

AMIRA P618

Cannington

P618 Meeting 7/12/01

Introduction

- Eastern Succession Mt Isa Inlier
Proterozoic hosted - BHT deposit
- Lies beneath a thin cover of onlapping
Eromanga Basin
- 44 Mt - 538 g/t Ag, 11.6% Pb, 0.6%
Zn, (Walters & Bailey 1998)

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Structure

- Ore body divided into northern and southern zones - late displacement
- Stratabound massive sulfide zones
- Complex deformational history

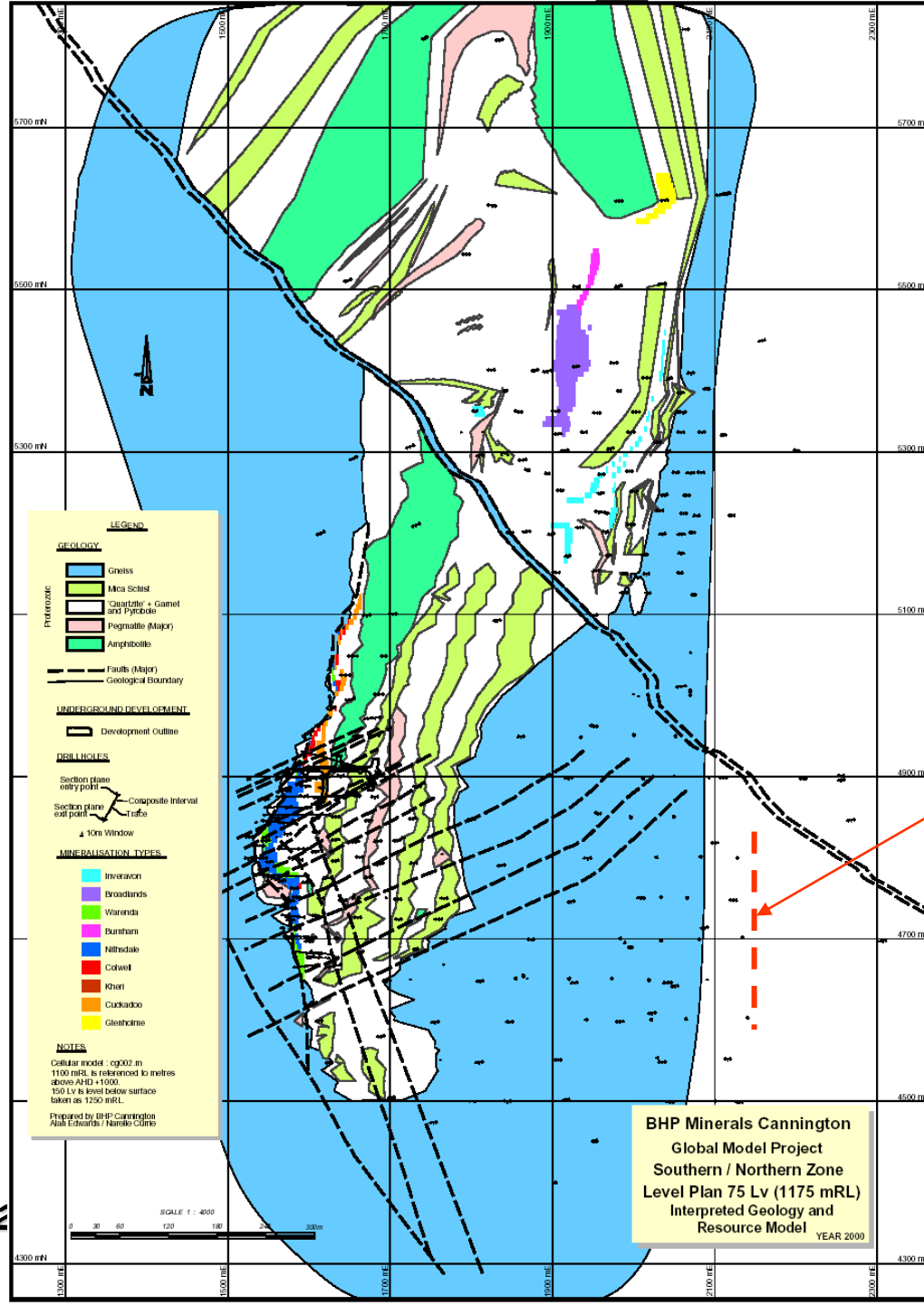
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Plan View

1175mRL

approx. 75m

below surface



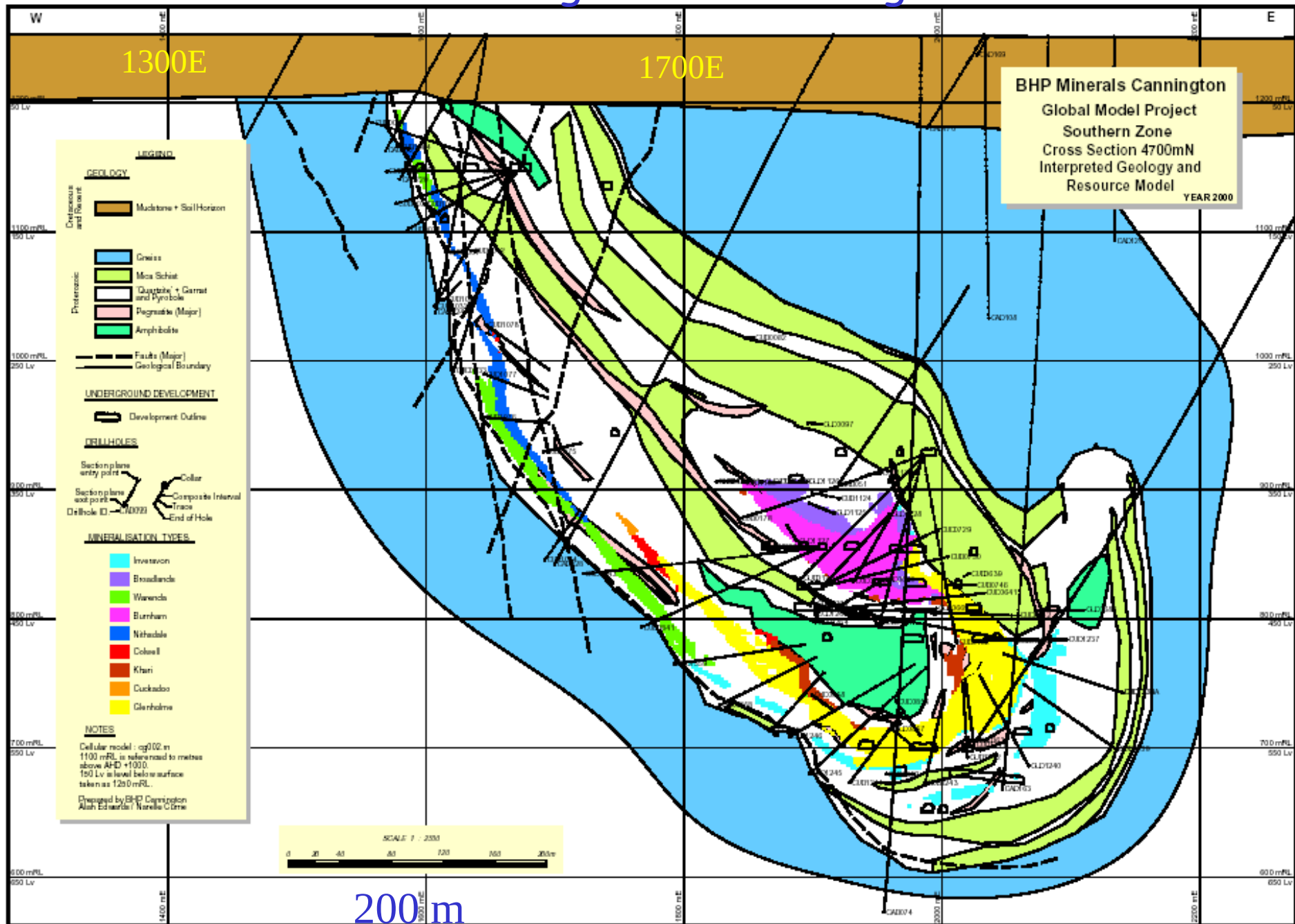
Approximate
eastern extension
of ore body at
depth in the region
of 4700N

Geology

- 10 to 60 m of Cretaceous and Recent sediments cover the deposit
- Amphibolite facies migmatitic quartzofeldspathic gneiss host
- Complex metasomatism and retrograde overprints

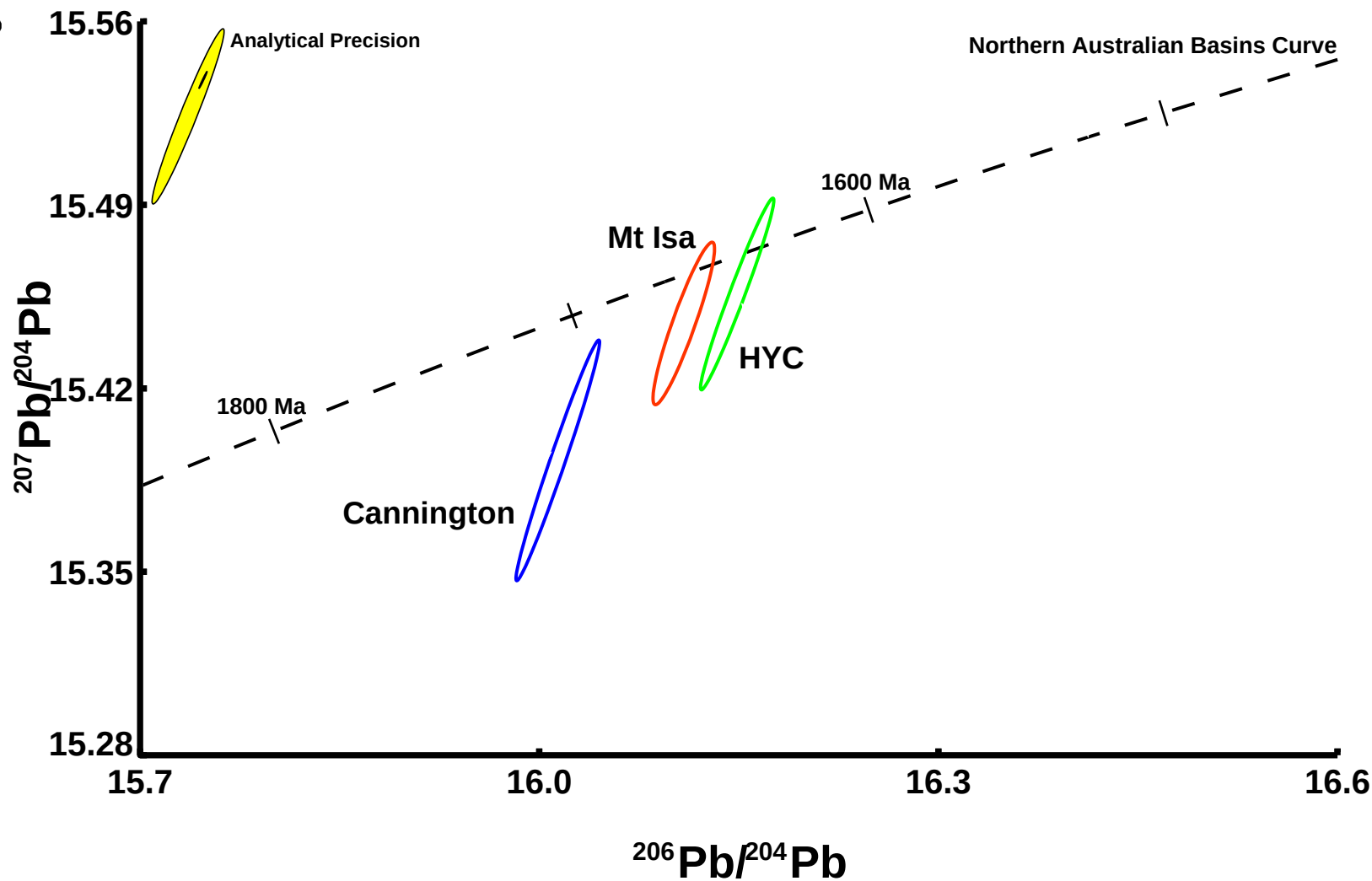
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Section along 4700N Cannington



Pb Isotope Geochemistry

- Principal sulfides are galena and sphalerite
- Homogeneous Pb isotope population



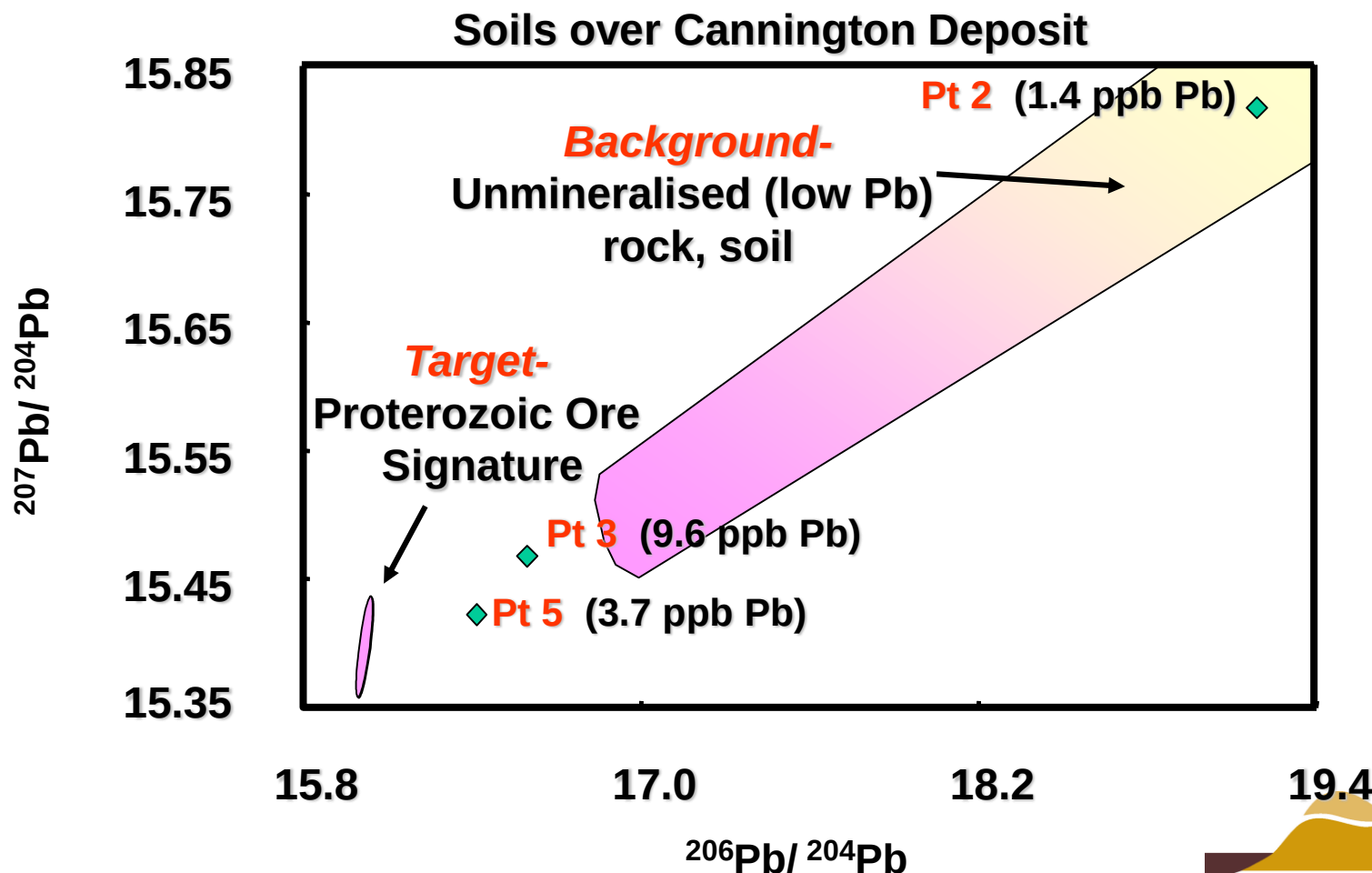
Pb Isotope Geochemistry

- Stratigraphic equivalents 1677 ± 9 Ma
- NAB model age 1665 ± 10 Ma
- Broken Hill, Mt Isa, HYC similar

Pb isotope partial leach work

- 1995 pilot study
- Soil sample from cover over southern ore body
- Gave an encouraging response with evidence of Proterozoic Pb

Early Work

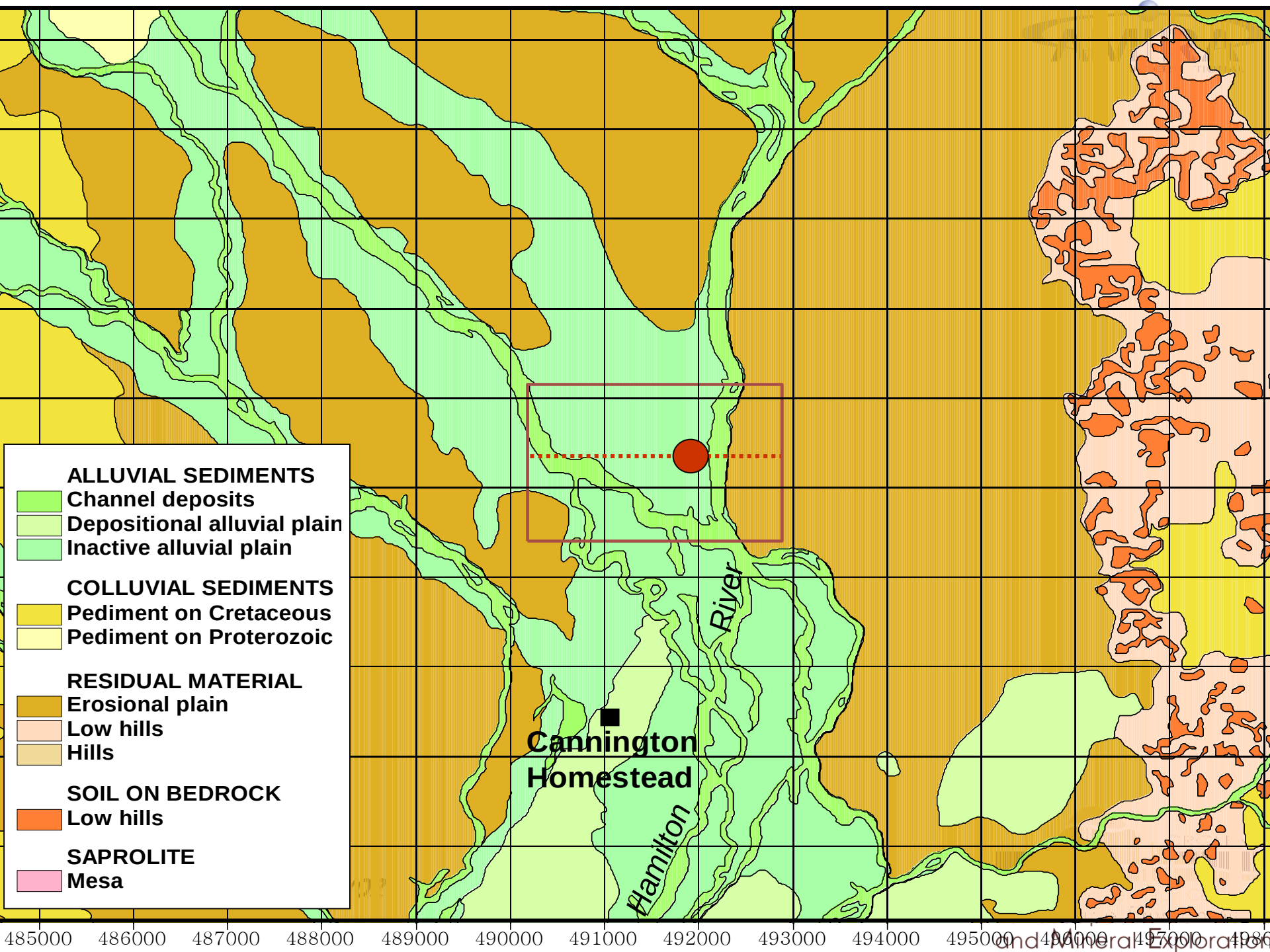


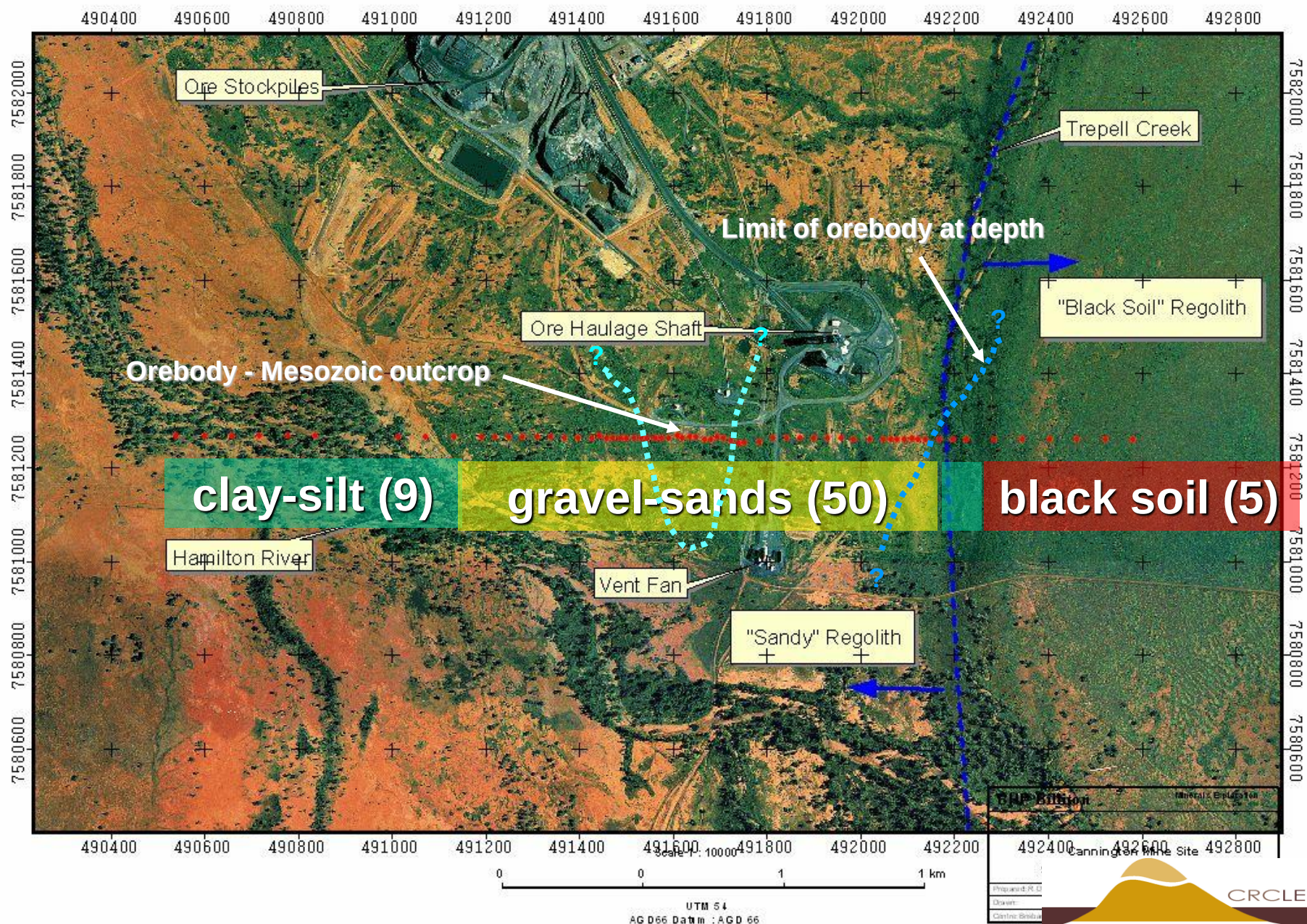
Next steps

- Good result but based on one sample
- Need to obtain a sample set with least opportunity for contamination
- BHPB sample set taken in 1997-8 is the best set that can be located.

