



# Geophysical Exploration

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## Contributors

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# Exploration Methods

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- Soil Properties (temperature, thermal conductivity, moisture content and volumetric moisture content)
- DC Resistivity Method
- Ground Penetrating Radar (GPR) Method
- Seismic Refraction Method
- Frequency EM Method (data not presented)






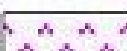
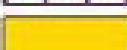
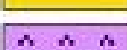






# Schedule

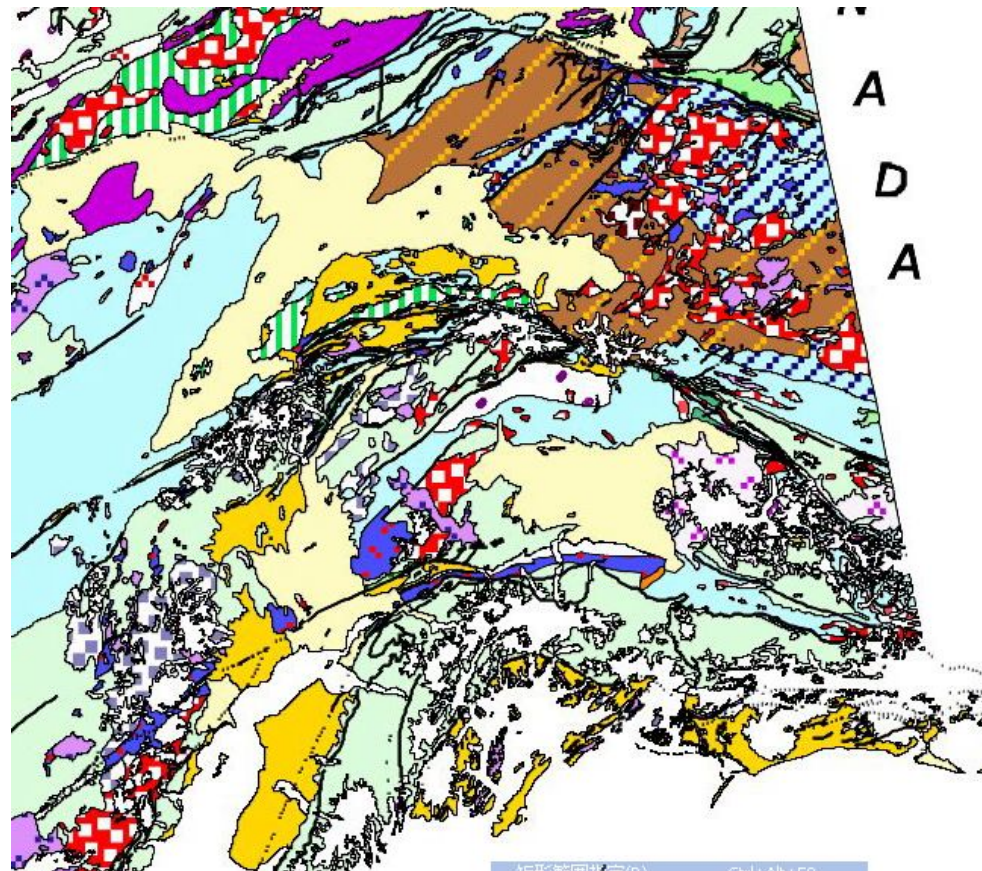
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- October 6 site 1 (near Canadian Border)
- October 7 sites 1 & 2 (near Canadian Border & Northway)
- October 8 site 2 (Northway)

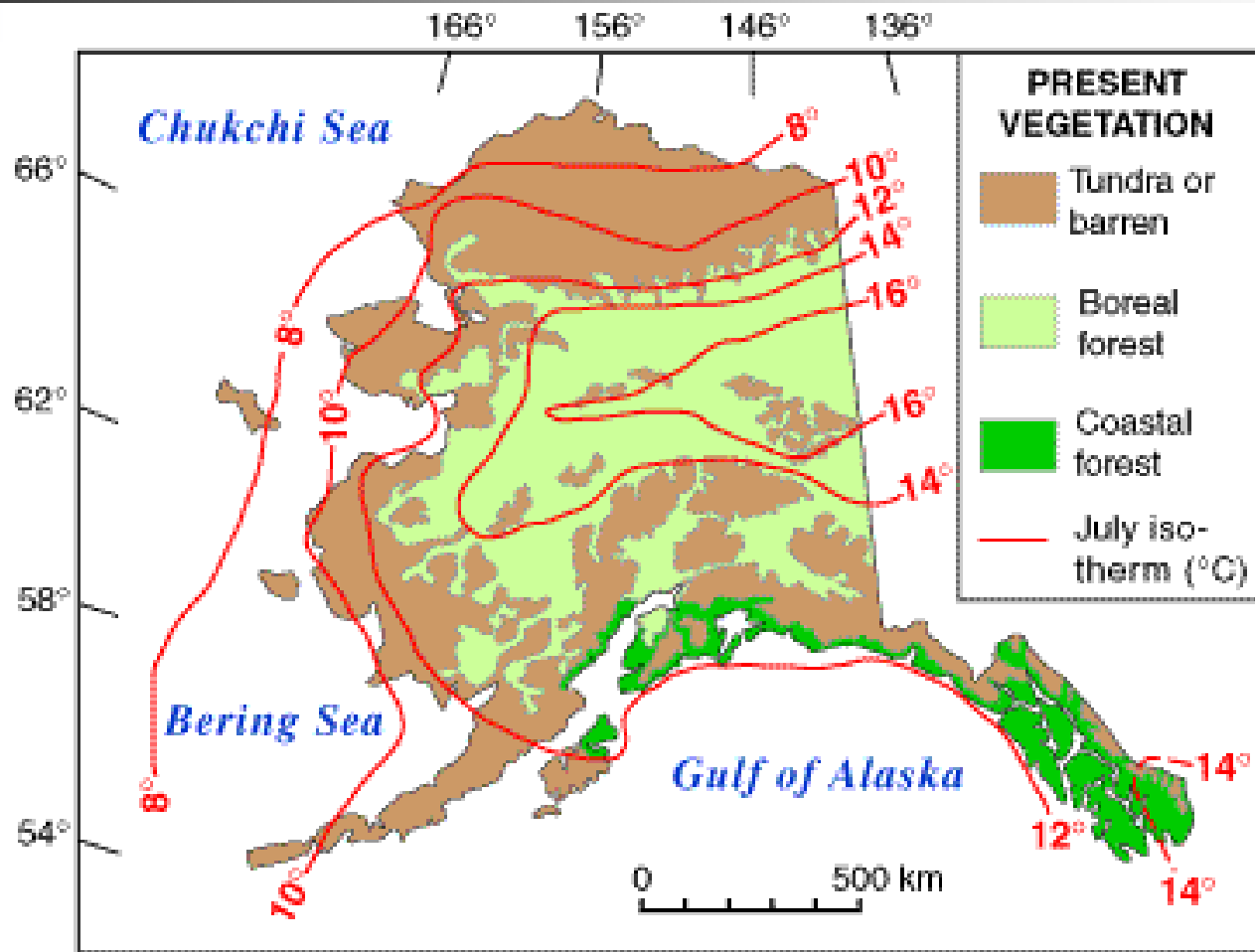
# Geology

## Geologic Units

-  Ice/Water
-  Quaternary sedimentary
-  Quaternary volcanic
-  Quaternary/Tertiary volcanic
-  Tertiary sedimentary
-  Tertiary volcanic
-  Tertiary plutonic
-  Tertiary/Mesozoic sedimentary
-  Tertiary/Mesozoic volcanic
-  Tertiary/Mesozoic plutonic
-  Mesozoic sedimentary
- 



