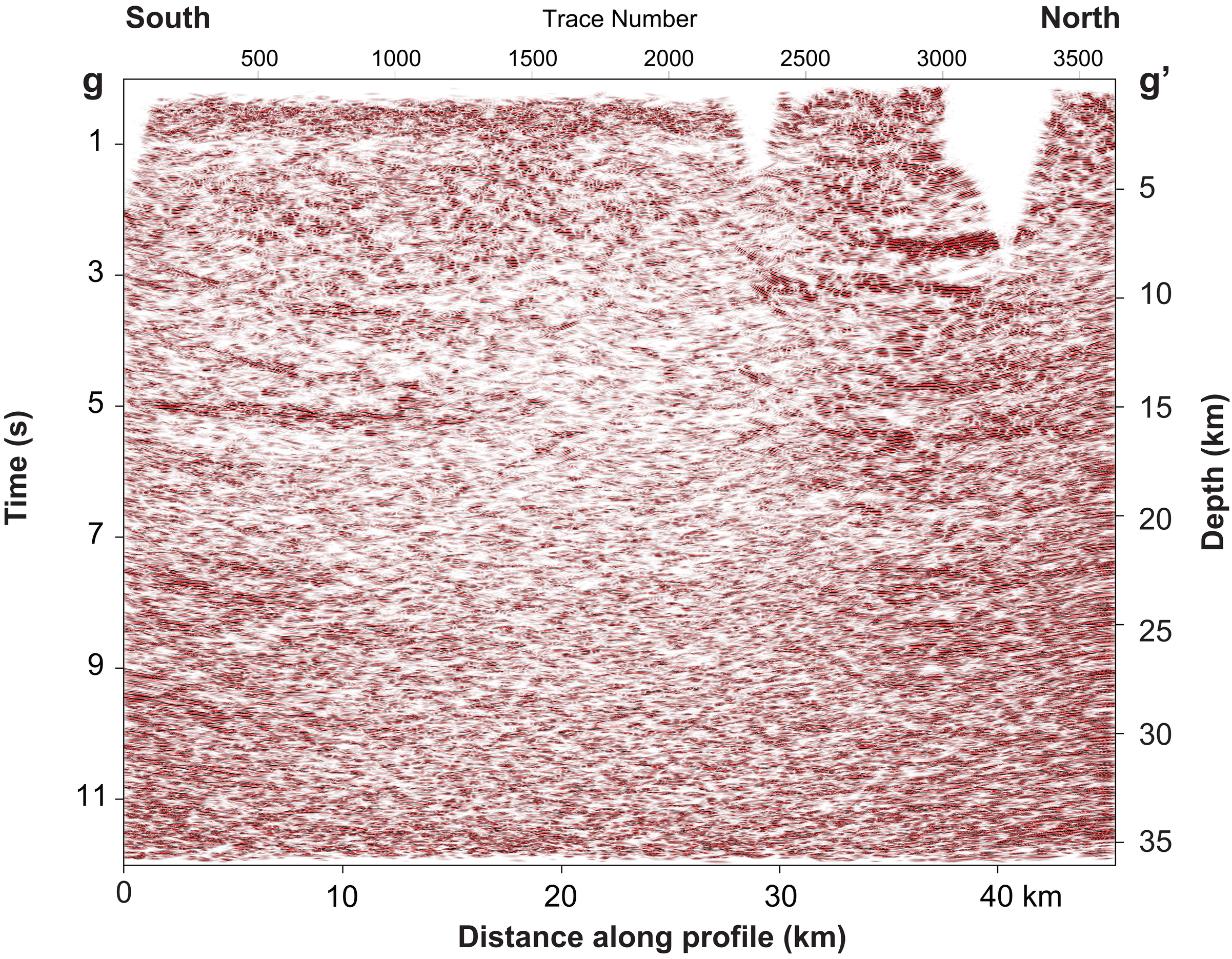
Abitibi subprovince

Pv — Porcupine assemblage (volcanics; 2700-2685 Ma)

Matheson R1 seismic section (LN261)

Abitibi subprovince, Superior Province

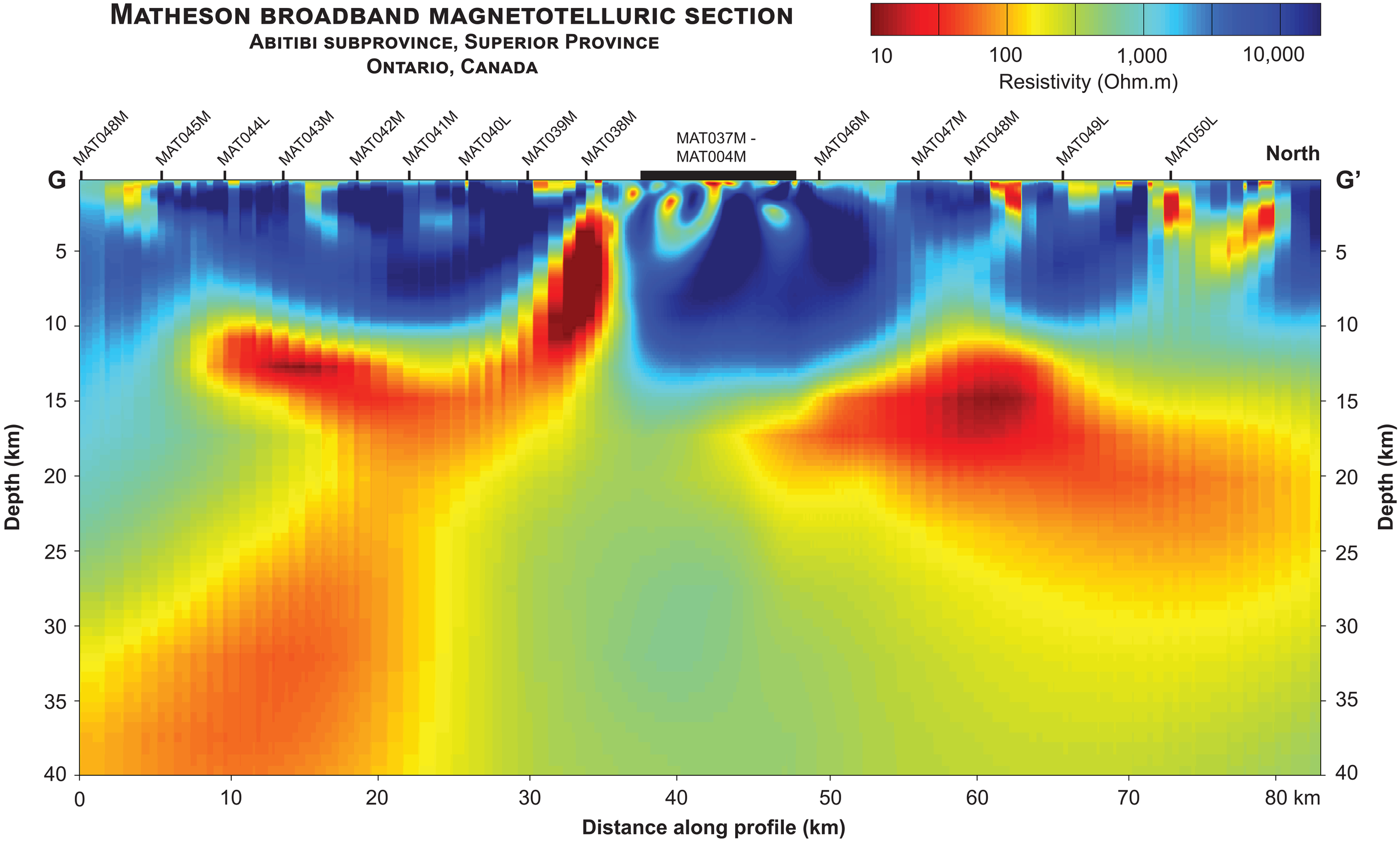
Ontario, Canada



Matheson broadband magnetotelluric section

Abitibi subprovince, Superior Province

Ontario, Canada



Matheson composite geological section

Abitibi subprovince, Superior Province Ontario, Canada

Metasedimentary assemblages

- P — Porcupine assemblage (<2700-2685 Ma)

Metavolcanic assemblages

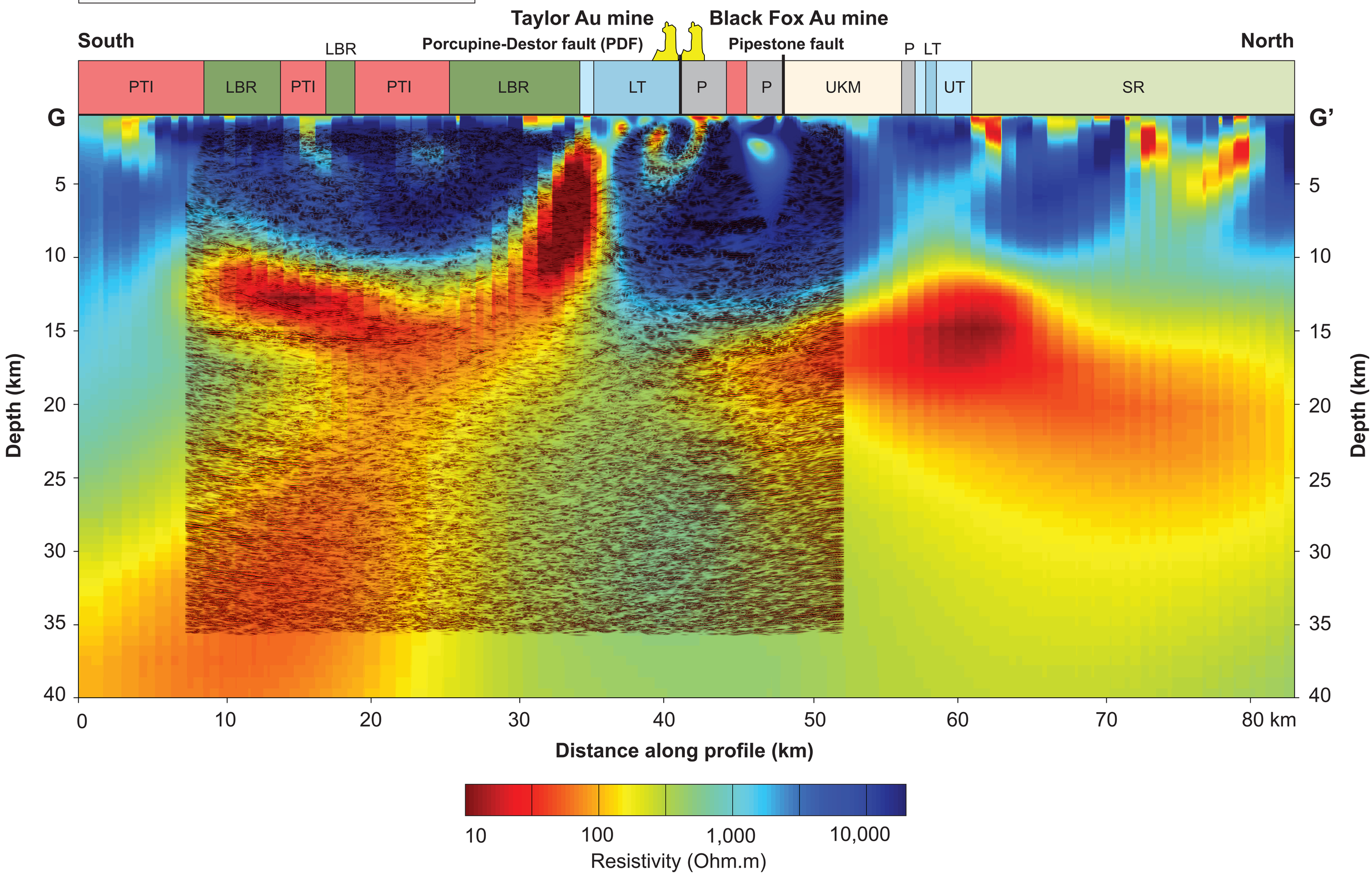
- LBR — Lower Blake River as. (2704-2701 Ma)
- UT — Upper Tisdale as. (2706-2704 Ma)
- LT — Lower Tisdale as. (2710-2706 Ma)

Metavolcanic assemblages (cont.)

- UKM — Upper Kidd-Munro as. (2717-2711 Ma)
- SR — Stoughton-Roquemaure as. (2723-2720 Ma)

Intrusions

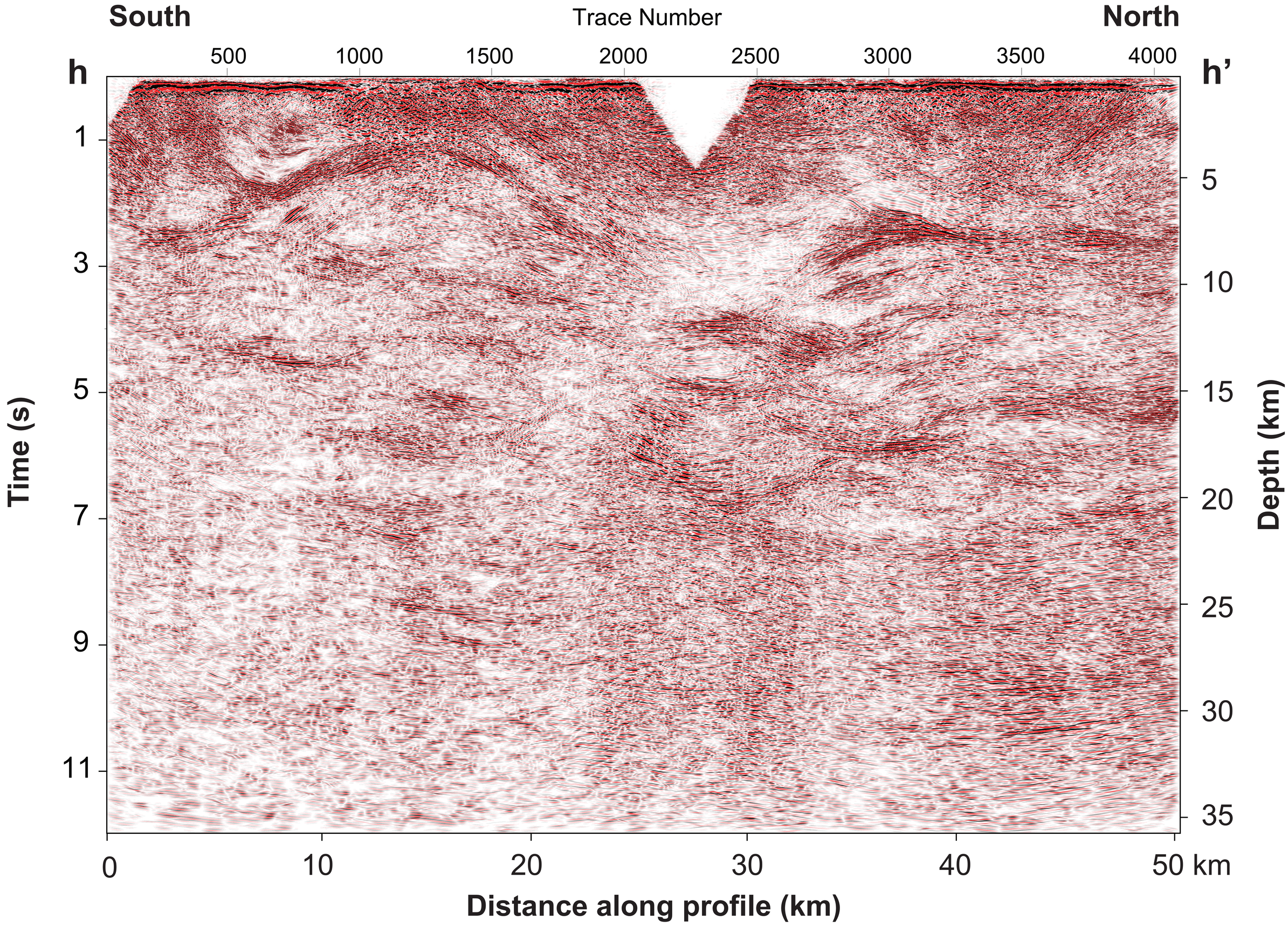
- PTI — Pre-Timiskaming intrusions 2695-2682 Ma)



