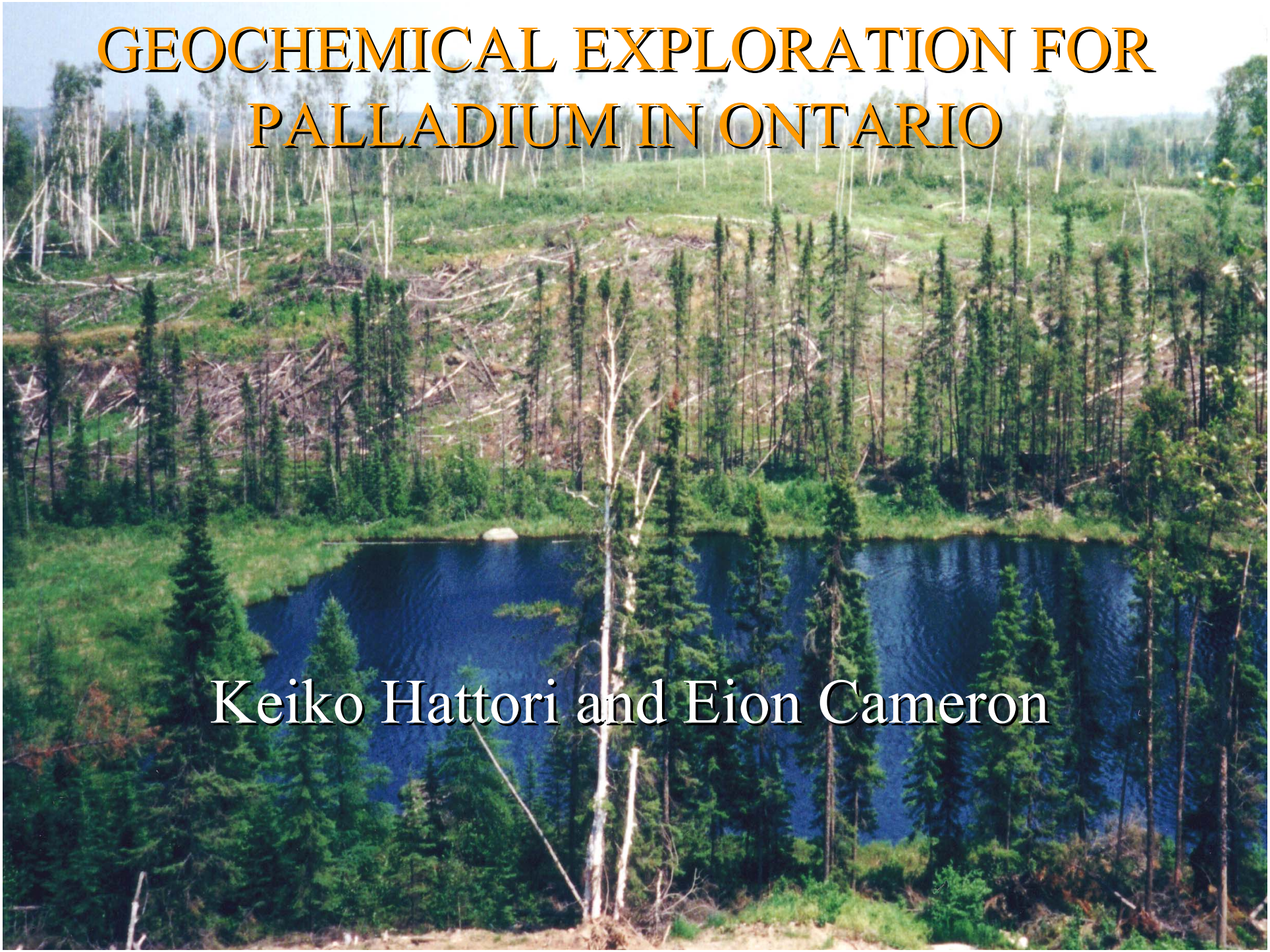
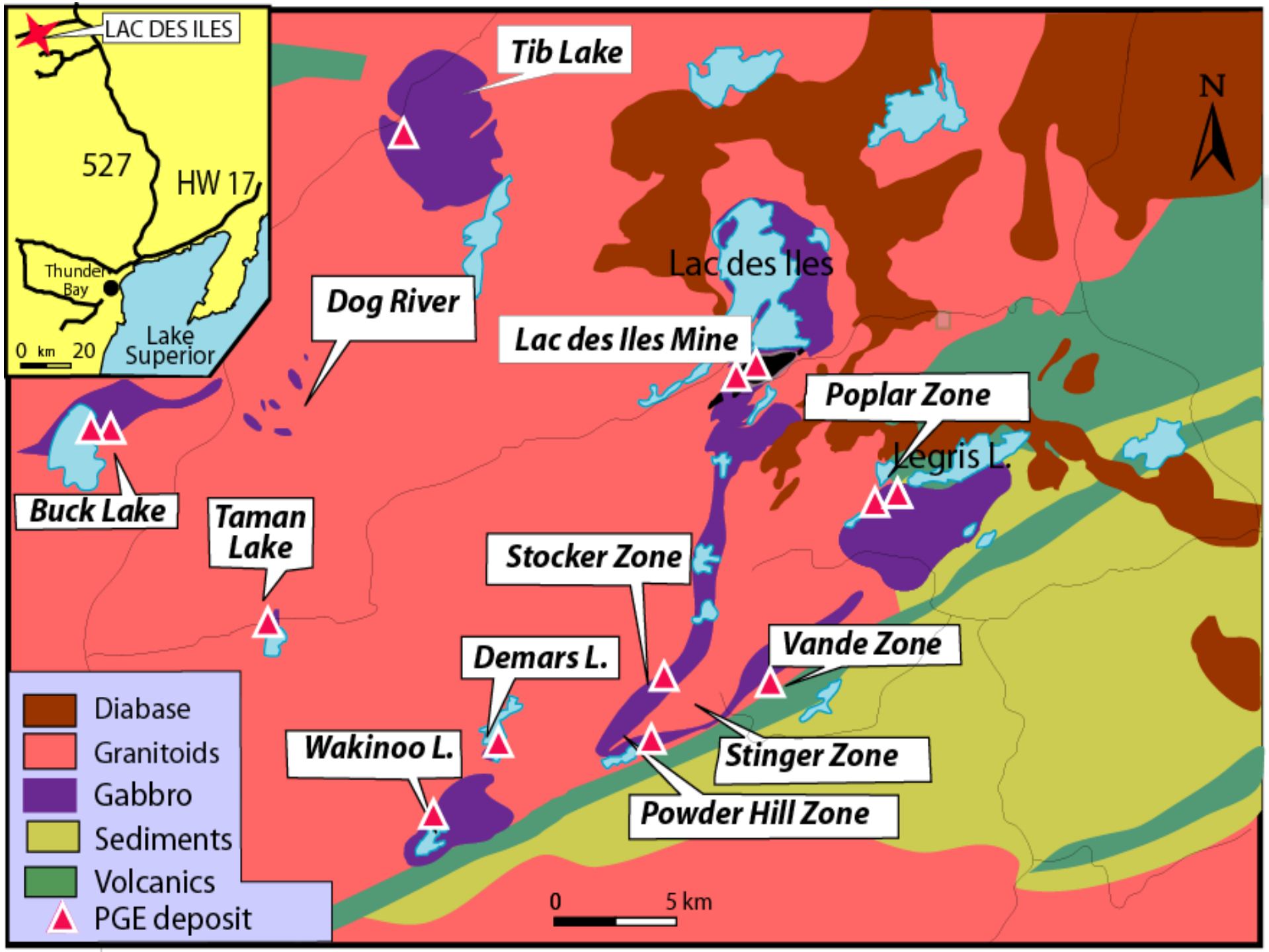
GEOCHEMICAL EXPLORATION FOR PALLADIUM IN ONTARIO

