Carbon Mineralization Potential

Using physical properties to assess and quantify the carbon sequestration (through mineralization) potential of British Columbia

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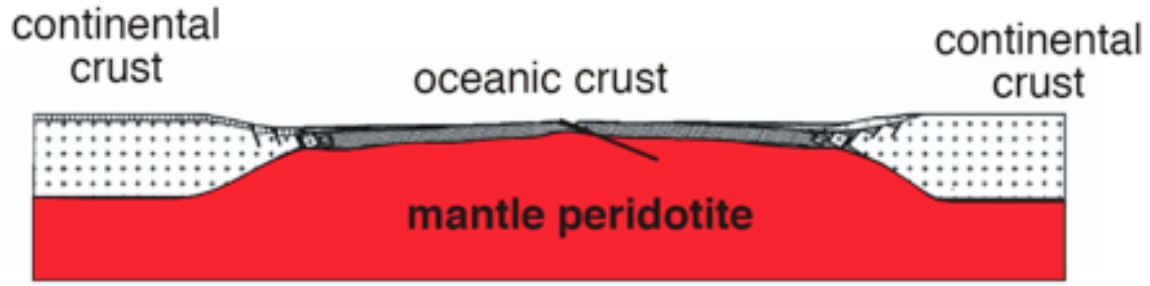
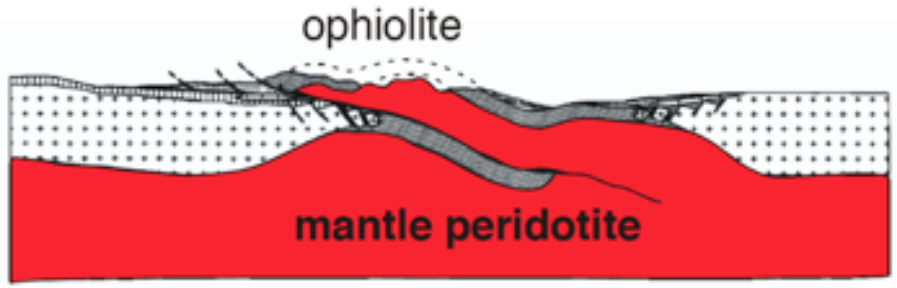
Carbon Mineralization

Carbon mineralization offers advantages over gas/liquid storage:

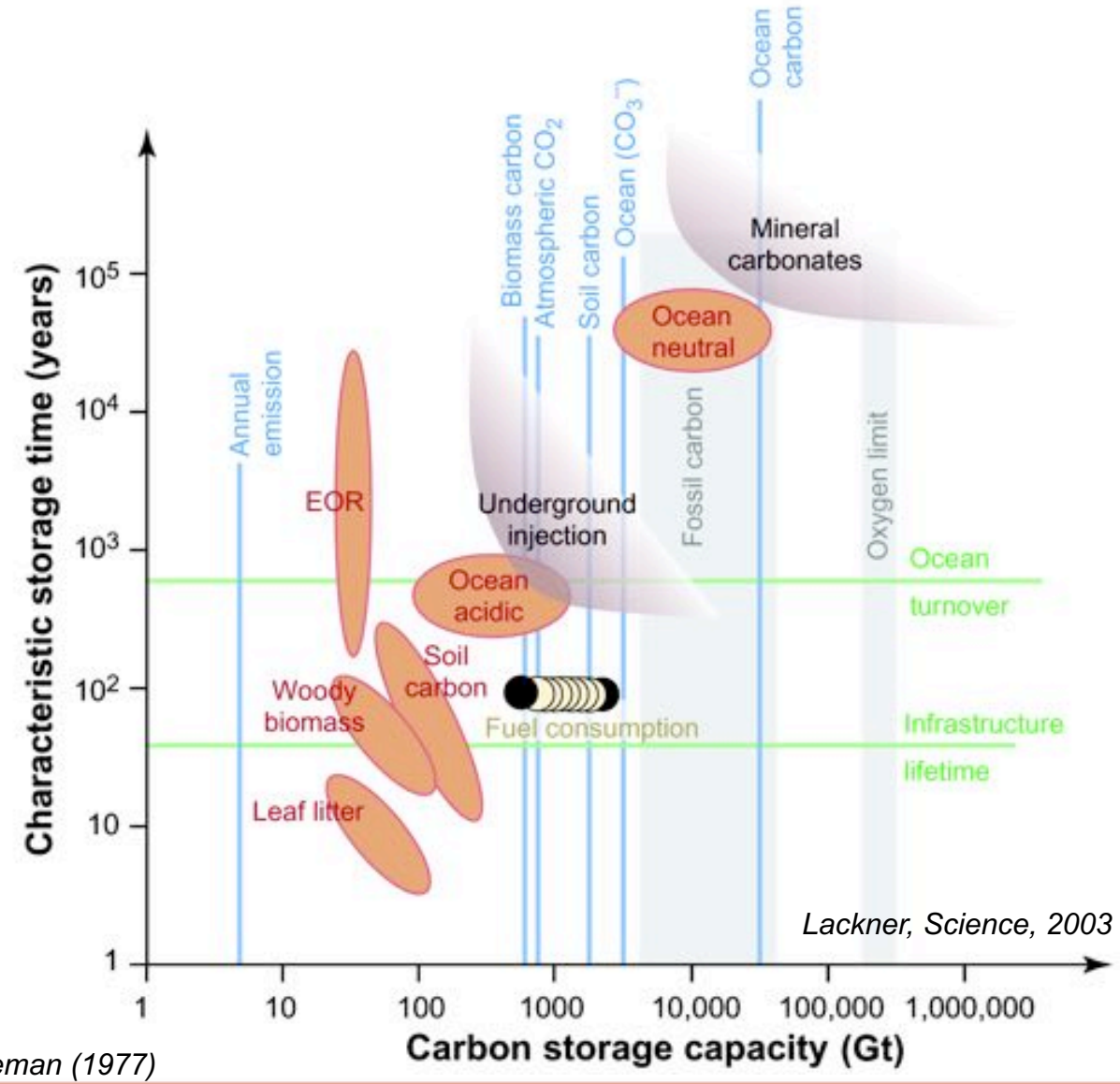
- stable over millennia
- dense
- virtually unlimited capacity (Petatonnes)
- geologic setting differs from “conventional” CCS