# Vegetation

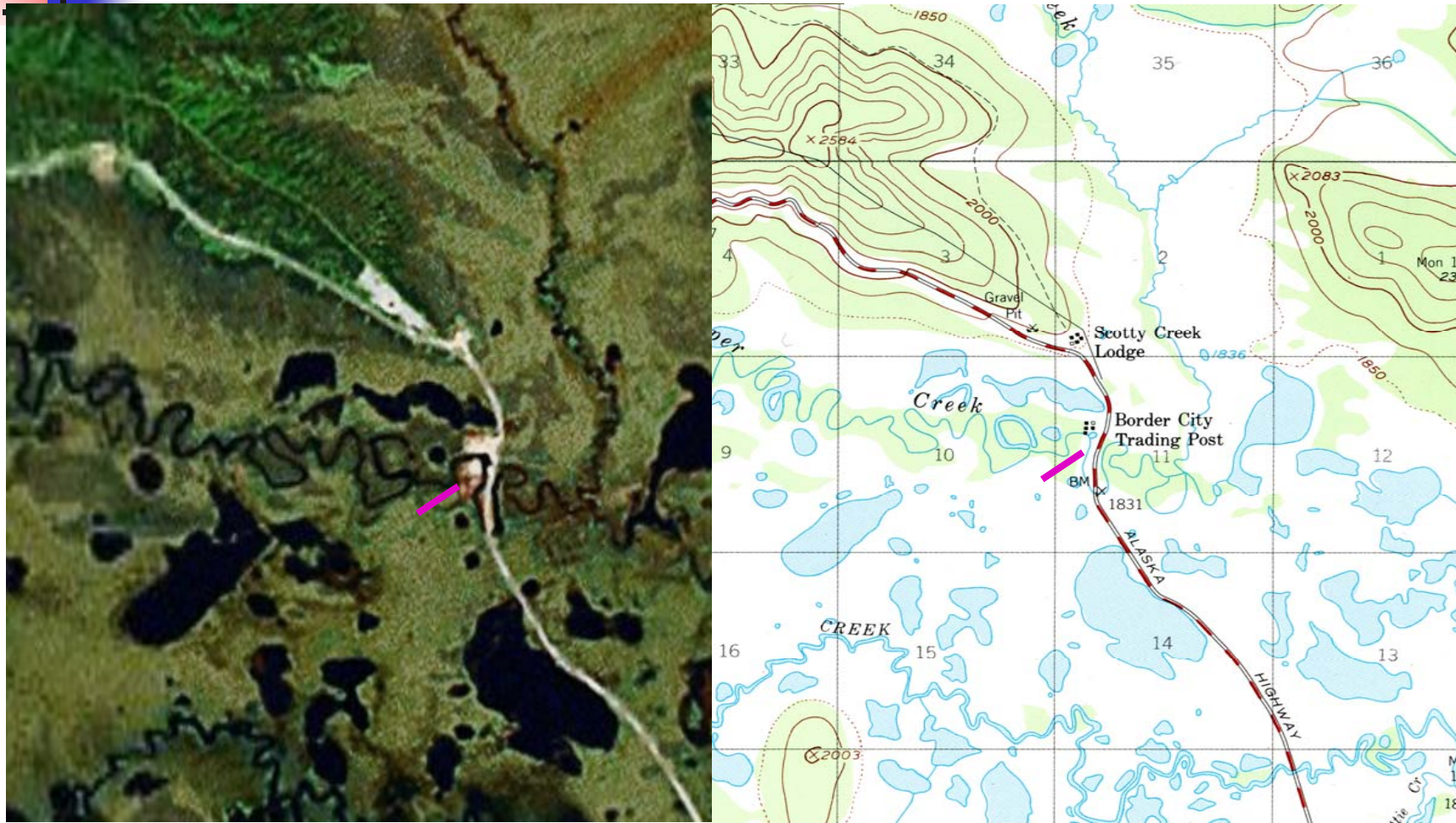


# Test Sites



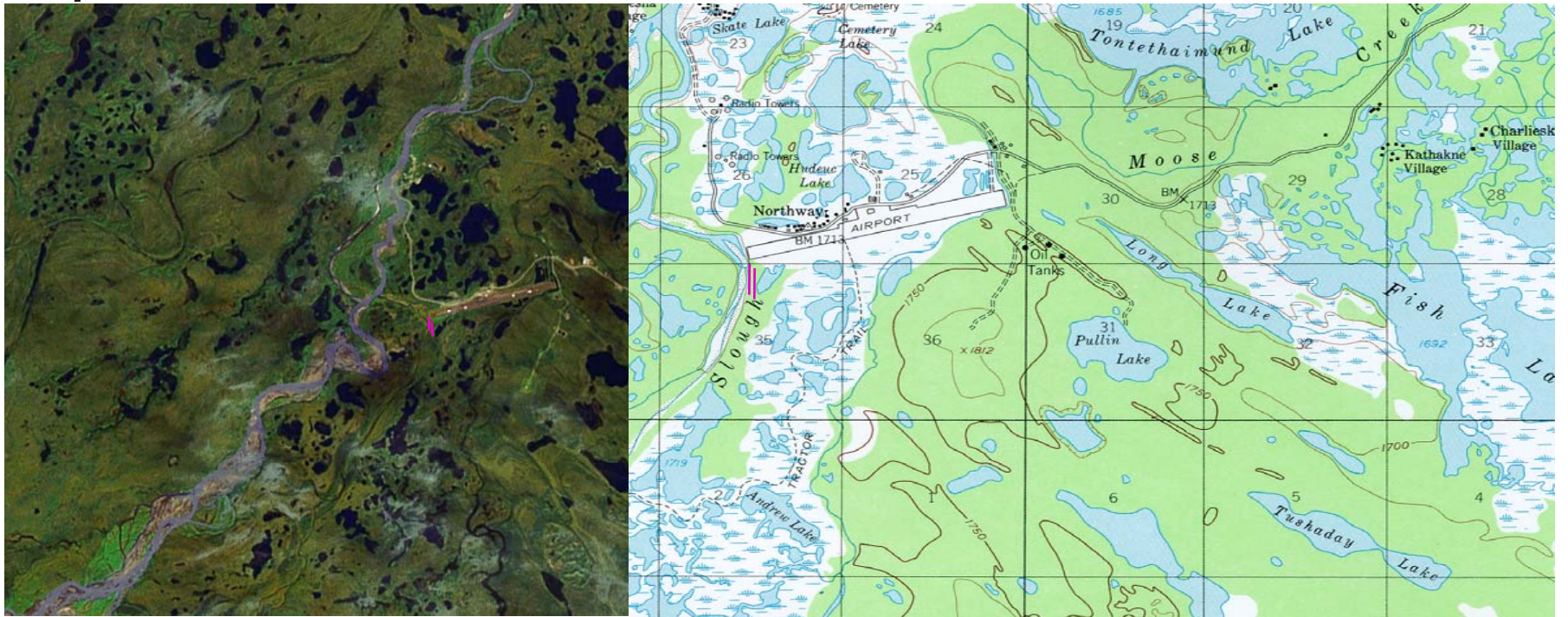


# Site 1 Location





# Site 2 Location





# Survey Lines (150 m length)

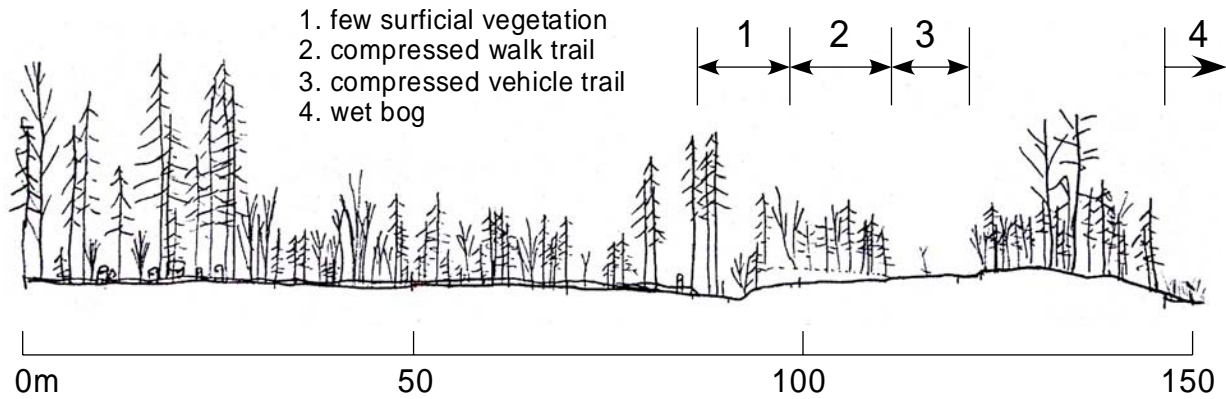
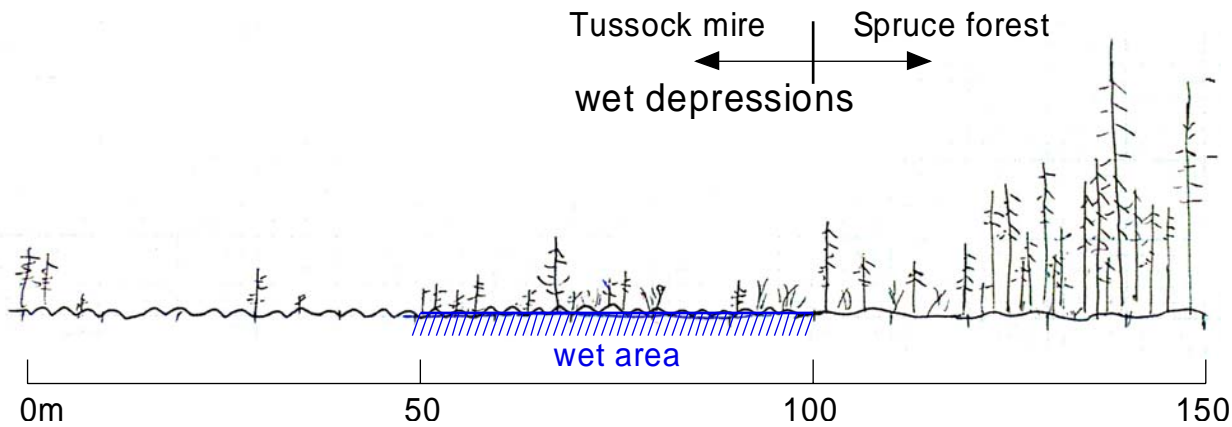