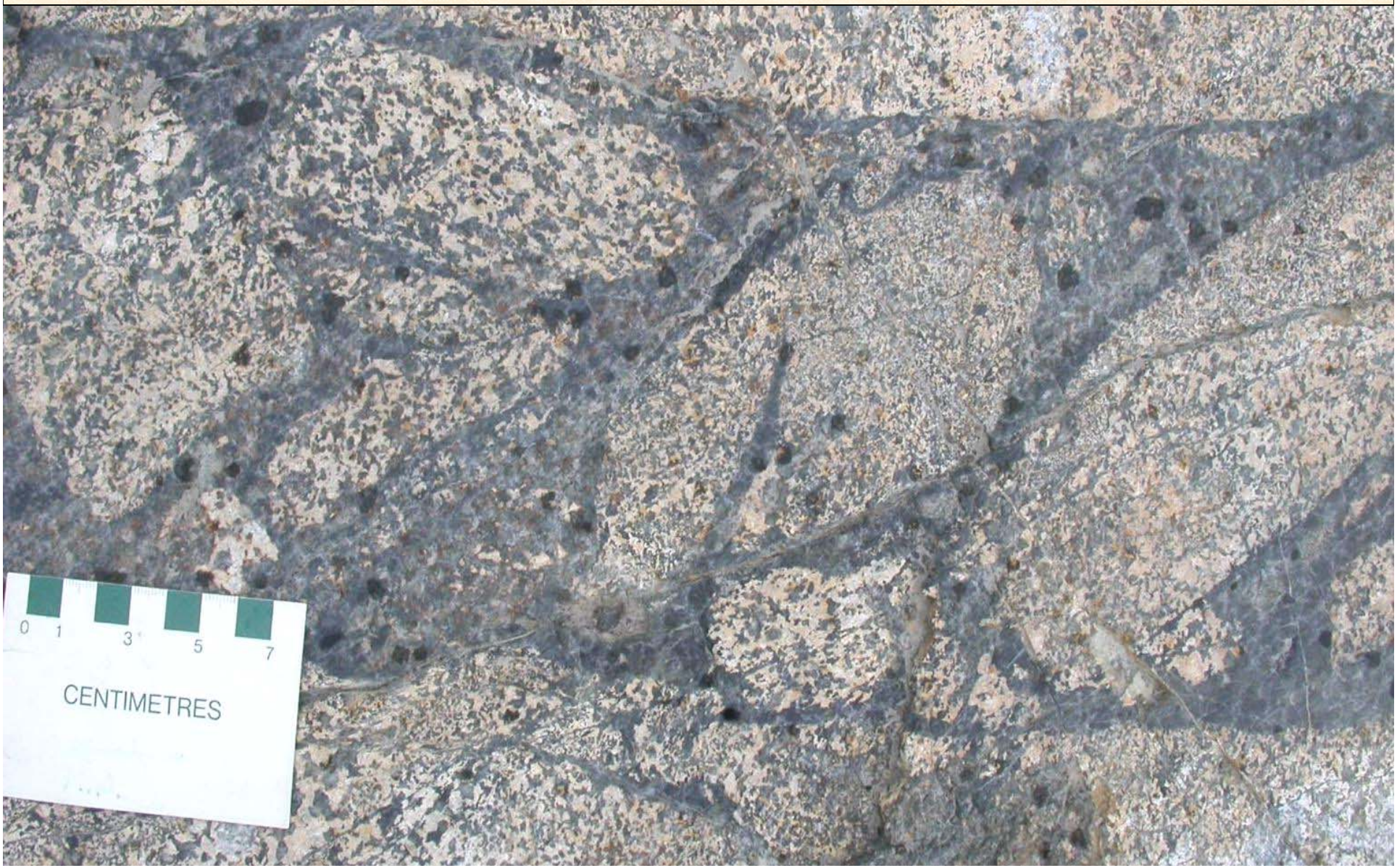


Keiko Hattori and Eion Cameron

Lac des Iles Palladium Mine


LAC DES ILES
527
HW 17
Thunder Bay
Lake Superior
0 km 20
Tib Lake
Dog River
Lac des Iles
Lac des Iles Mine
Poplar Zone
Legris L.
Buck Lake
Taman Lake
Stocker Zone
Demars L.
Vande Zone
Wakinoo L.
Stinger Zone
Powder Hill Zone
N
Diabase
Granitoids
Gabbro
Sediments
Volcanics
PGE deposit
0
5 km

Lac des Iles Mine: *Sulphide-Poor* Palladium Ore in Archean Brecciated Gabbro



Palladium-Bearing Minerals

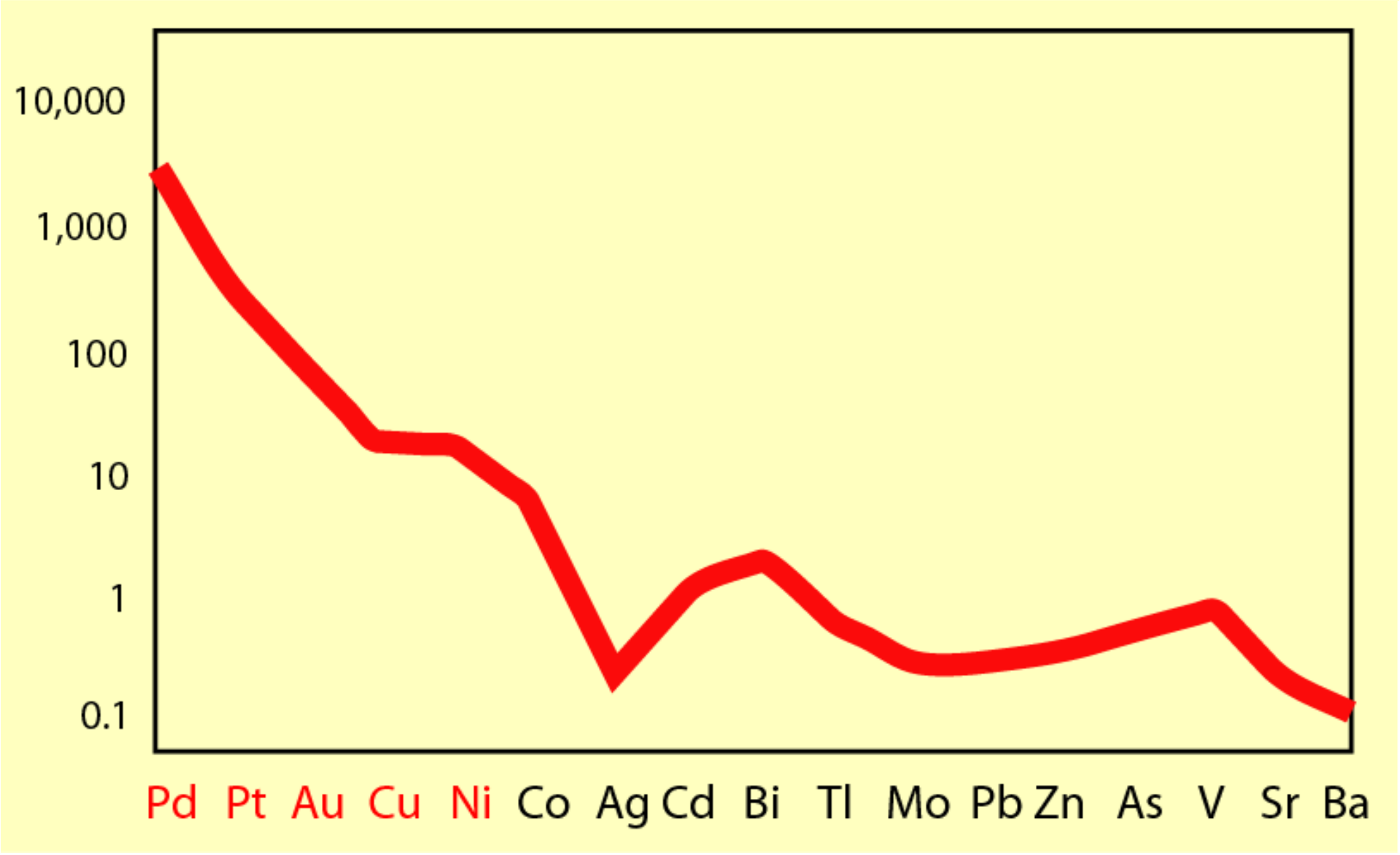
Kotulskite	Pd (Te, Bi)
Braggite	PdS
Merenskyite	$Pd (Te, Se, Bi)_2$
Sperrylite	PtAs
Moncheite	$Pd (Te,Bi)_2$
Palladoarsenide	Pd_2As

Sulphides <5%

Question

Are Palladium and Other Indicator Elements Mobile in the Absence of Sulphide Weathering ?