But slow to form in nature.



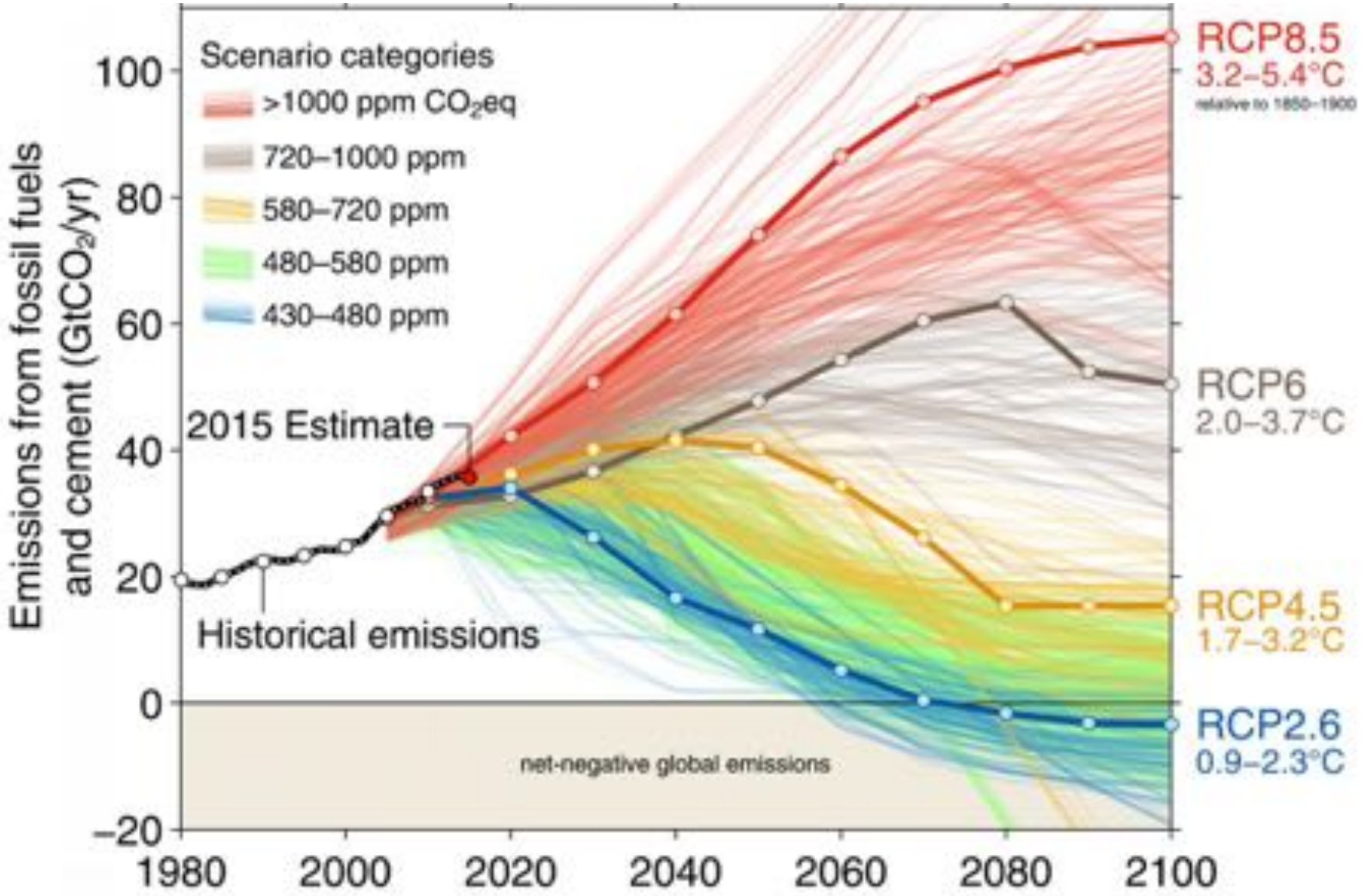


Kelemen after Coleman (1977)