Crawchest R1 seismic section (LN7)

Abitibi subprovince, Superior Province

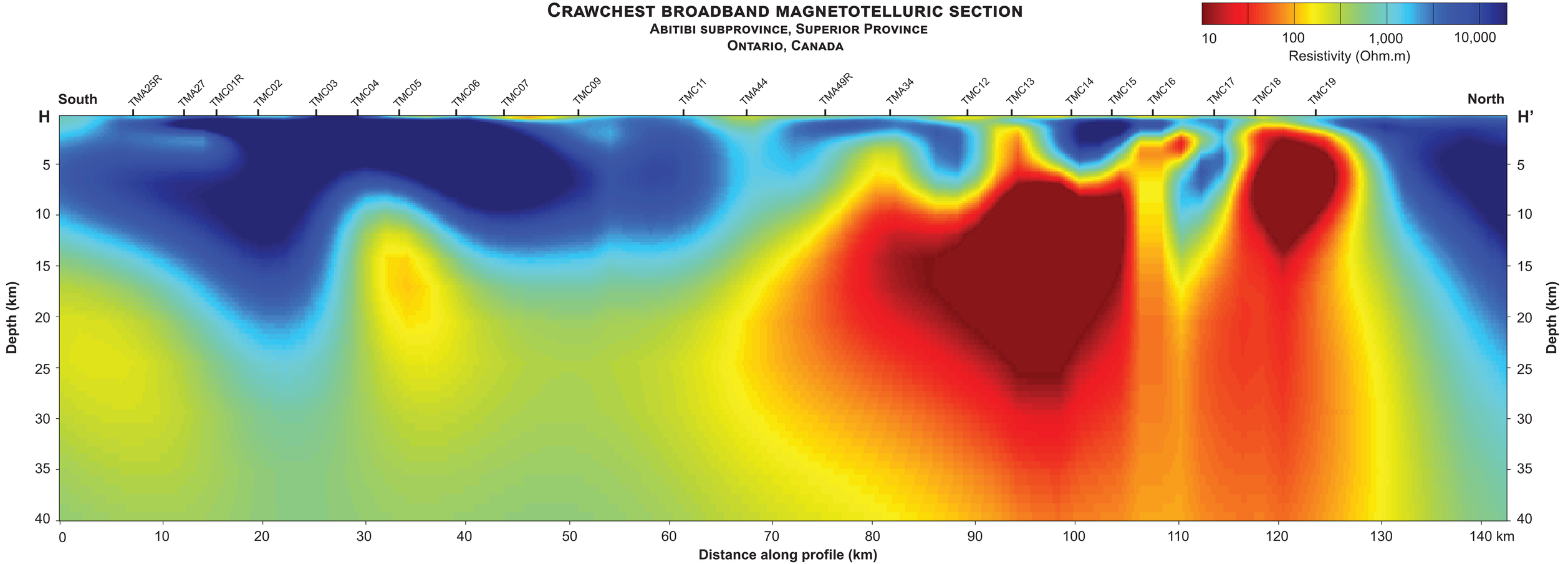
Ontario, Canada



Crawchest broadband magnetotelluric section

Abitibi subprovince, Superior Province

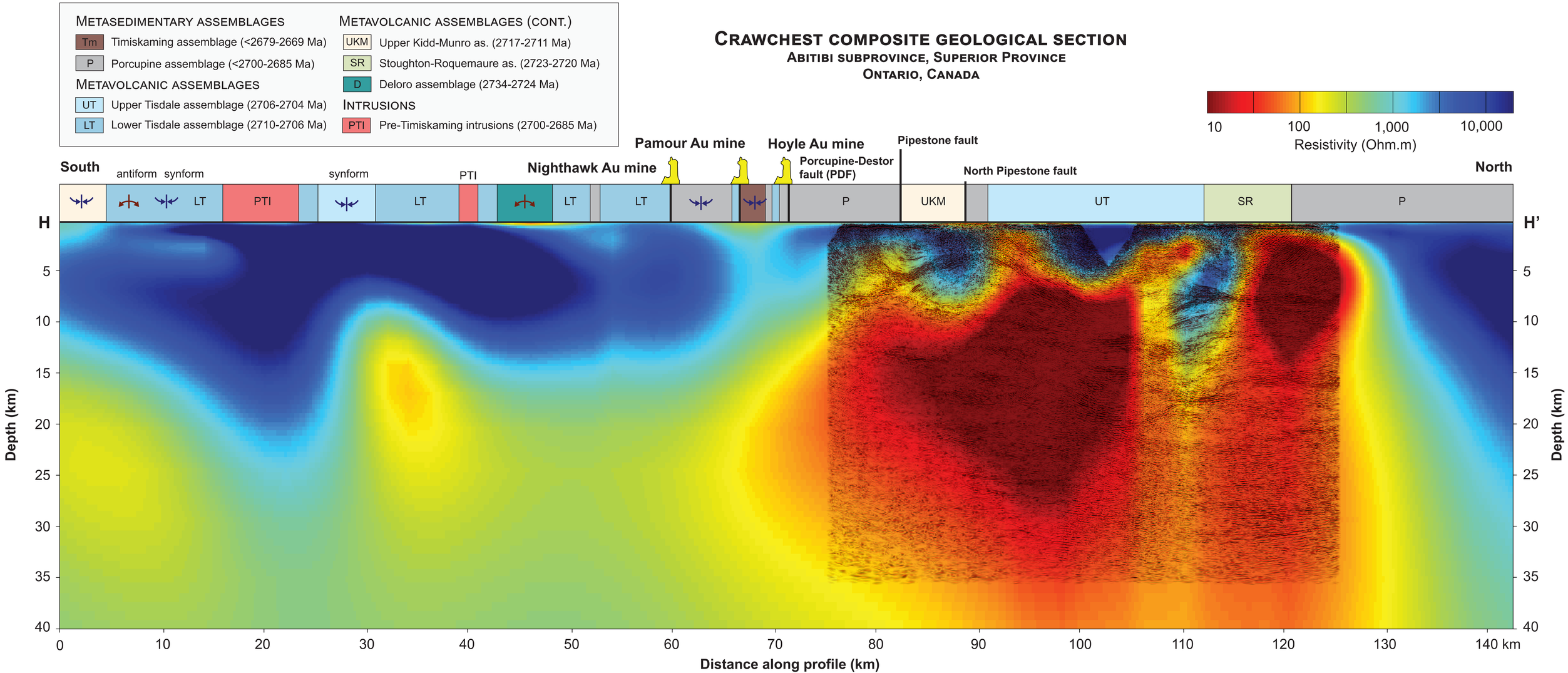
Ontario, Canada



Crawchest composite geological section

Abitibi subprovince, Superior Province

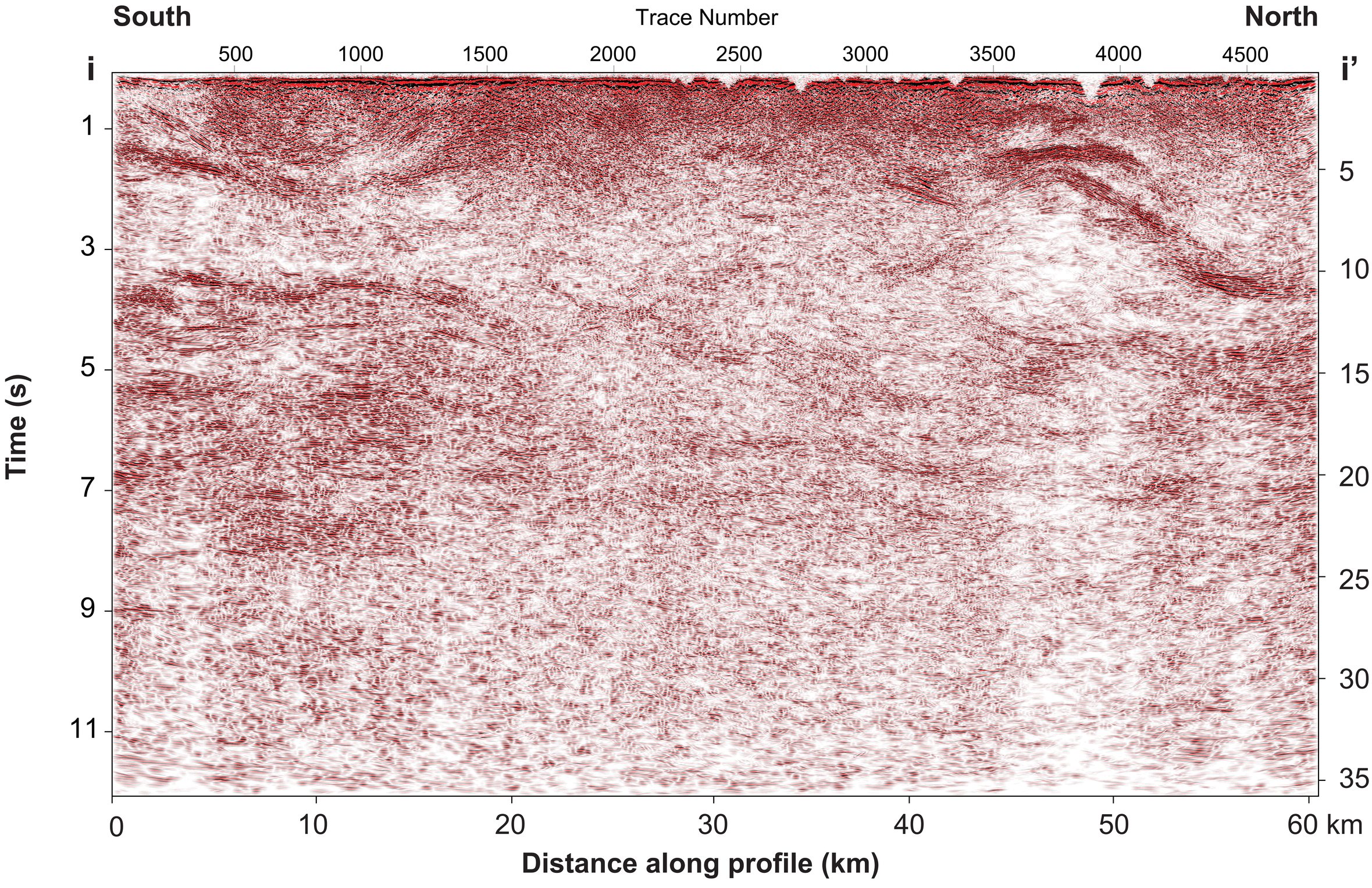
Ontario, Canada



South Timmins R1 seismic section (LN8)

Abitibi subprovince, Superior Province

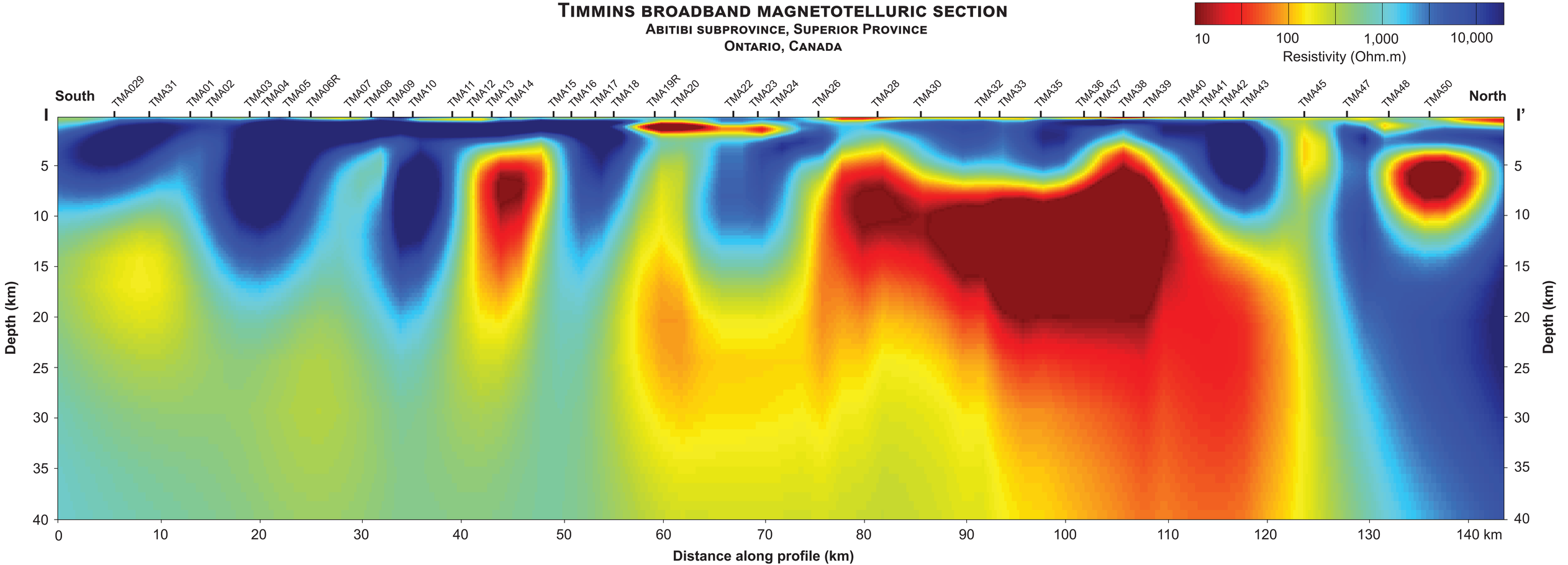
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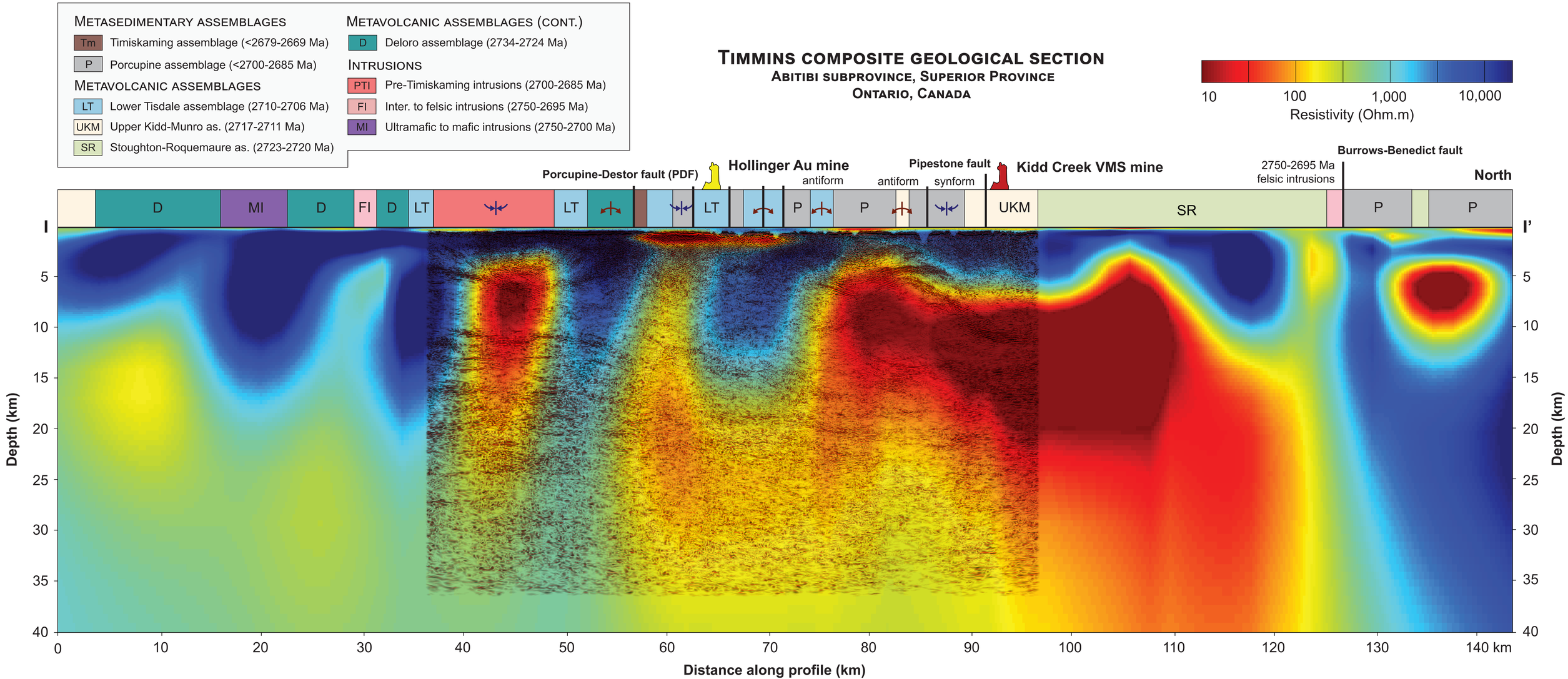