Site 1

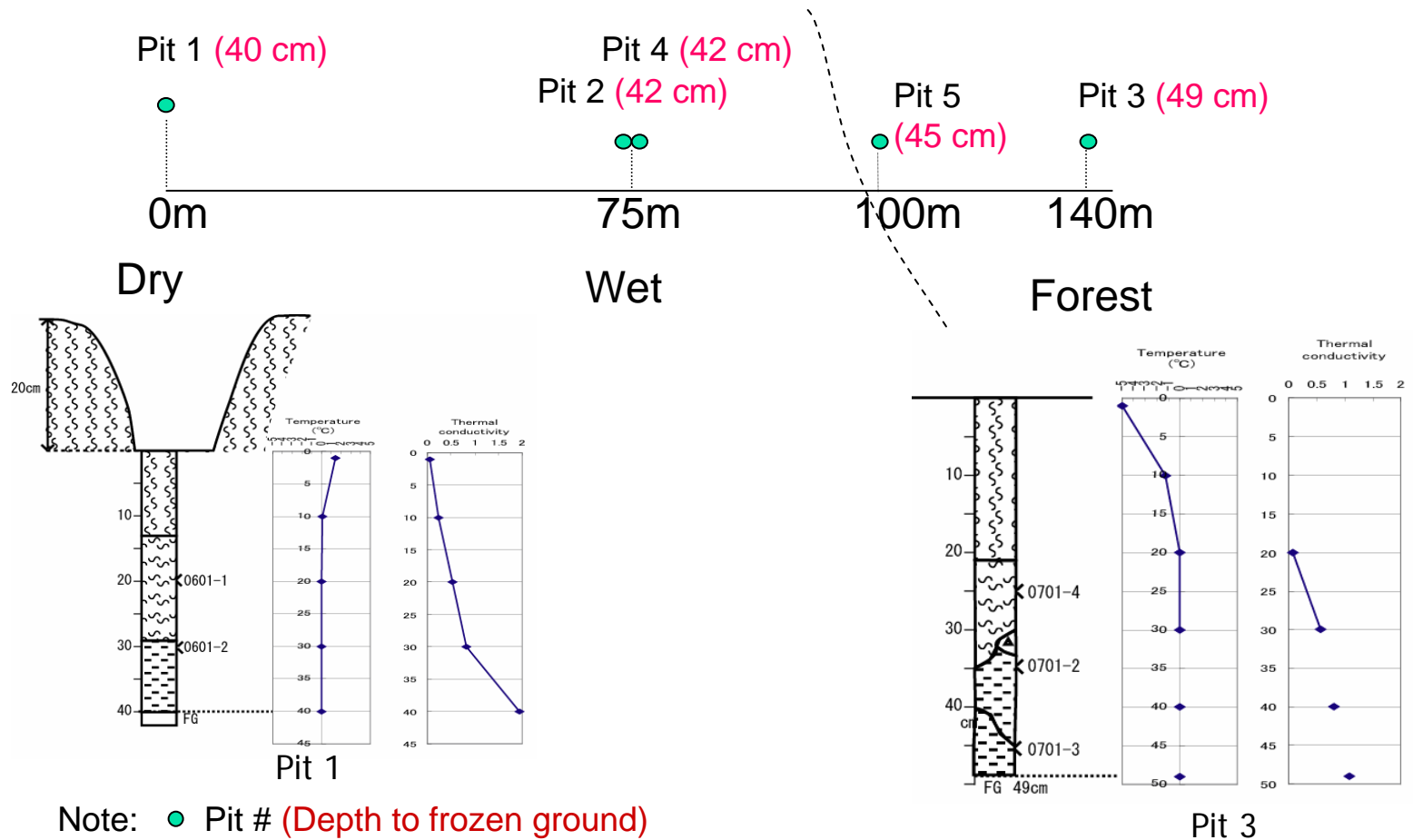


Site 2

# Survey Lines

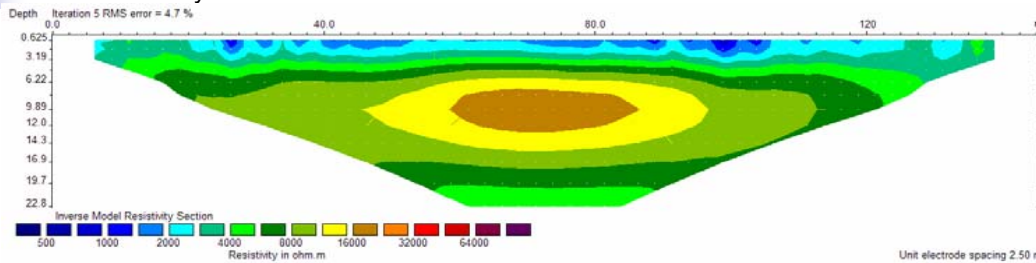


# Soil Condition at Site 1



# DC Resistivity at Site 1

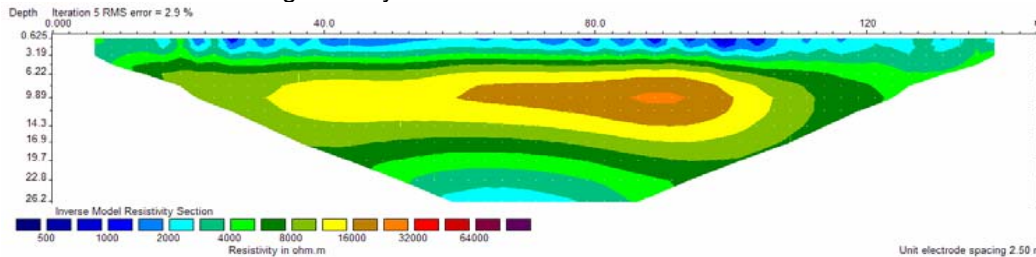
Wenner array



Upper: low value (<2k ohm)  
Lower: high value (>4k ohm)  
Lens of high value (>12k ohm)