Identification of Indicator Elements: Palladium Ore Normalized to Upper Crust



Possible Pathfinder Elements

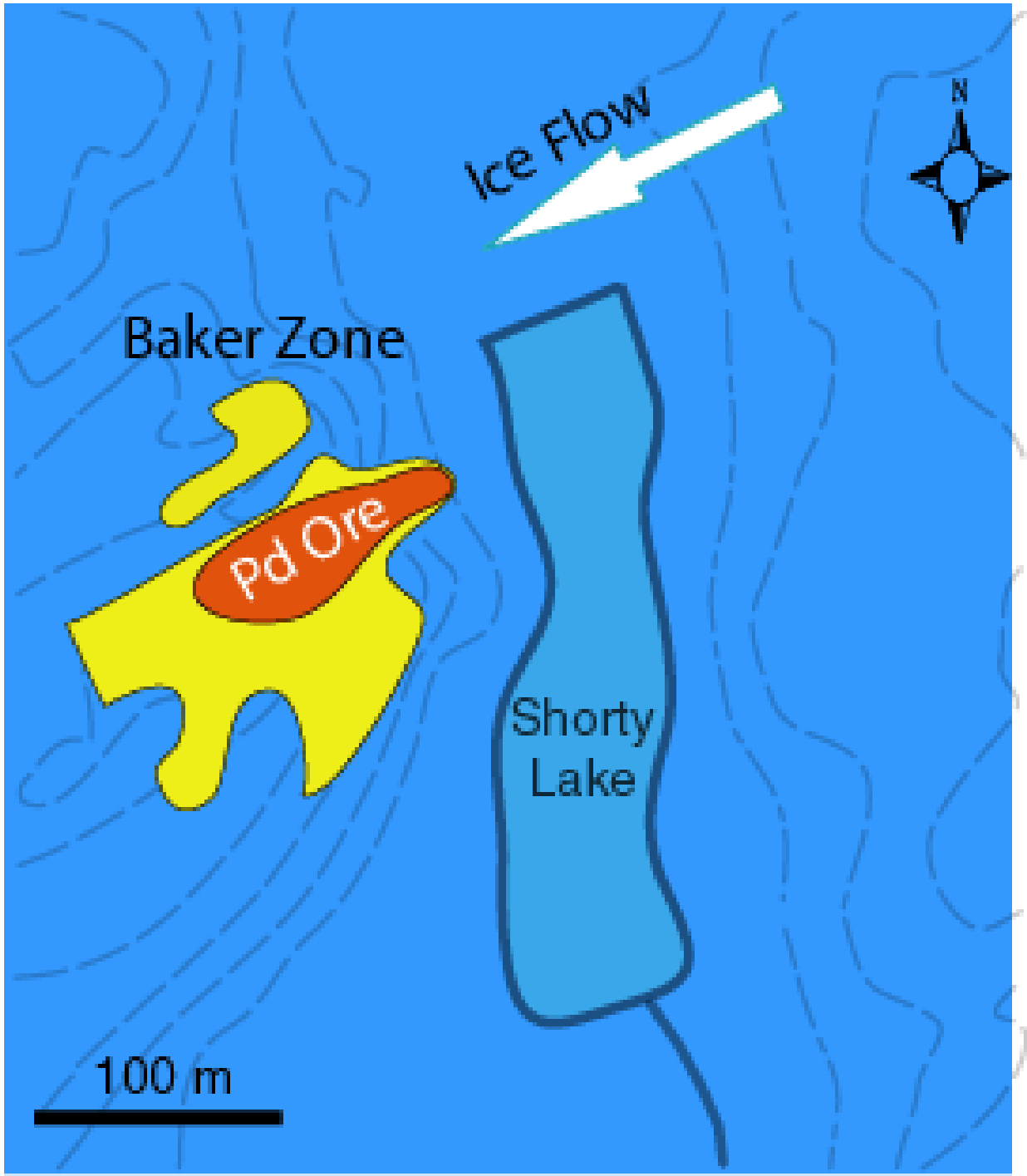
Pd: **Yes** if Mobile

Pt: **Yes** if Mobile

Au: **No** Unrelated Gold Veins in Area

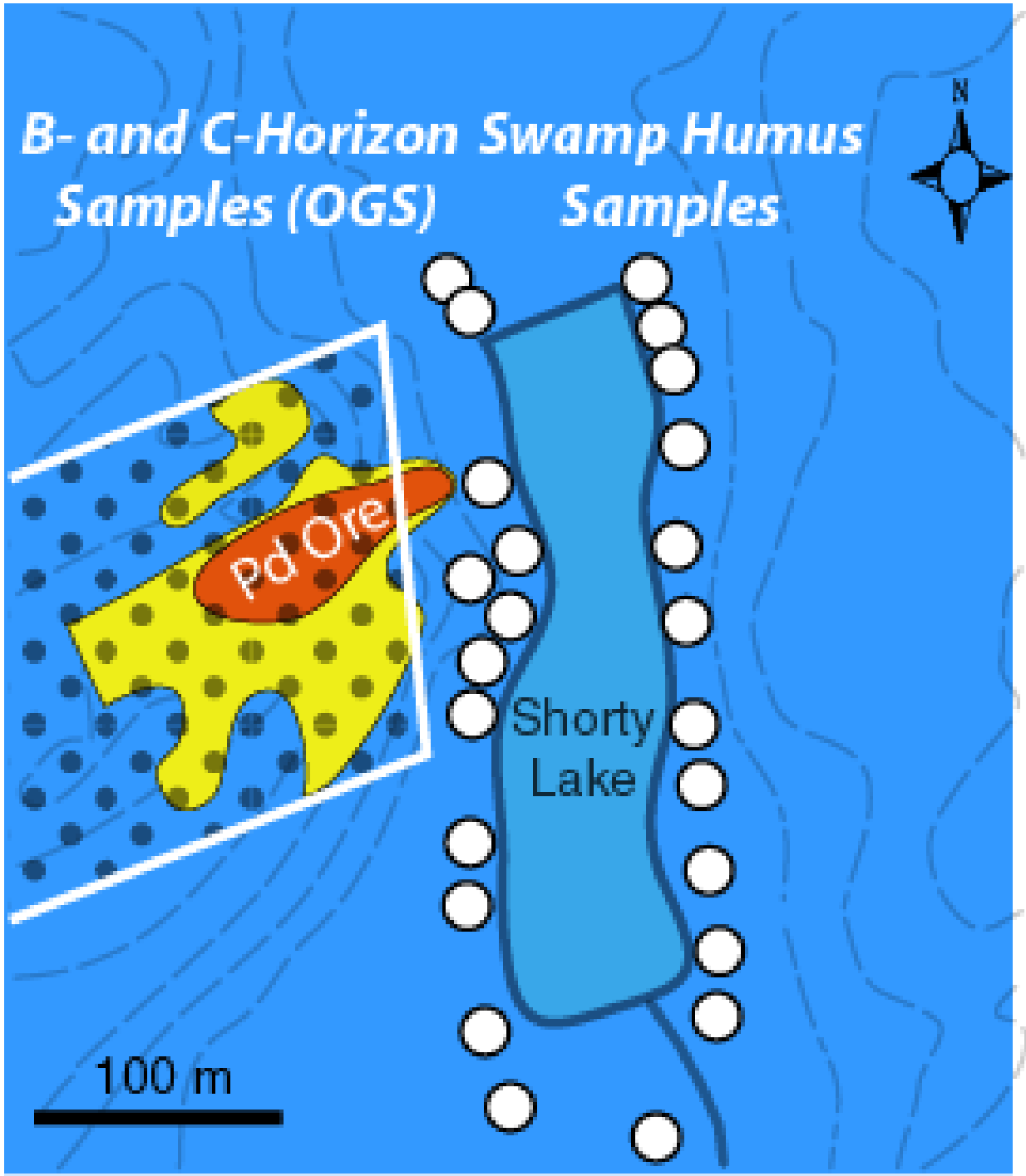
Cu, Ni: **No** Unrelated Base Metal Sulphides