Timmins broadband magnetotelluric section

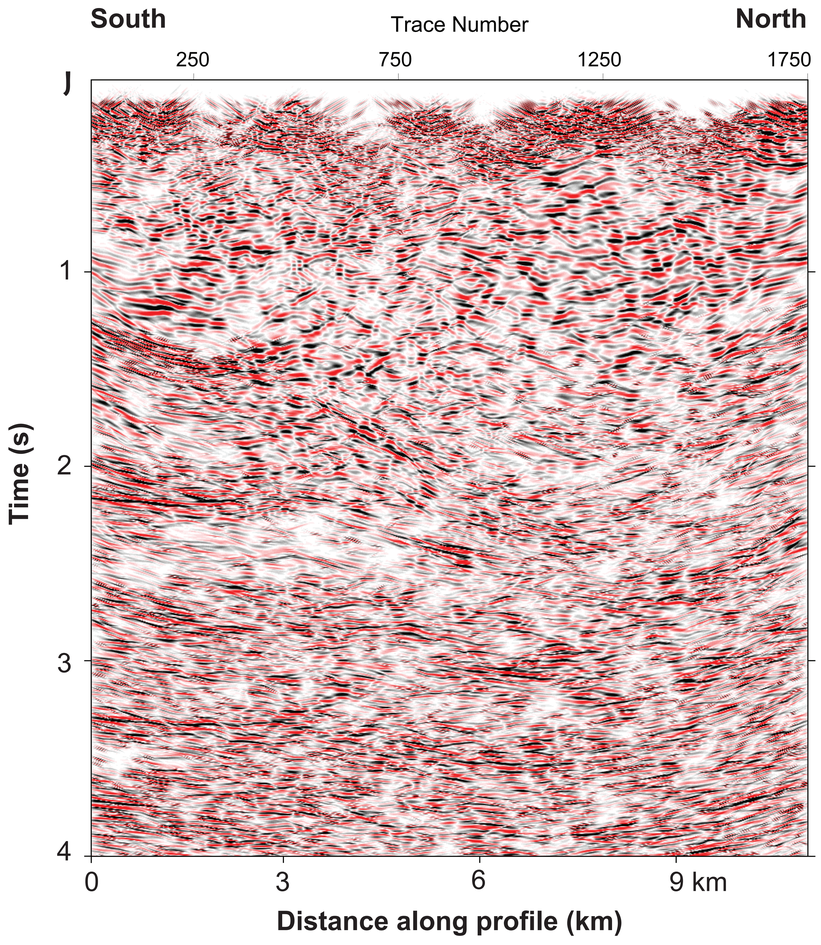
Abitibi subprovince, Superior Province

Ontario, Canada

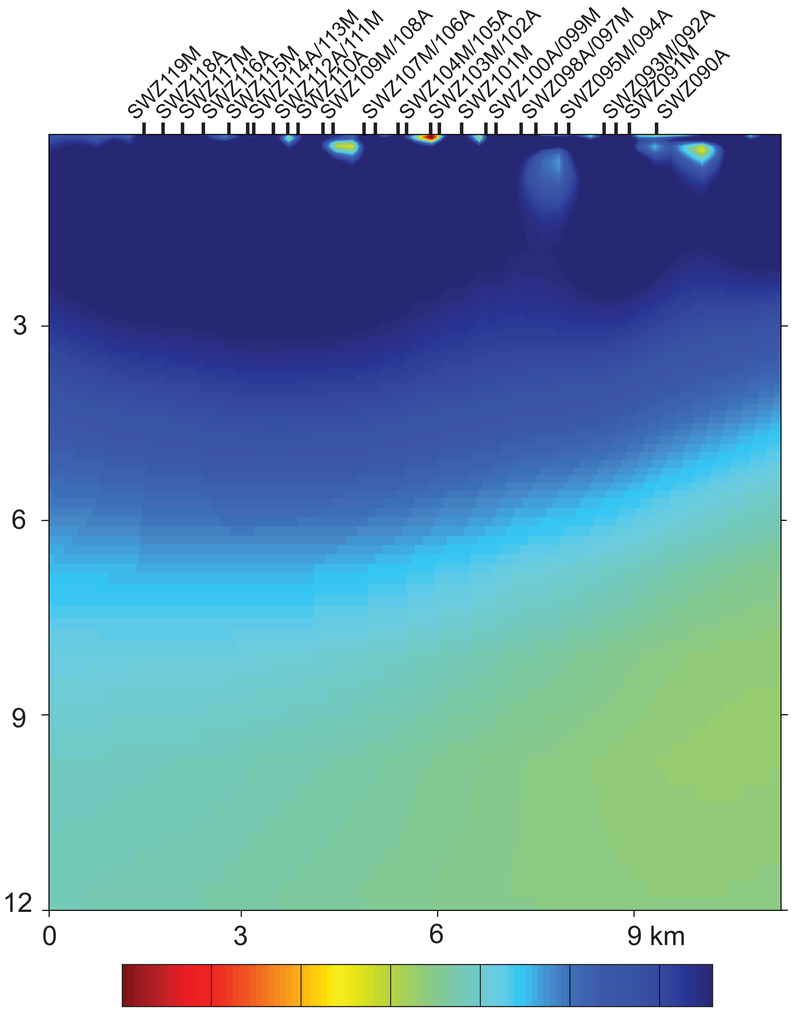



METASEDIMENTARY ASSEMBLAGES
Tm Timiskaming assemblage (<2679-2669 Ma)
P Porcupine assemblage (<2700-2685 Ma)
METAVOLCANIC ASSEMBLAGES
LT Lower Tisdale assemblage (2710-2706 Ma)
UKM Upper Kidd-Munro as. (2717-2711 Ma)
SR Stoughton-Roquemaure as. (2723-2720 Ma)
METAVOLCANIC ASSEMBLAGES (CONT.)
D Deloro assemblage (2734-2724 Ma)
INTRUSIONS
PTI Pre-Timiskaming intrusions (2700-2685 Ma)
FI Inter. to felsic intrusions (2750-2695 Ma)
MI Ultramafic to mafic intrusions (2750-2700 Ma)
TIMMINS COMPOSITE GEOLOGICAL SECTION
ABITIBI SUBPROVINCE, SUPERIOR PROVINCE
ONTARIO, CANADA
10
100
1,000
10,000
Resistivity (Ohm.m)
Porcupine-Destor fault (PDF)
Hollinger Au mine
antiform
Pipestone fault
antiform
synform
Kidd Creek VMS mine
2750-2695 Ma
felsic intrusions
Burrows-Benedict fault
North
D
MI
D
FI
D
LT
LT
LT
P
P
UKM
SR
P
P
I
I'
Depth (km)
Depth (km)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140 km
Distance along profile (km)

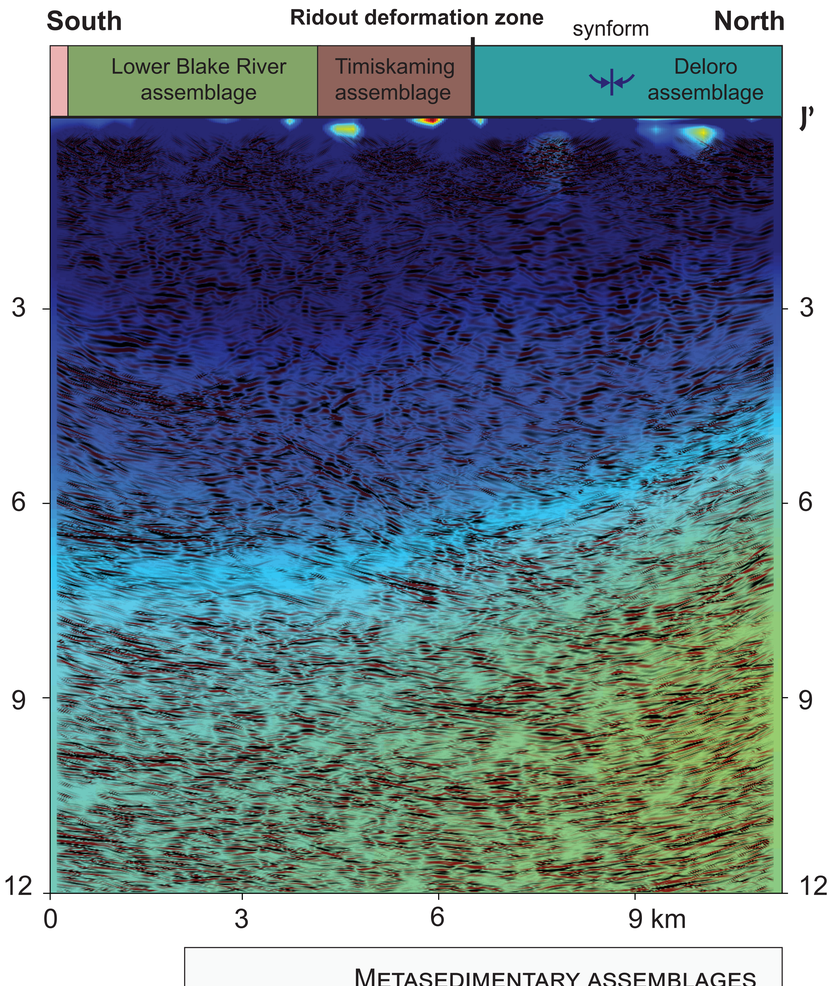
Easy Swayze
R2 seismic section (LN252)
Abitibi subprovince, Superior Province
Ontario, Canada



East Swayze
Audio-frequency magnetotelluric section
Abitibi subprovince, Superior Province
Ontario, Canada



East Swayze
Composite geological section
Abitibi subprovince, Superior Province
Ontario, Canada



Metasedimentary assemblages

Timiskaming assemblage (<2679-2669 Ma) — Tm

Metavolcanic assemblages

Lower Blake River as. (2704-2701 Ma) — LBR

Deloro assemblage (2734-2724 Ma) — D

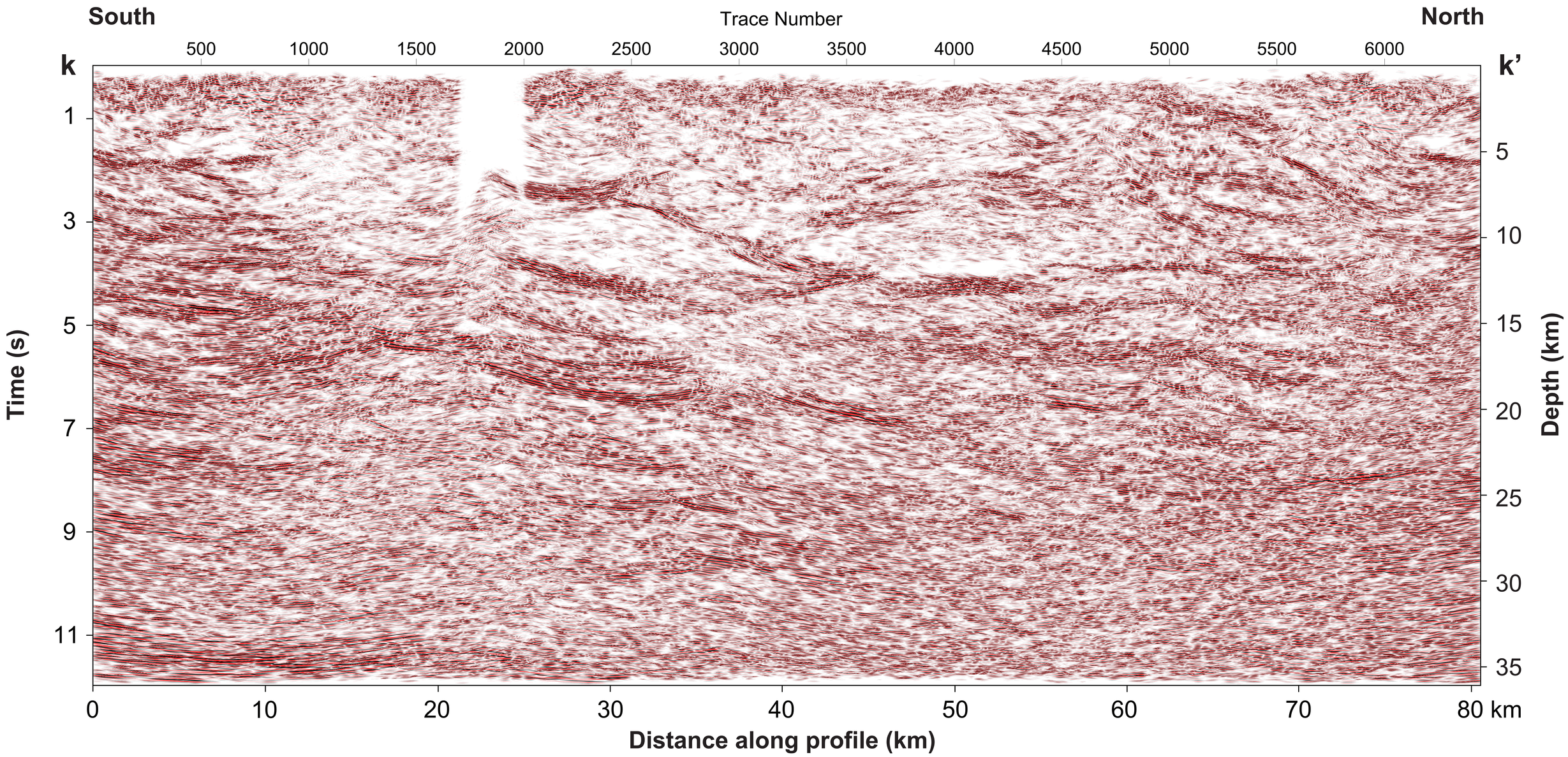
Intrusions

Intermediate to felsic intrusions (2750-2695 Ma) — FI

Swayze R1 seismic section (LN241)