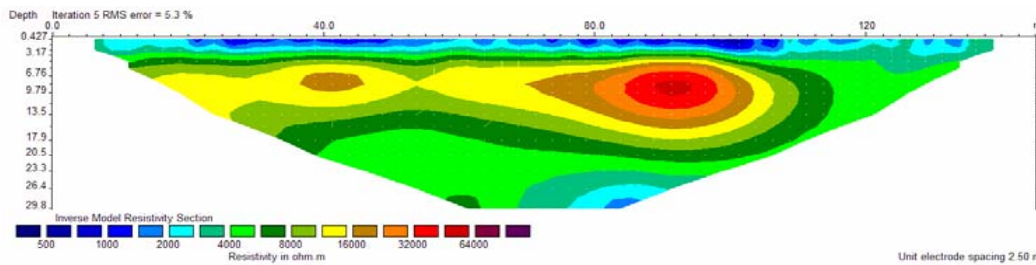


Wenner-Schlumberger array



Upper: unfrozen material  
Lower: frozen material  
(Indicative of permafrost)

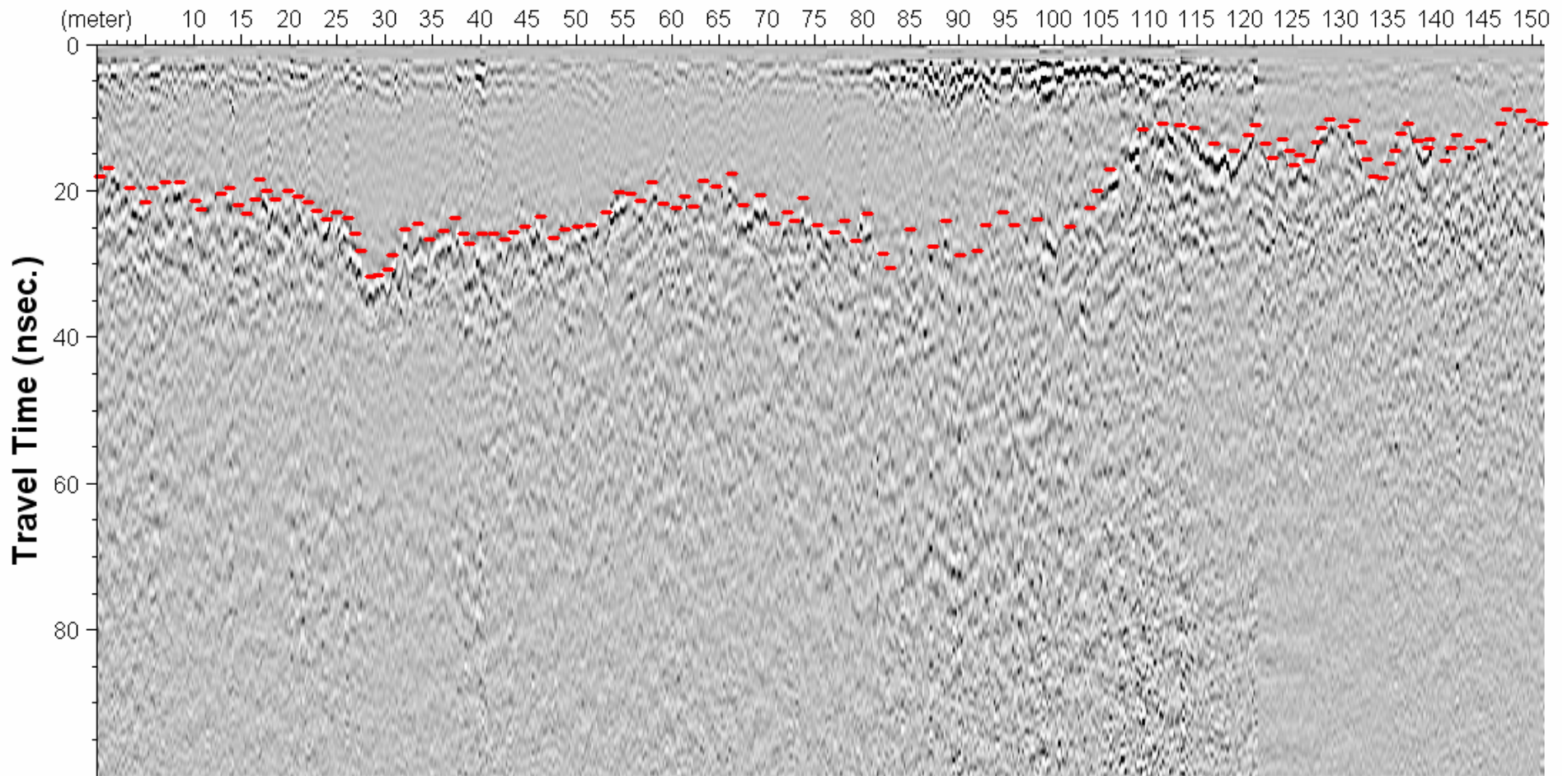
Double Dipole array



High resistivity indicates  
ice or ice-rich sediments  
beneath the wet area  
(approx. 50 – 100m)