Test Site: Baker Zone Prospect

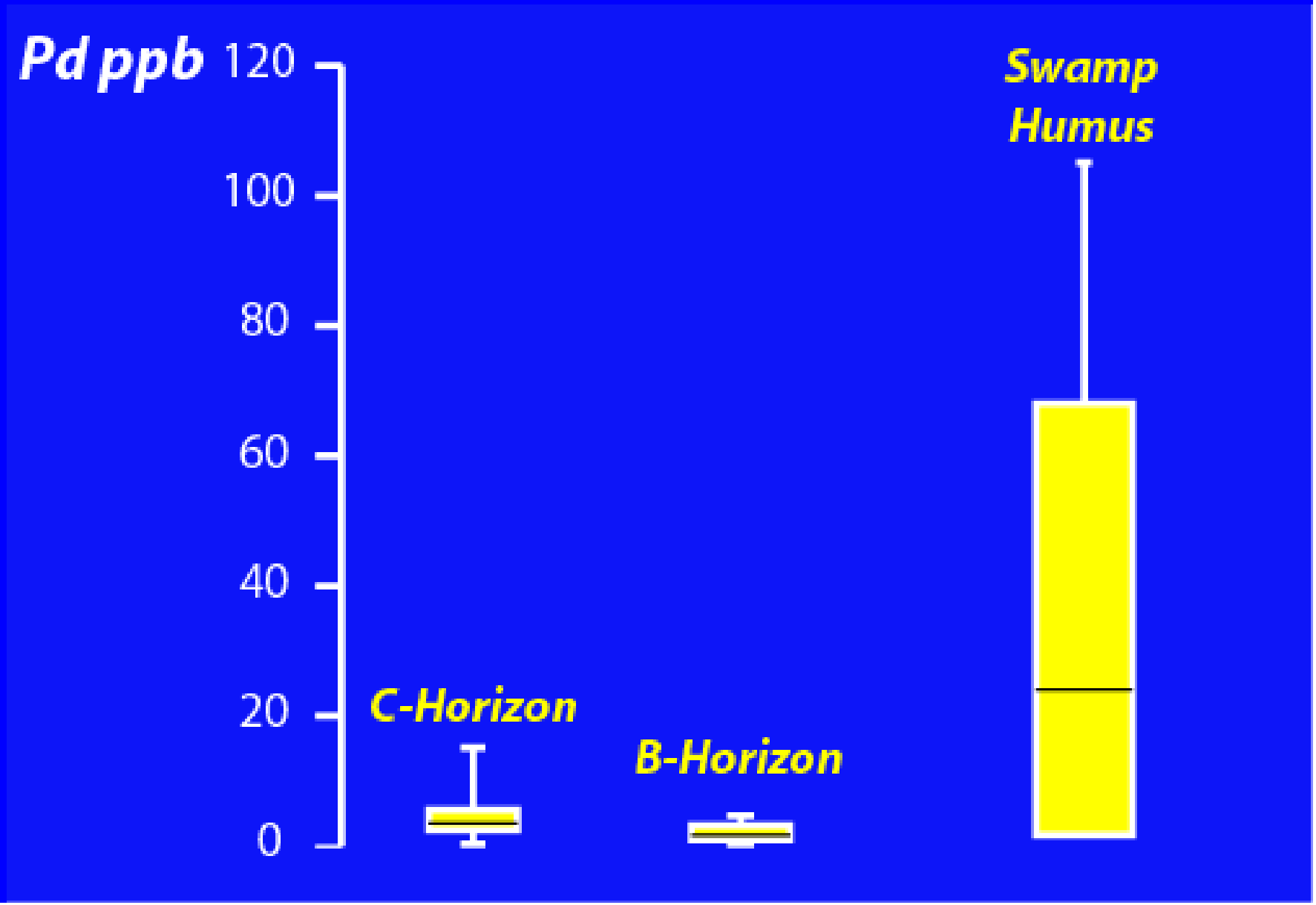


Shorty Lake

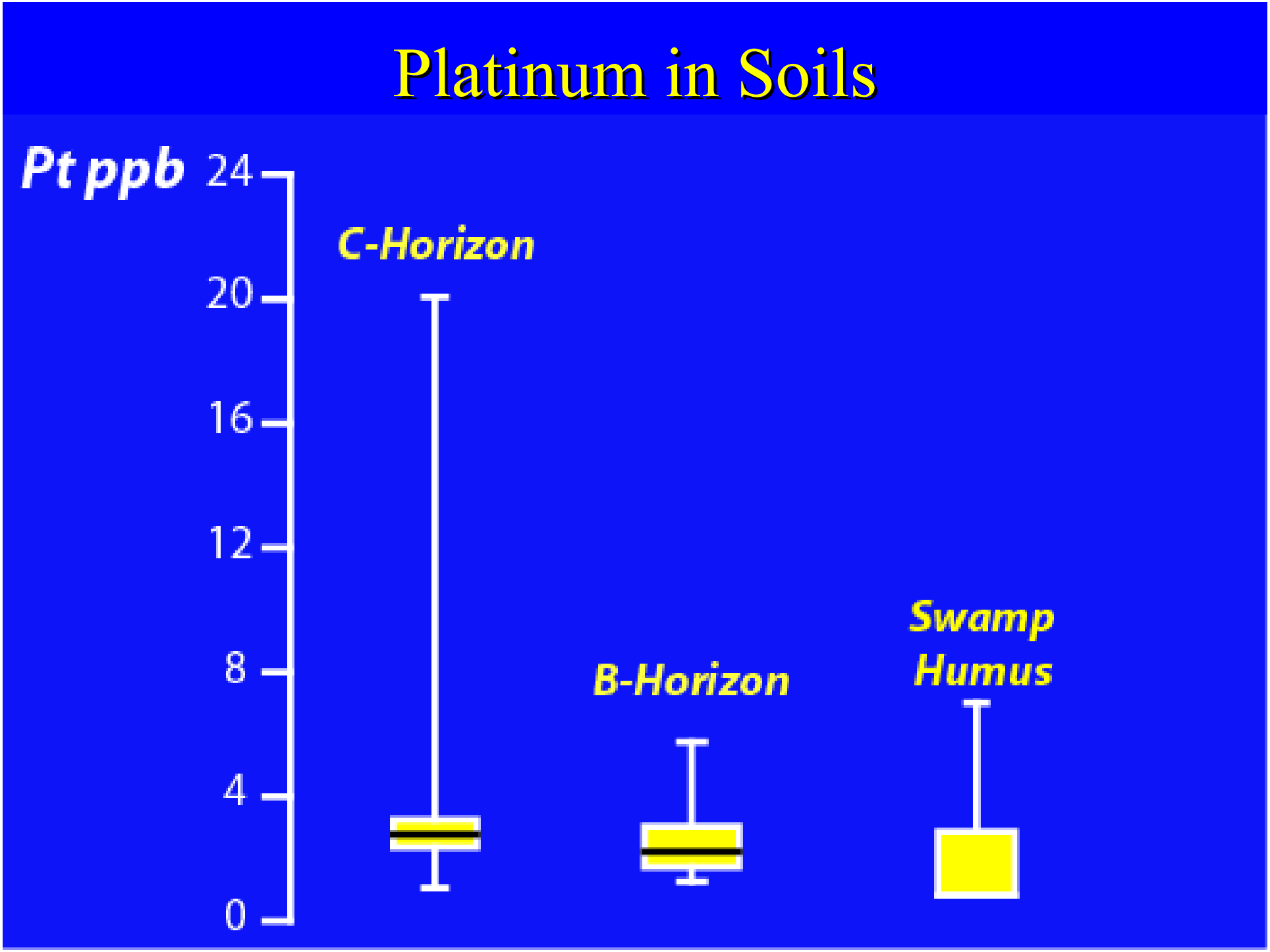
Sampling: Shorty Lake–Baker Zone



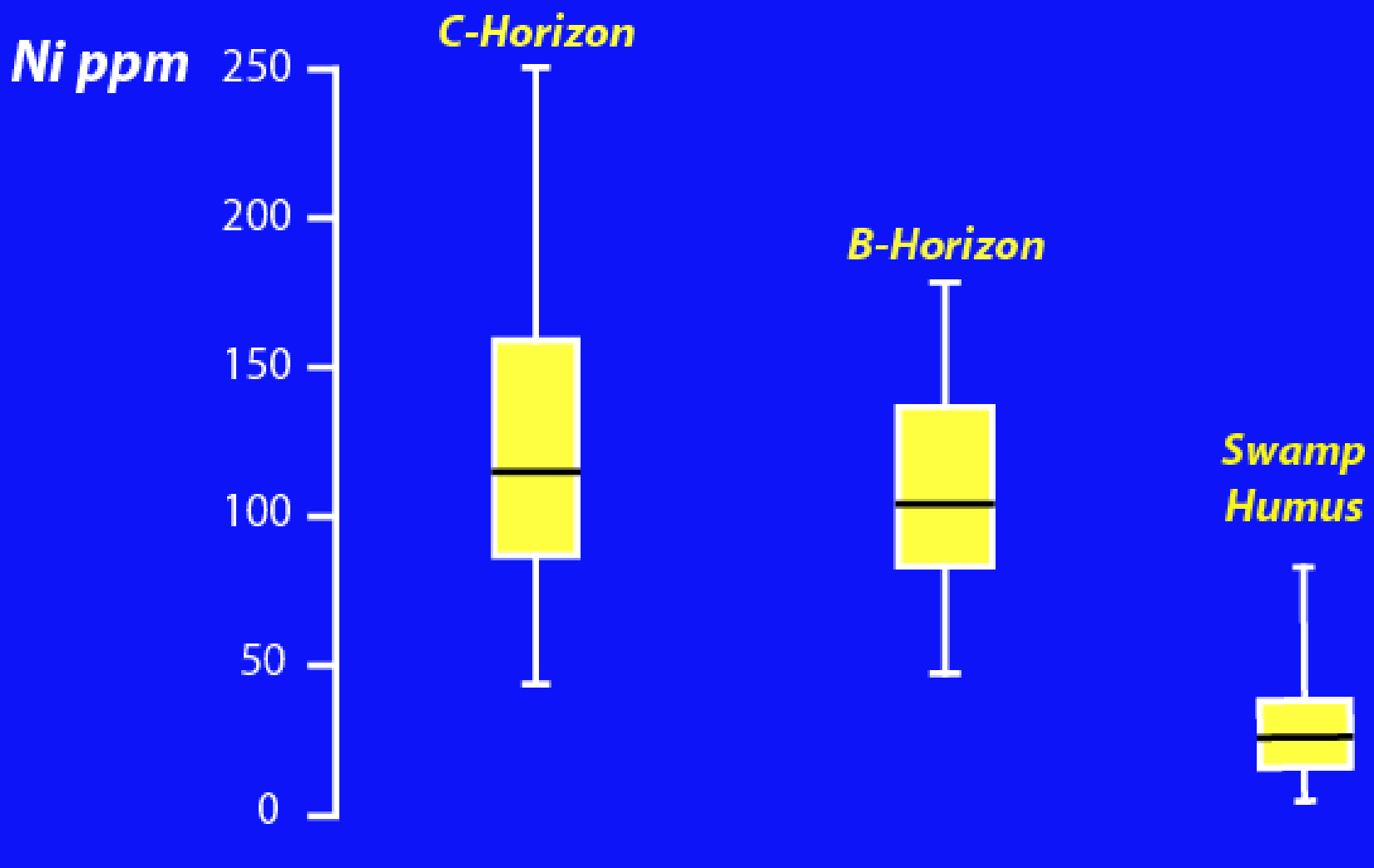
Palladium in Soils



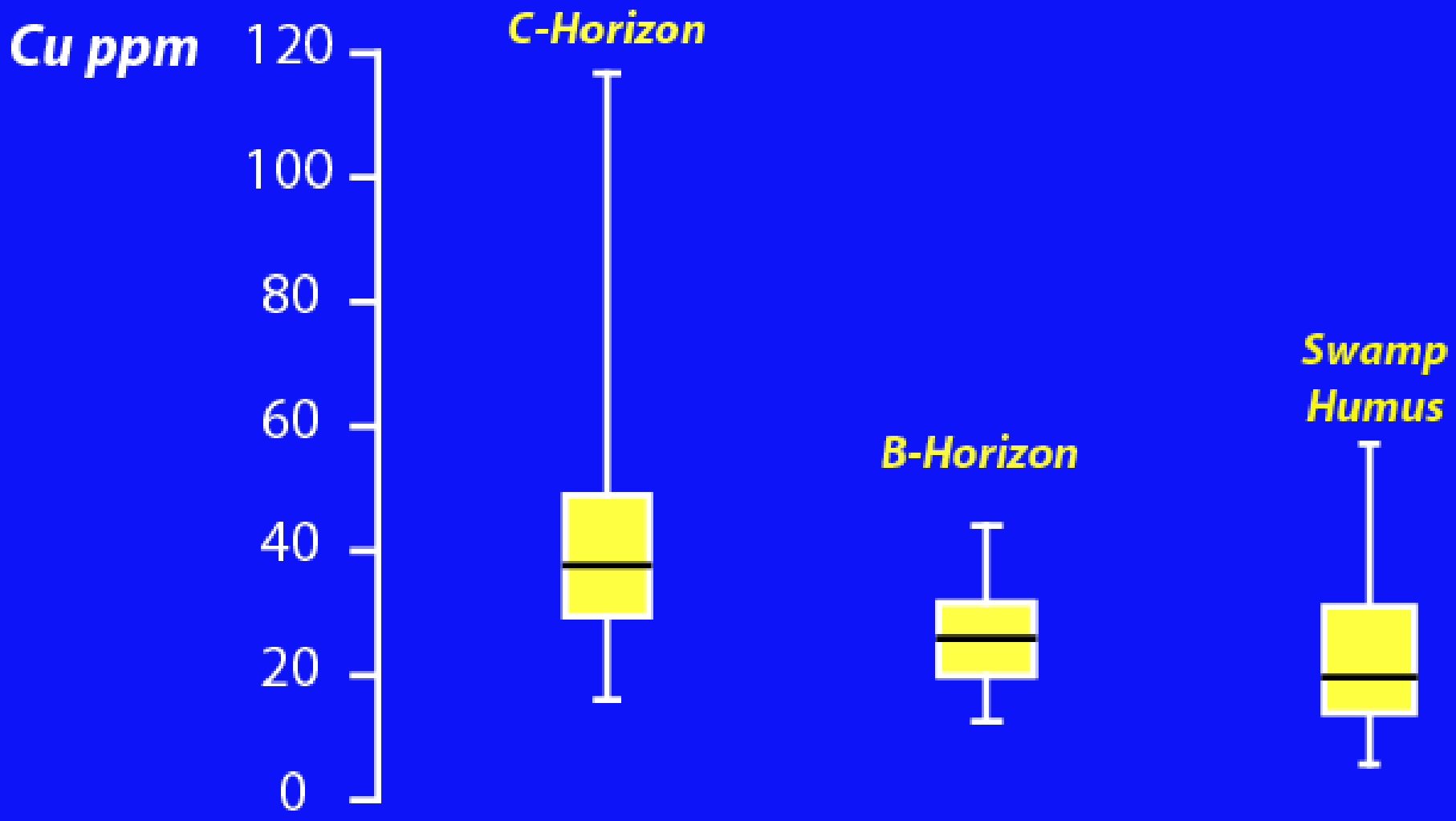