Sampling

- Line 4700N provided by Steve Walters (AGS)
- Crosses the southern extremity of the ore body
- Low potential for contamination





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1500E

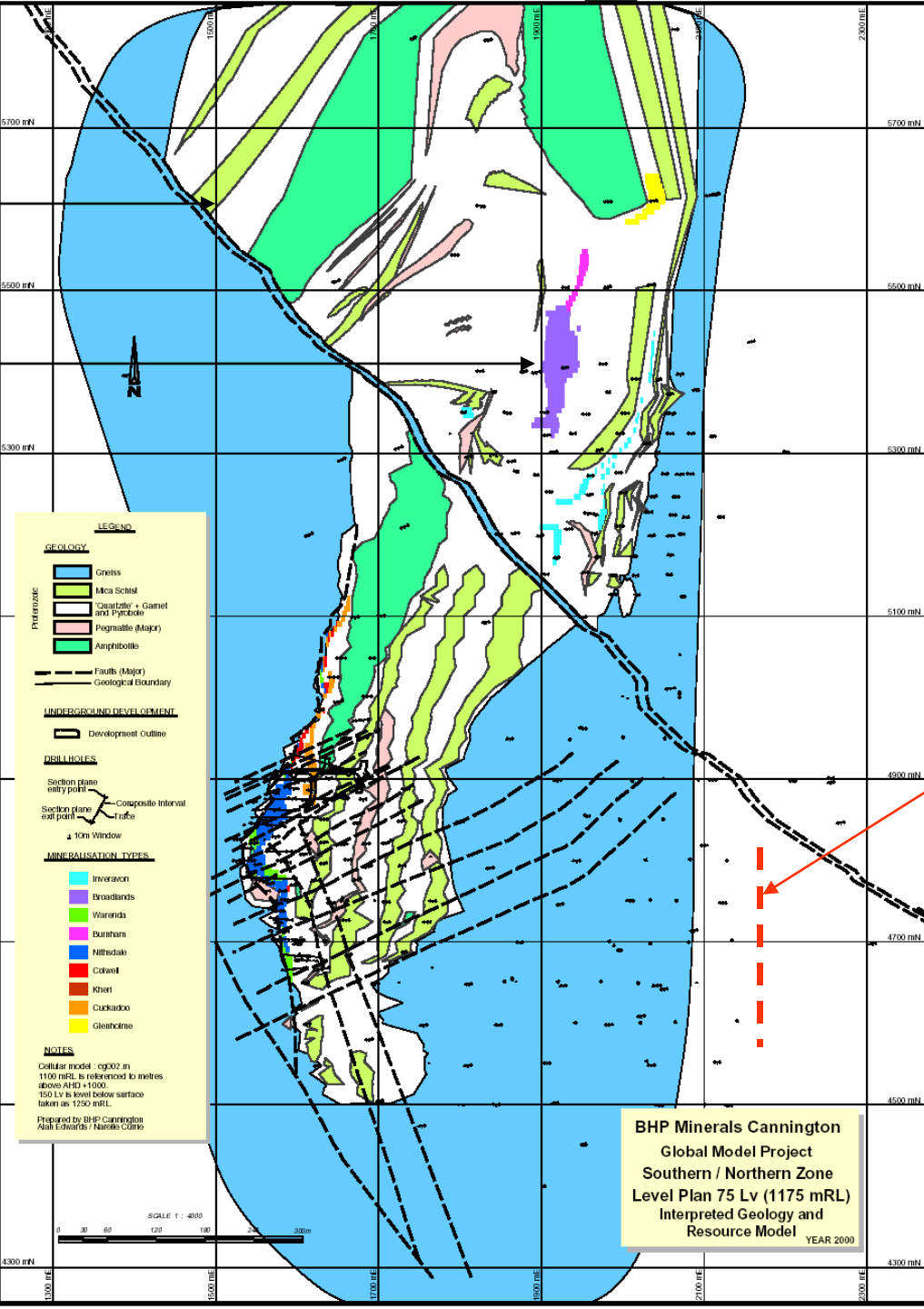
1900E

5500N

5100N

Approximate
eastern extension
of ore zone at
depth on line
4700N

4700N



LEGEND

GEOLOGY

- Gneiss
- Mica Schist
- Quartzite + Garnet and Pyroxene
- Pegmatite (Major)
- Amphibolite

UNDERGROUND DEVELOPMENT

- Development Outline

DRILLHOLES

- Section plane entry point
- Section plane exit point
- Composite interval of tube
- 10m Window

MINERALISATION TYPES

- Intrusion
- Broadlands
- Wairanda
- Burnham
- Niltedale
- Colwell
- Khari
- Cuckadoo
- Giesholme

NOTES

Cellular model - 1000m
1100 mRL is referenced to metres above AHD +1000.
150 Lv is level below surface taken as 1250 mRL.

Prepared by BHP Cannington
Alan Edwards / Narelle Curno

BHP Minerals Cannington
Global Model Project
Southern / Northern Zone
Level Plan 75 Lv (1175 mRL)
Interpreted Geology and
Resource Model
YEAR 2000

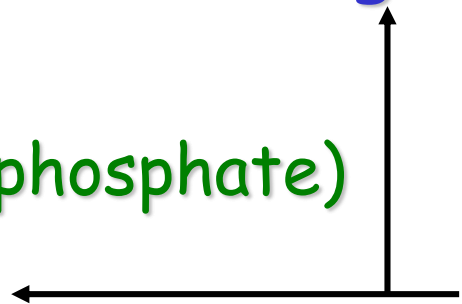
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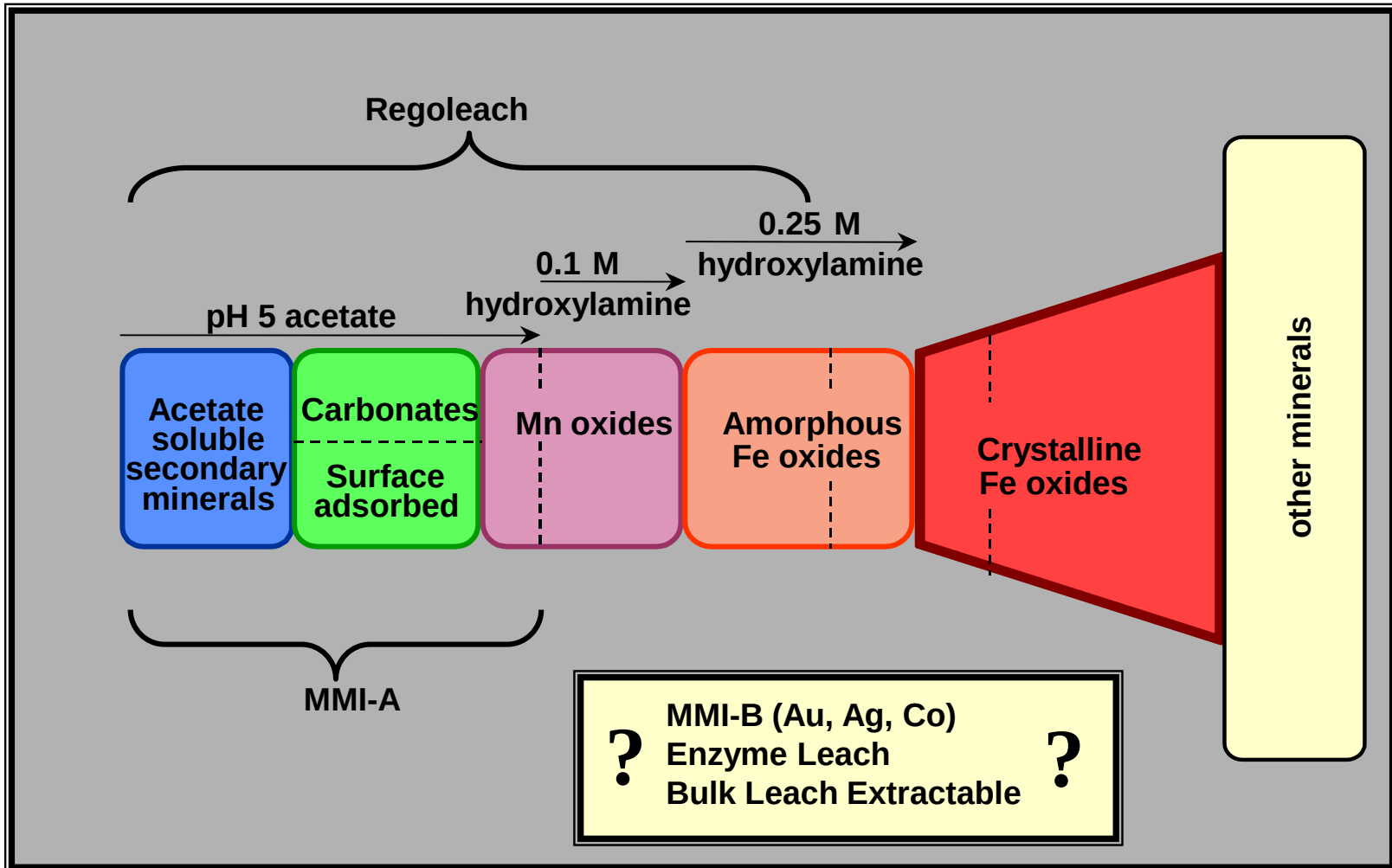
Sampling

- Bulk available for 50%
- >100 μm for 100%
- Sealed in plastic bags
- Collected all splits (up to 10)

"Conventional" Mineral Phases

- Weakly bonded metals
 - e.g., oxide surfaces, cation exchangeable, bound to organic matter.
 - Within organic matter (pyrophosphate)
 - Carbonates (pH 5 acetate)
 - Mn oxides (0.1 M hydroxylamine)
 - Amorphous Fe oxides (0.25 M hydroxylamine)
 - Crystalline Fe oxides (1 M hydroxylamine or citrate dithionite)
- 

Soil phases dissolved by selective and acid extractions

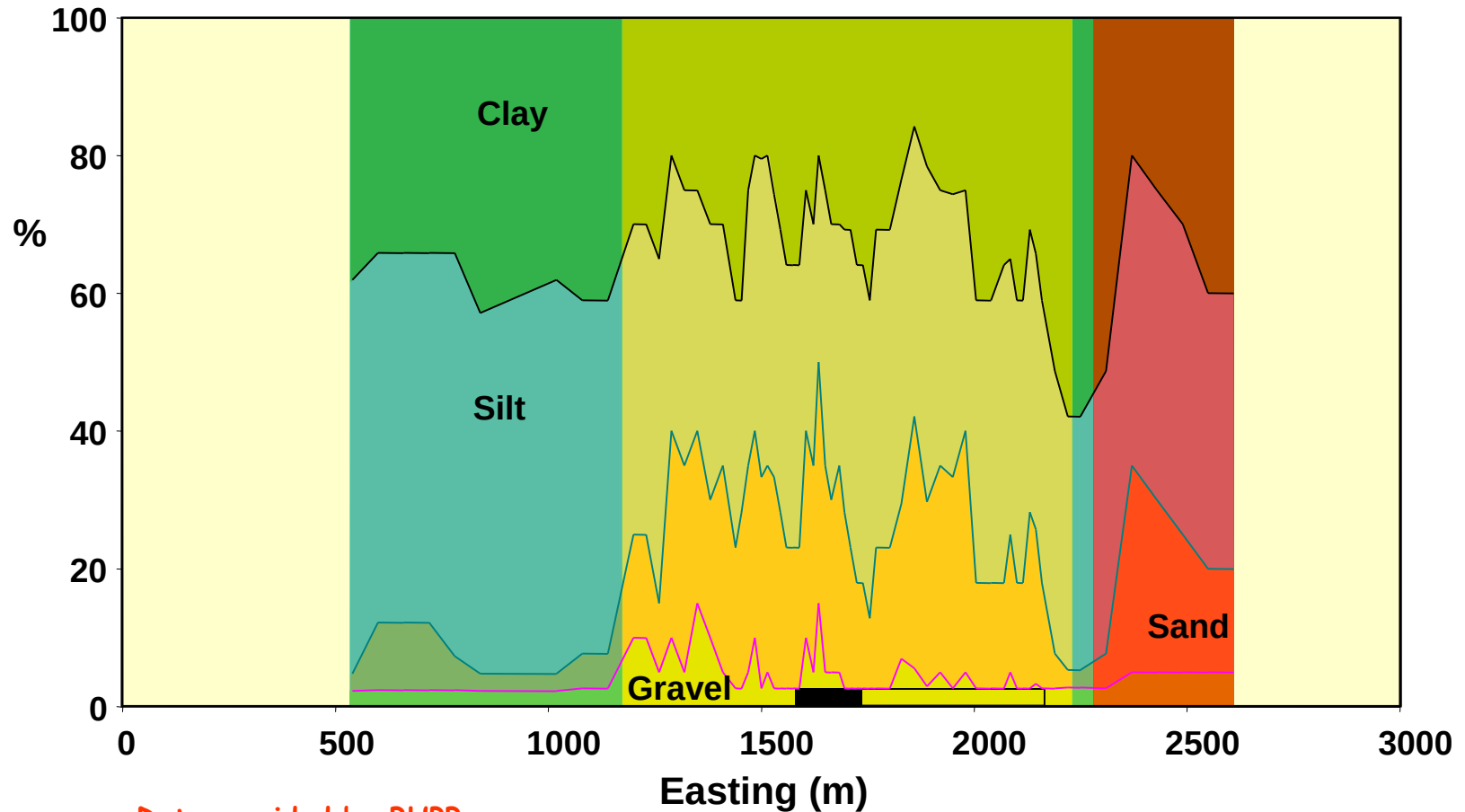


Particle size - Cannington

clay-silt

gravel-sands

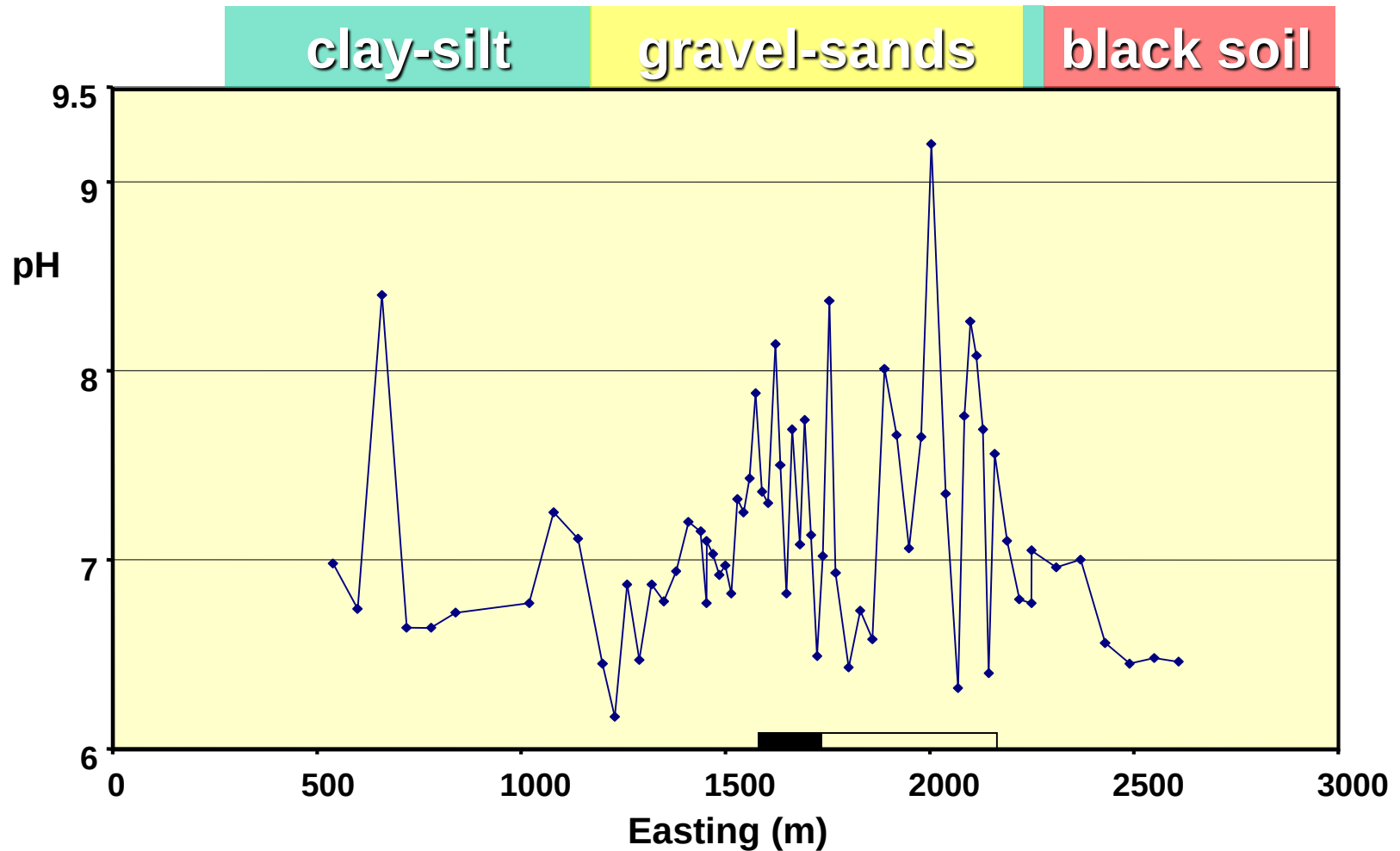
black soil



Data provided by BHPB

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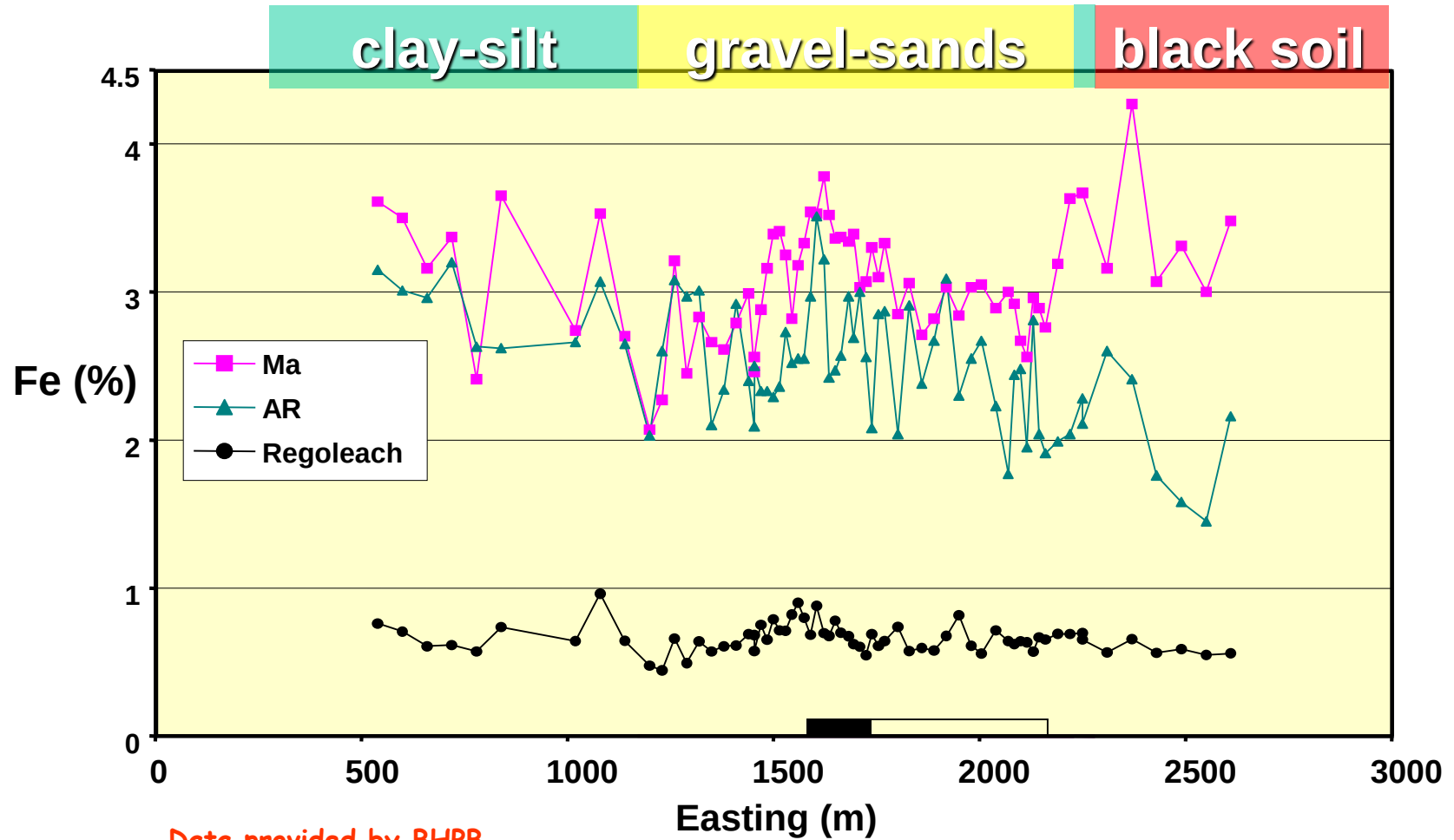
pH - Cannington