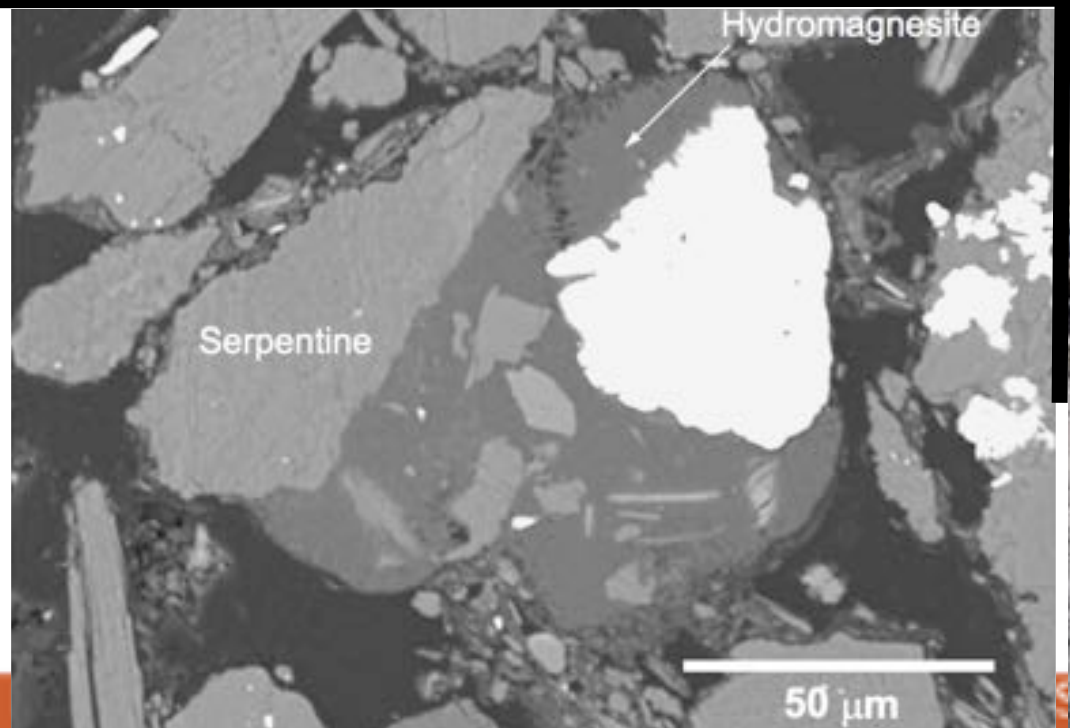
Lackner, Science, 2003

Emissions Projections and Climate

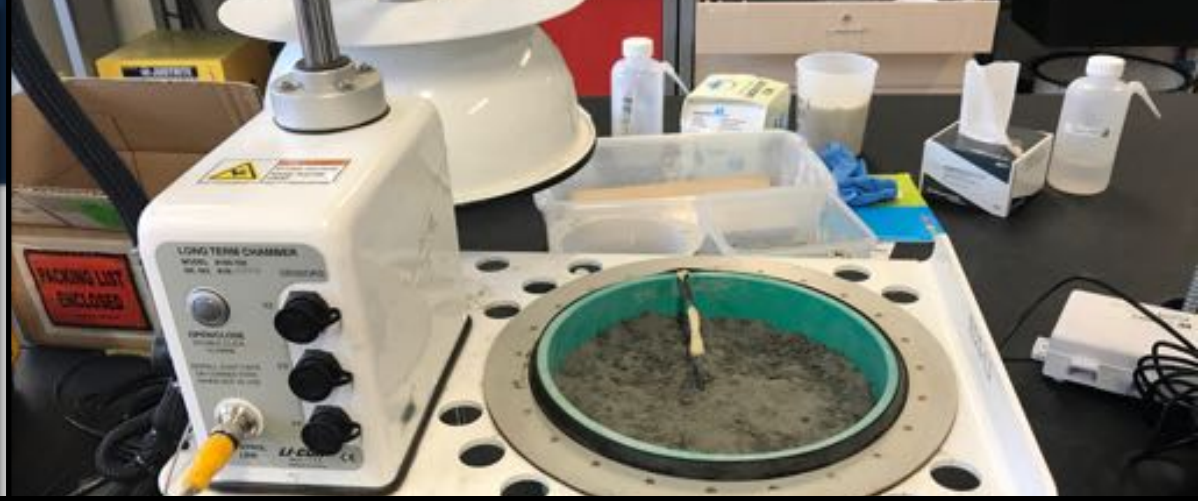


(Modified after Fuss et al., 2014, *Nature*)

Active Carbon Mineralization at Mine Sites



400 t/year CO_2
0.4 kg CO_2 / m^2 / year
Diavik Diamond Mine, North West Territories, Canada