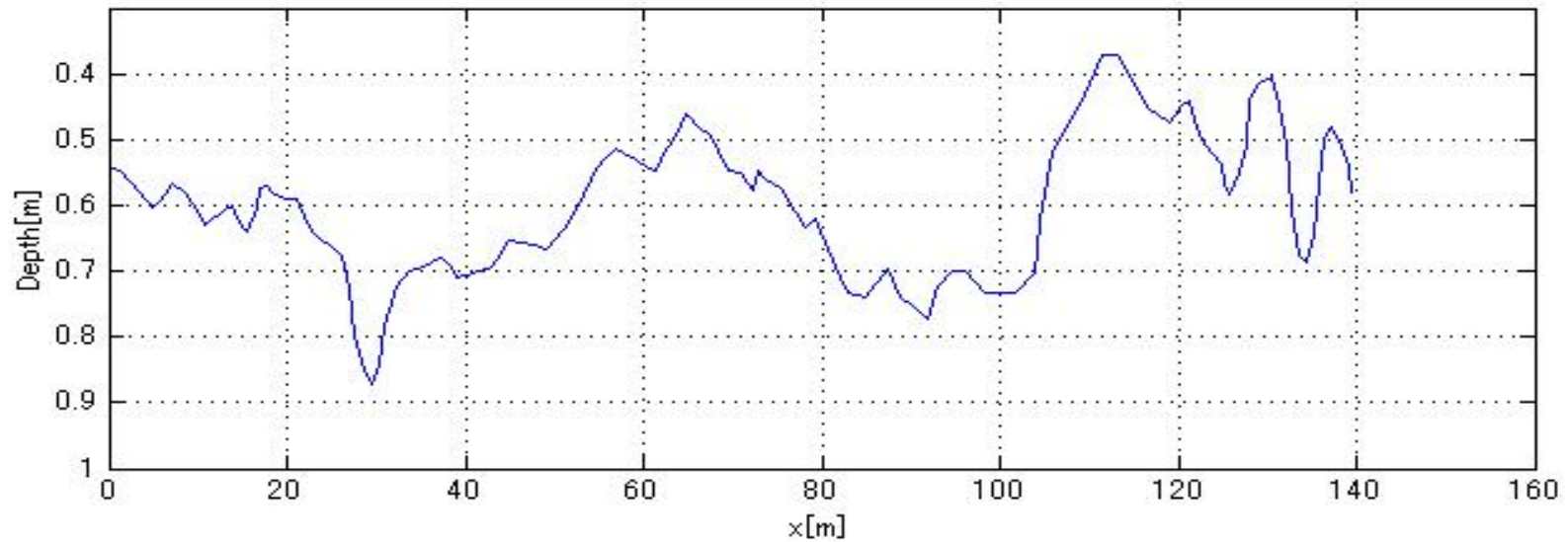


# GPR at Site 1



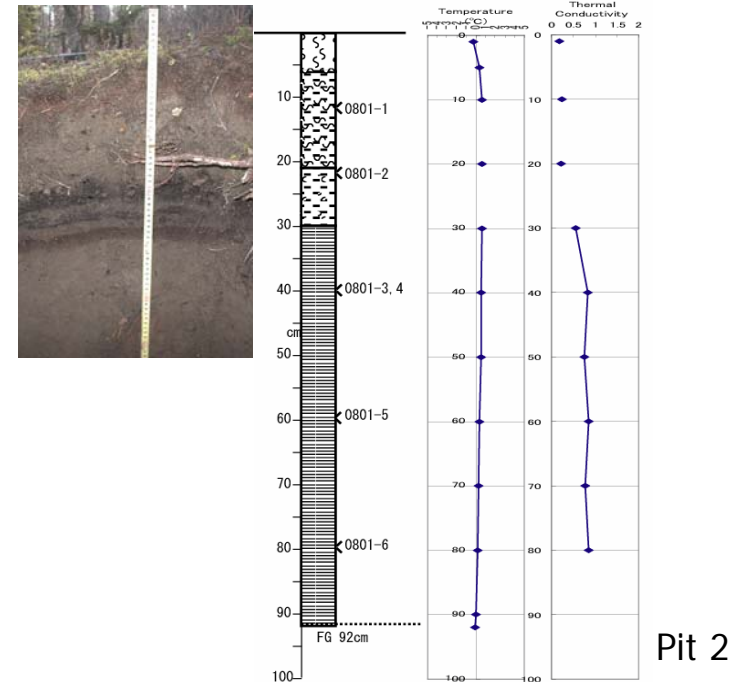
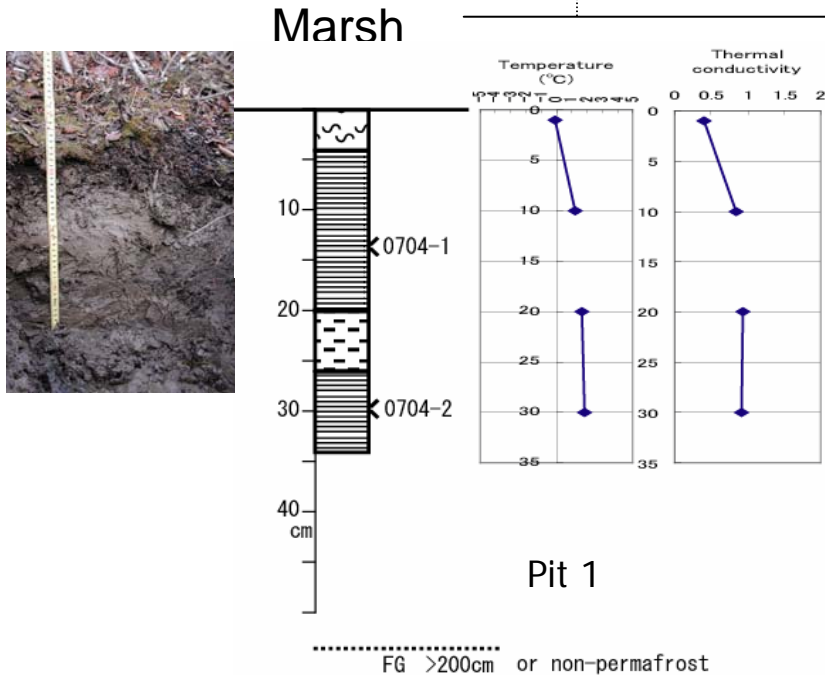
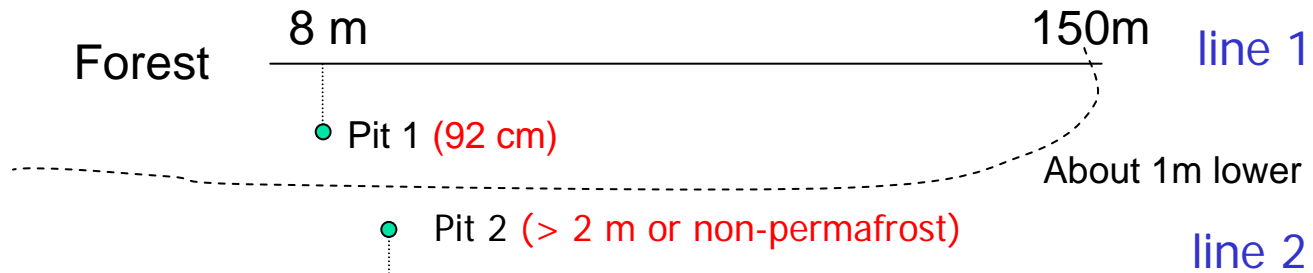
(GPR image at 400 MHz)