Data provided by BHPB

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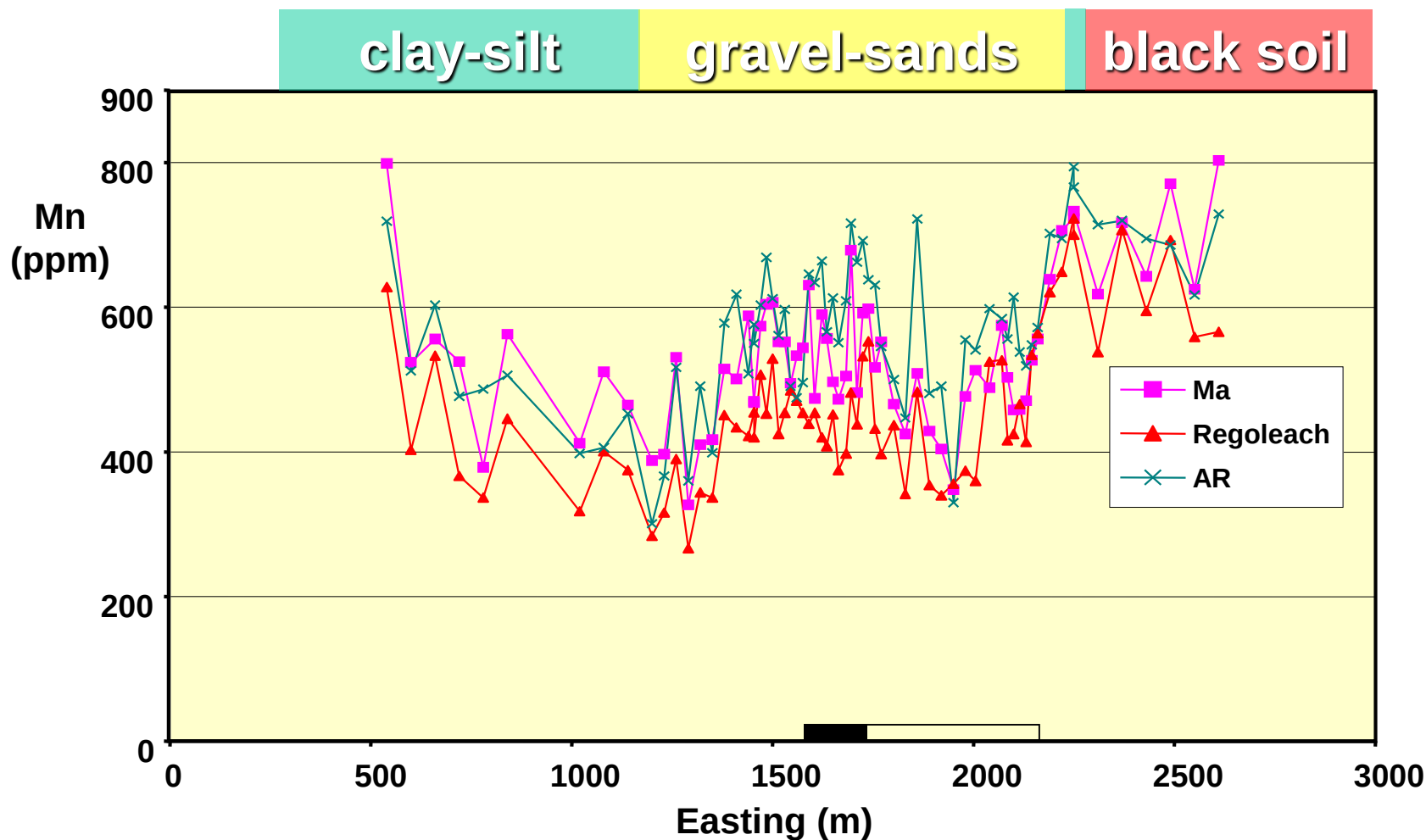
Fe - Cannington



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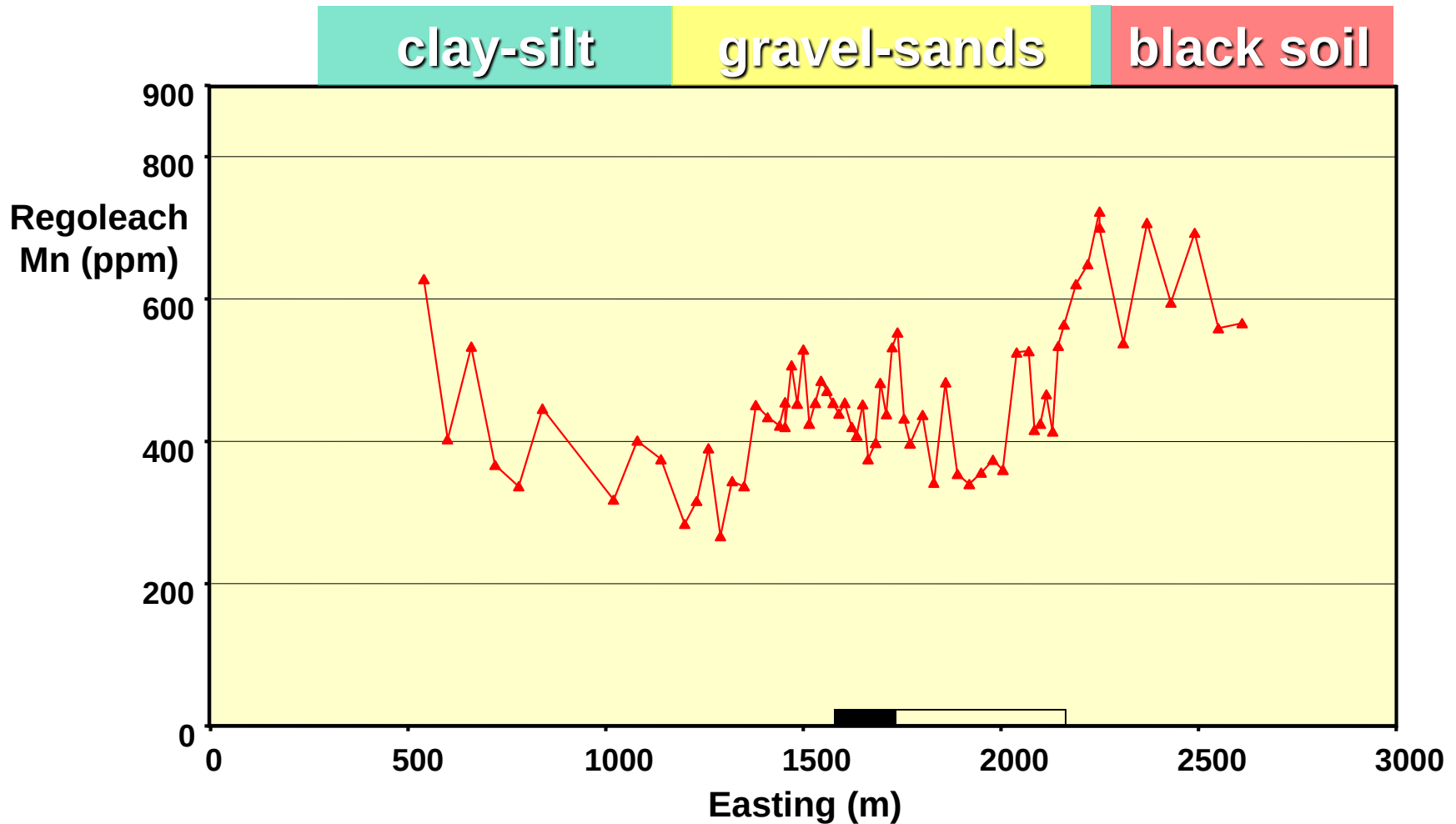
Mn - Cannington



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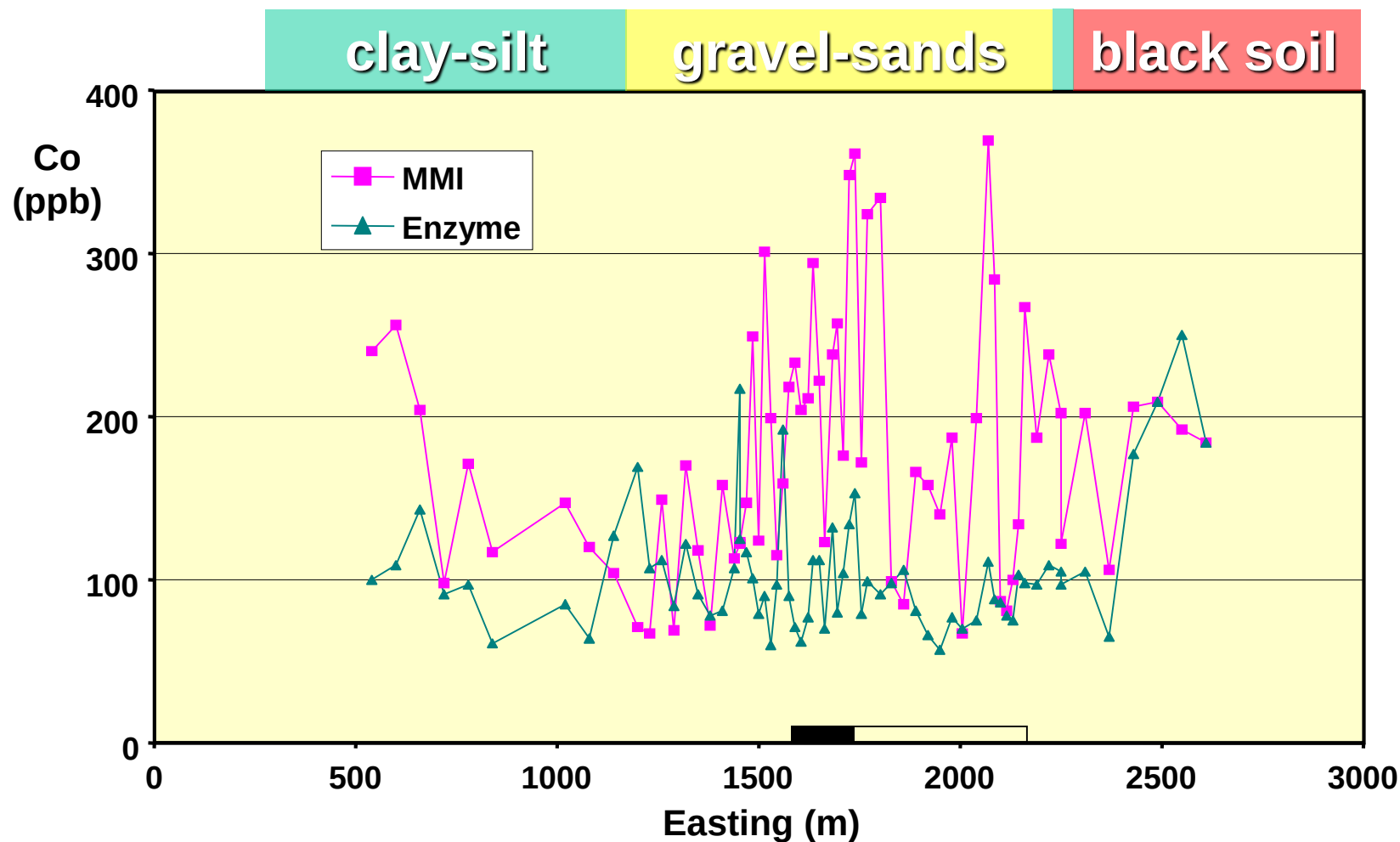
Regoleach Mn - Cannington



Data provided by BHPB

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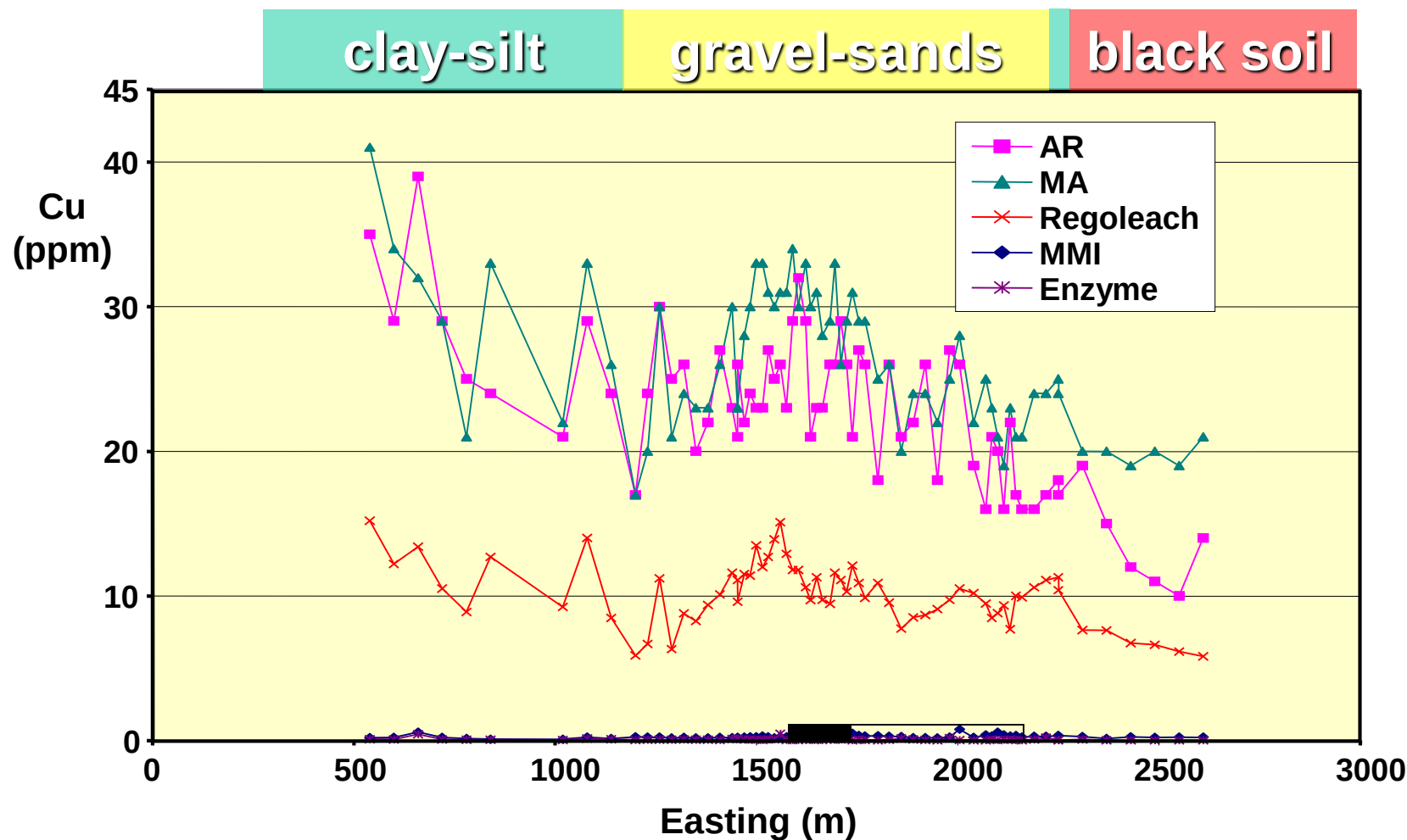
Co - Cannington



Data provided by BHPB

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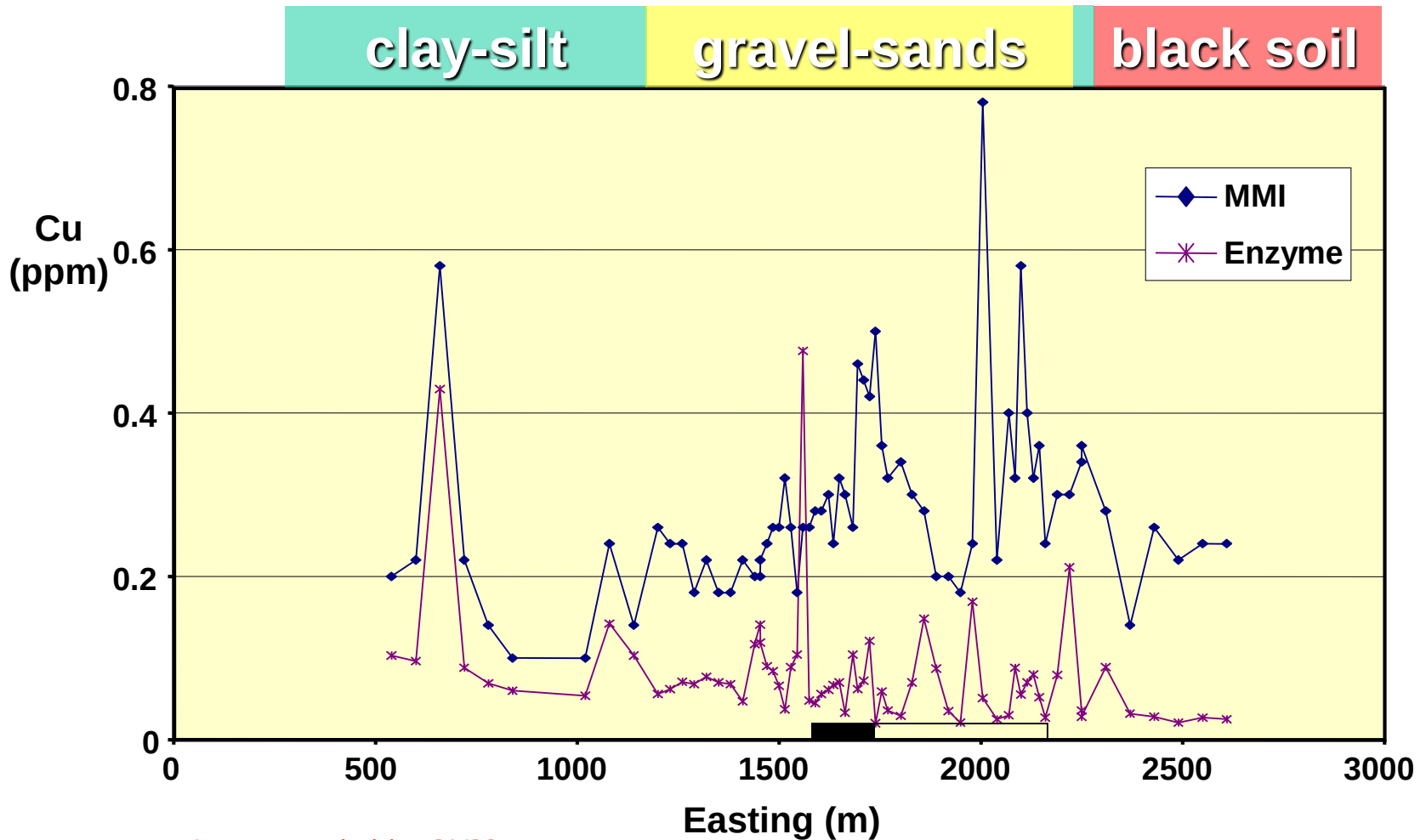
Cu - Cannington 1