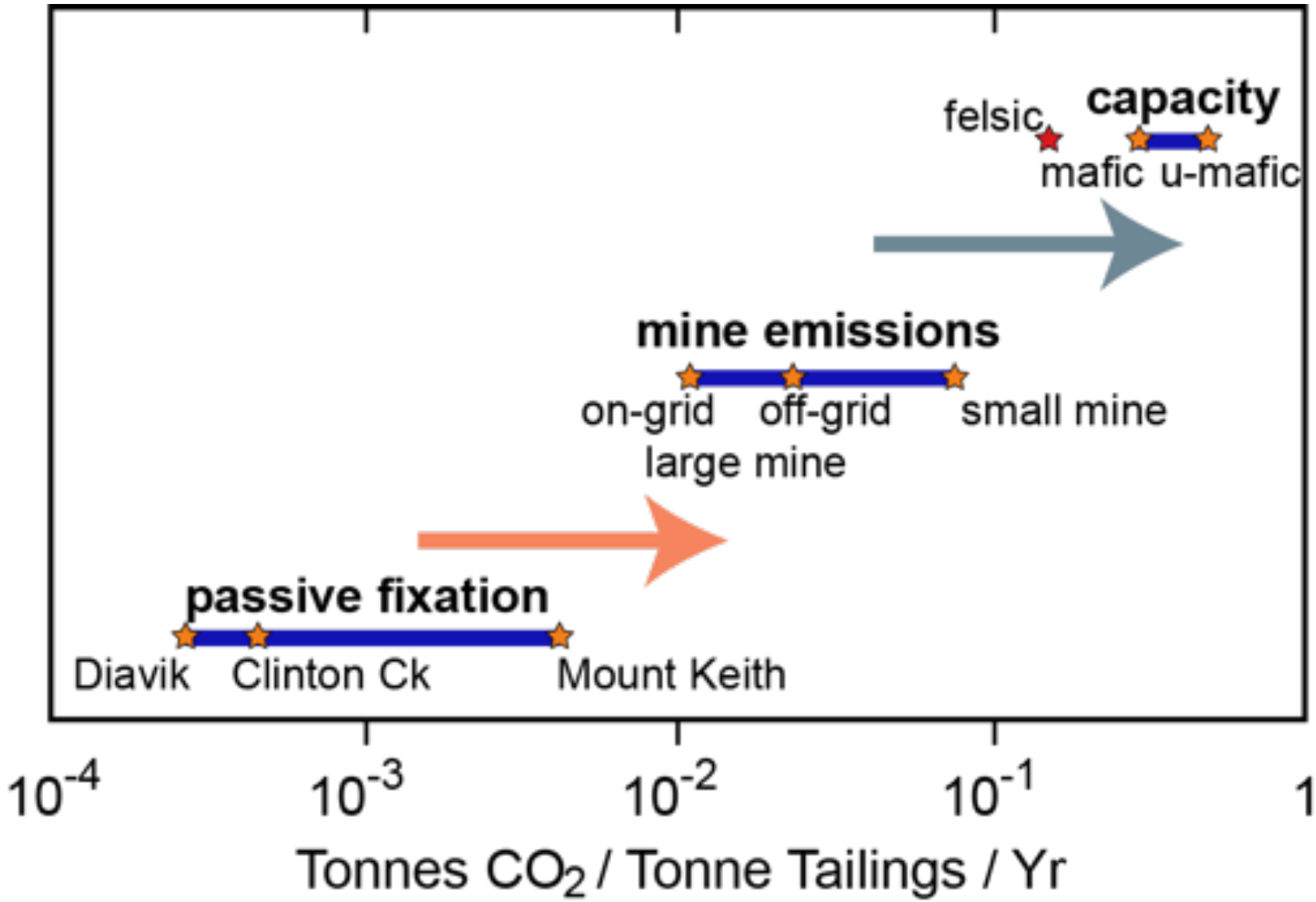


3 kg CO_2 / m^2 / year
Lab-based “soil” gas flux measurements

460 t/year CO_2
0.9 kg CO_2 / m^2 / year
Woodsreef Chrysotile Mine, NSW, Australia