Abitibi subprovince, Superior Province

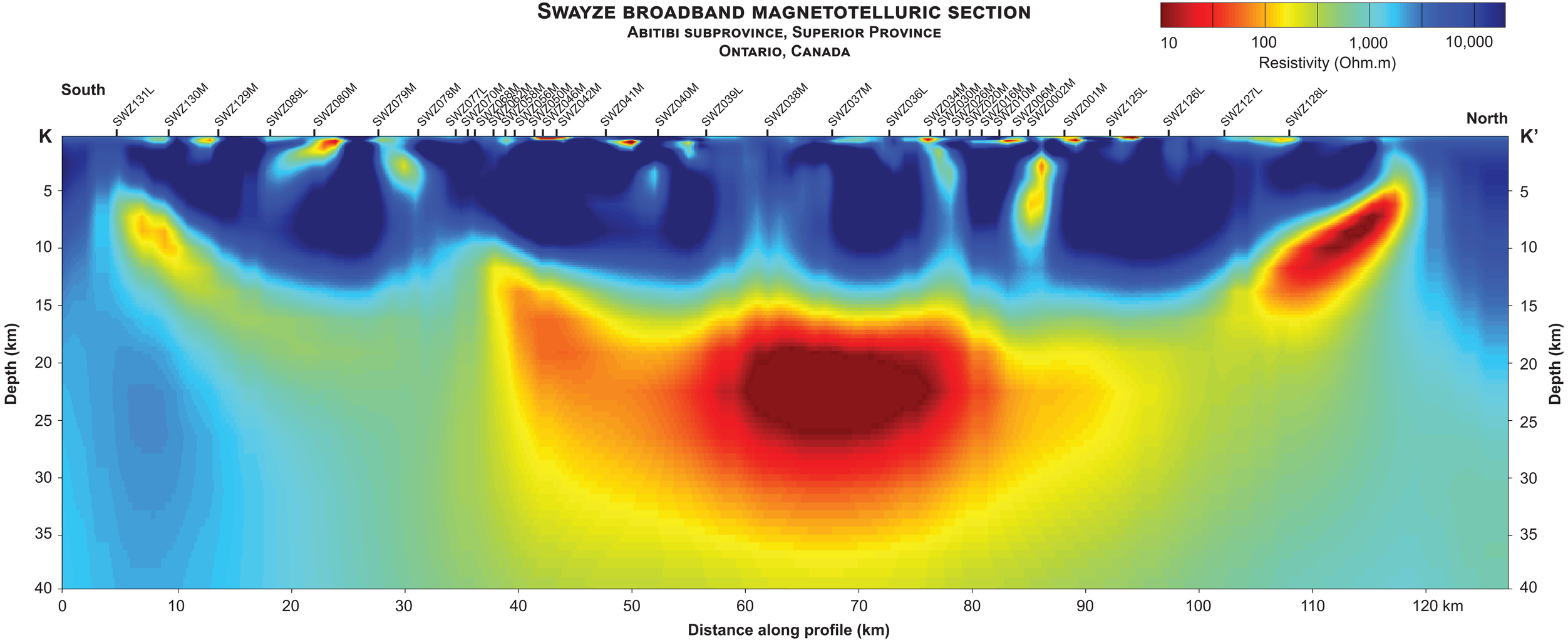
Ontario, Canada

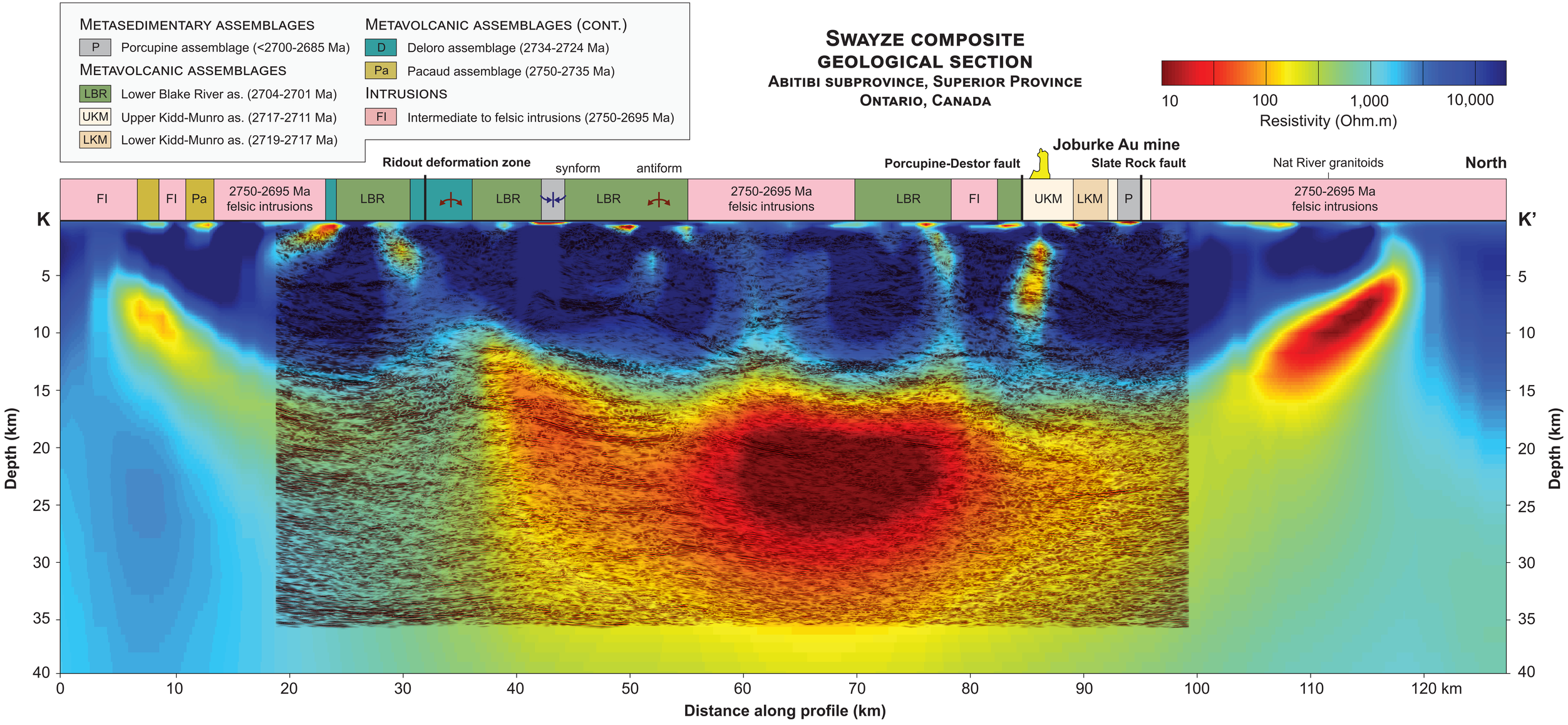


SWAYZE BROADBAND MAGNETOTELLURIC SECTION

ABITIBI SUBPROVINCE, SUPERIOR PROVINCE

ONTARIO, CANADA

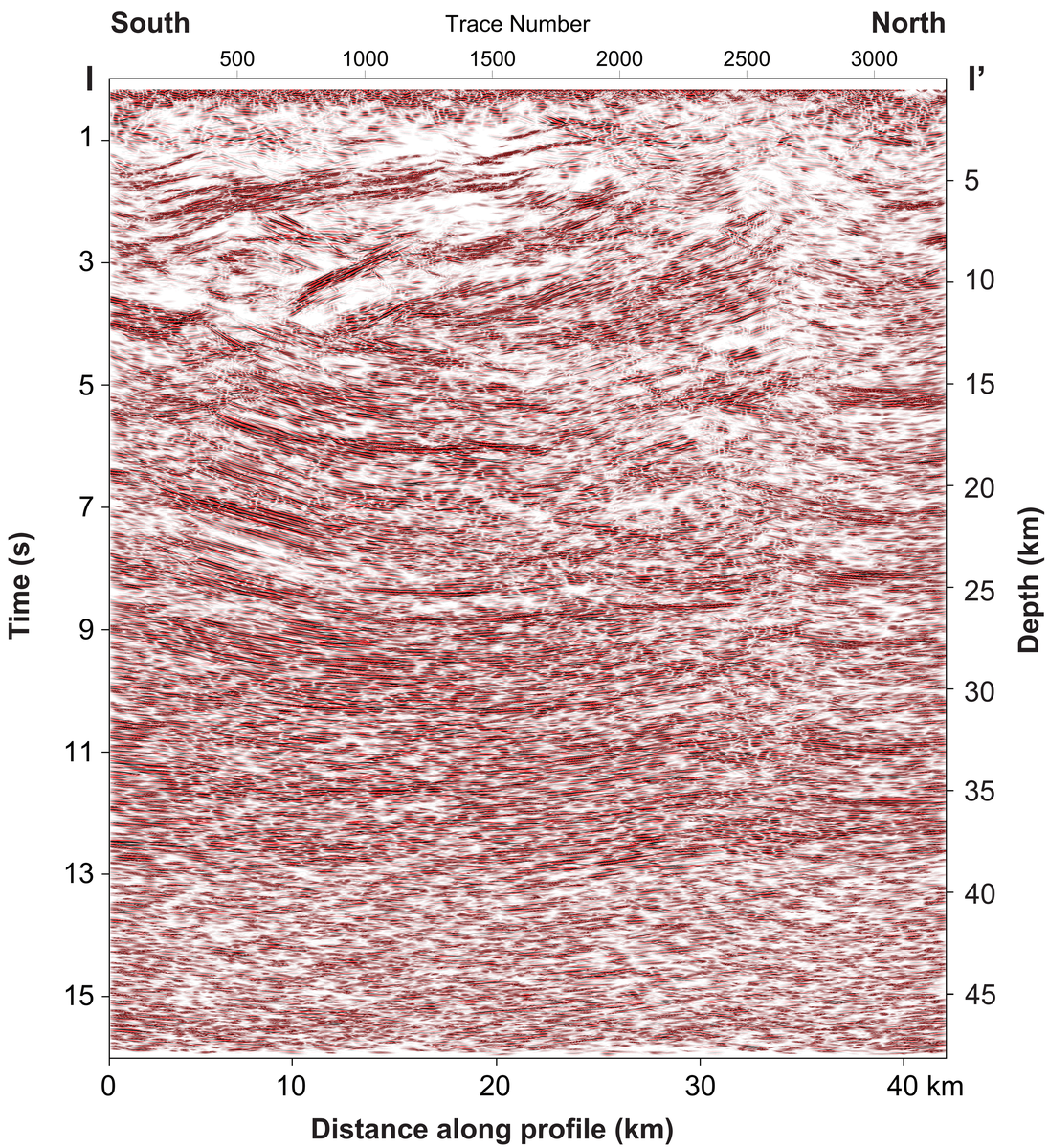



Metasedimentary assemblages
P Porcupine assemblage (<2700-2685 Ma)
Metavolcanic assemblages
LBR Lower Blake River as. (2704-2701 Ma)
UKM Upper Kidd-Munro as. (2717-2711 Ma)
LKM Lower Kidd-Munro as. (2719-2717 Ma)
Metavolcanic assemblages (cont.)
D Deloro assemblage (2734-2724 Ma)
Pa Pacaud assemblage (2750-2735 Ma)
Intrusions
FI Intermediate to felsic intrusions (2750-2695 Ma)
Swayze composite geological section
Abitibi subprovince, Superior Province
Ontario, Canada
10
100
1,000
10,000
Resistivity (Ohm.m)
Joburke Au mine
Ridout deformation zone
synform
antiform
Porcupine-Destor fault
Slate Rock fault
Nat River granitoids
North
FI
FI
Pa
2750-2695 Ma felsic intrusions
LBR
LBR
LBR
2750-2695 Ma felsic intrusions
LBR
FI
UKM
LKM
P
2750-2695 Ma felsic intrusions
K
K'
Depth (km)
Depth (km)
0
10
20
30
40
50
60
70
80
90
100
110
120 km
Distance along profile (km)

South Geraldton R1 seismic section (LN301)

Quetico and Eastern Wabigoon subprovinces, Superior Province

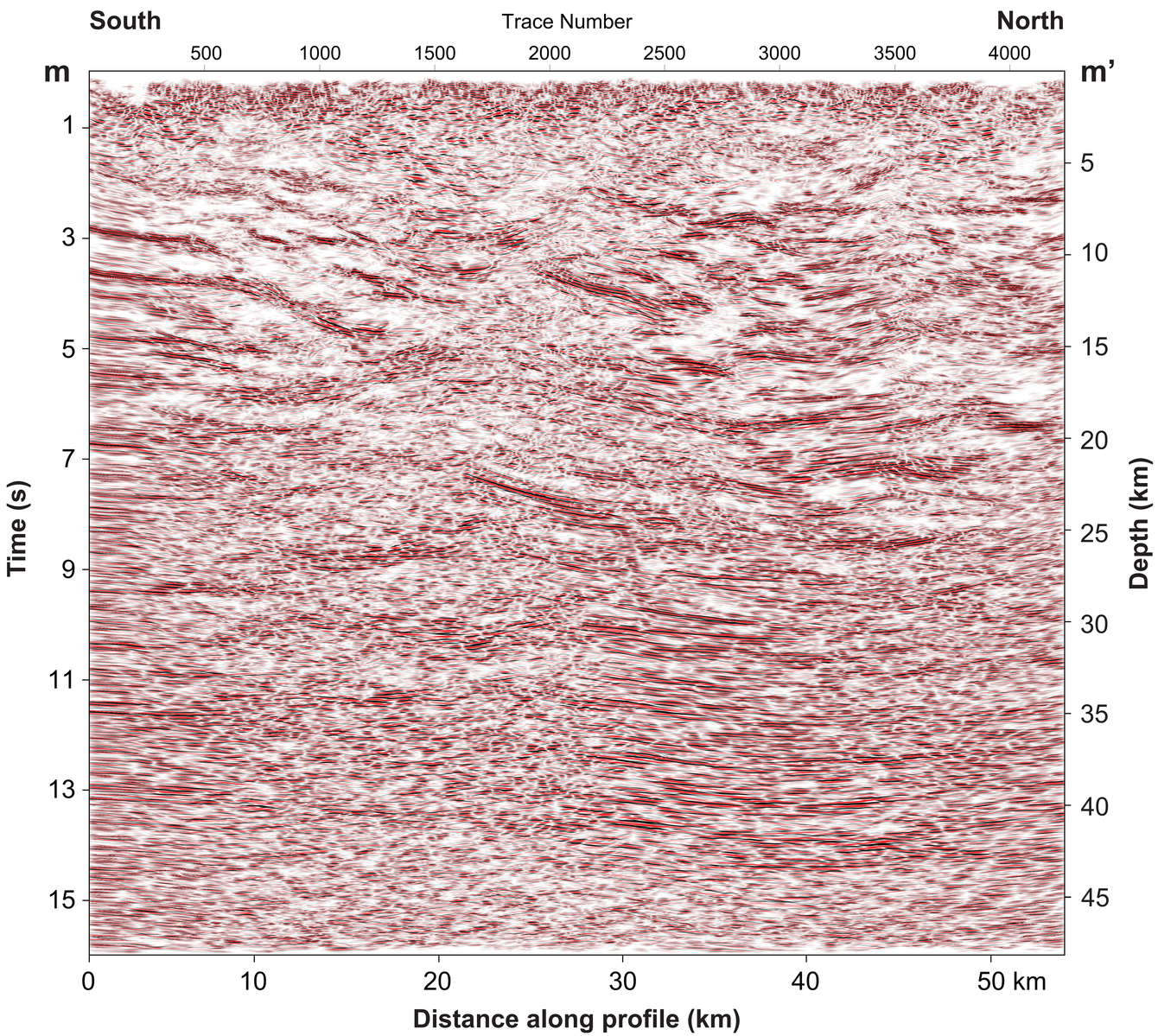
Ontario, Canada



North Geraldton R1 seismic section (LN311)