Data provided by BHPB

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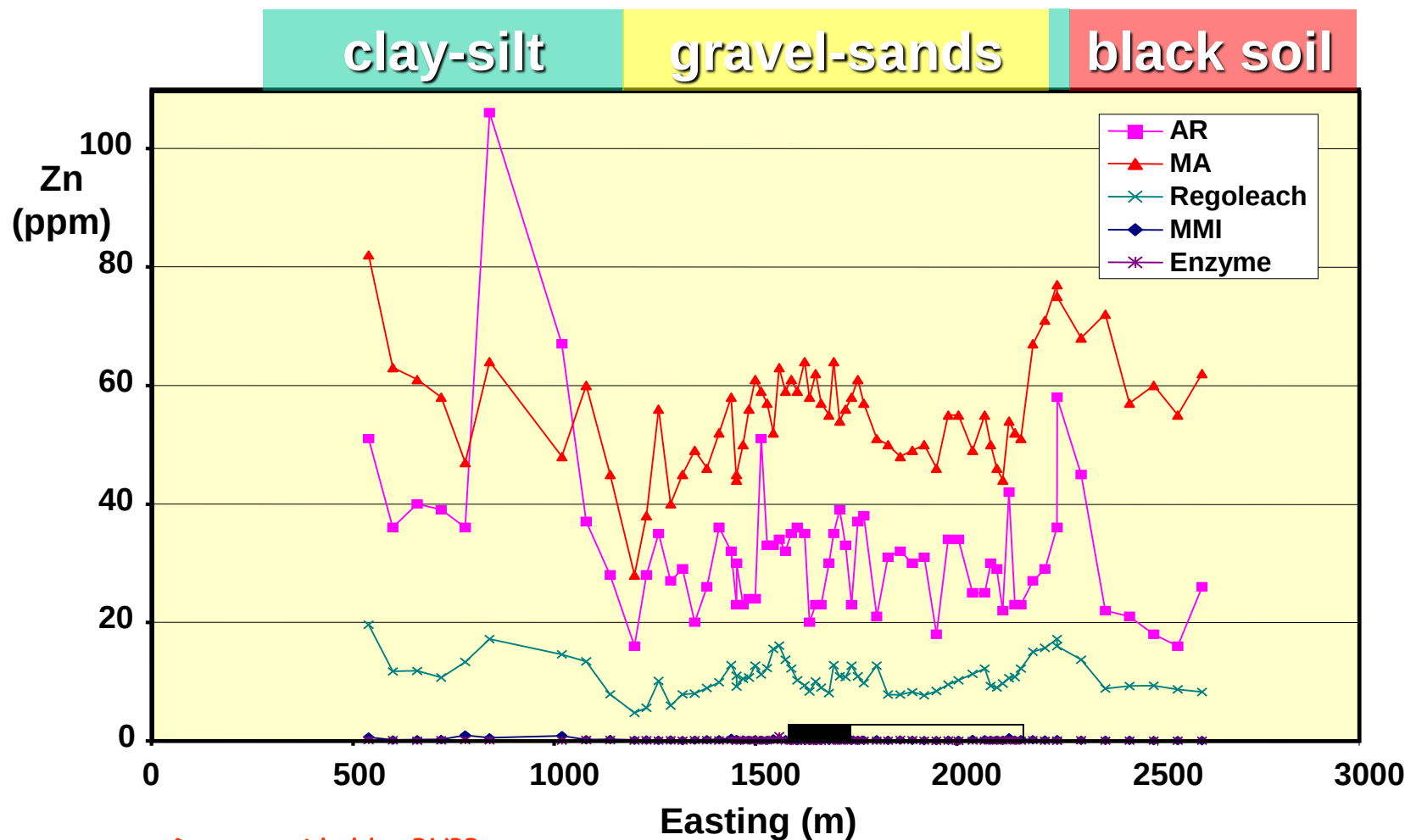
Cu - Cannington 2



Data provided by BHPB

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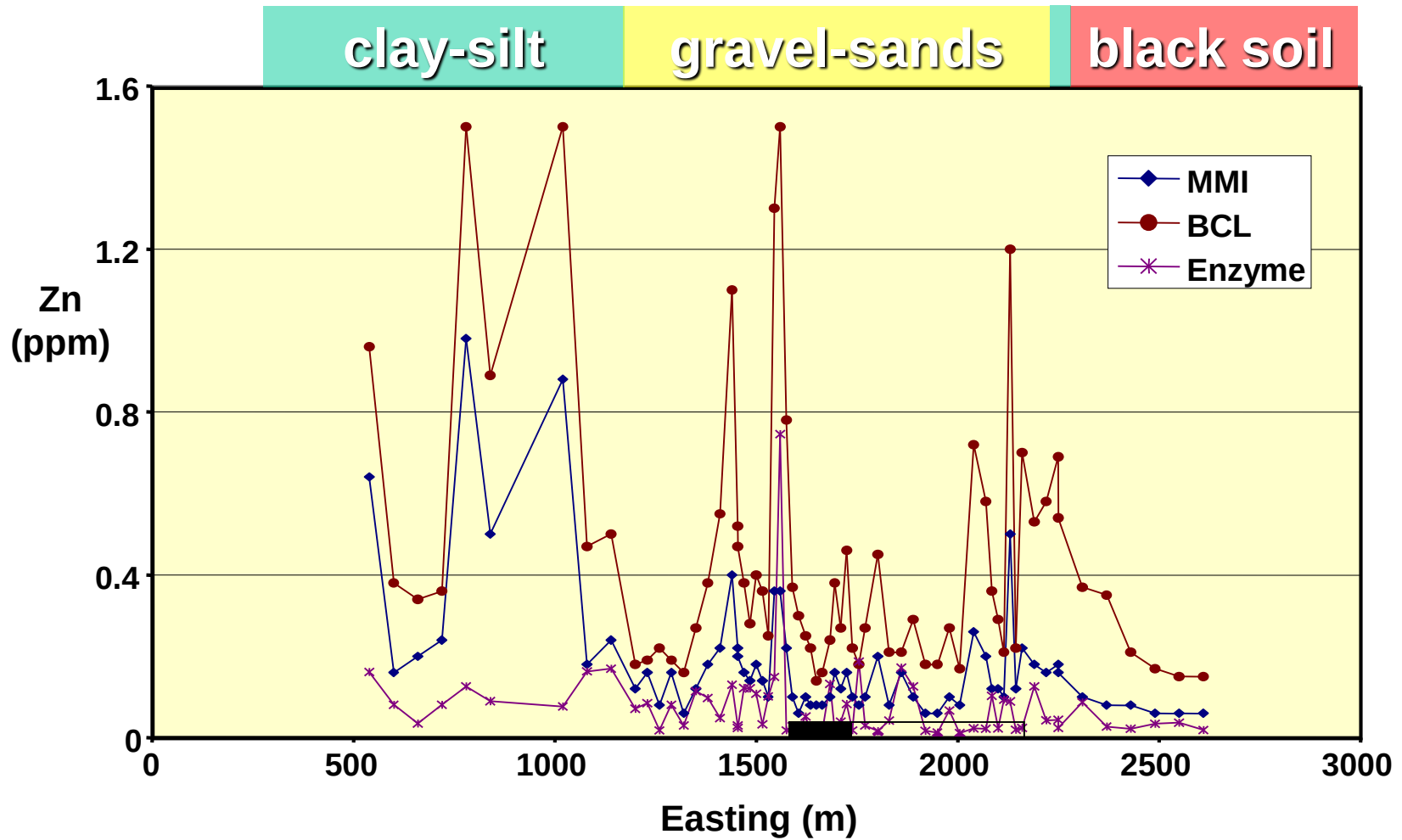
Zn - Cannington 1



Data provided by BHPB

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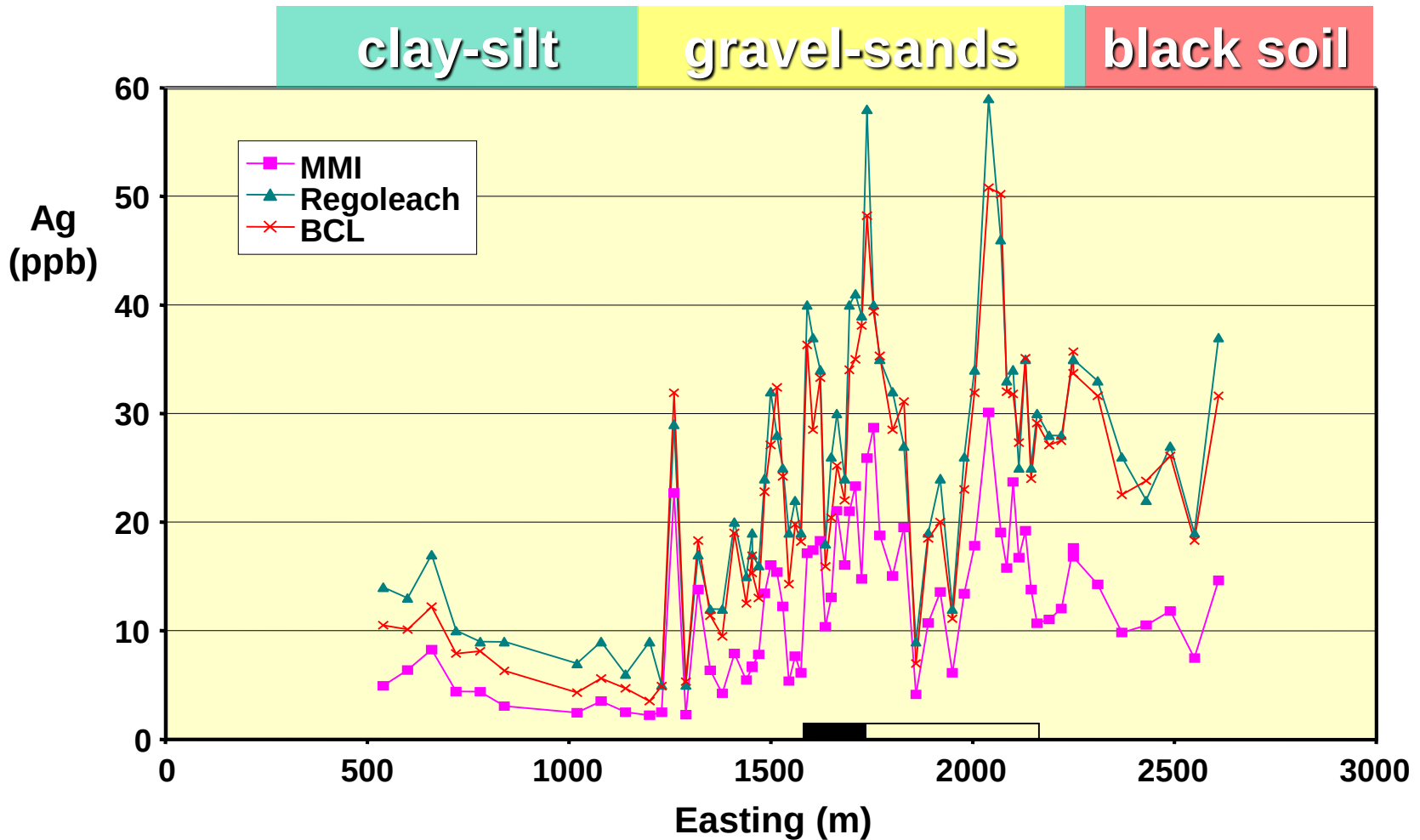
Zn - Cannington 2



Data provided by BHPB

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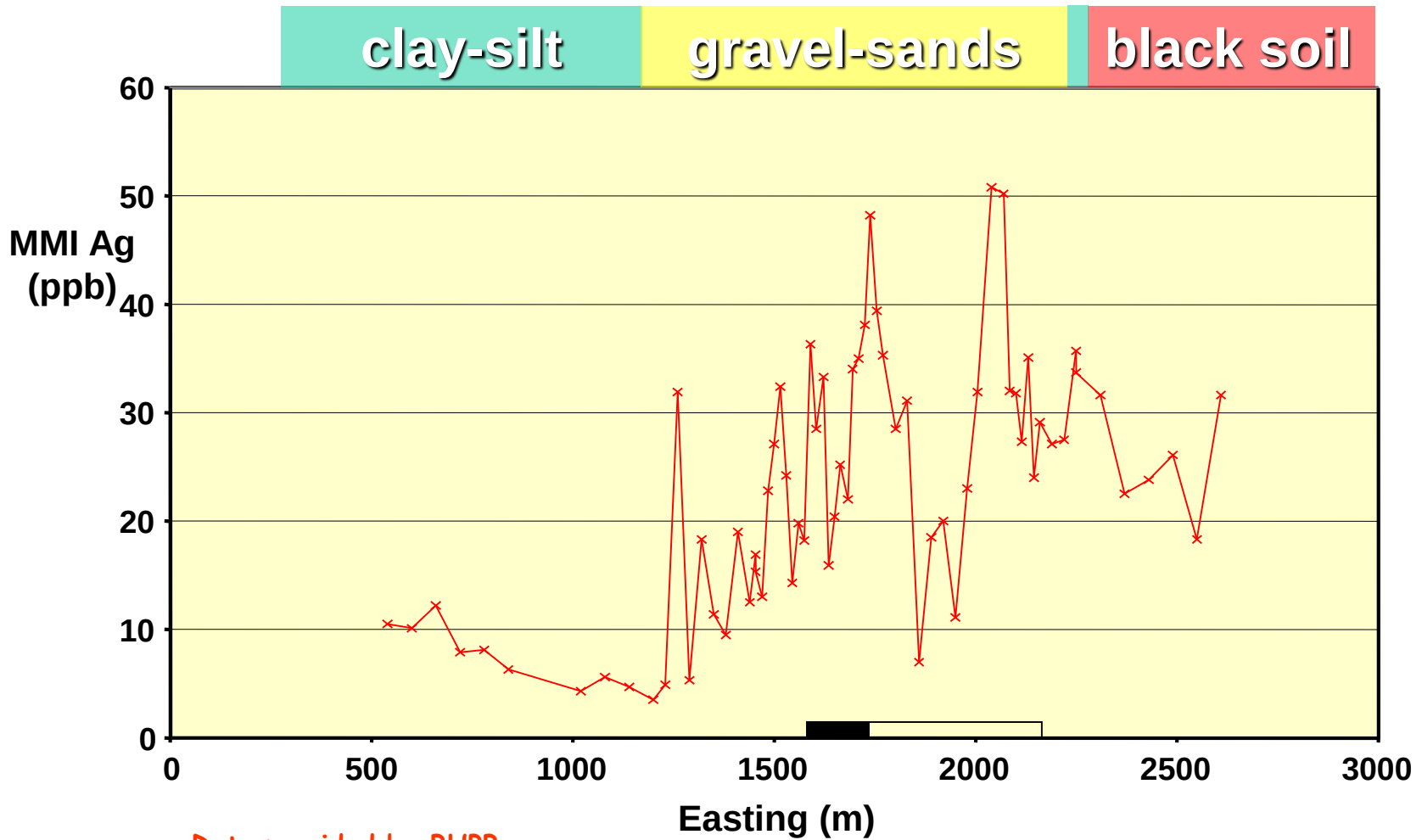
Ag - Cannington



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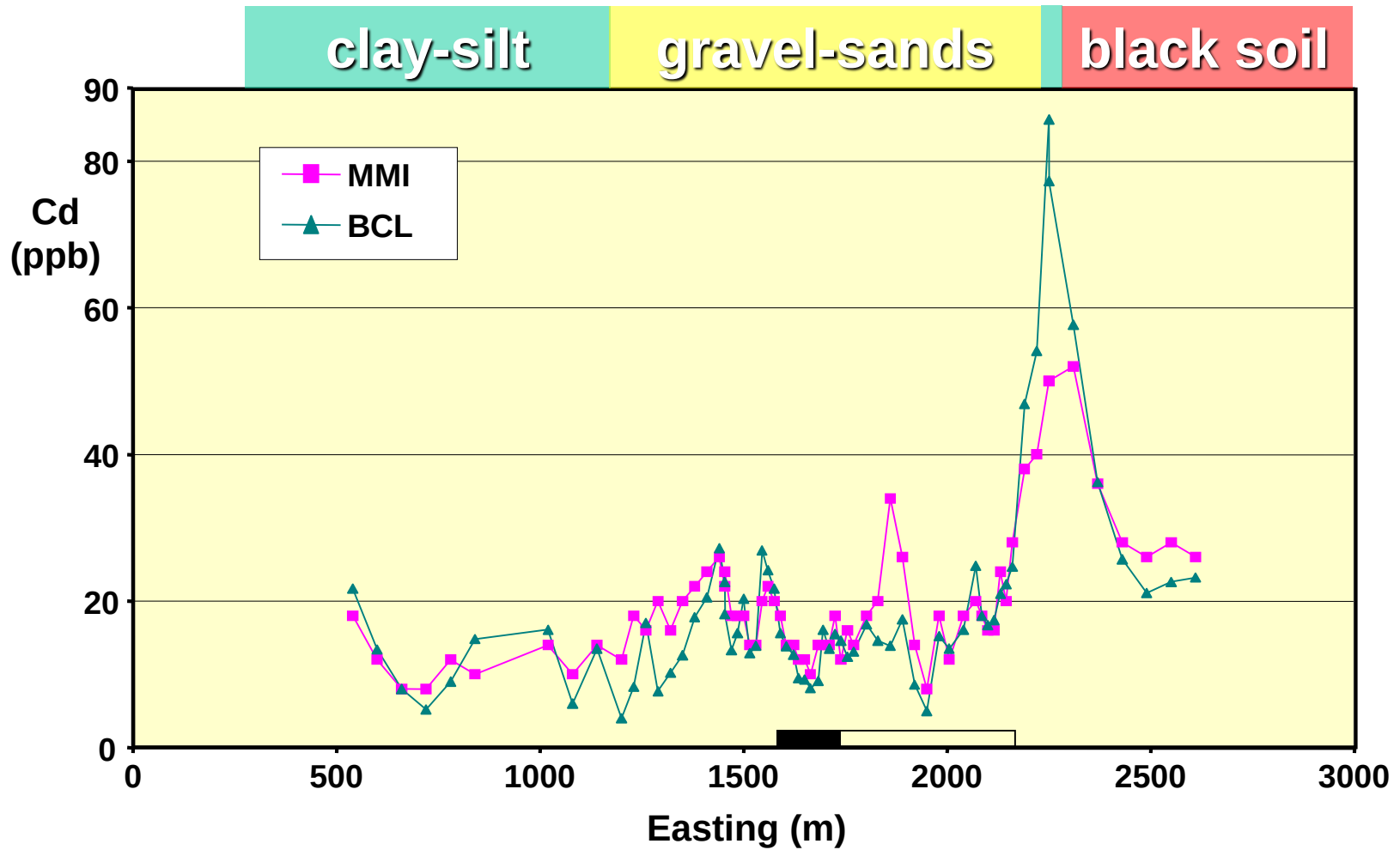
MMI Ag - Cannington



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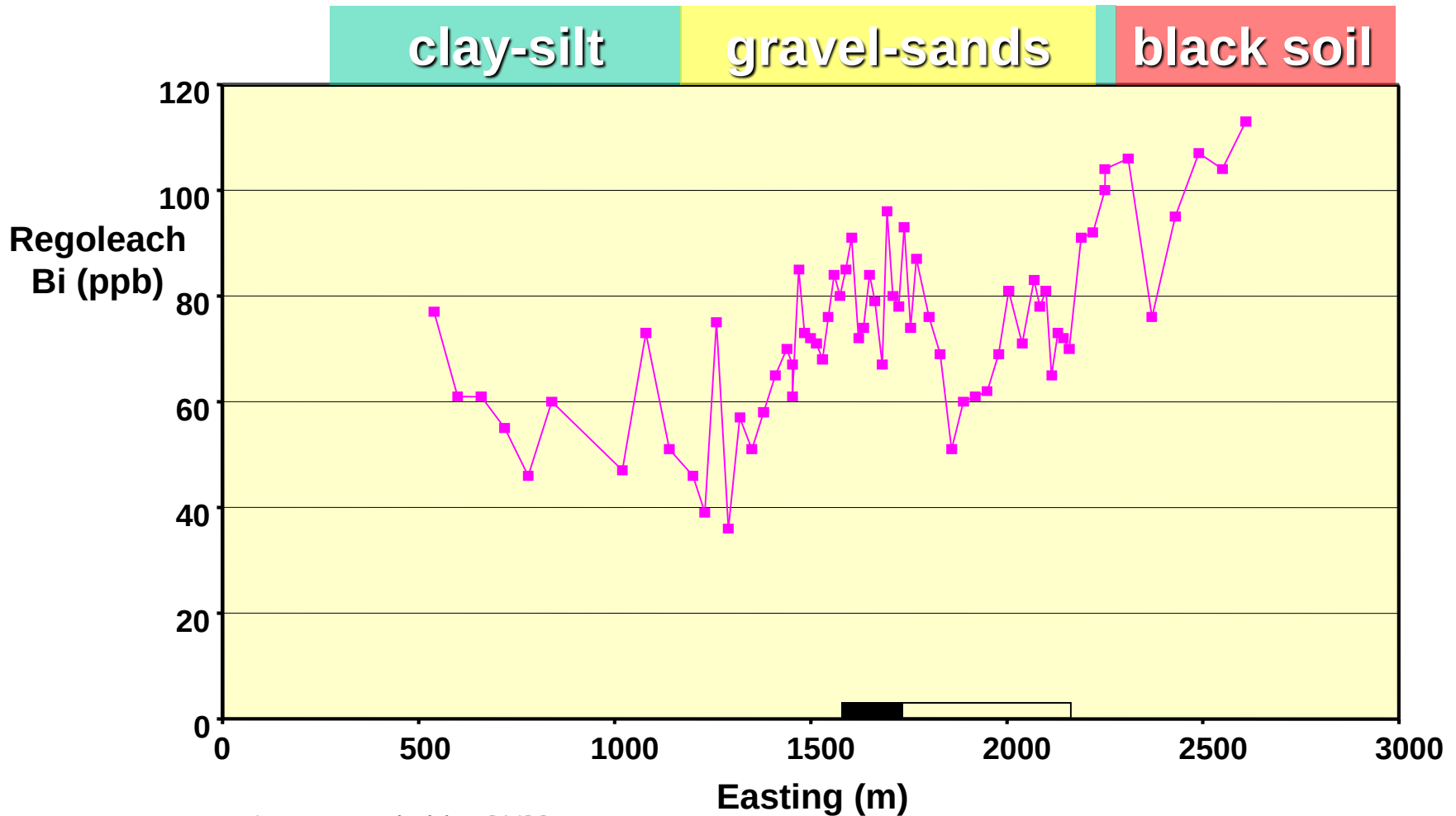
Cd - Cannington