Platinum in Soils



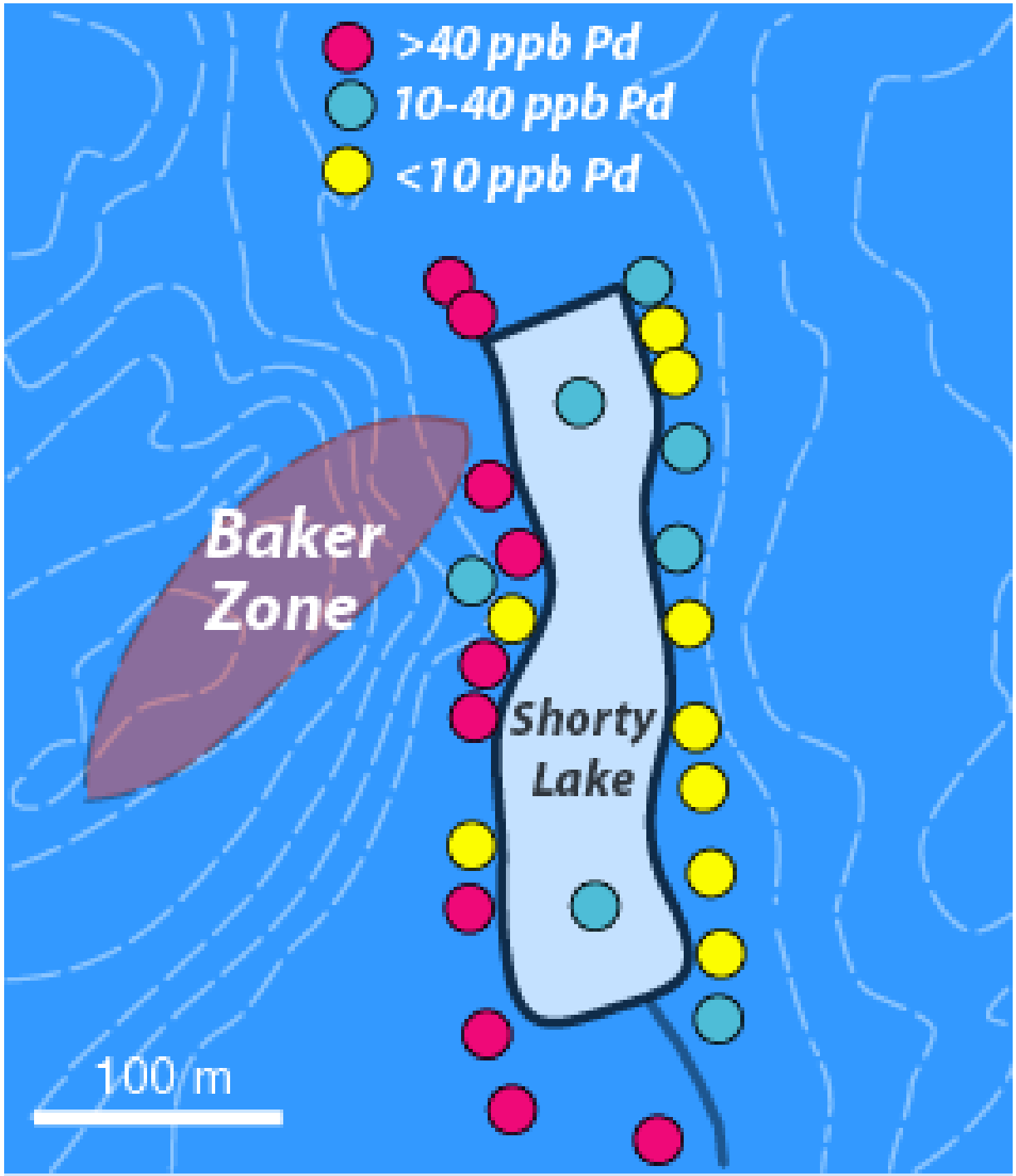
Nickel in Soils



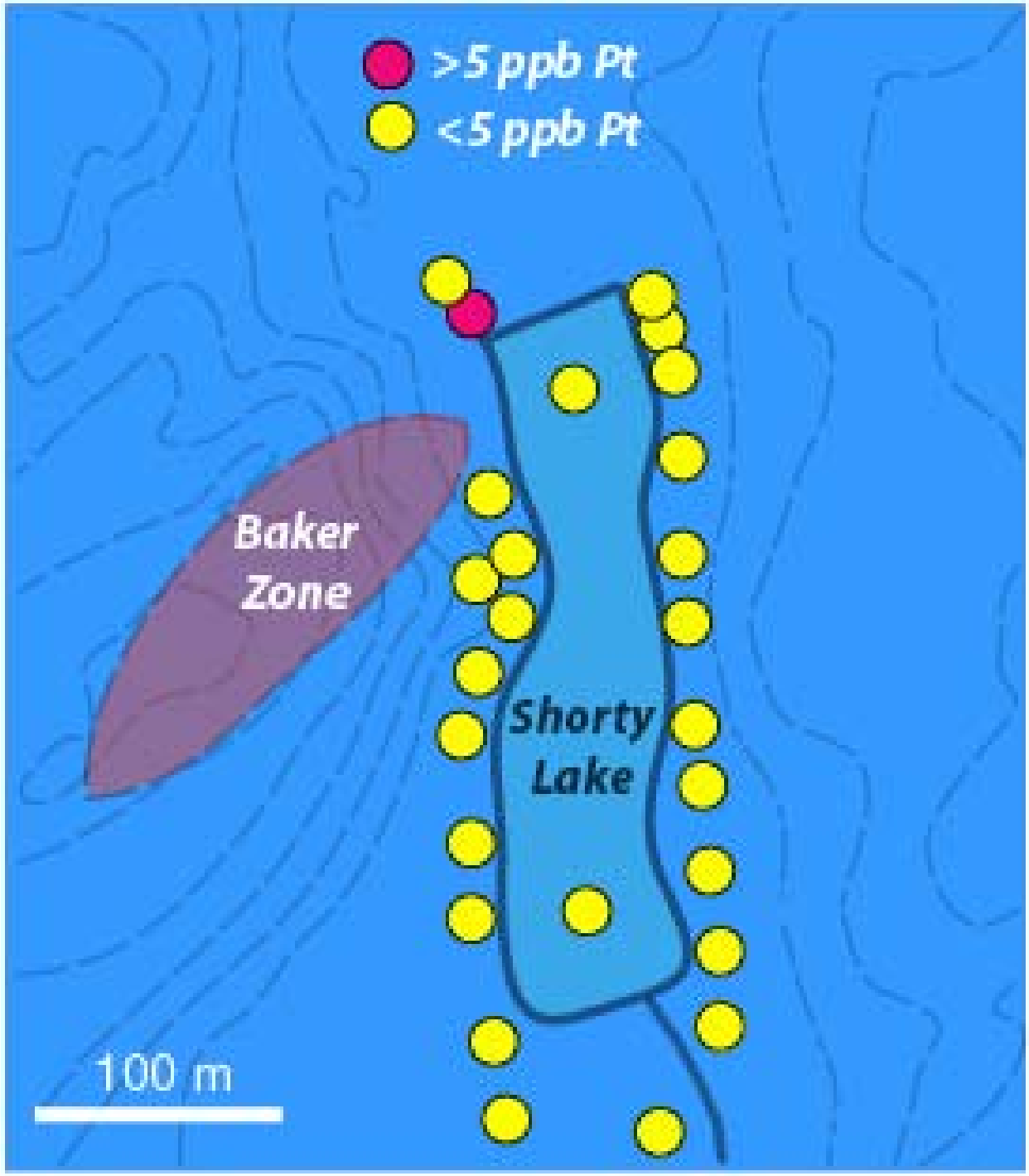
Copper in Soils



Palladium in Swamp Humus



Platinum in Swamp Humus



Interpretation

Palladium is Readily Transported in Solution to Swamps, where it is Fixed with Organic Matter

Palladium is Depleted in B-Horizon Soils

Predominant Pd species in Neutral pH Waters:
$Pd(OH)_2^{o}$ $Pd(OH)_3^{-}$ $Pd(OH)_4^{2-}$
not Adsorbed by Negatively-Charged Fe Oxides