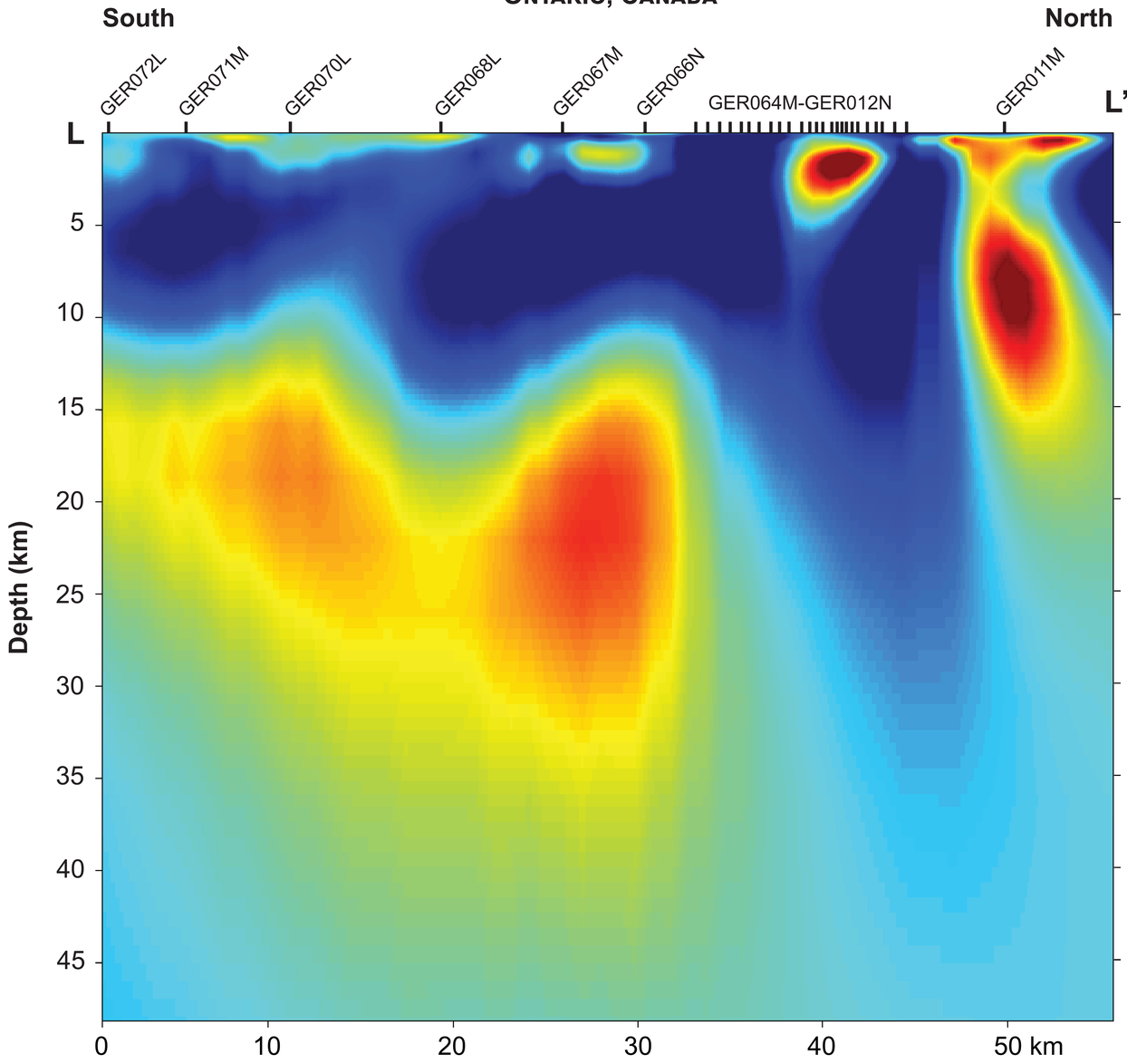
Eastern Wabigoon subprovince, Superior Province

Ontario, Canada



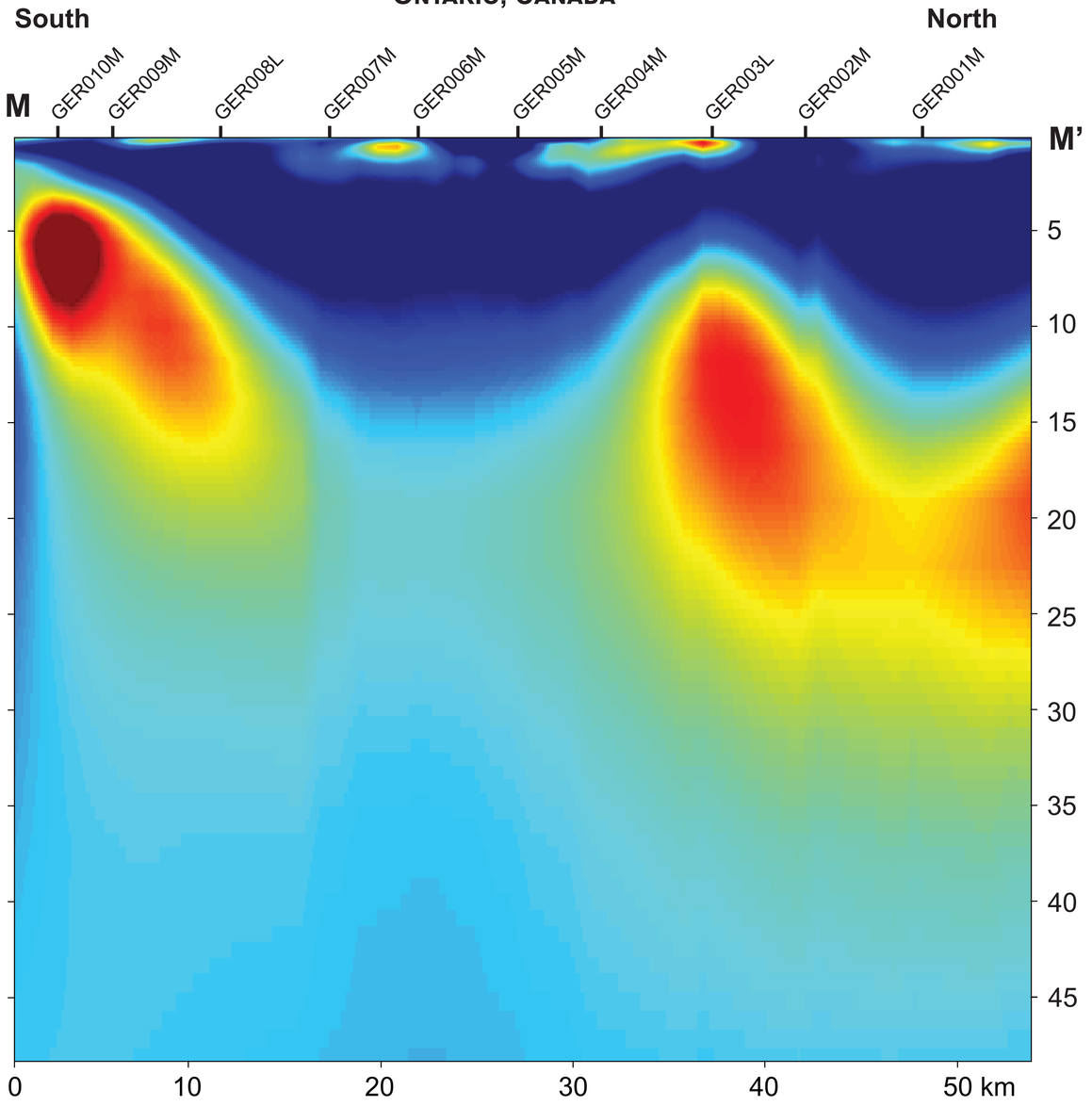
South Geraldton broadband magnetotelluric section

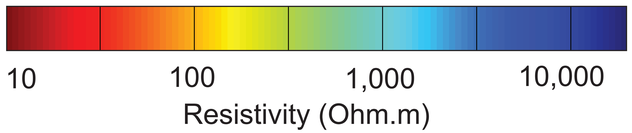
Quetico and Eastern Wabigoon subprovinces, Superior Province
Ontario, Canada



North Geraldton broadband magnetotelluric section

Eastern Wabigoon subprovince, Superior Province
Ontario, Canada

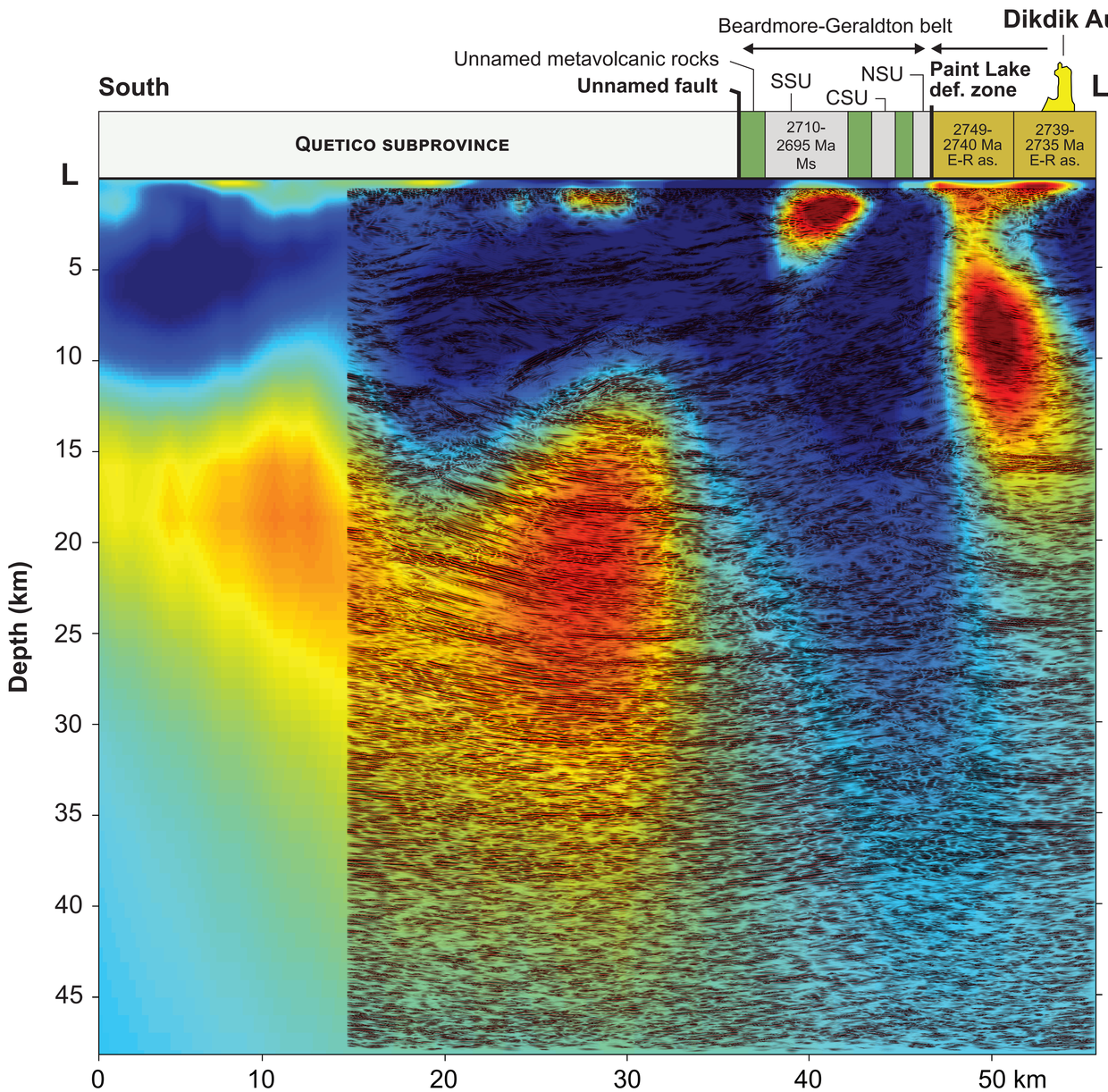




South Geraldton composite geological section

Quetico and Eastern Wabigoon subprovinces, Superior Province

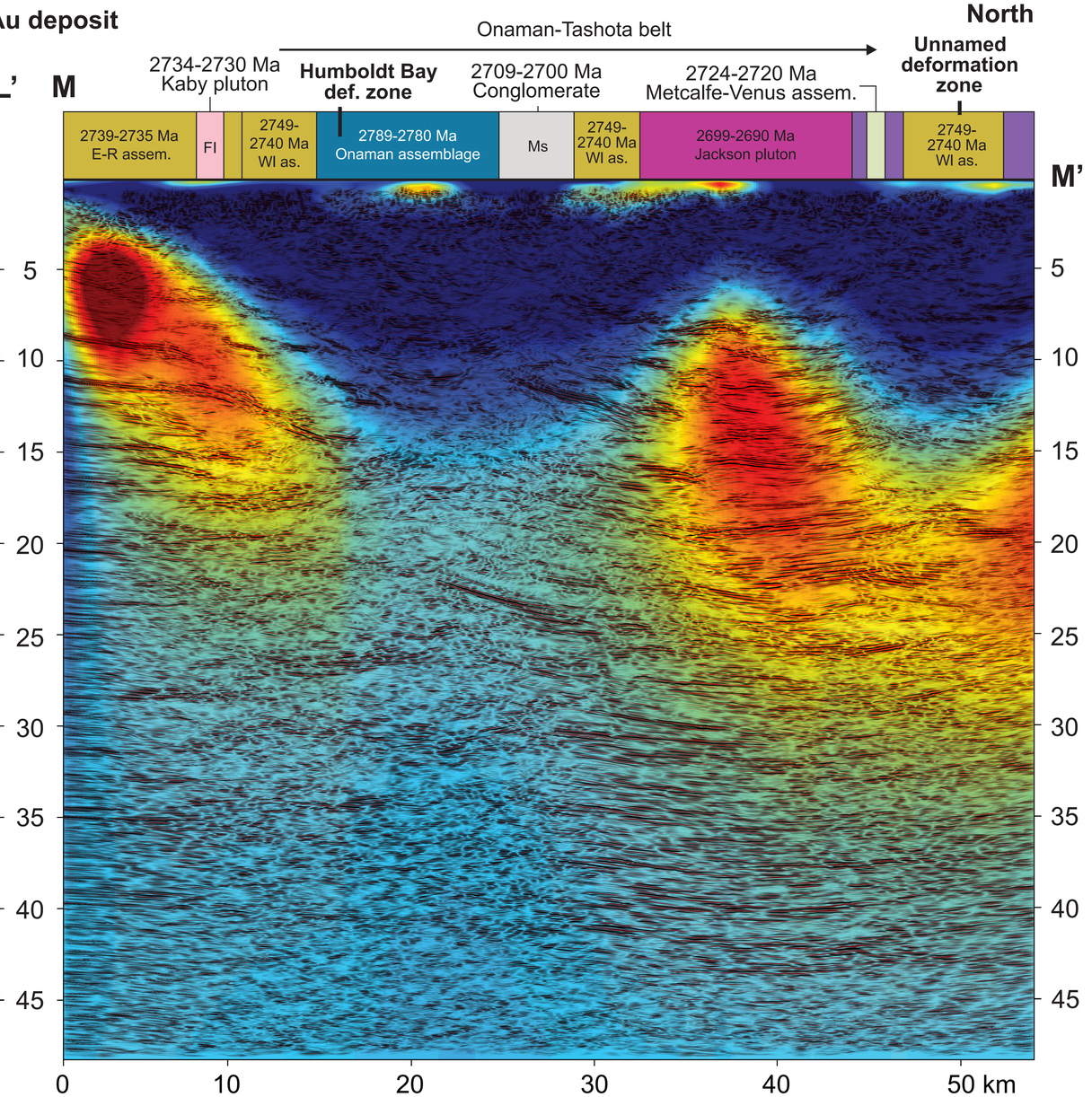
Ontario, Canada



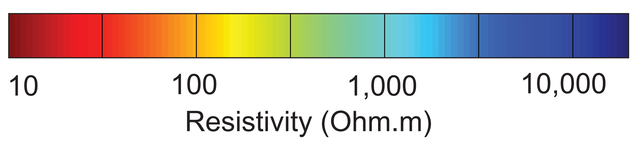
North Geraldton composite geological section