Data provided by BHPB

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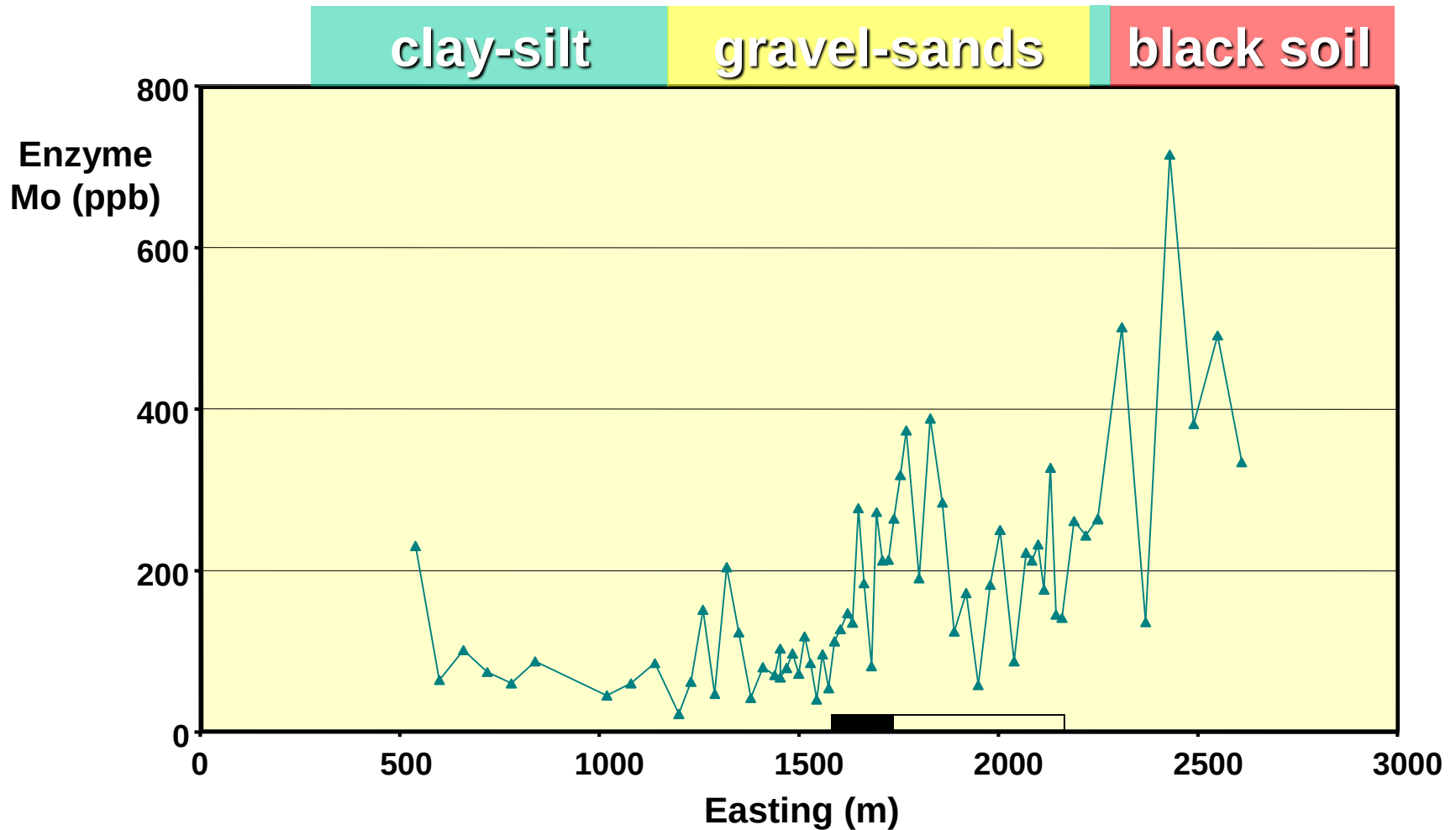
Regoleach Bi - Cannington



Data provided by BHPB

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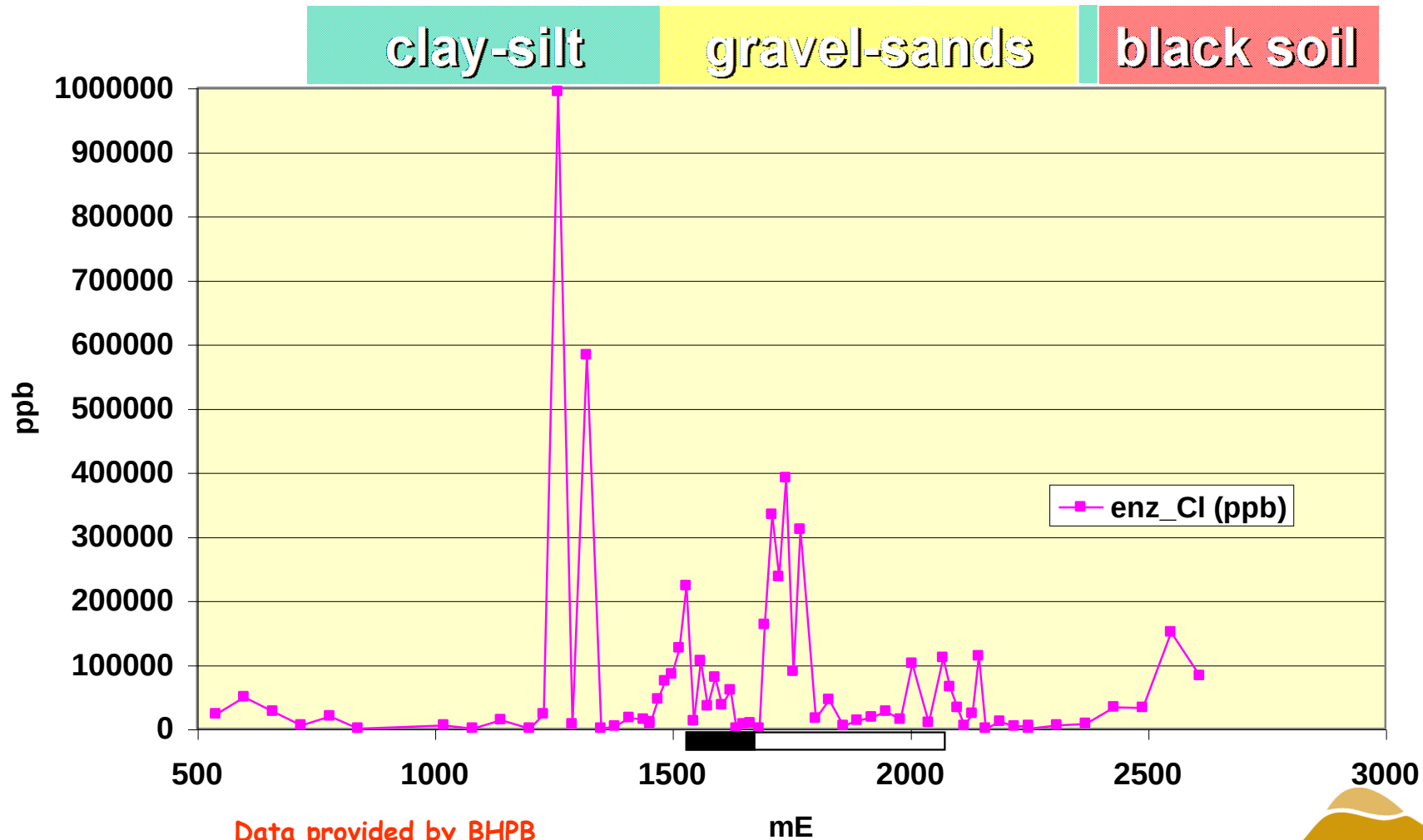
Enzyme Mo - Cannington



Data provided by BHPB

P618 Meeting 25/7/02

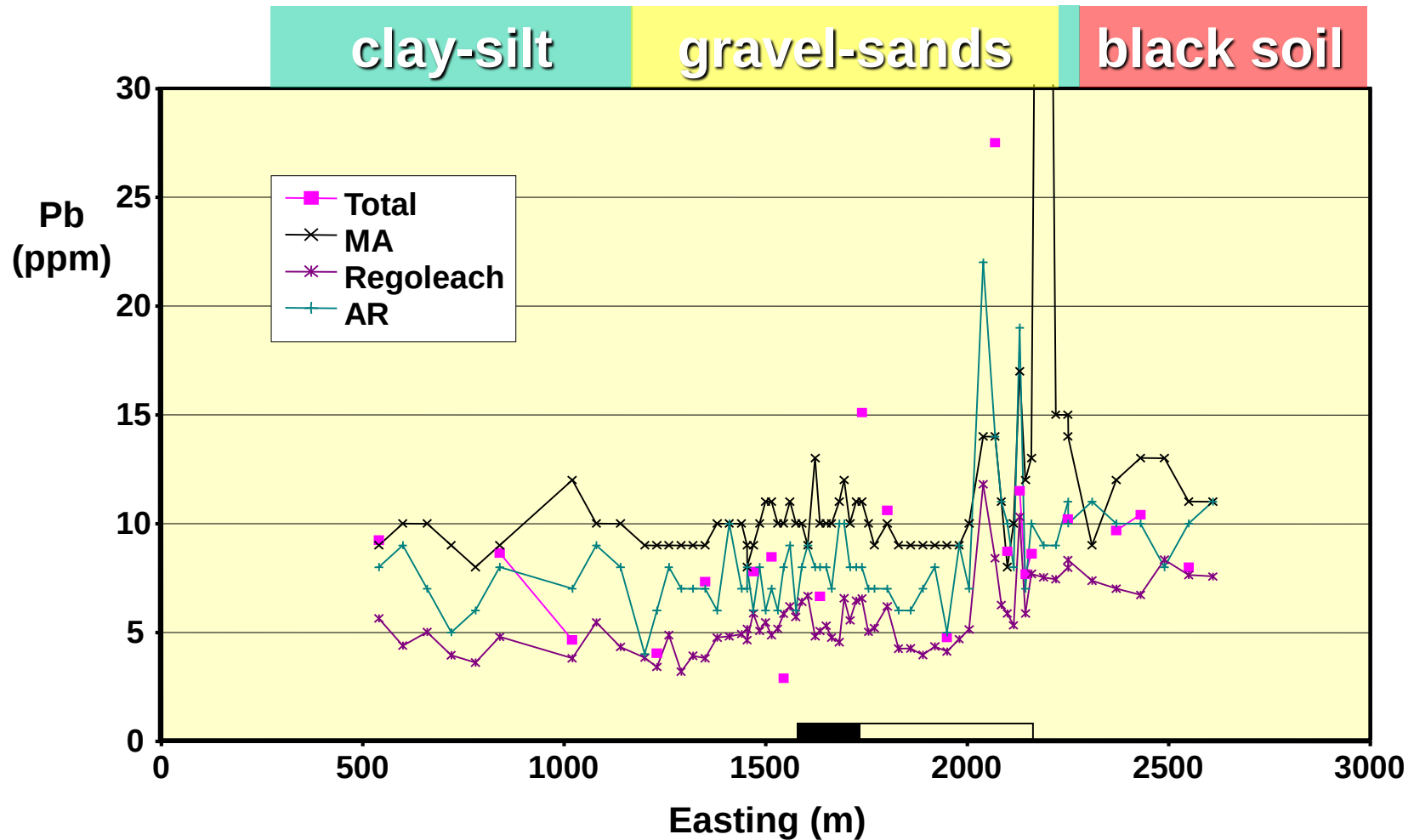
Enzyme Cl - Cannington



Data provided by BHPB

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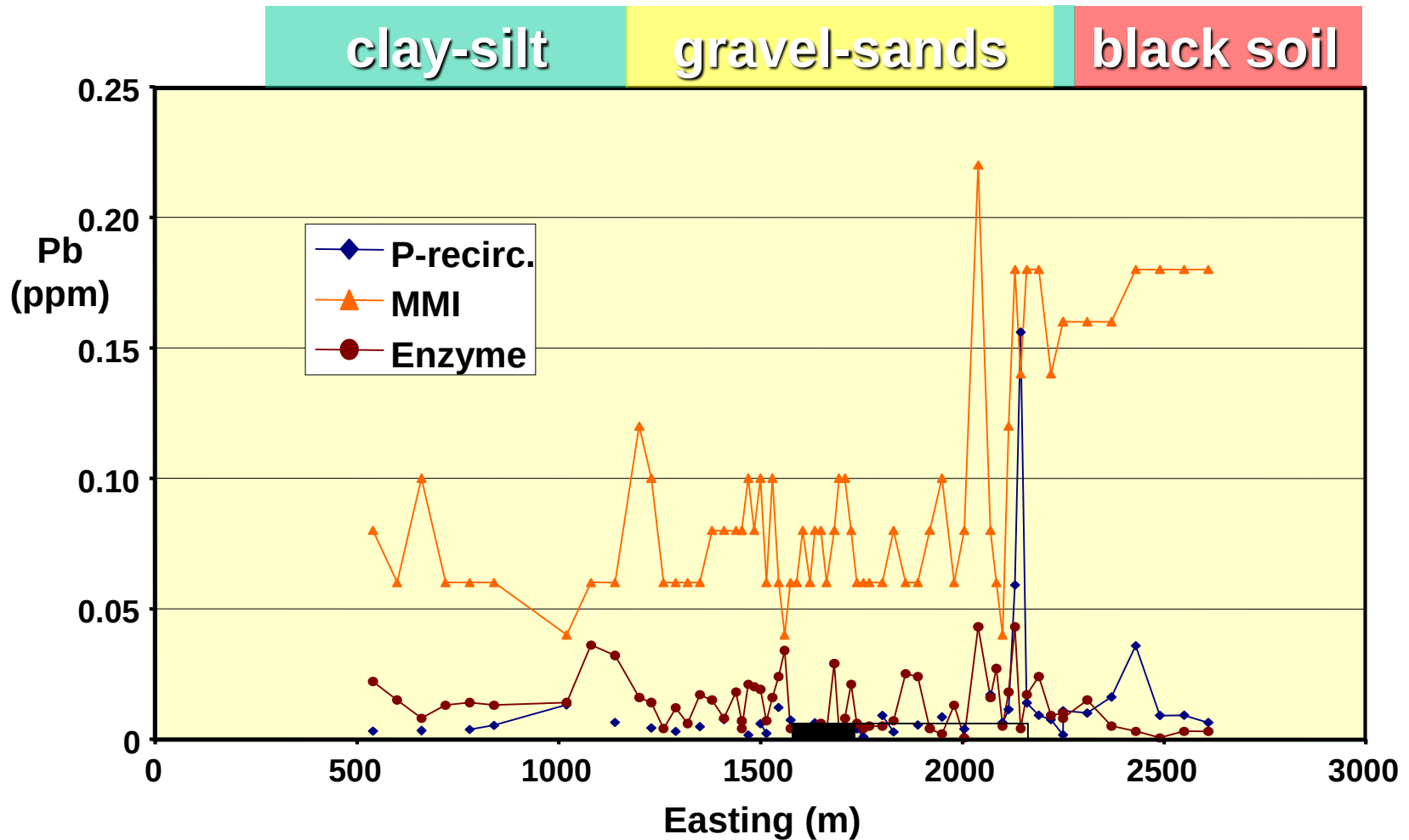
Pb - Cannington 1



Totals - CSIRO P618 data
Other data provided by BHPB

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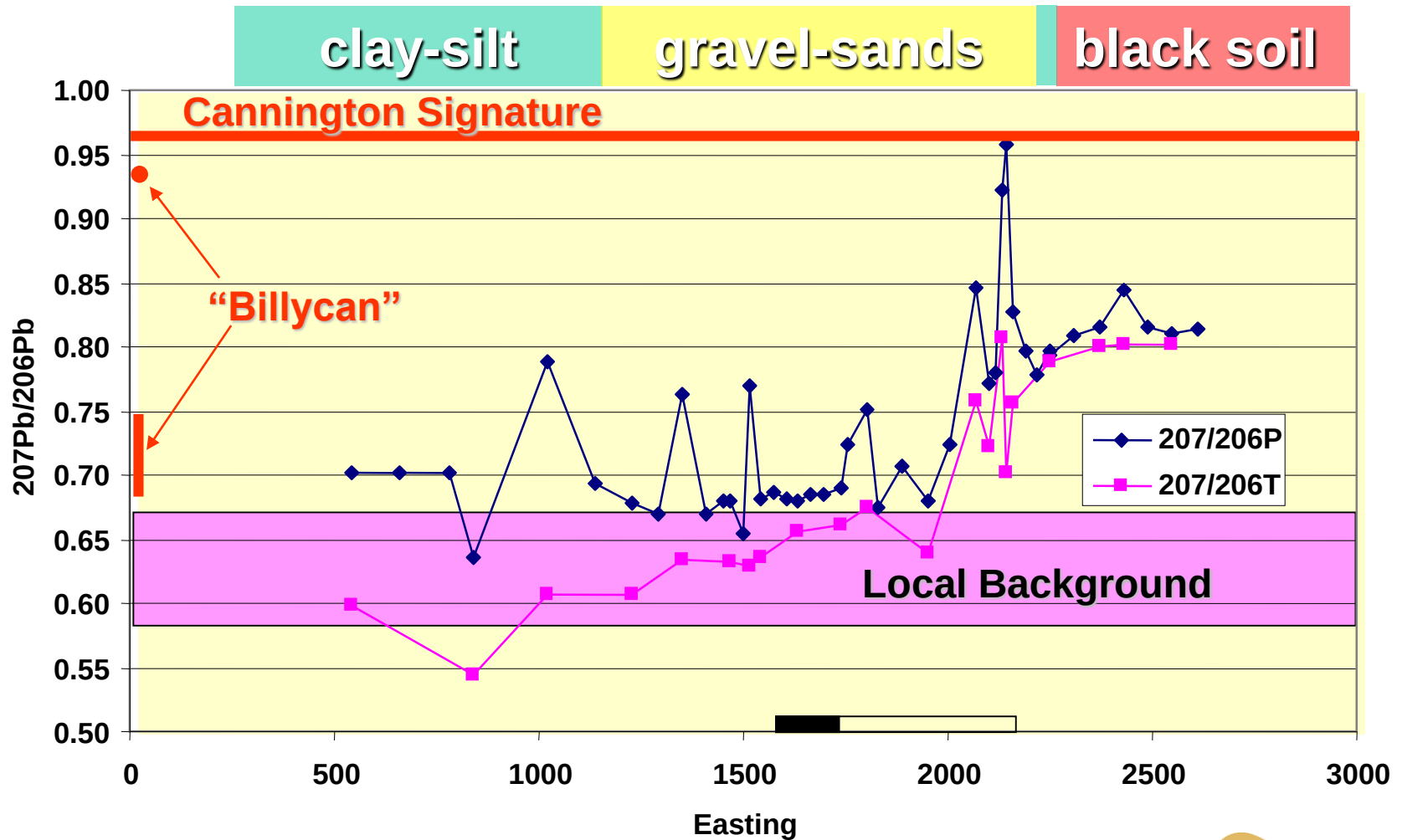
Pb - Cannington 2



P-recirc. - CSIRO P618 data
Other data provided by BHPB

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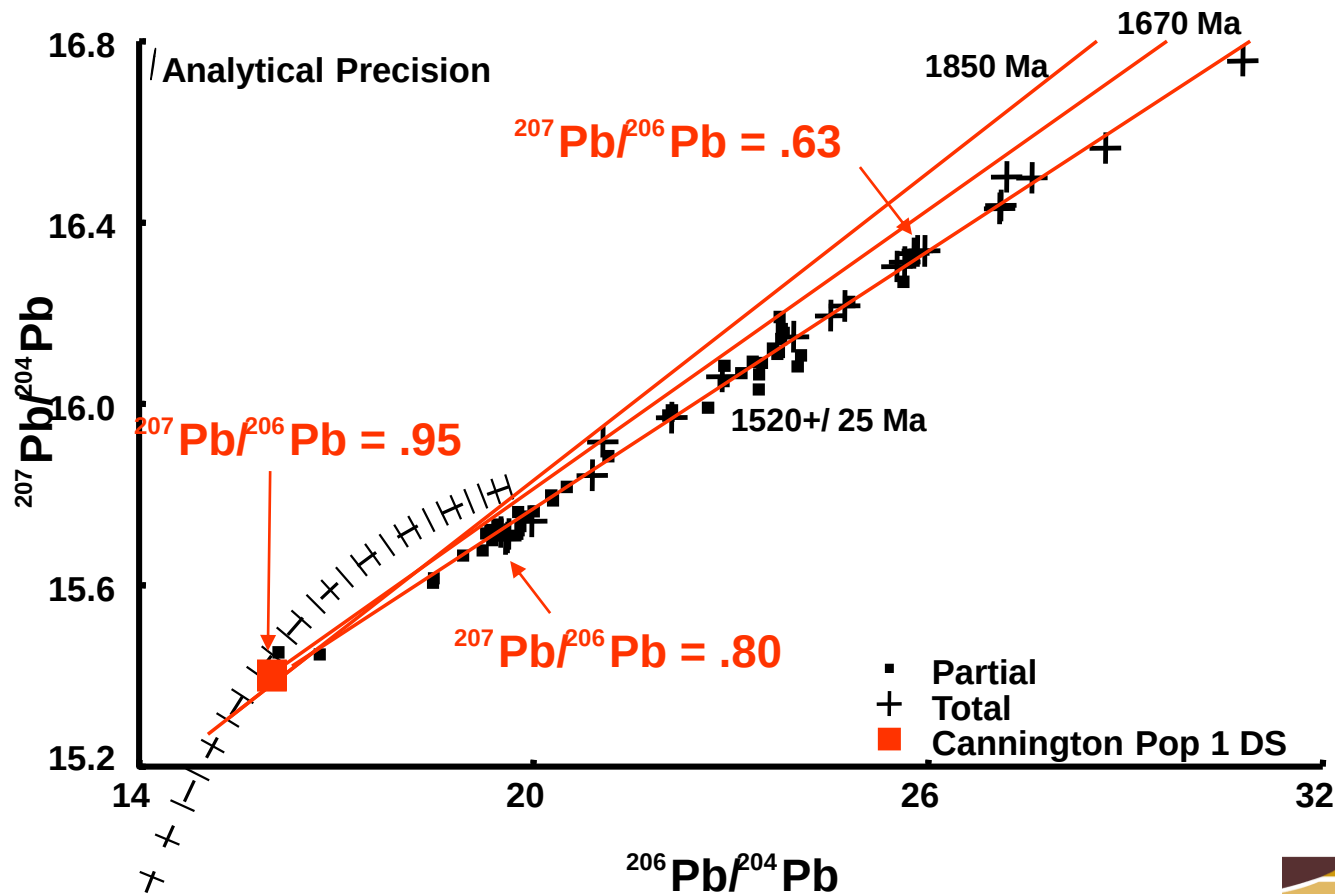
$^{207}\text{Pb}/^{206}\text{Pb}$ Partial & Total