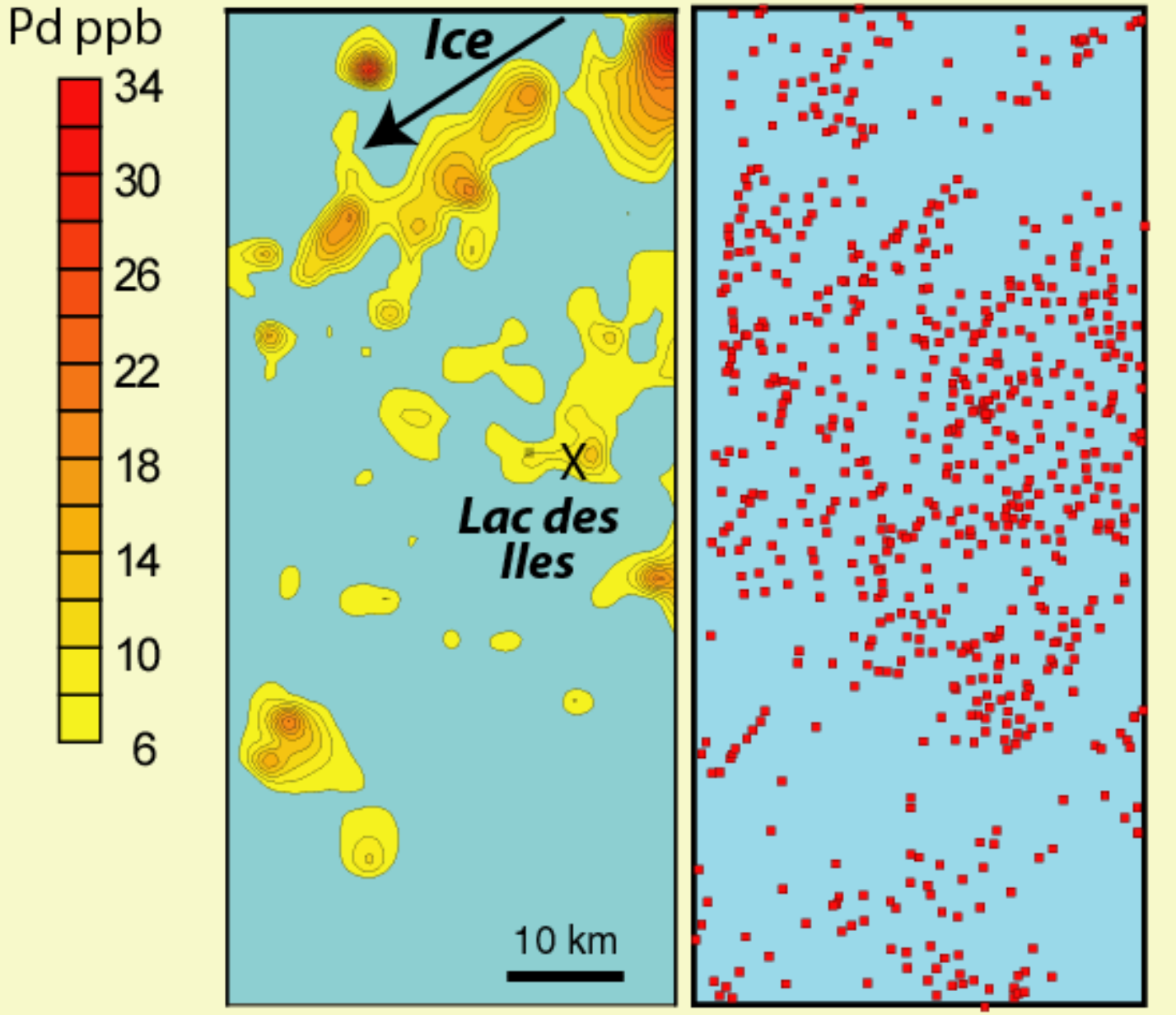
Good:

High Mobility of Palladium in Surface Environment is Useful for Exploration

Possible Problem:

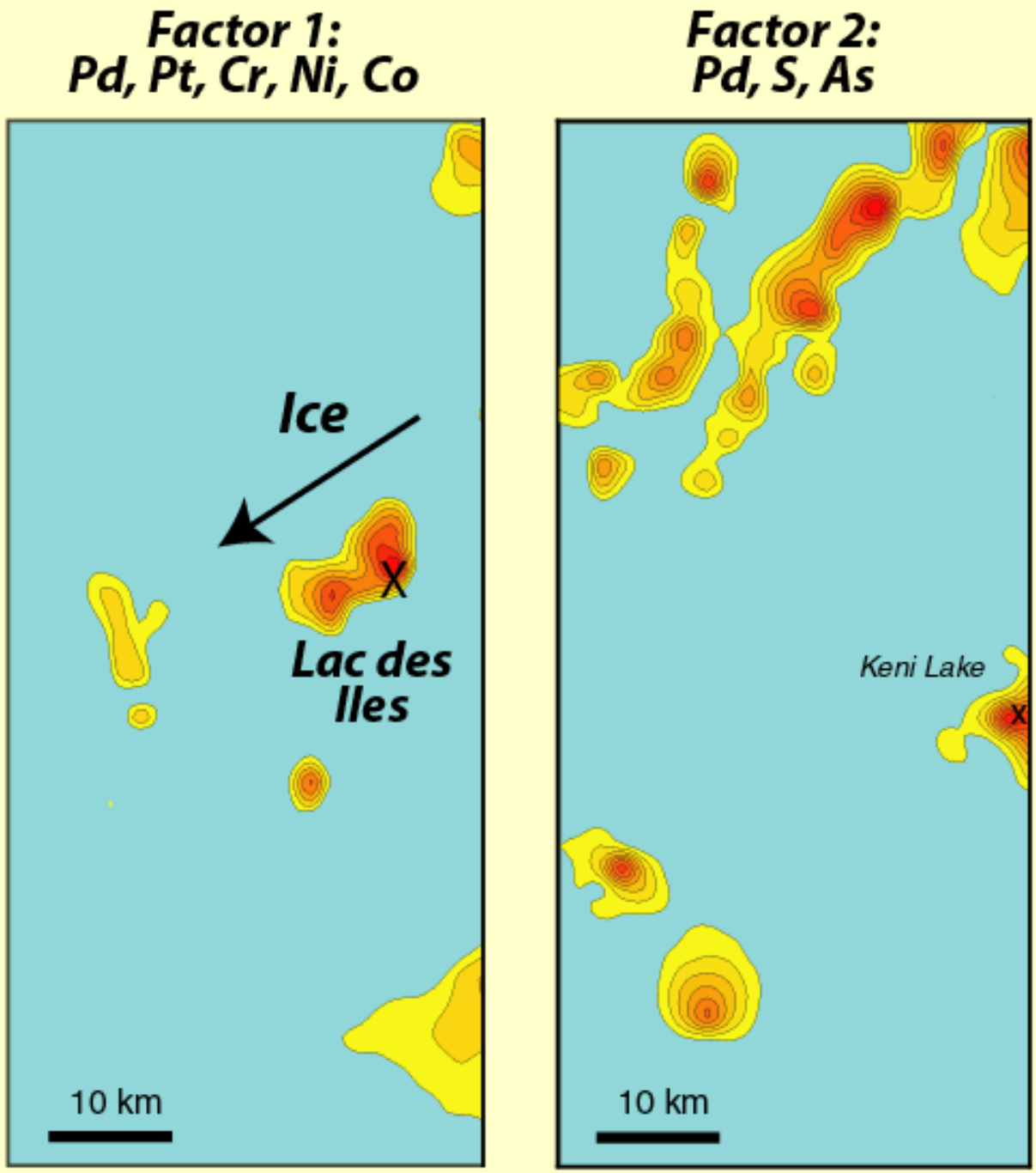
High Mobility May Cause False Anomalies

Regional Lake Sediment Surveys (OGS)