Eastern Wabigoon subprovince, Superior Province

Ontario, Canada



Distance along profile (km)



Metasedimentary assemblages

- Ms — Conglomerate assemblage/ Metased. deposits (<2710-2695 Ma)
  - SSU - Southern sedimentary unit
  - CSU - Central sedimentary unit
  - NSU - Northern sedimentary unit

Metavolcanic assemblages

- MV — Metcalfe-Venus as. (2724-2720 Ma)
- E-R — Elmhirst-Rickaby as. (2750-2735 Ma)
- WI — Willet assemblage (2750-2740 Ma)
- On — Onaman assemblage (2789-2780 Ma)

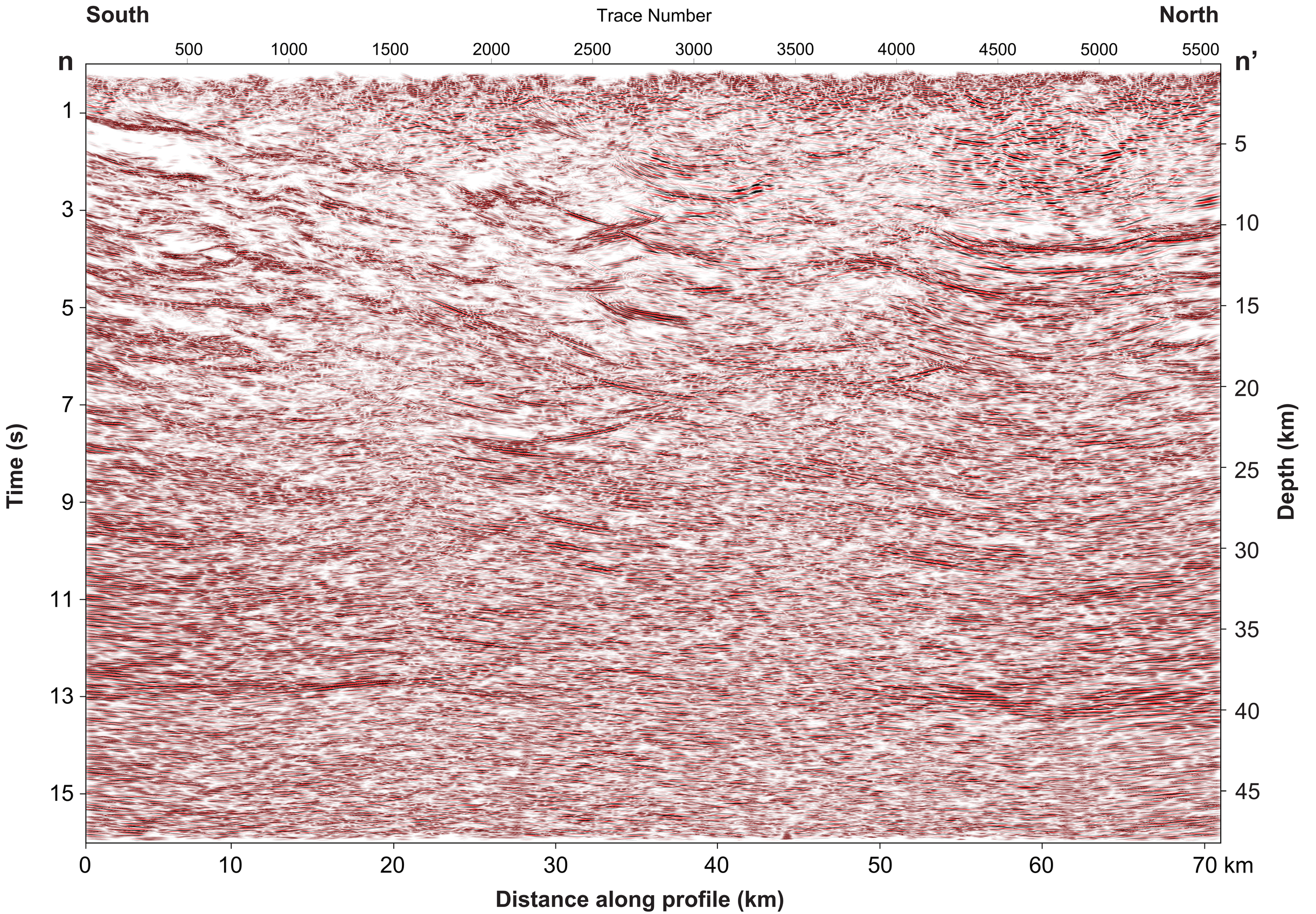
Intrusions

- PTI — Intermediate to felsic intrusions (2699-2690 Ma)
- FI — Intermediate to felsic intrusions (2750-2695 Ma)
- MI — Undiff. ultramafic to mafic intrusions (2799-2500 Ma)

Sturgeon Lake R1 seismic section (LN331)

Winnipeg River and Western Wabigoon subprovinces, Superior Province

Ontario, Canada



Sturgeon Lake broadband magnetotelluric section

Winnipeg River and Western Wabigoon subprovinces, Superior Province

Ontario, Canada

South

North

STU016M STU015M STU014M STU013B STU012L STU011B STU010B STU009B STU008M STU007B STU006M STU005M STU004L STU003M STU002M STU001M

N

N'

Depth (km)

5 10 15 20 25 30 35 40 45

0 10 20 30 40 50 60 70 km

Distance along profile (km)

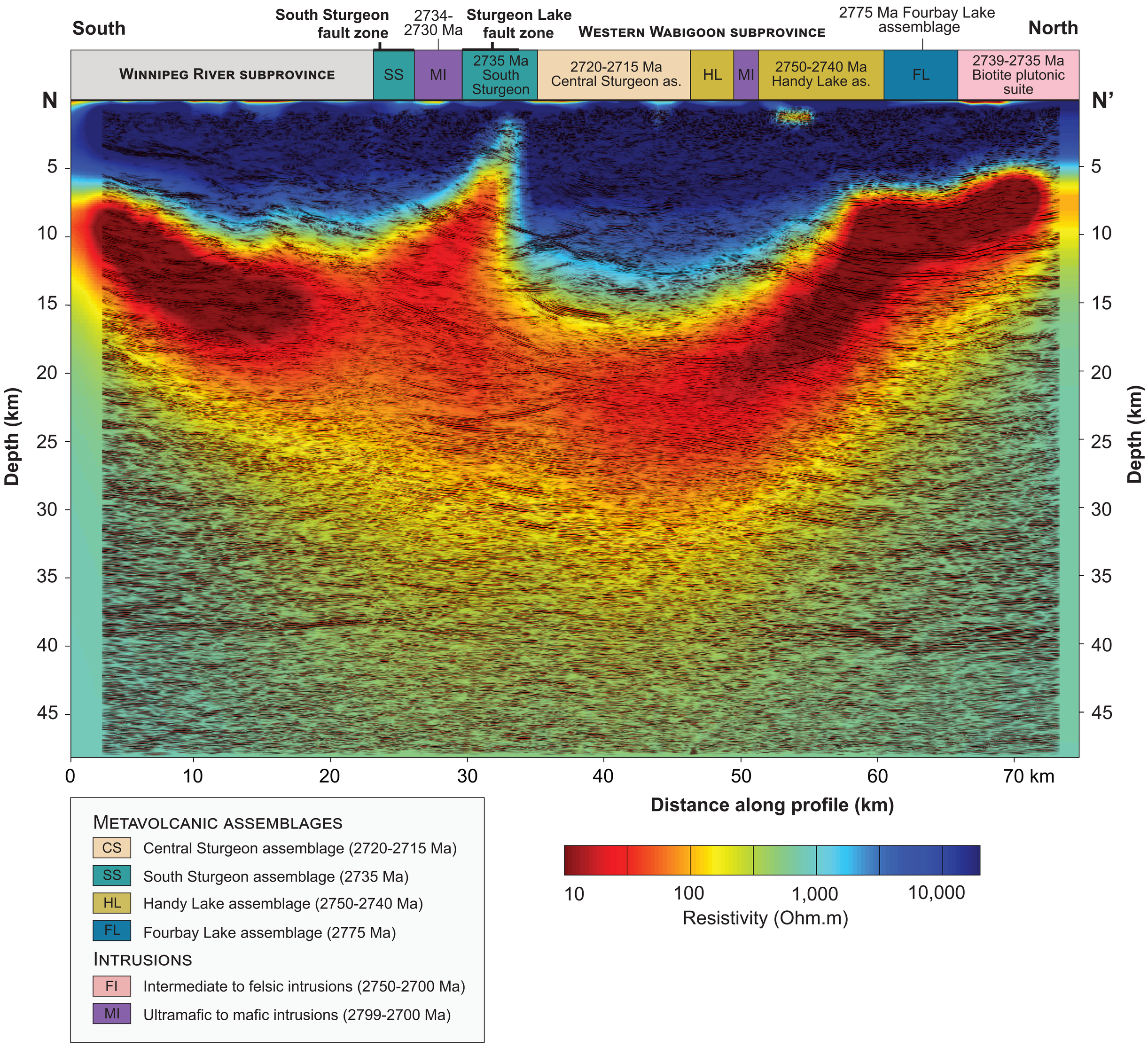
10 100 1,000 10,000

Resistivity (Ohm.m)

Sturgeon Lake composite geological section

Winnipeg River and Western Wabigoon subprovinces, Superior Province

Ontario, Canada



Metavolcanic assemblages

- CS — Central Sturgeon assemblage (2720-2715 Ma)
- SS — South Sturgeon assemblage (2735 Ma)
- HL — Handy Lake assemblage (2750-2740 Ma)
- FL — Fourbay Lake assemblage (2775 Ma)

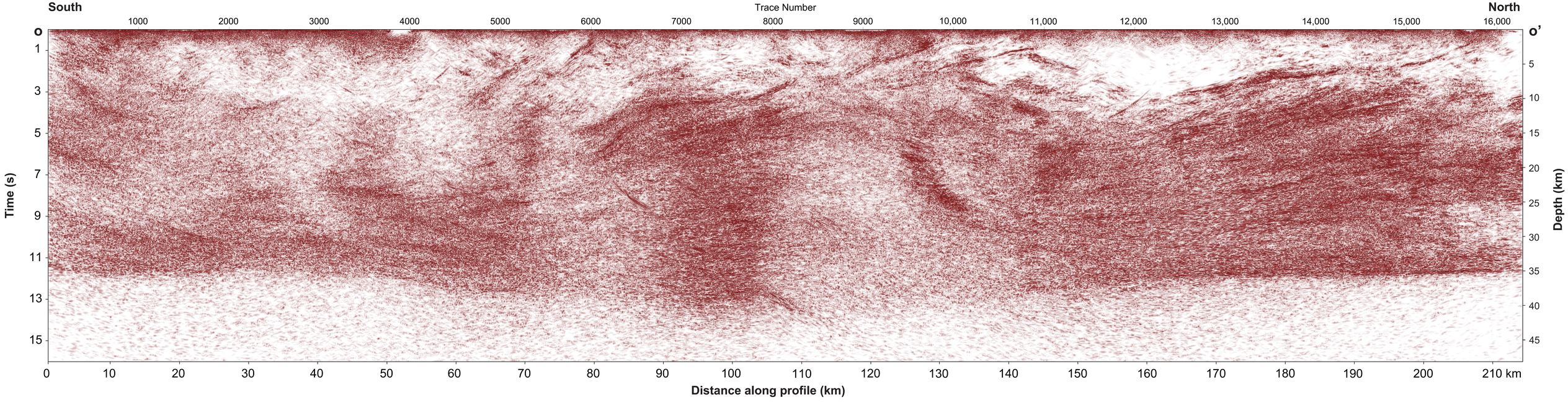
Intrusions

- FI — Intermediate to felsic intrusions (2750-2700 Ma)
- MI — Ultramafic to mafic intrusions (2799-2700 Ma)

Red Lake seismic section (WS2B)