CSIRO & P618 data

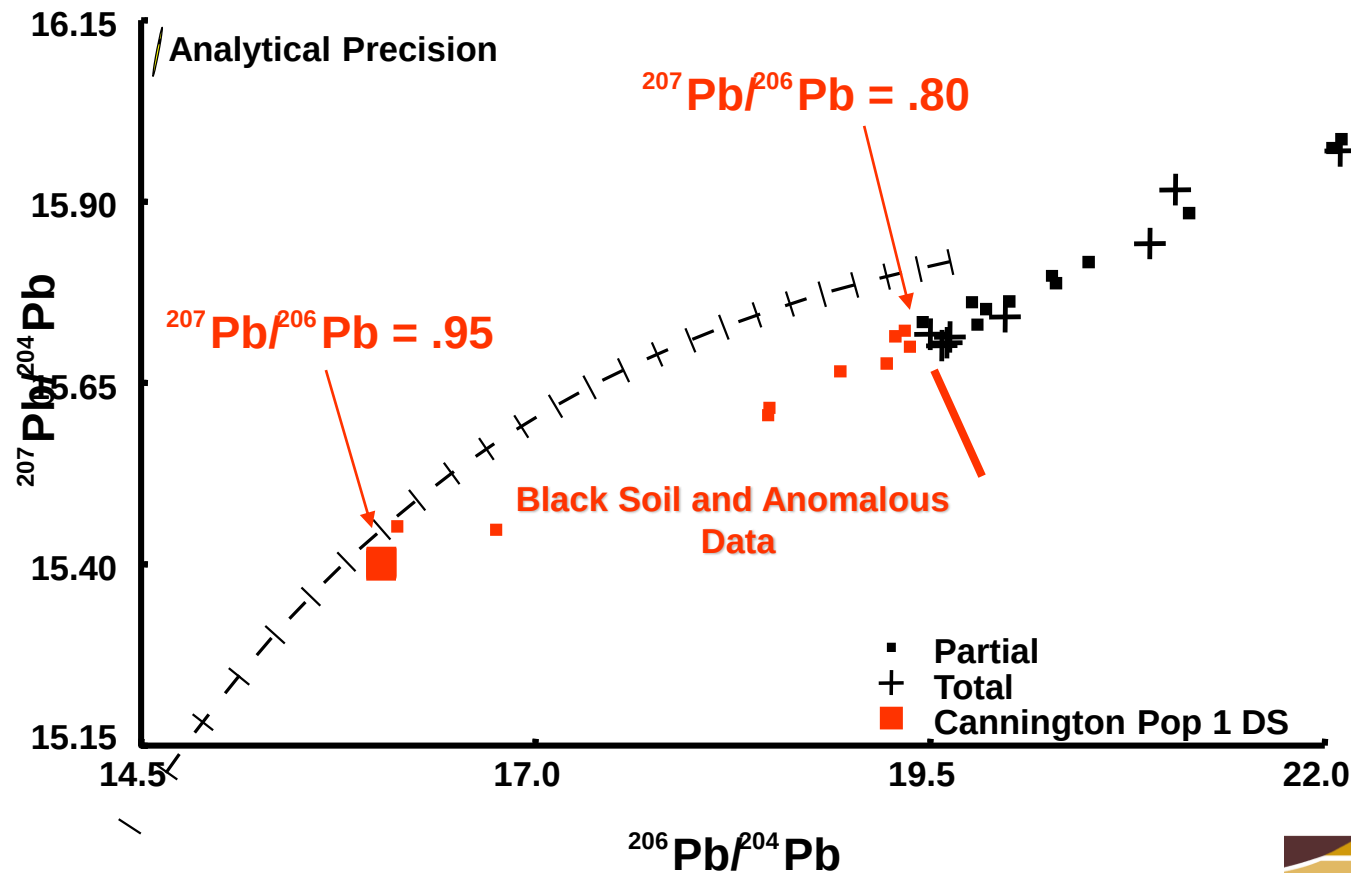
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Total Pb Isotope Data



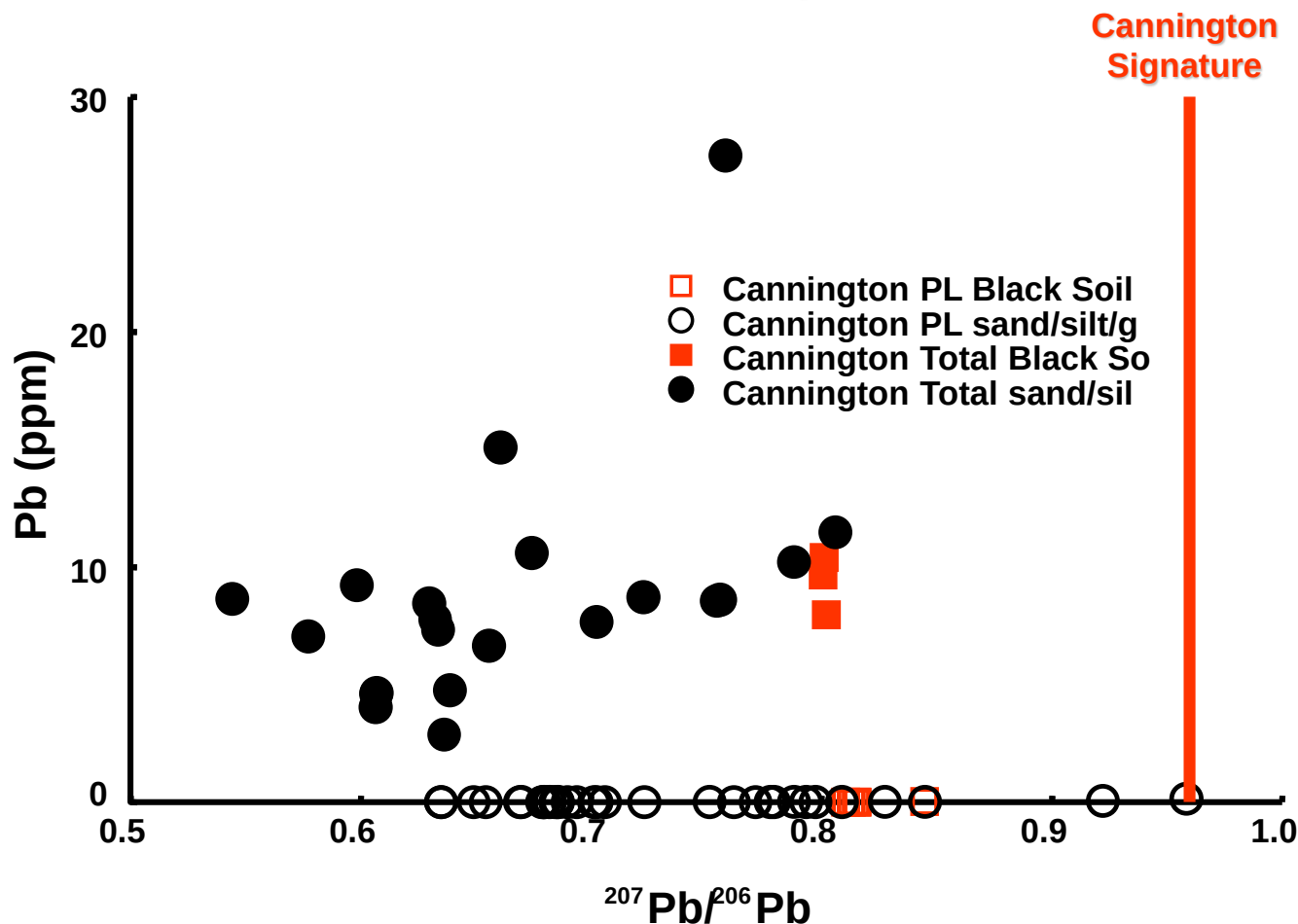
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Anomalous Data

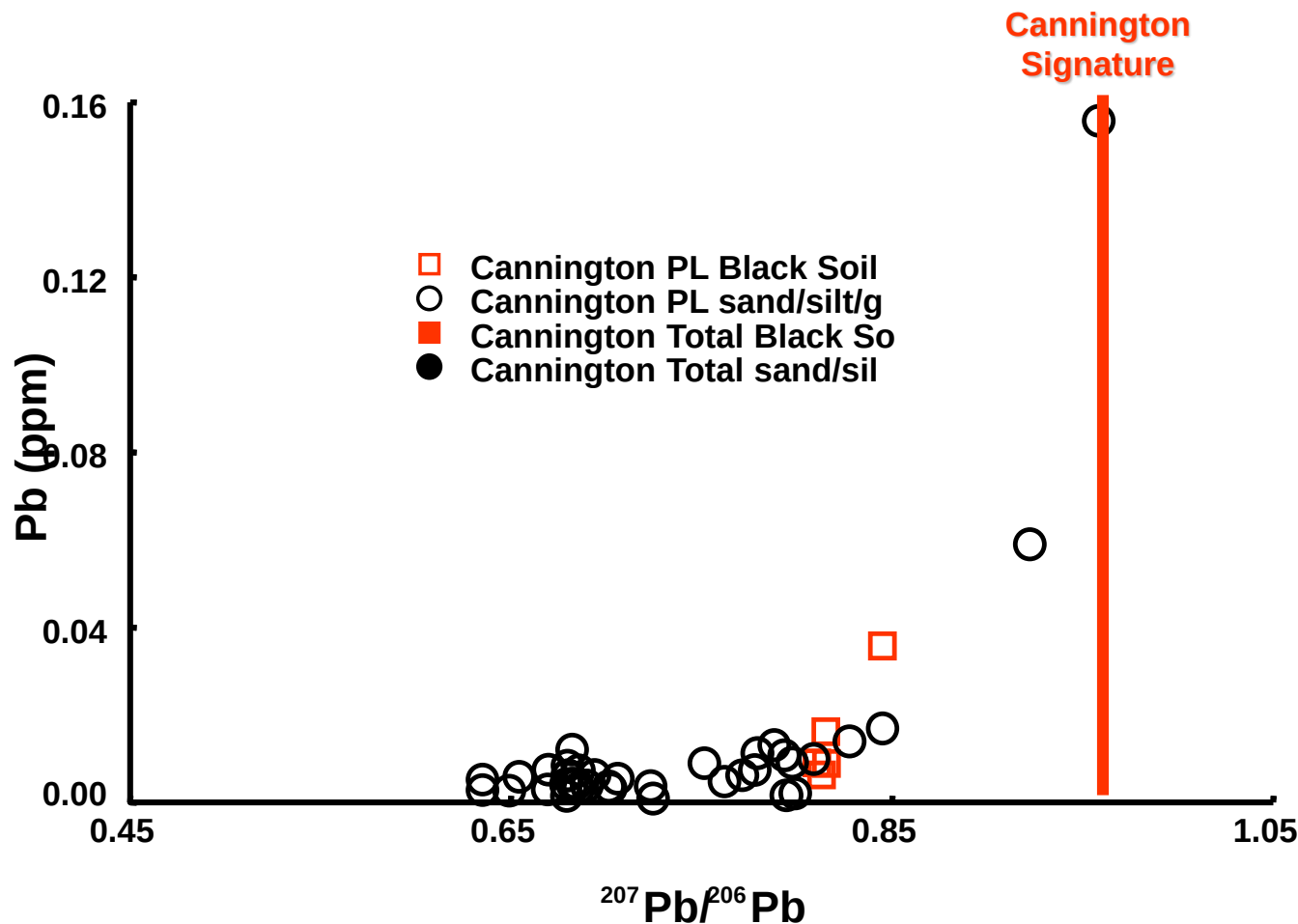


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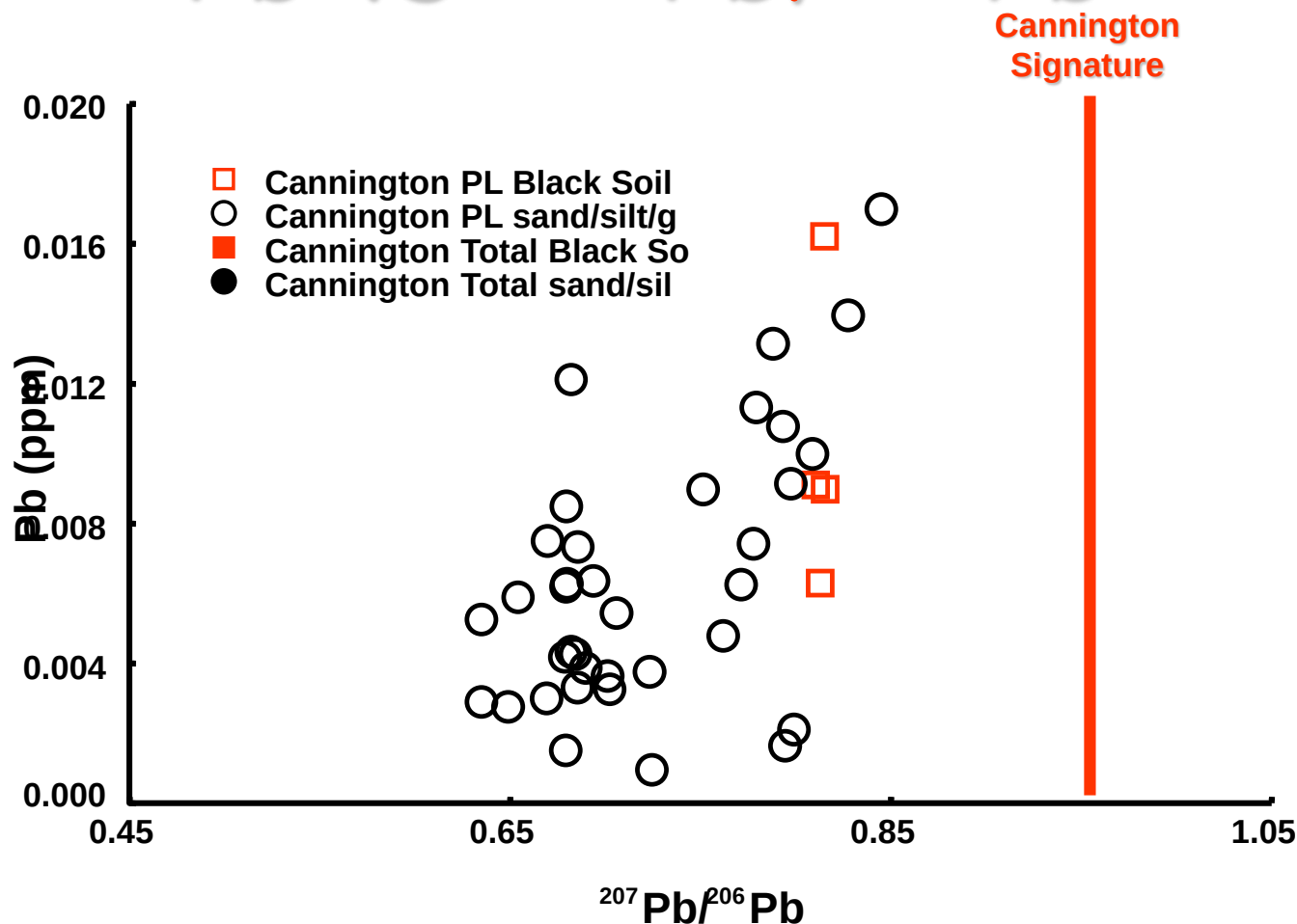
Pb vs $^{207}\text{Pb}/^{206}\text{Pb}$



Pb vs $^{207}\text{Pb}/^{206}\text{Pb}$



Pb vs $^{207}\text{Pb}/^{206}\text{Pb}$



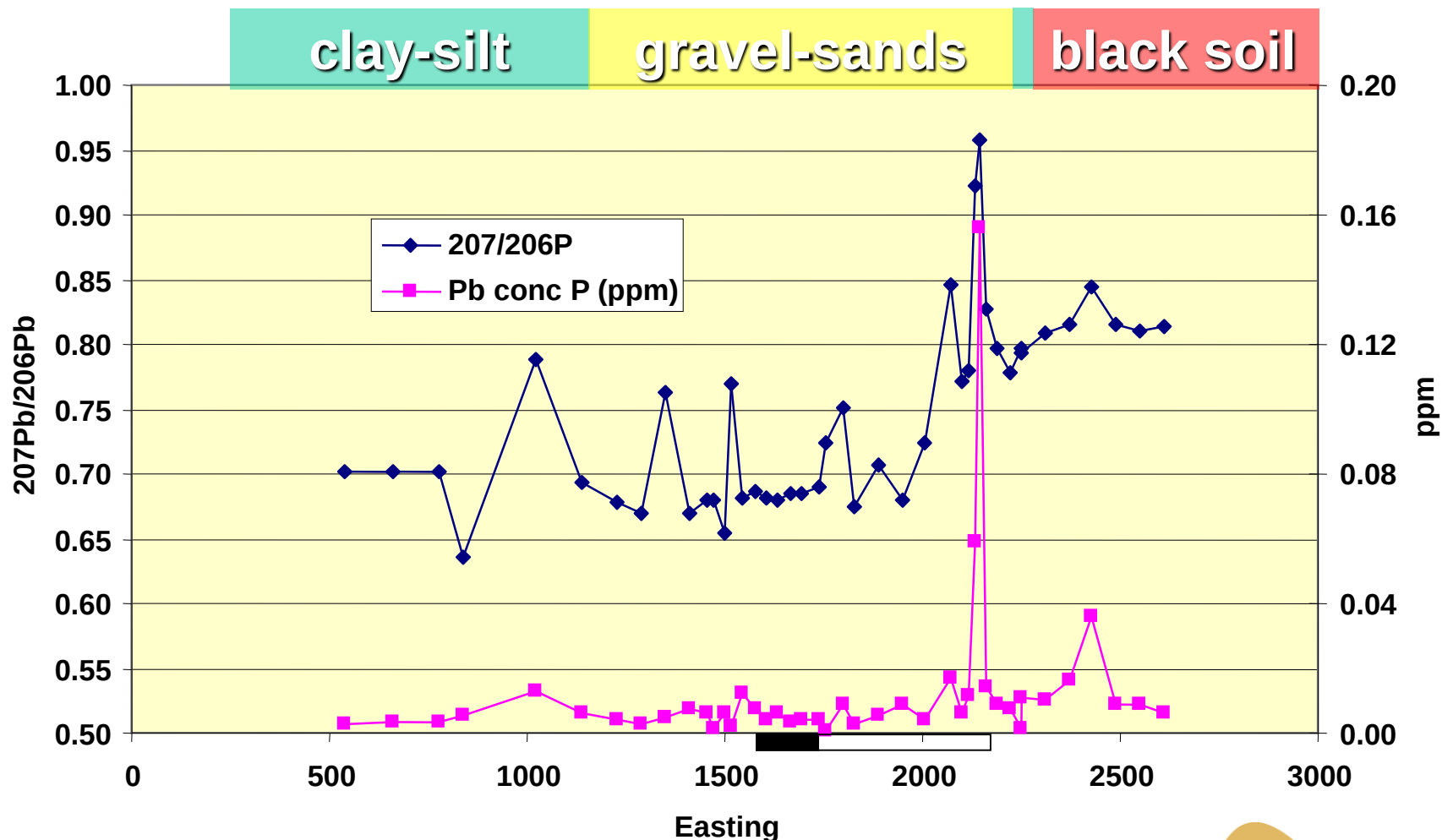
Pb Isotope Observations

1. Sand/silt/gravel AR leaches represent local Pb isotope background
2. Partial leaches in sand/silt/clay have higher $^{207}\text{Pb}/^{206}\text{Pb}$ - at least 2 sources of Pb - mobile and in situ

Pb Isotope Observations

3. Black soil has higher $^{207}\text{Pb}/^{206}\text{Pb}$ -
 - Older Pb component?
 - Other explanation?
4. Difference between partial and AR Pb isotope ratios in Black Soil is minor - Why?
5. Anomaly at E end of ore projection must have major component of Proterozoic Pb.
 - True Partial Leach anomaly?
 - Anthropogenic contamination?