# GPR at Site 1



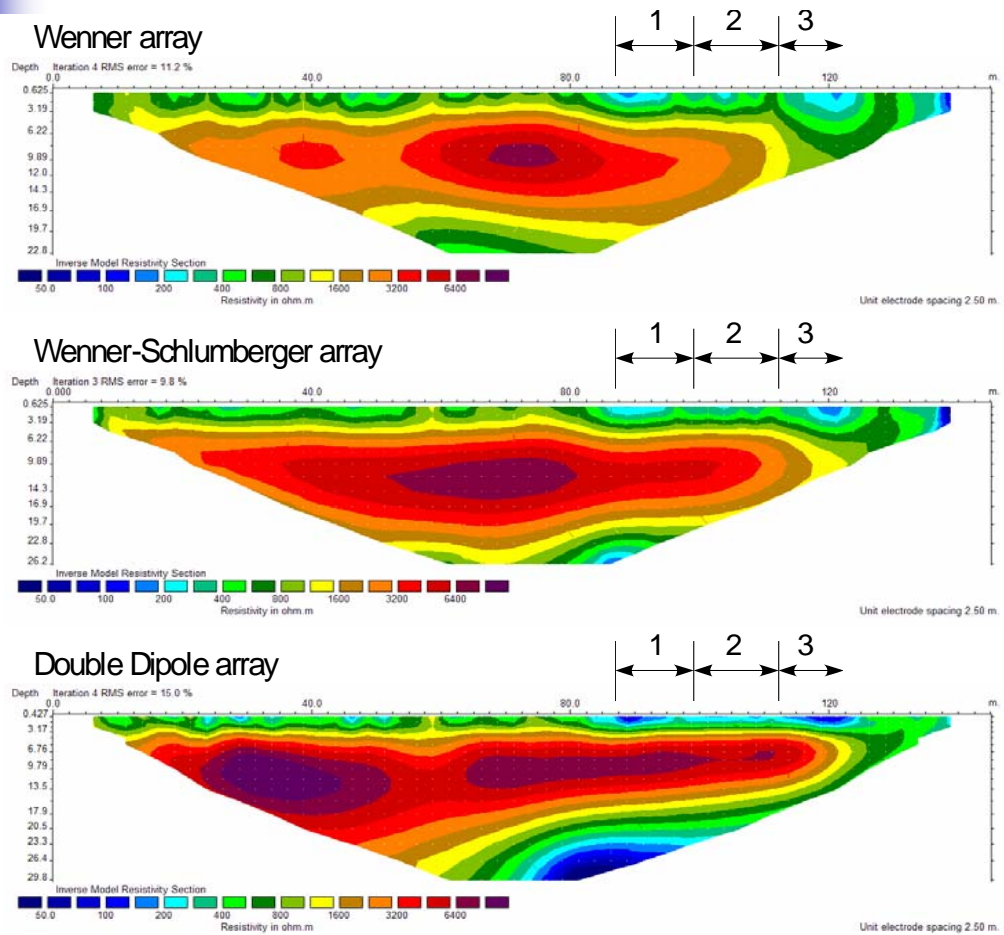
(Active layer thickness estimated based on GPR 400 MHz)

# Soil Condition at Site 2



Note: ● Pit # (Depth to frozen ground)

# DC Resistivity at Site 2 (line 1)



Upper: low value (< 800 ohm)  
Lower: high value (> 2.4k ohm)  
Depression of the low value  
between 90 and 130m



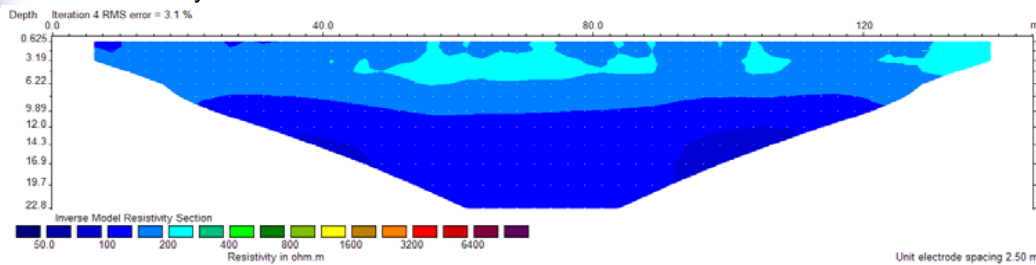
Upper: unfrozen material  
Lower: frozen material  
(Indicative of permafrost)

Depression of the low value  
Indicates deeper thawing  
beneath bare ground and  
trails (90 – 130m)



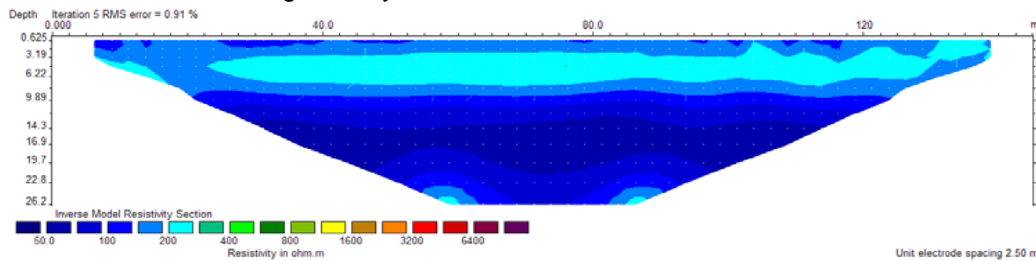
# DC Resistivity at Site 2 (line 2)

Wenner array



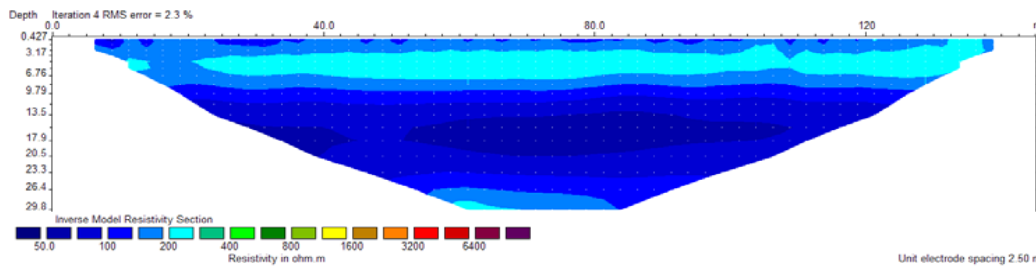
Resistivity: 50-300 ohm  
Homogeneous horizontal  
structure