English River, Uchi and North Caribou subprovinces, Superior Province

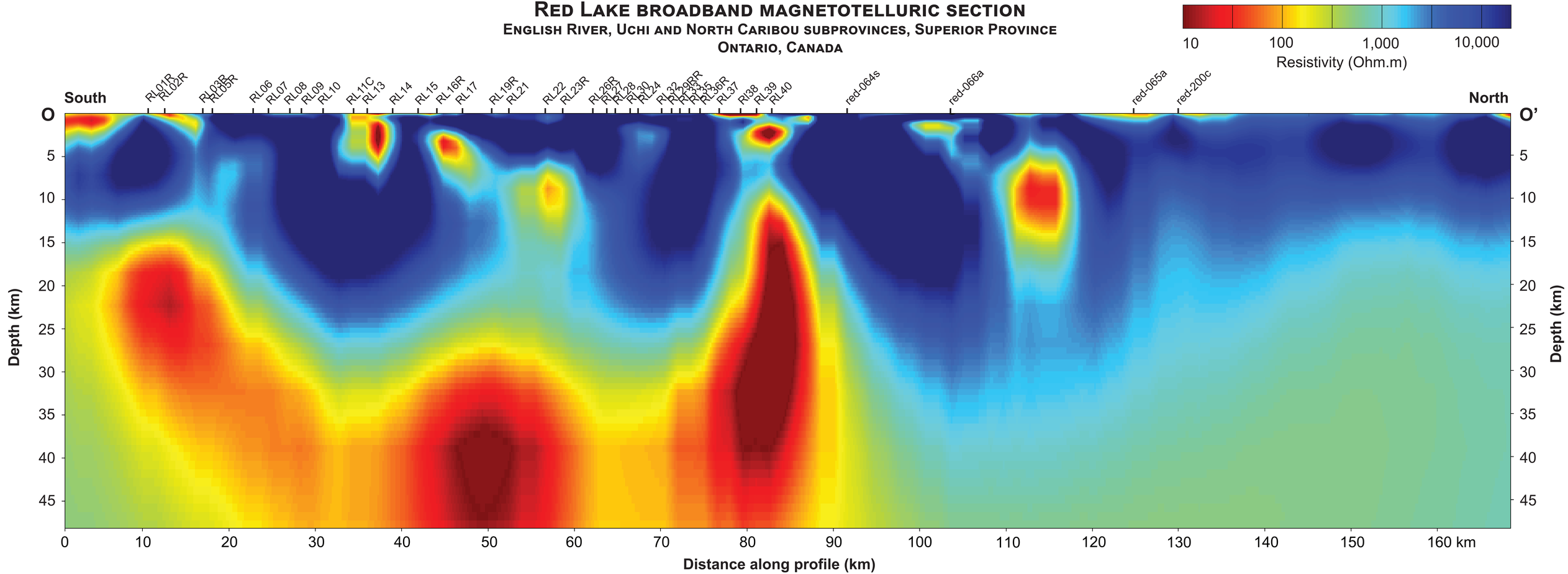
Ontario, Canada



Red Lake broadband magnetotelluric section

English River, Uchi and North Caribou subprovinces, Superior Province

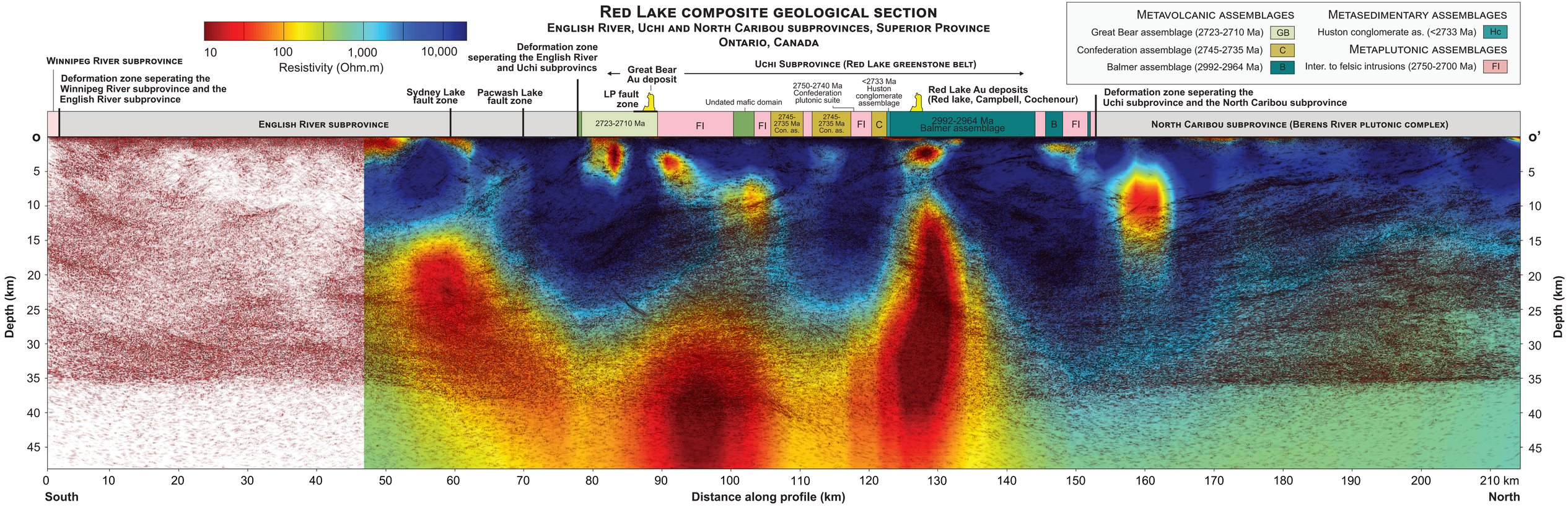
Ontario, Canada



Red Lake composite geological section

English River, Uchi and North Caribou subprovinces, Superior Province

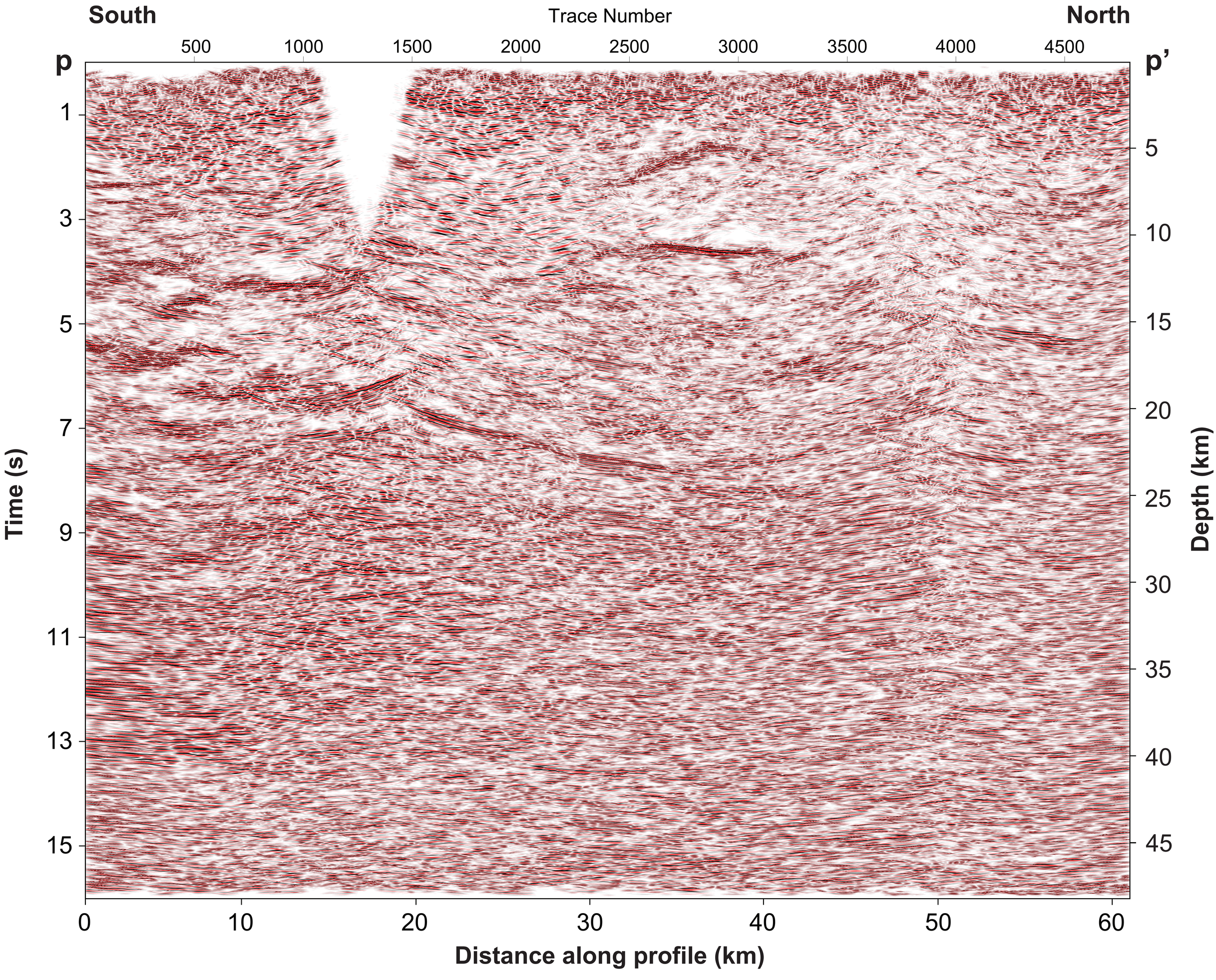
Ontario, Canada



Dryden R1 seismic section (LN341)

Western Wabigoon subprovince, Superior Province

Ontario, Canada



Dryden broadband magnetotelluric section

Western Wabigoon subprovince, Superior Province

Ontario, Canada

South

North

ATT022M
ATT023M
DRY086M
DRY085L
DRY084M
DRY081MR-DRY043M
DRY042M
DRY041M
DRY040M
DRY039L
DRY038M
DRY037M
DRY036M
DRY001M

P

P’

Depth (km)

5
10
15
20
25
30
35
40
45

0
10
20
30
40
50
60
70
80 km

Distance along profile (km)

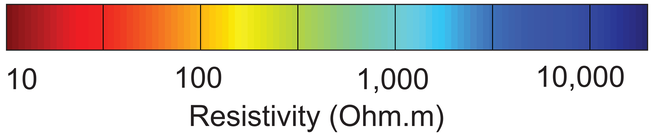
10
100
1,000
10,000

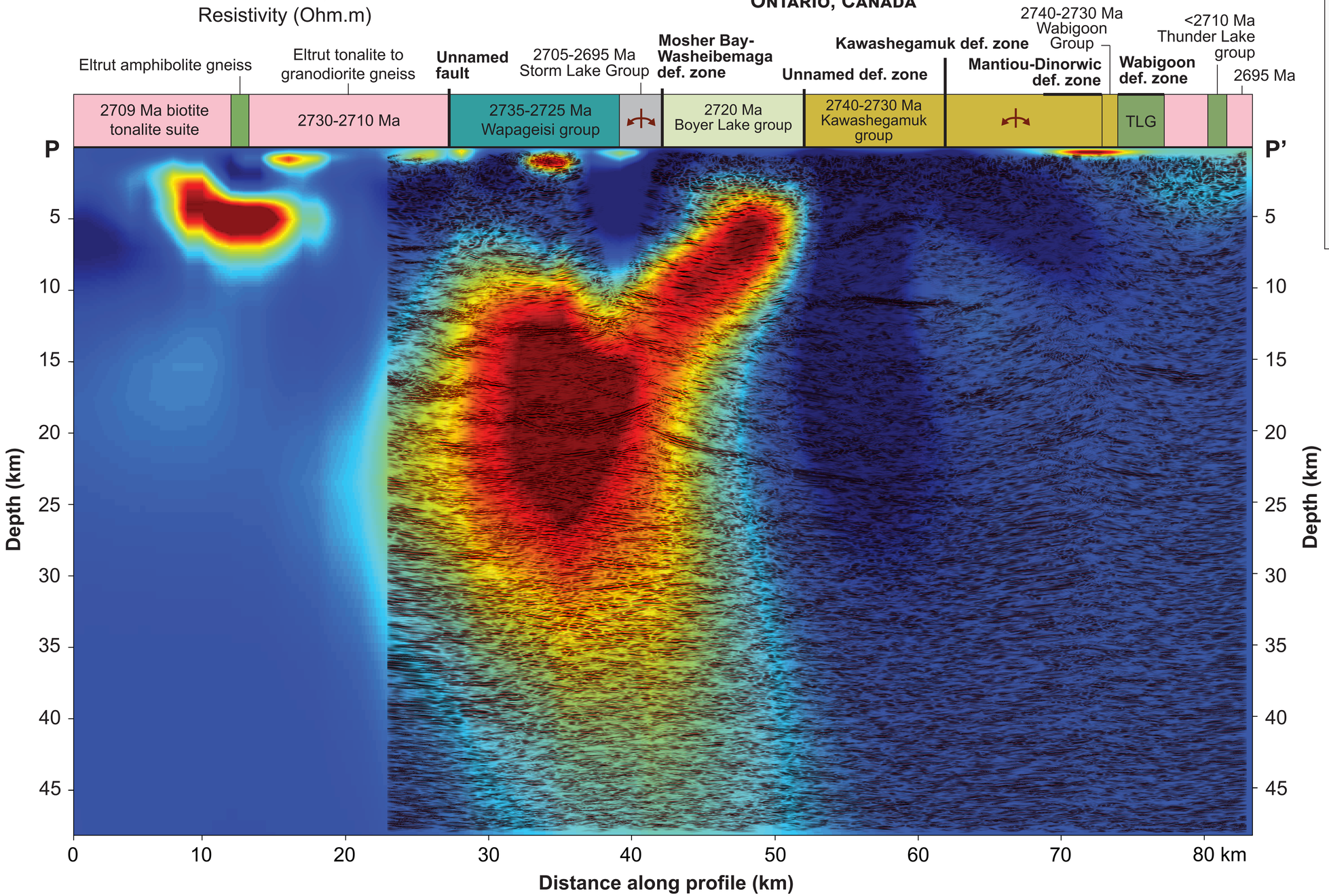
Resistivity (Ohm.m)

Dryden composite geological section

Western Wabigoon subprovince, Superior Province

Ontario, Canada





Metasedimentary assemblages

- SL — Stormy Lake group (<2705-2695 Ma)

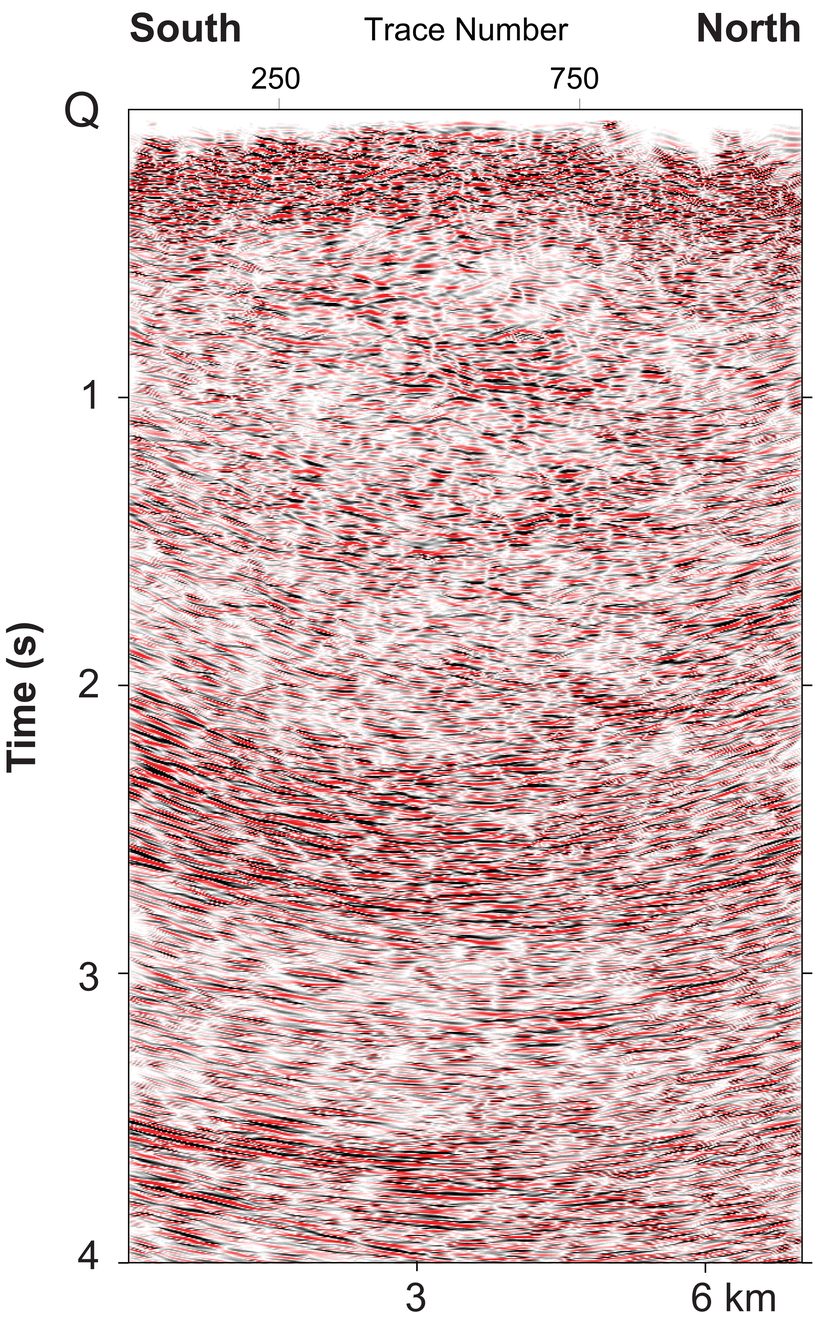
Metavolcanic assemblages

- TLG — Thunder Lake group (2710-2695 Ma)
- BL — Boyer Lake group (2720 Ma)
- WG — Wapageisi group (2735-2725 Ma)
- KG — Kawashegamuk and Wabigoon groups (2740-2730 Ma)