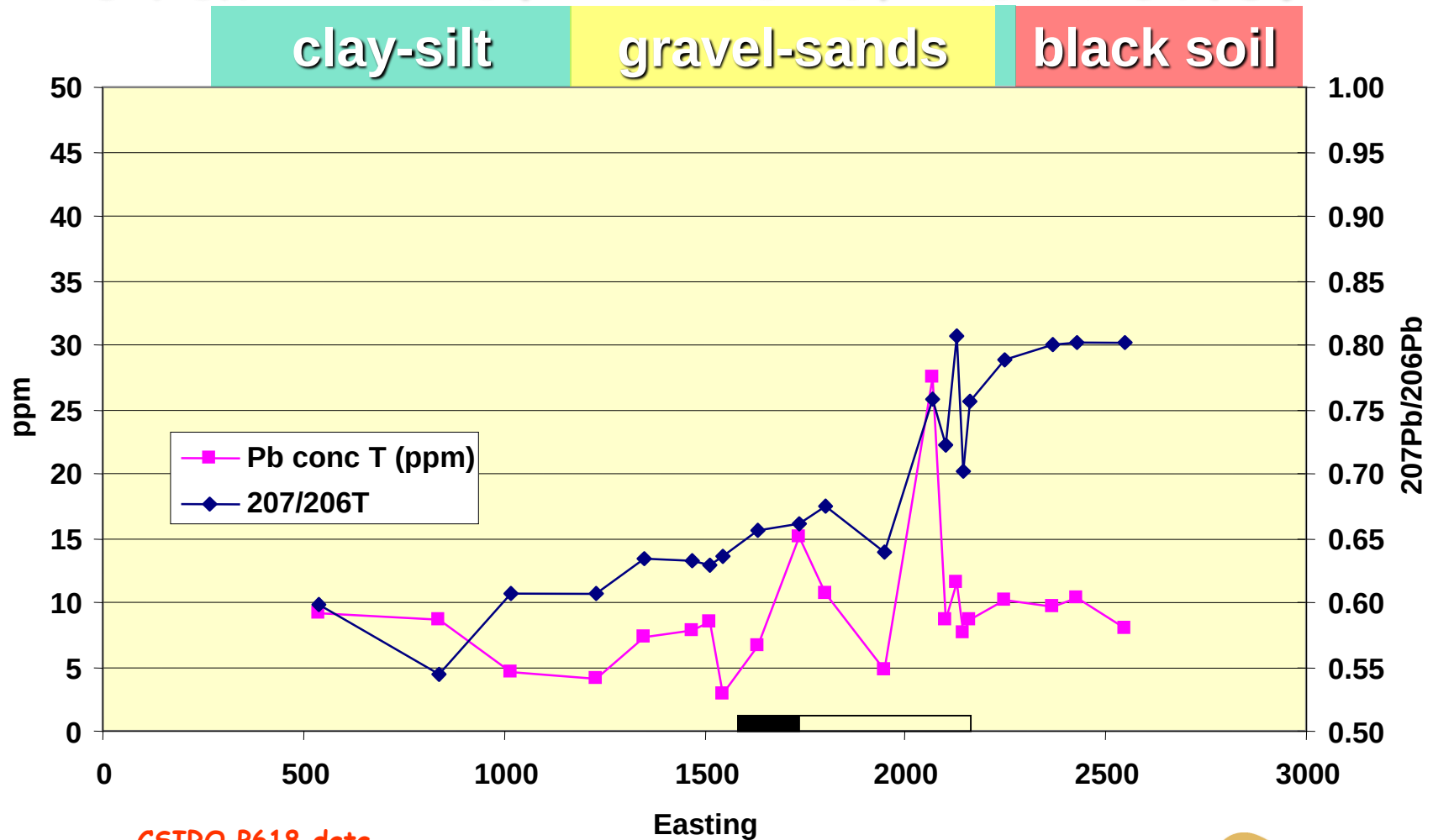
Partial $^{207}\text{Pb}/^{206}\text{Pb}$ & Pb Conc.



CSIRO P618 data

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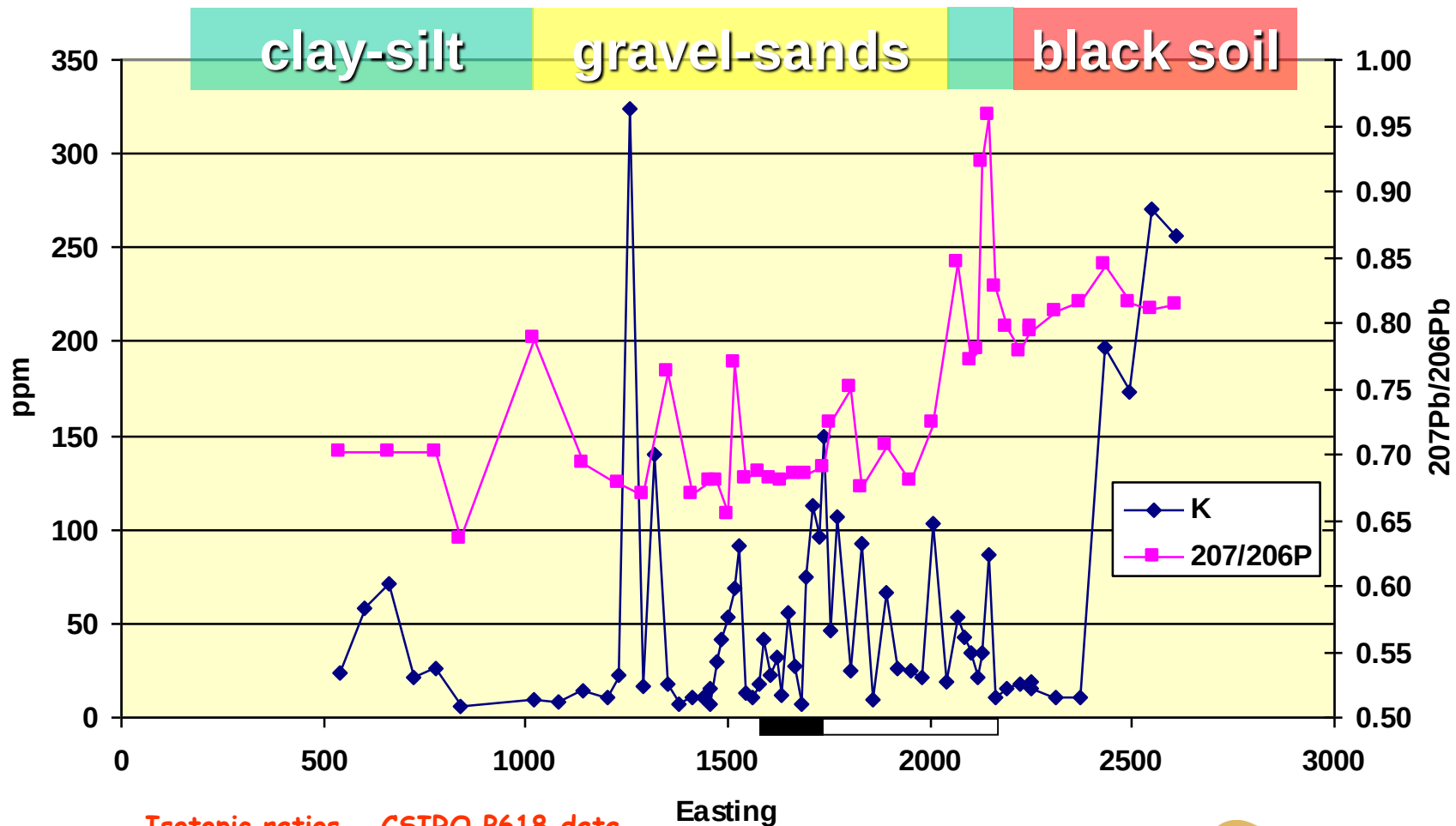
Total $^{207}\text{Pb}/^{206}\text{Pb}$ & Pb Conc.



CSIRO P618 data

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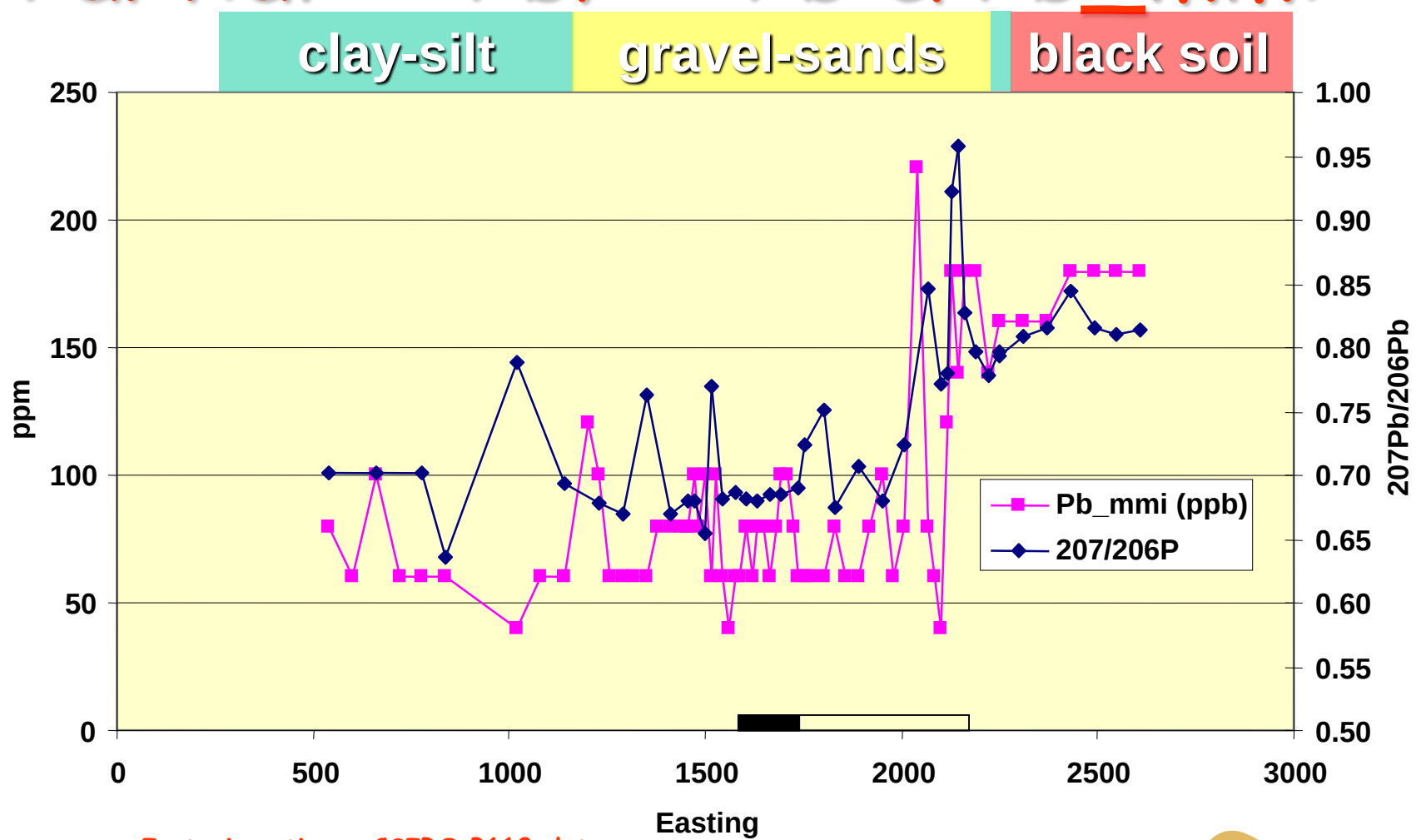
Partial $^{207}\text{Pb}/^{206}\text{Pb}$ & K



Isotopic ratios - CSIRO P618 data
Other data provided by BHPB

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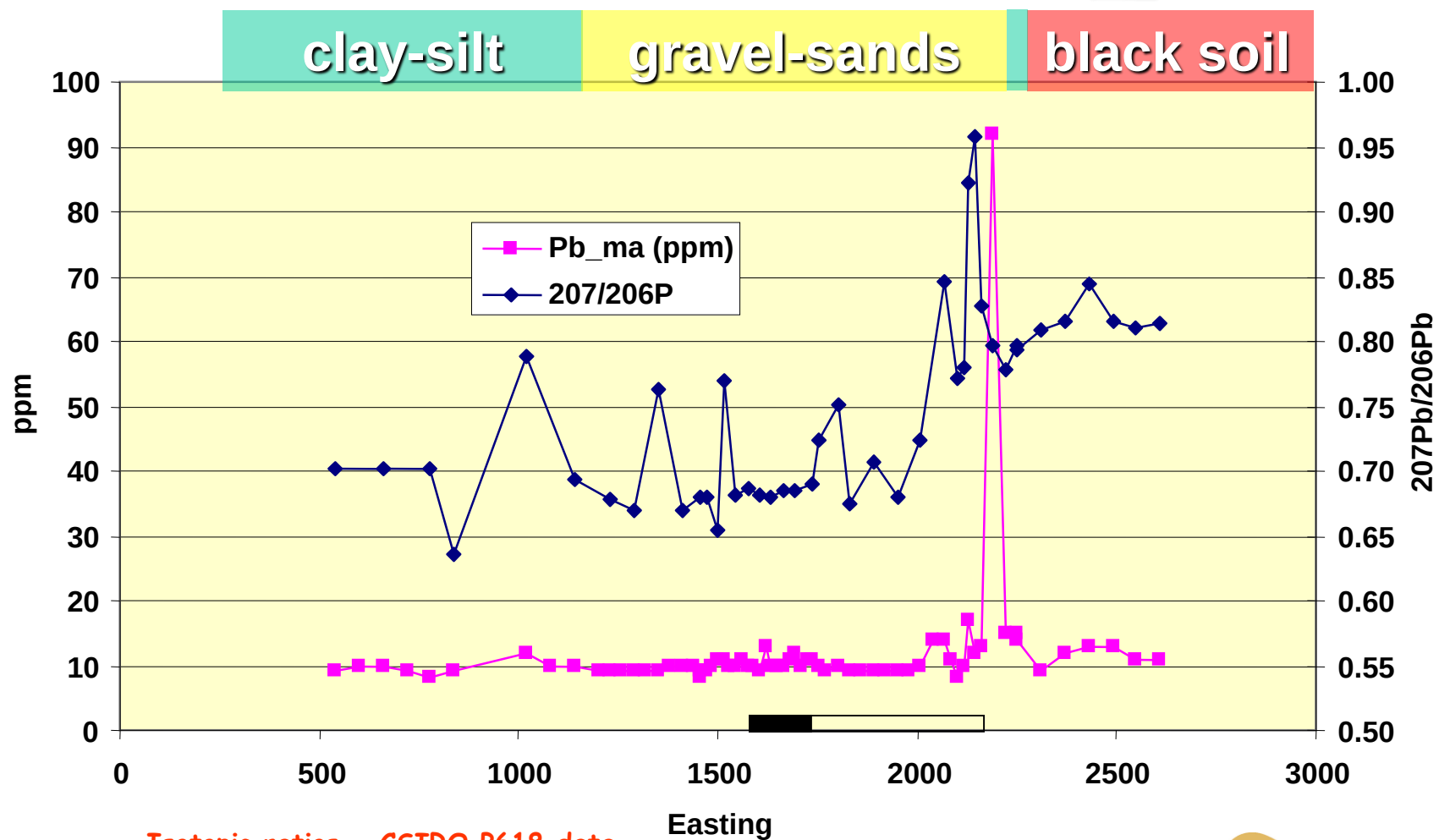
Partial $^{207}\text{Pb}/^{206}\text{Pb}$ & Pb_mmi



Isotopic ratios - CSIRO P618 data
Other data provided by BHPB

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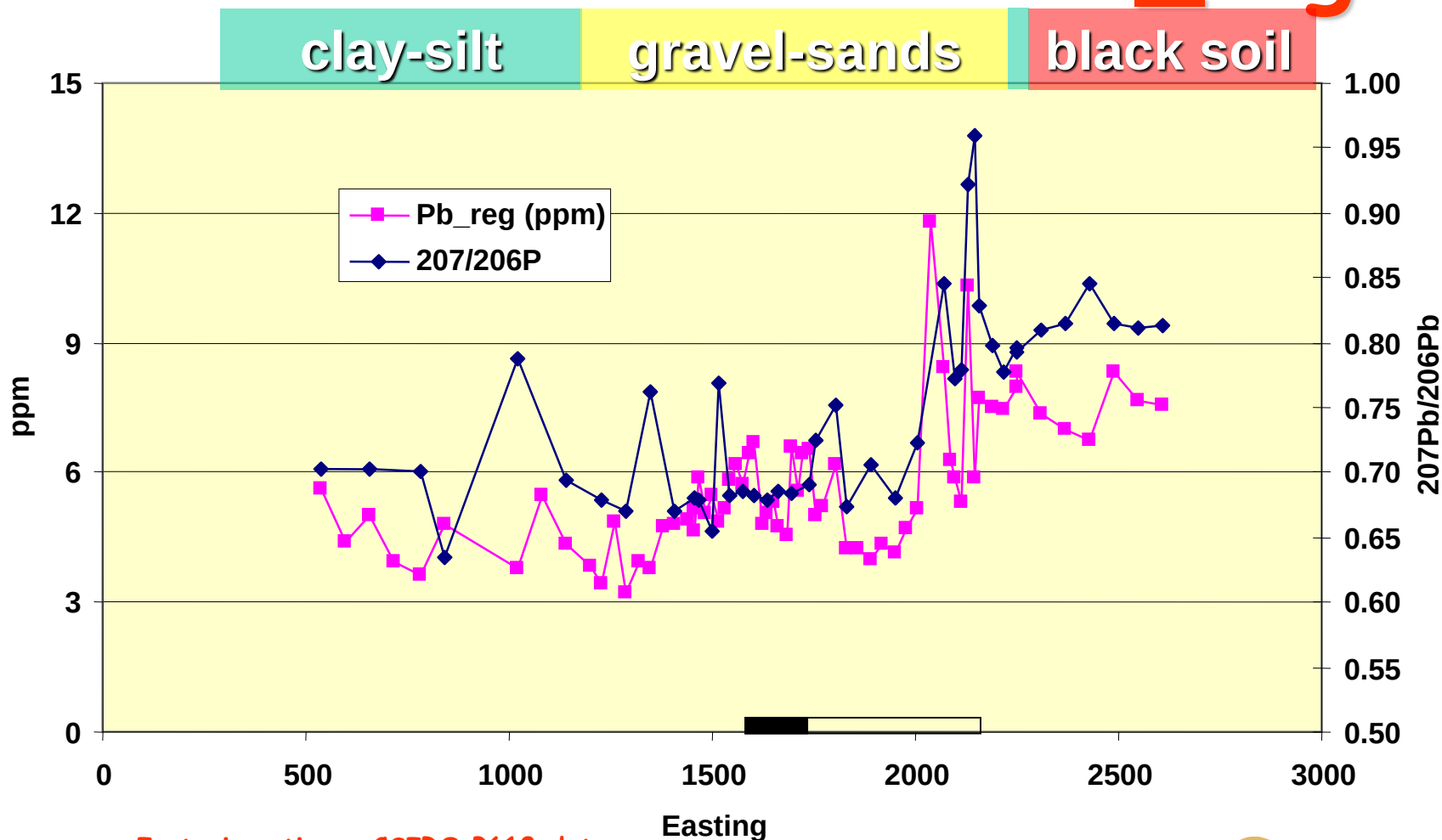
Partial $^{207}\text{Pb}/^{206}\text{Pb}$ & Pb_ma



Isotopic ratios - CSIRO P618 data
Other data provided by BHPB

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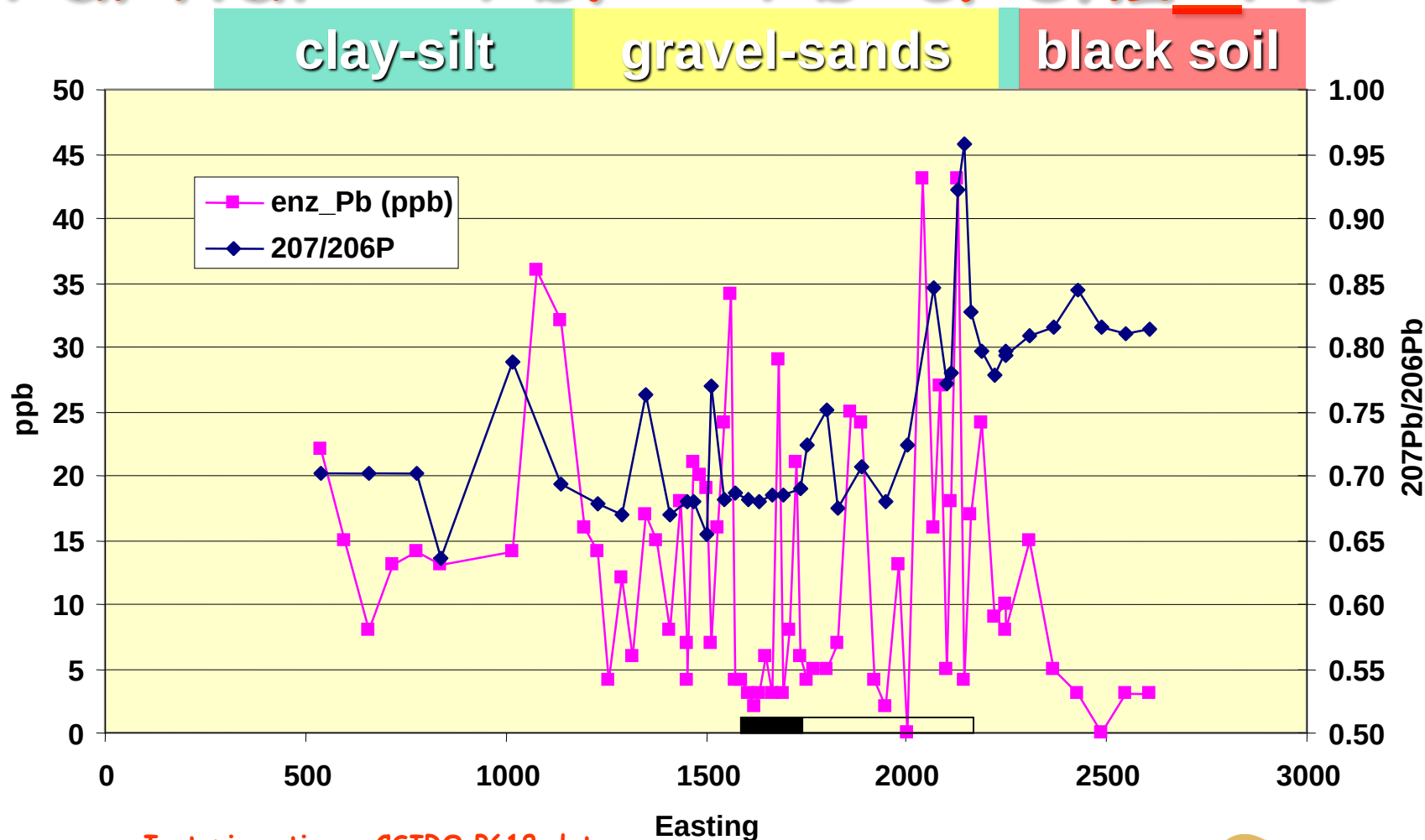
Partial $^{207}\text{Pb}/^{206}\text{Pb}$ & Pb_reg