Wenner-Schlumberger array

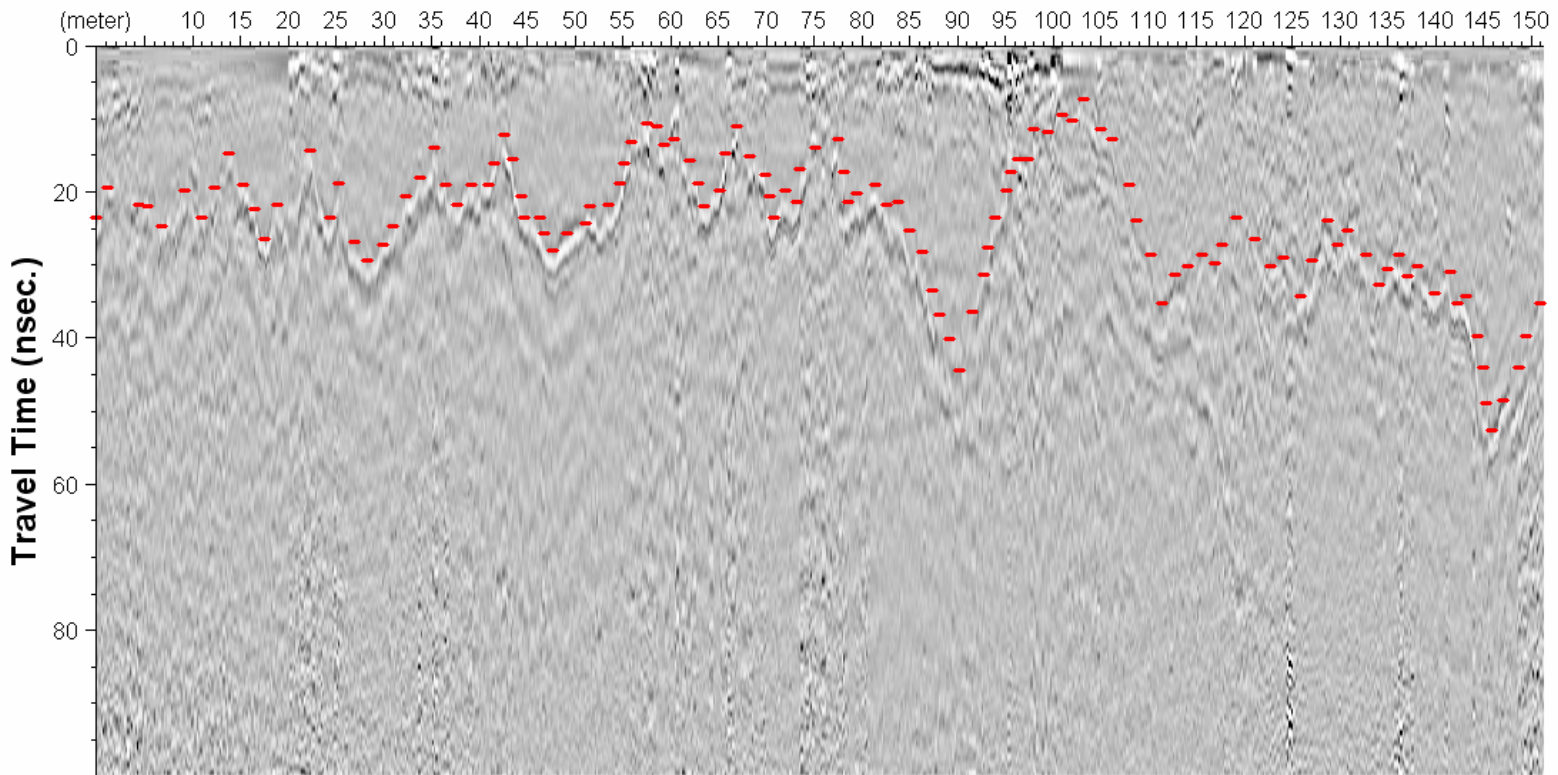


NO frozen material;  
no visible bedrock;  
indicating thick sediments

Double Dipole array

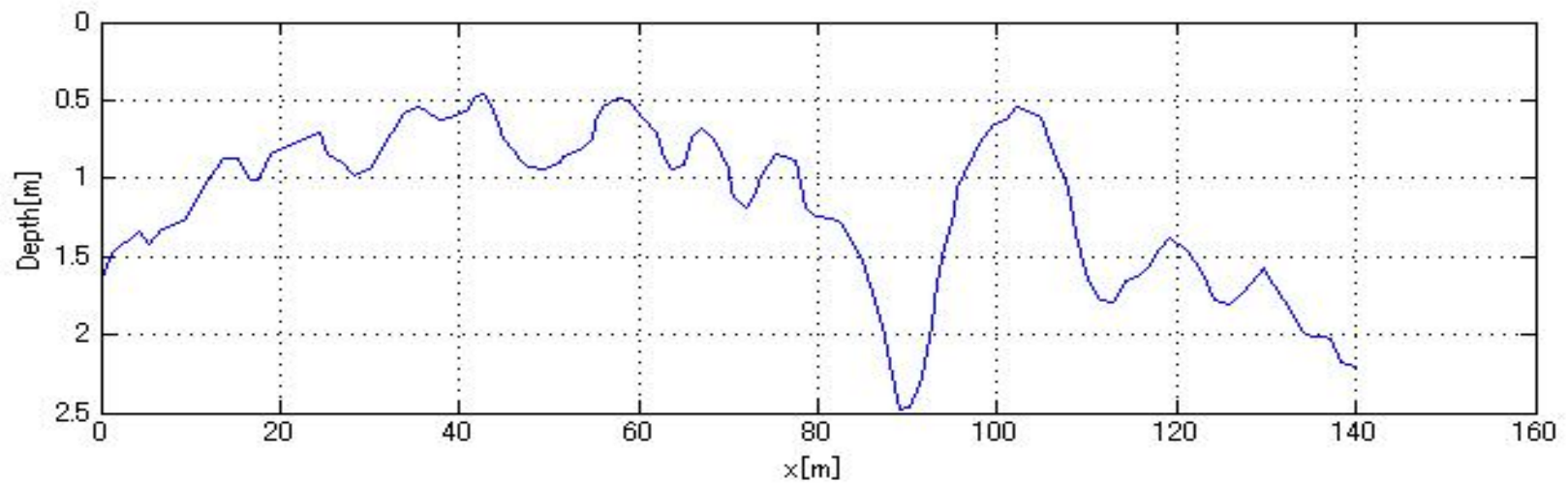


# GPR at Site 2 (line 1)



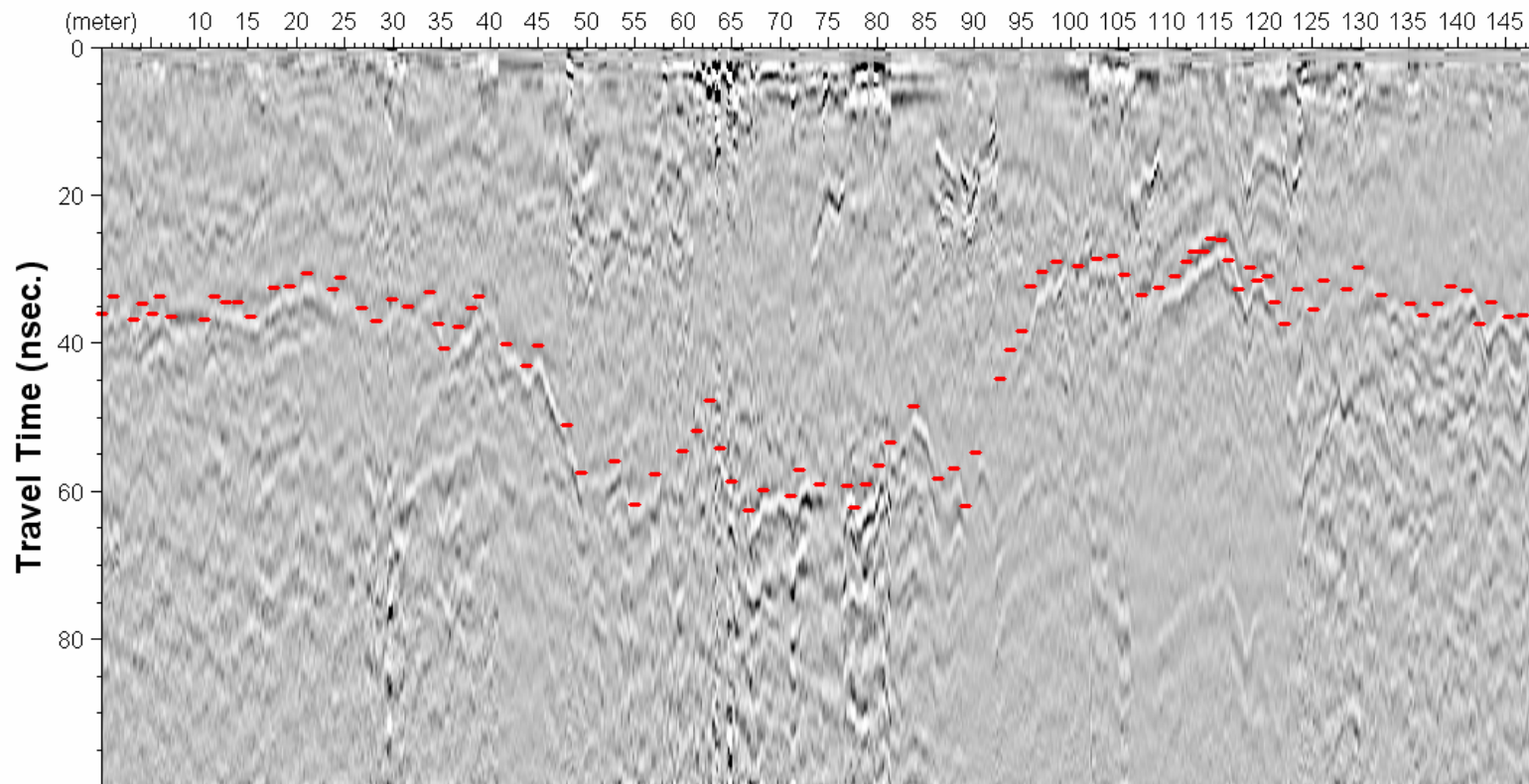
(GPR image at 200 MHz)