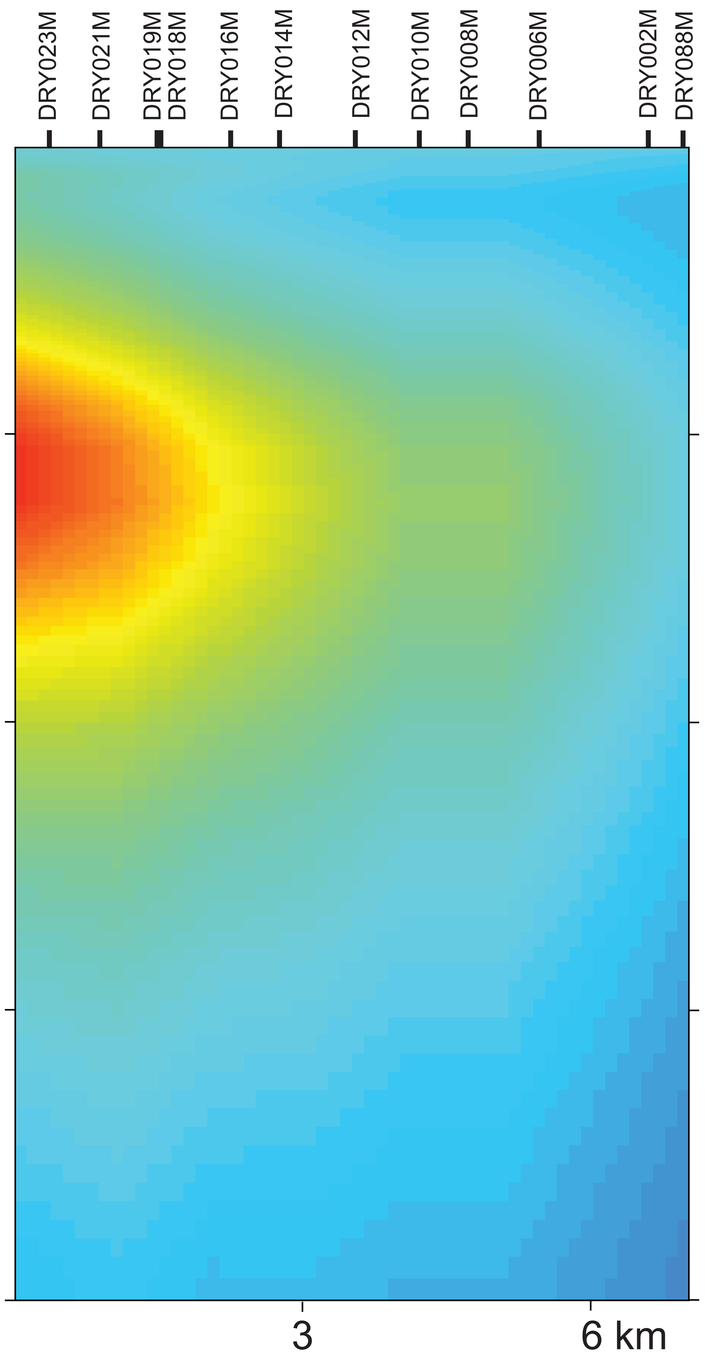
Intrusions

- FI — Intermediate to felsic intrusions (2750-2695 Ma)

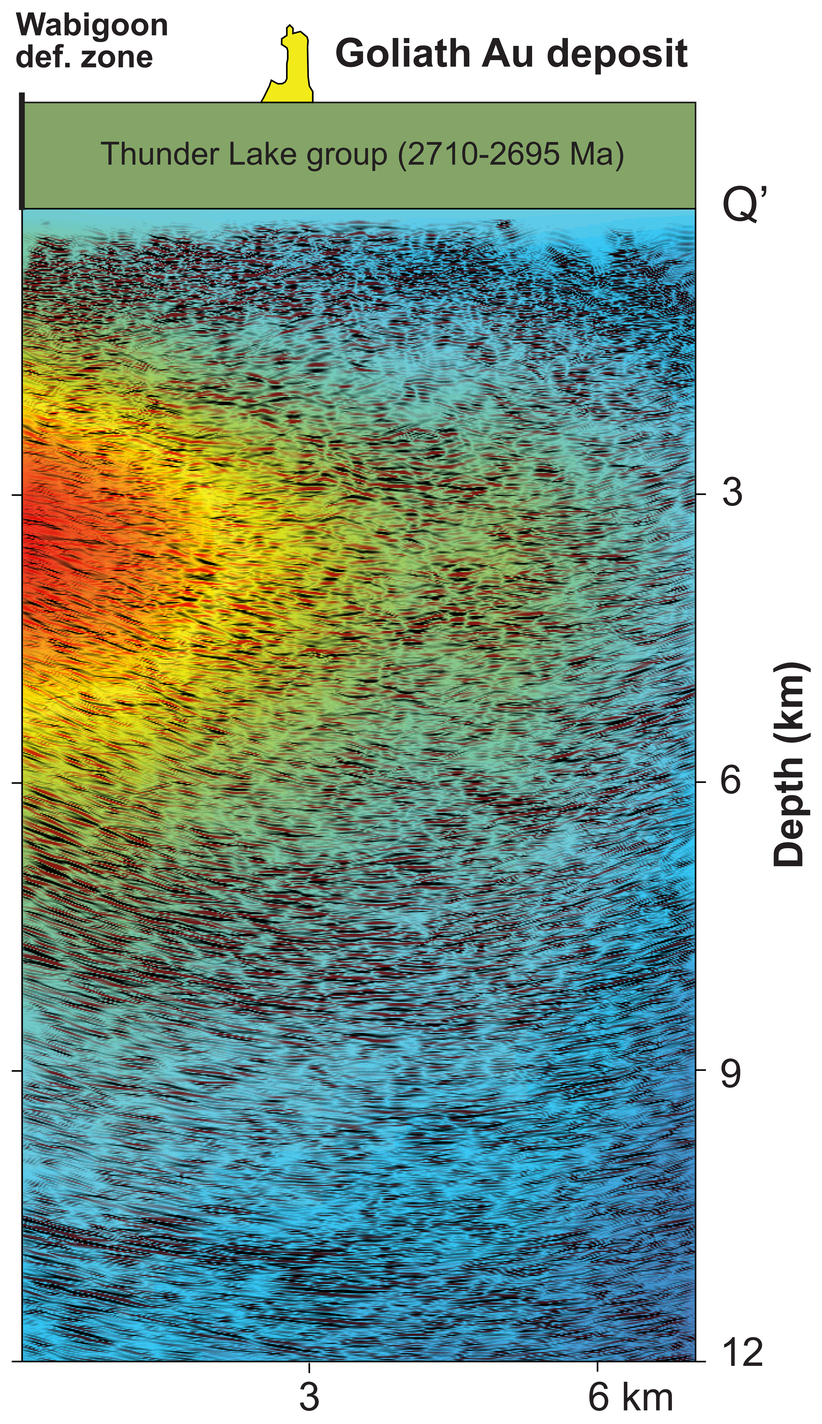
North Dryden
R2 seismic section (LN341)
W Wabigoon Subprovince,
Superior Province
Ontario, Canada

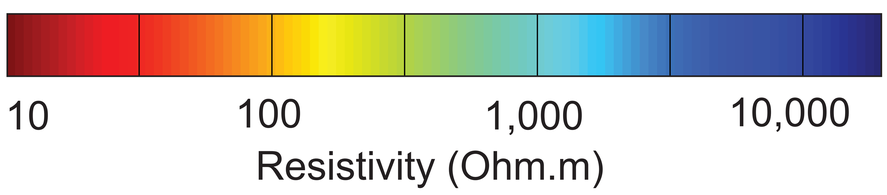


North Dryden
audio-frequency magnetotelluric section
W Wabigoon Subprovince,
Superior Province
Ontario, Canada



North Dryden
composite geological section
W Wabigoon Subprovince,
Superior Province
Ontario, Canada

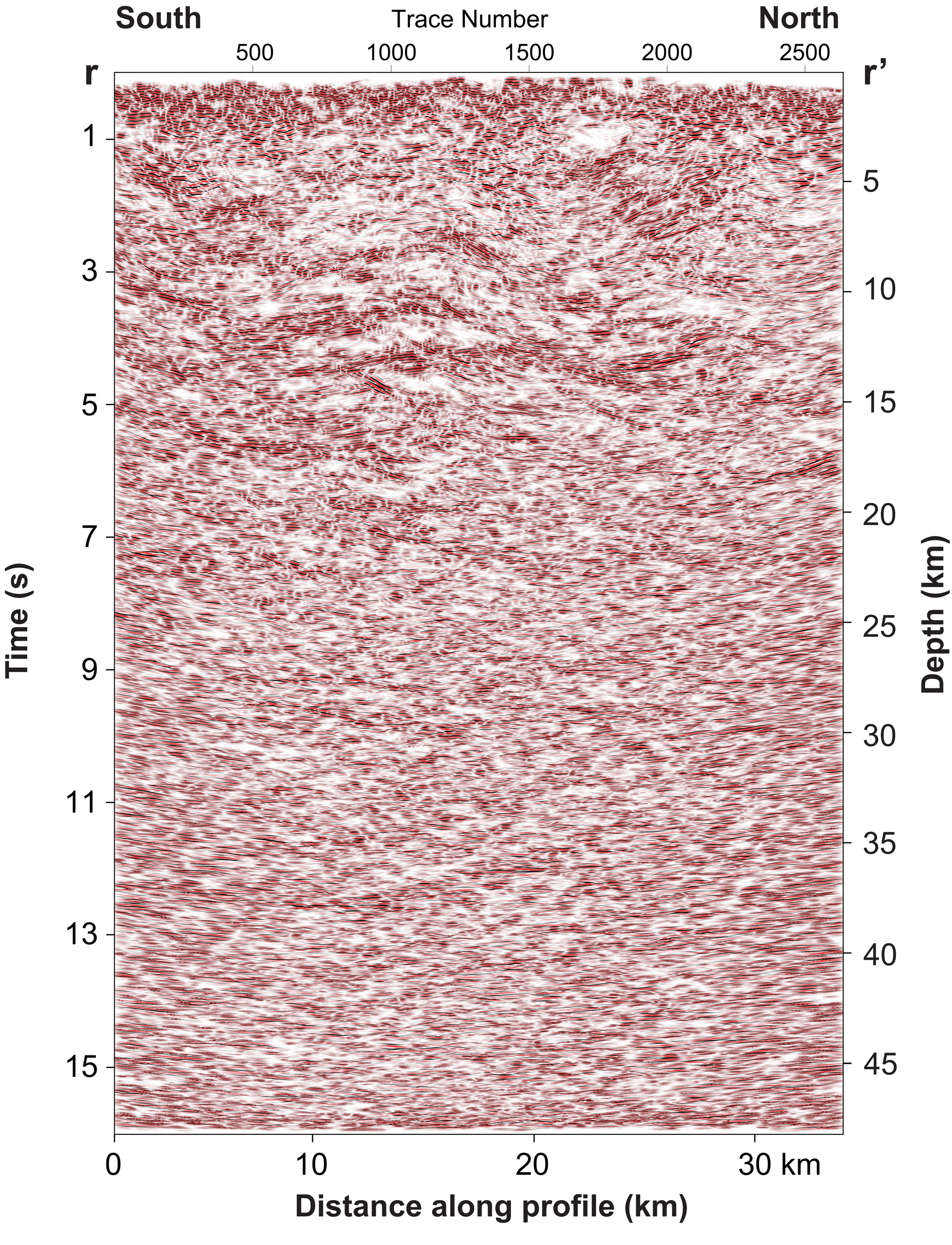




Rainy River R1 seismic section (LN361)

W Wabigoon subprovince, Superior Province

Ontario, Canada



Rainy River broadband magnetotelluric section

Western Wabigoon subprovince, Superior Province

Ontario, Canada

South

North

RRV043M RRV042M RRV041M RRV039M-RRV003M RRV002M RRV001M RRV044M RRV045M RRV046M

R

R’

5 10 15 20 25 30 35 40 45

Depth (km)

0 10 20 30 40 50 60 km

Distance along profile (km)

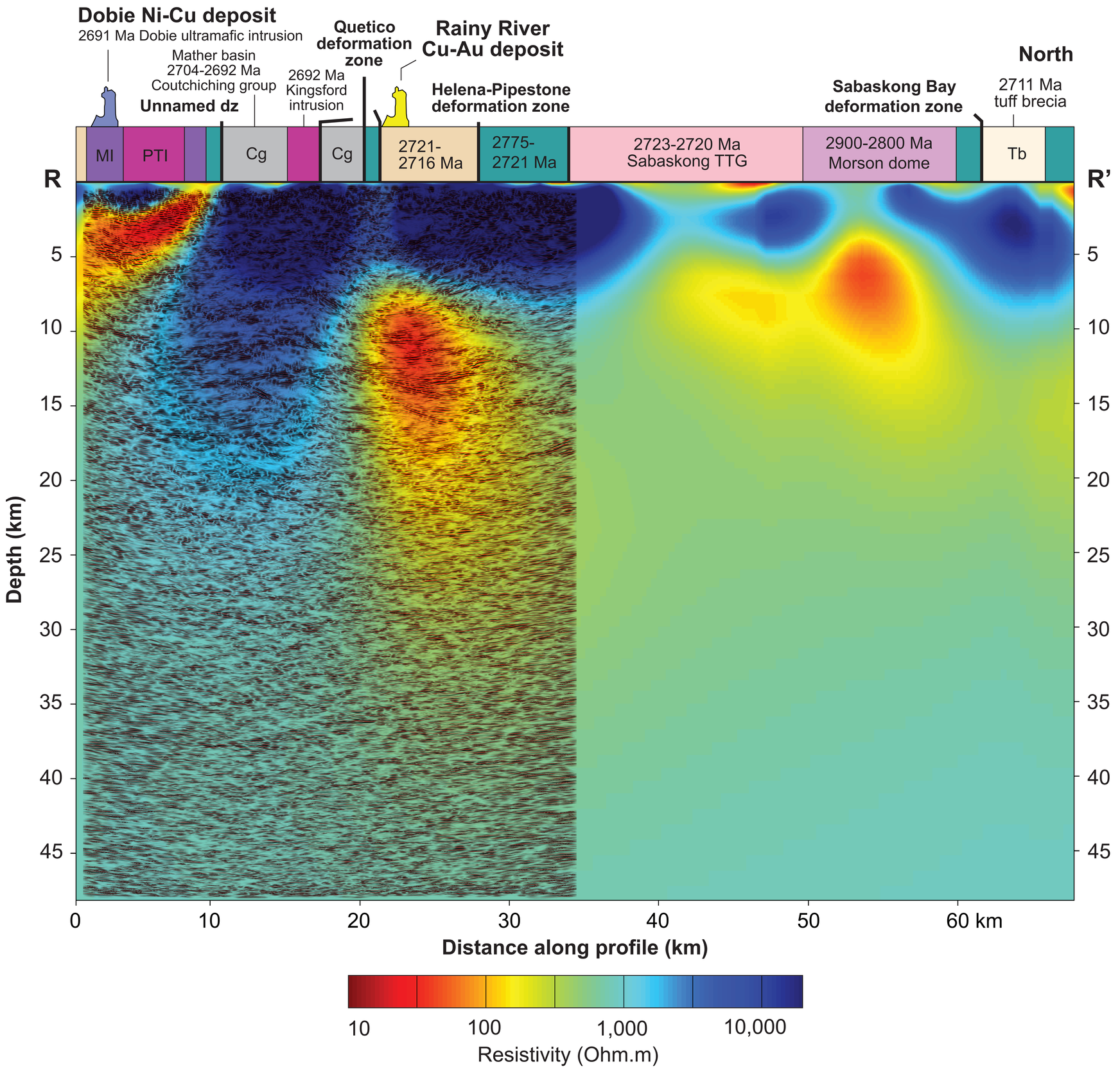
10 100 1,000 10,000

Resistivity (Ohm.m)

Rainy River composite geological section

Western Wabigoon subprovince, Superior Province

Ontario, Canada



Metasedimentary assemblages

- Cg — Coutchiching group (<2704-2692 Ma)

Metavolcanic assemblages

- Tb — Tuff breccia (2711 Ma)
- Fv — Felsic calc-alkaline volcanics (2721-2716 Ma)
- Mv — Mafic to intermediate volcanics (2775-2721 Ma)

Intrusions

- PTI — Intermediate to felsic intrusions (2700-2690 Ma)
- MI — Ultramafic to mafic intrusions (2700-2690 Ma)
- FI — Inter. to felsic intrusions (2750-2700 Ma)
- MI — Mesoarchean intrusions (2900-2800 Ma)