Isotopic ratios - CSIRO P618 data
Other data provided by BHPB

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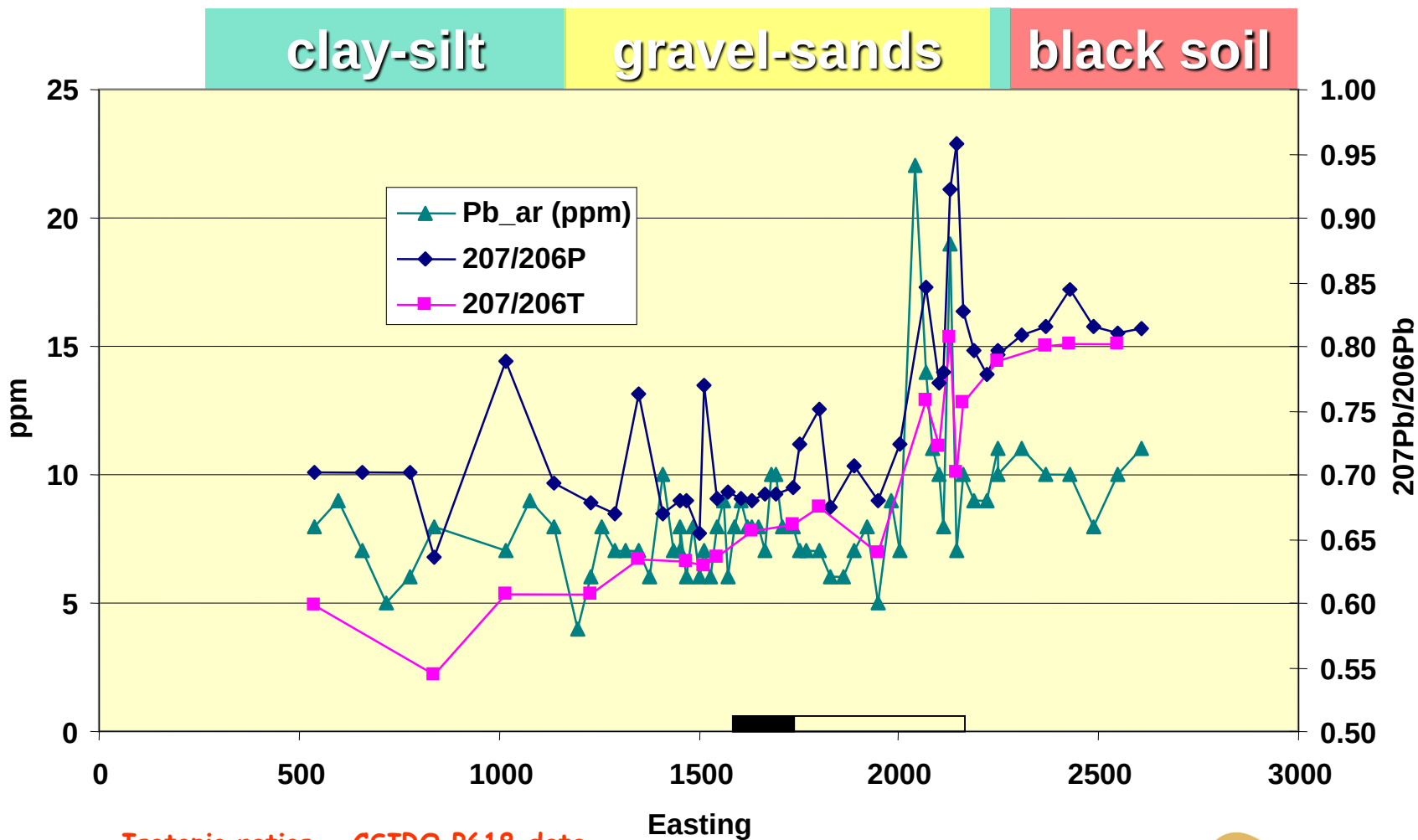
Partial $^{207}\text{Pb}/^{206}\text{Pb}$ & enz_Pb



Isotopic ratios - CSIRO P618 data
Other data provided by BHPB

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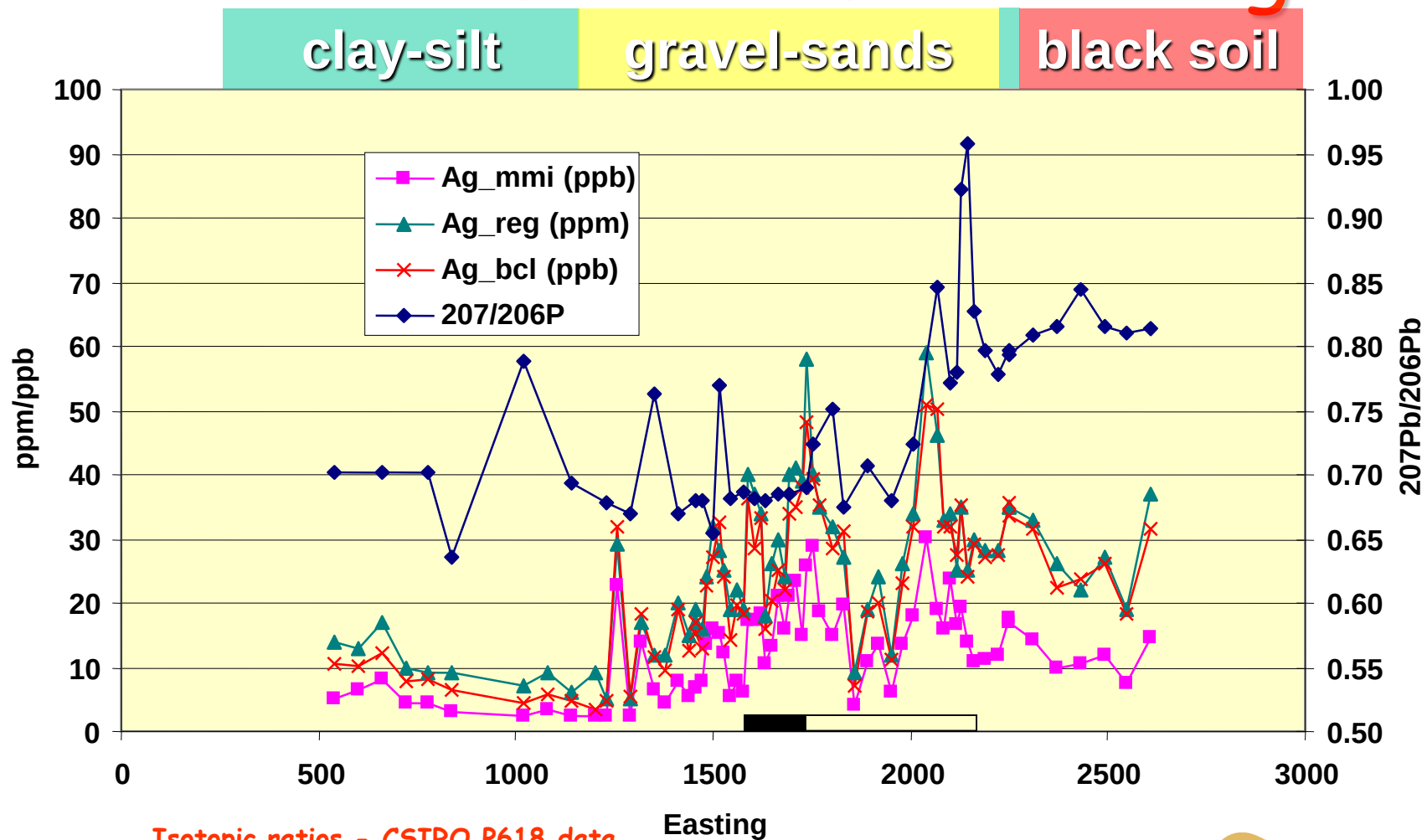
Partial & Total $^{207}\text{Pb}/^{206}\text{Pb}$ & Pb_ar



Isotopic ratios - CSIRO P618 data
Other data provided by BHPB

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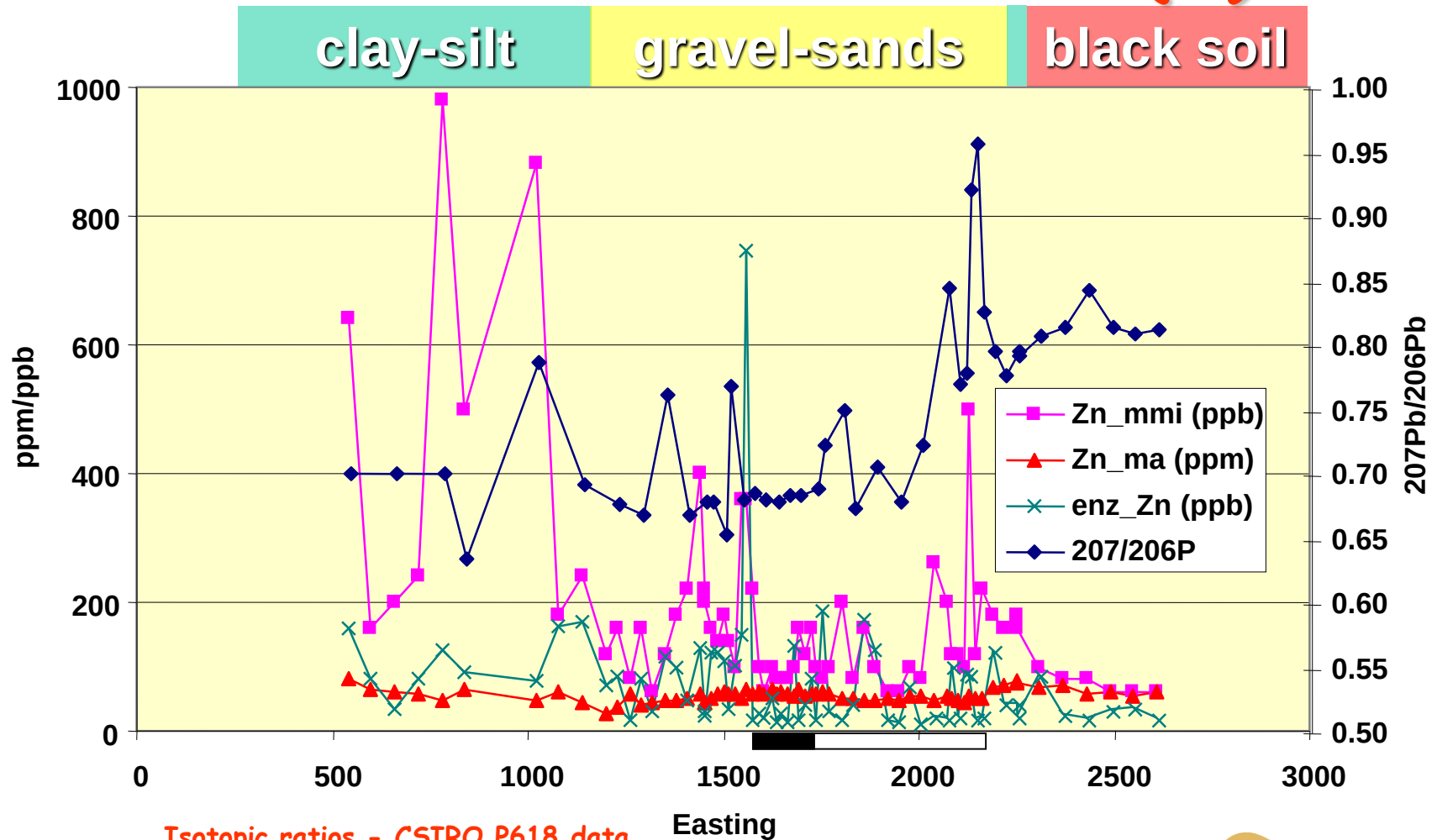
Partial $^{207}\text{Pb}/^{206}\text{Pb}$ & Partial Ag



Isotopic ratios - CSIRO P618 data
Other data provided by BHPB

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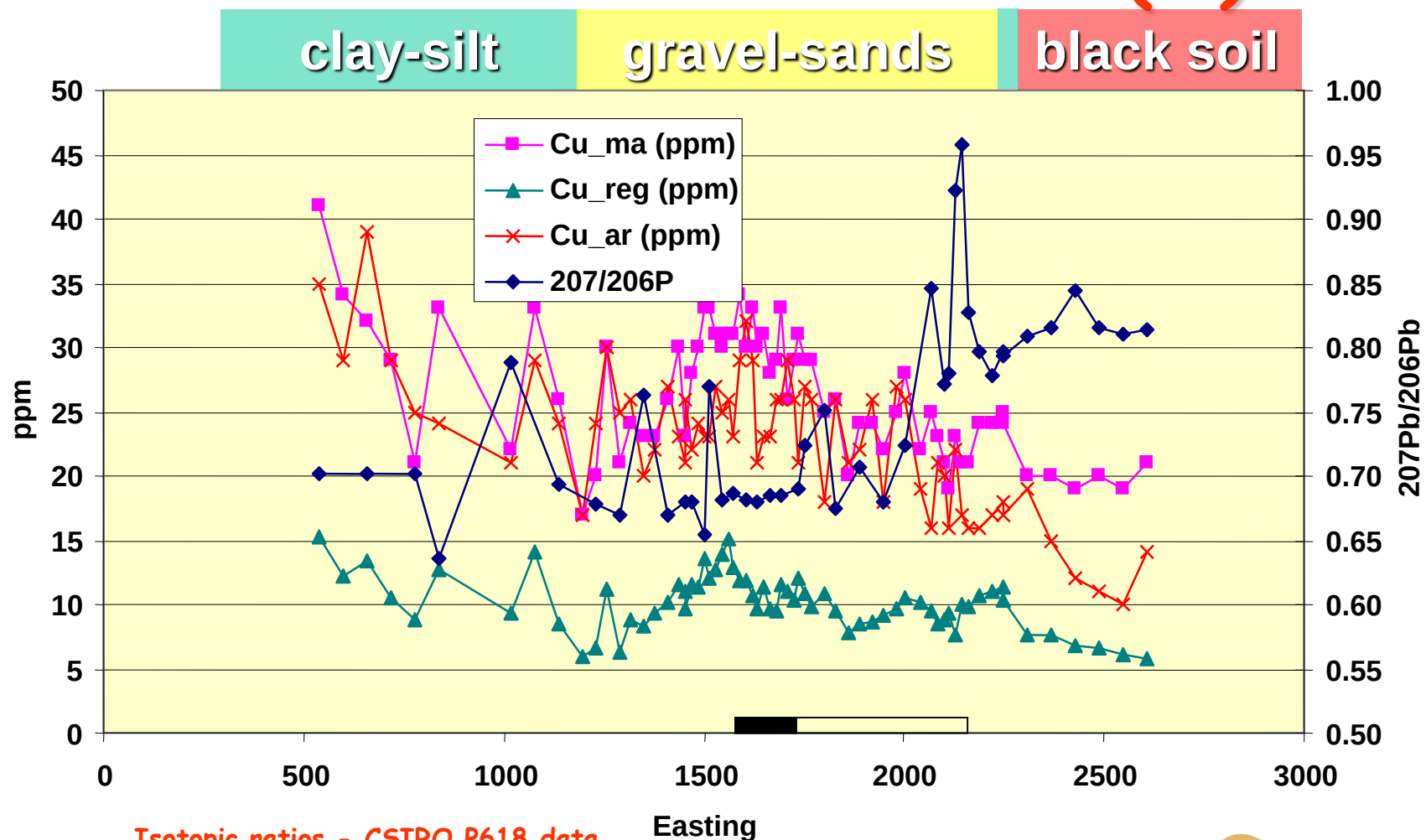
Partial $^{207}\text{Pb}/^{206}\text{Pb}$ & Zn (1)



Isotopic ratios - CSIRO P618 data
Other data provided by BHPB

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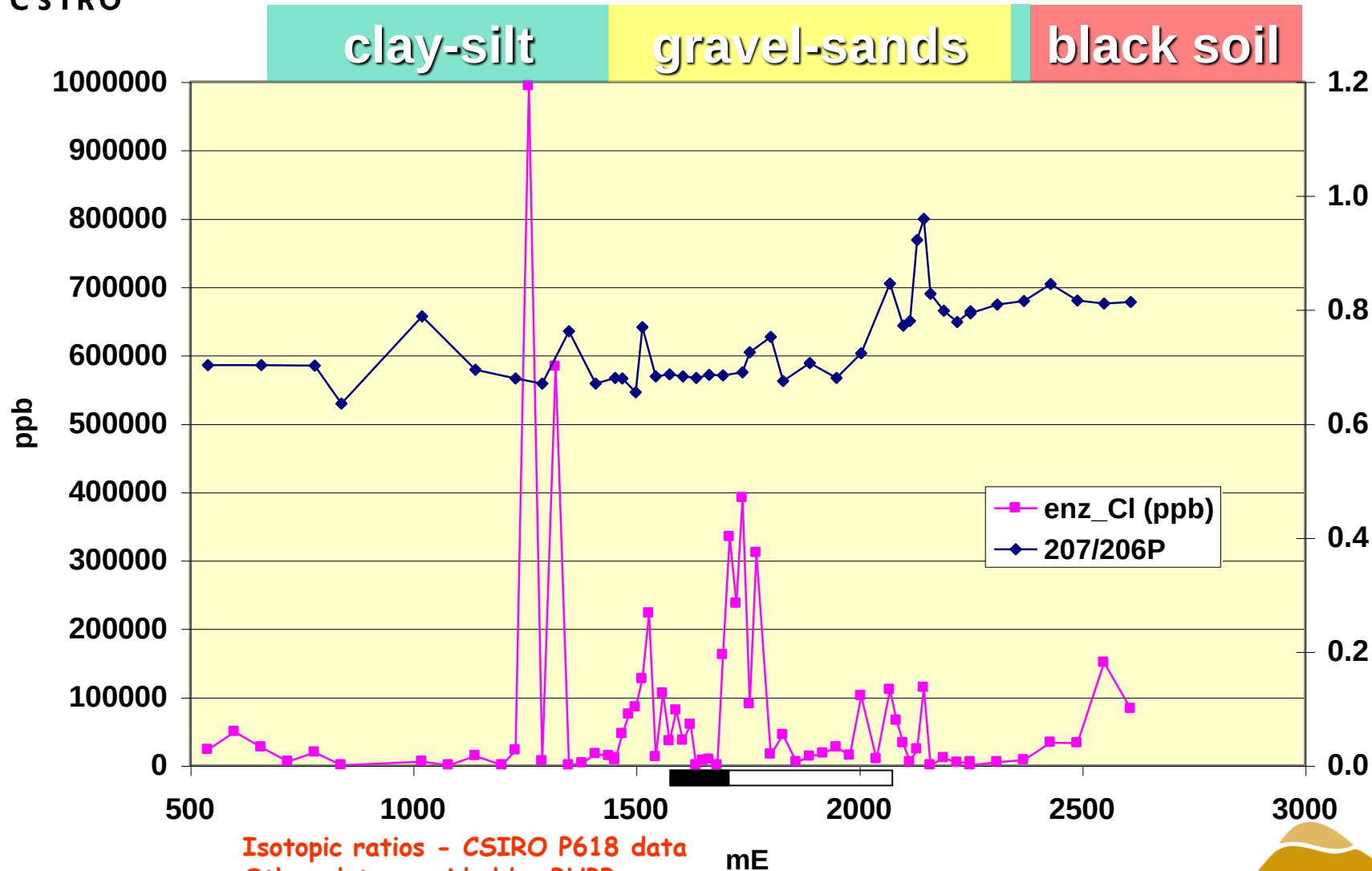
Partial $^{207}\text{Pb}/^{206}\text{Pb}$ & Cu (2)



Isotopic ratios - CSIRO P618 data
Other data provided by BHPB

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Partial $^{207}\text{Pb}/^{206}\text{Pb}$ & enz_Cl



Isotopic ratios - CSIRO P618 data
Other data provided by BHPB

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Concluding observations

1. Partial leach and total Pb isotope ratios show distinctions based on soil type
2. Pb isotope data indicate more than one source of Pb in most samples
3. Pb isotope anomaly at E end of ore projection must have major component of Proterozoic Pb.
 - True Partial Leach anomaly?
 - Anthropogenic contamination?
4. Some partial leach concentration data shows distinction between soil types
5. Suggestion that Cl, Bi and Mo show anomalies over the mineralisation