# GPR at Site 2 (line 1)



(Active layer thickness estimated based on GPR 200 MHz)

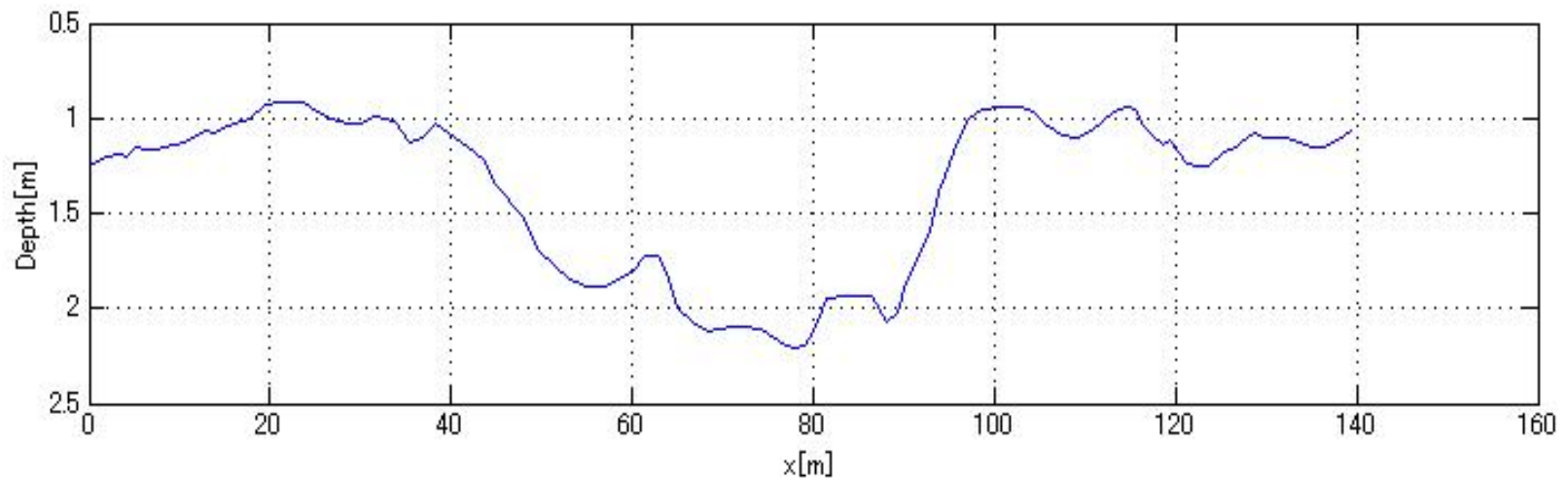
# GPR at Site 2 (line 2)



(GPR image at 200 MHz)

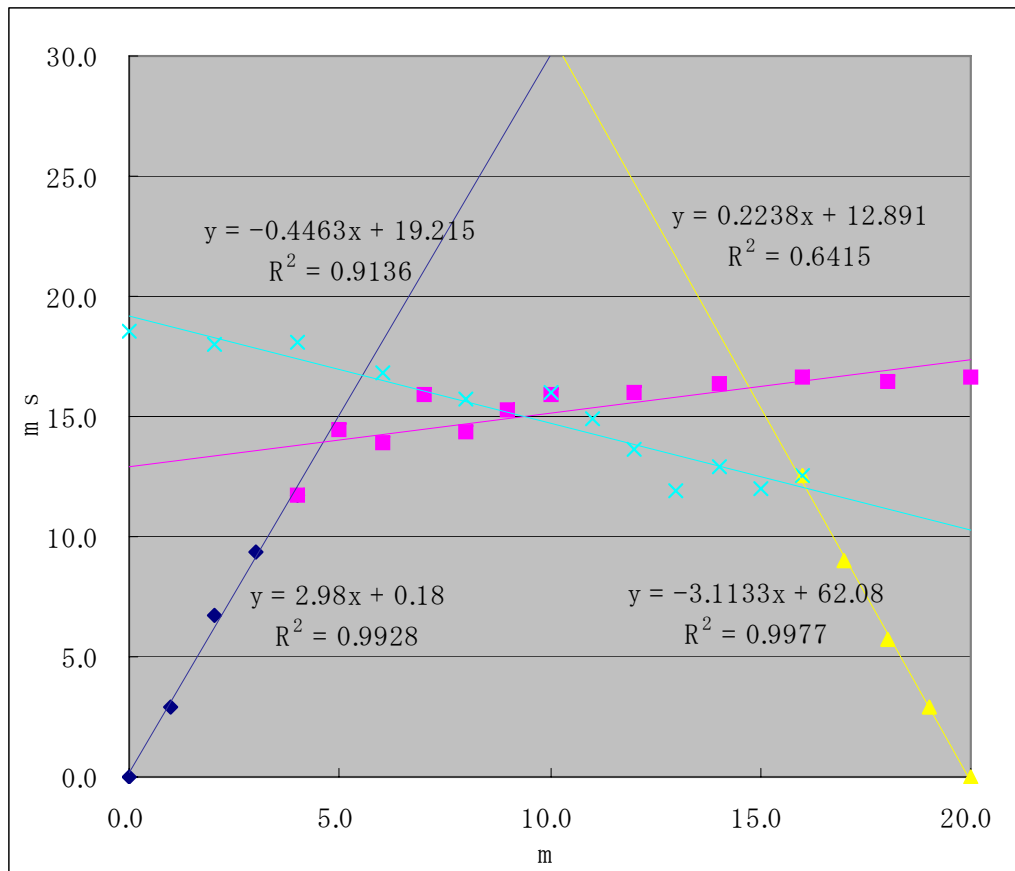


# GPR at Site 2 (line 2)



(Active layer thickness estimated based on GPR 200 MHz)

# Seismic Survey at Site 2 (line 1)



V1 328 m/sec  
V2 2984 m/sec (2400-4000 m  
/sec)

Thickness of first layer 2.0 m