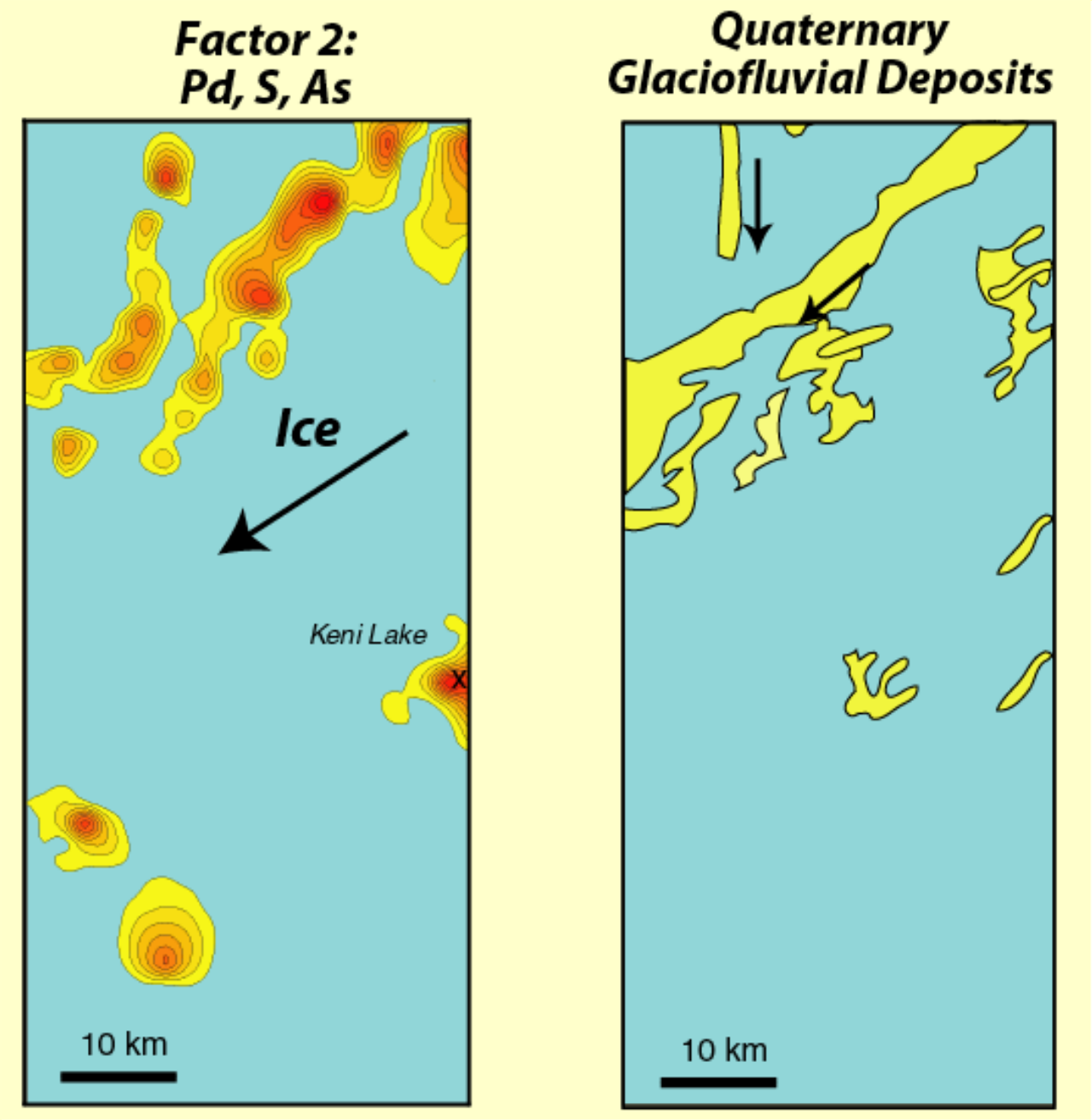


2800 km^2
675
samples

Factor Analysis of Lake Sediment Data: Plots of Factor Scores



Factor 2 Correlates with Quaternary Glaciofluvial Deposits, e.g., Eskers

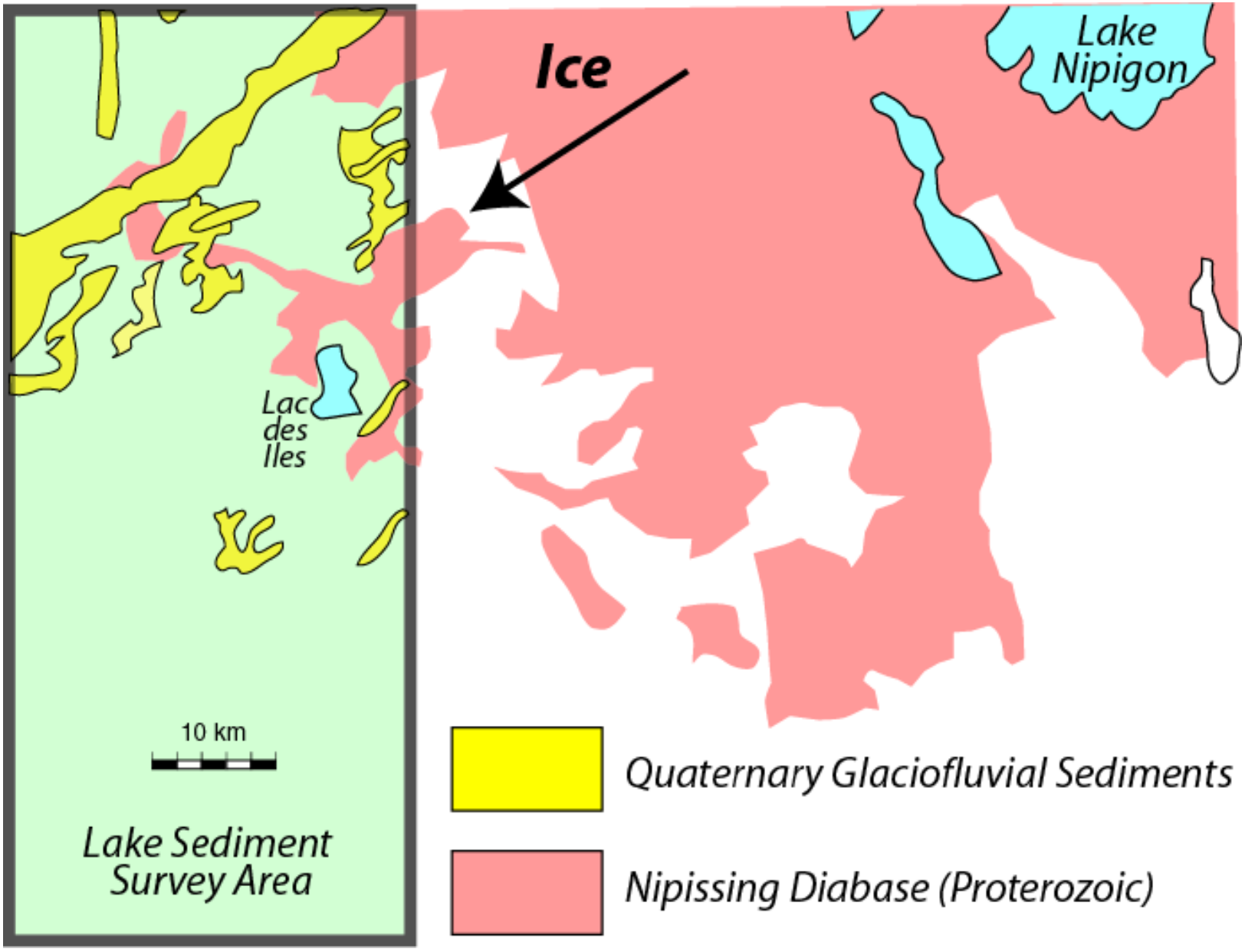


Keni Lake: Highest Factor 2 Score and 29 ppb Pd in Sediment

Springs Into Keni Lake from Base of Esker

Esker with Boulder of Decomposed Nipissing Diabase

Outcrop Area of Nipissing Diabase



Analyses of Fresh Nipissing Diabase Boulders from Esker

	Pd ppb	Pt ppb
Nipissing Diabase Boulder	15	12
Nipissing Diabase Boulder	20	11
MORB	0.5	7
Mantle Peridotite	4	7

Nature of Pd Associated with Lake Sediment Factor 2

Derived from Leaching of Decomposing Nipissing Diabase Boulders in Permeable Eskers

Conclusions

High Mobility of Palladium Derives from its Dissolution as Neutral and Anionic Species, which are not Readily Adsorbed by Fe Oxides

but

Palladium is Fixed by Organic Material in Swamps and Lake Sediments

Acknowledgements

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