40,000 t/year CO_2
2.4 kg CO_2 / m^2 / year
Mt Keith Nickel Mine, WA, Australia

Carbon Mineralization Rates

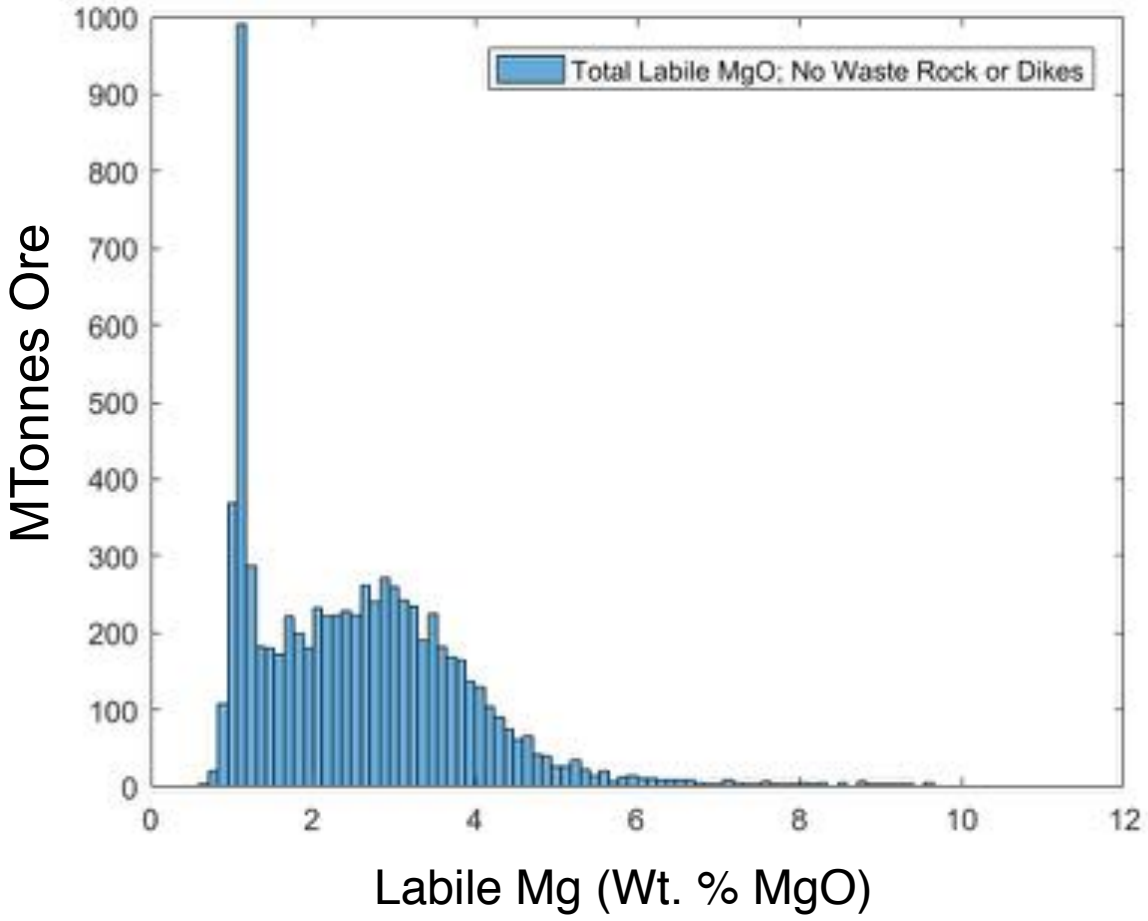


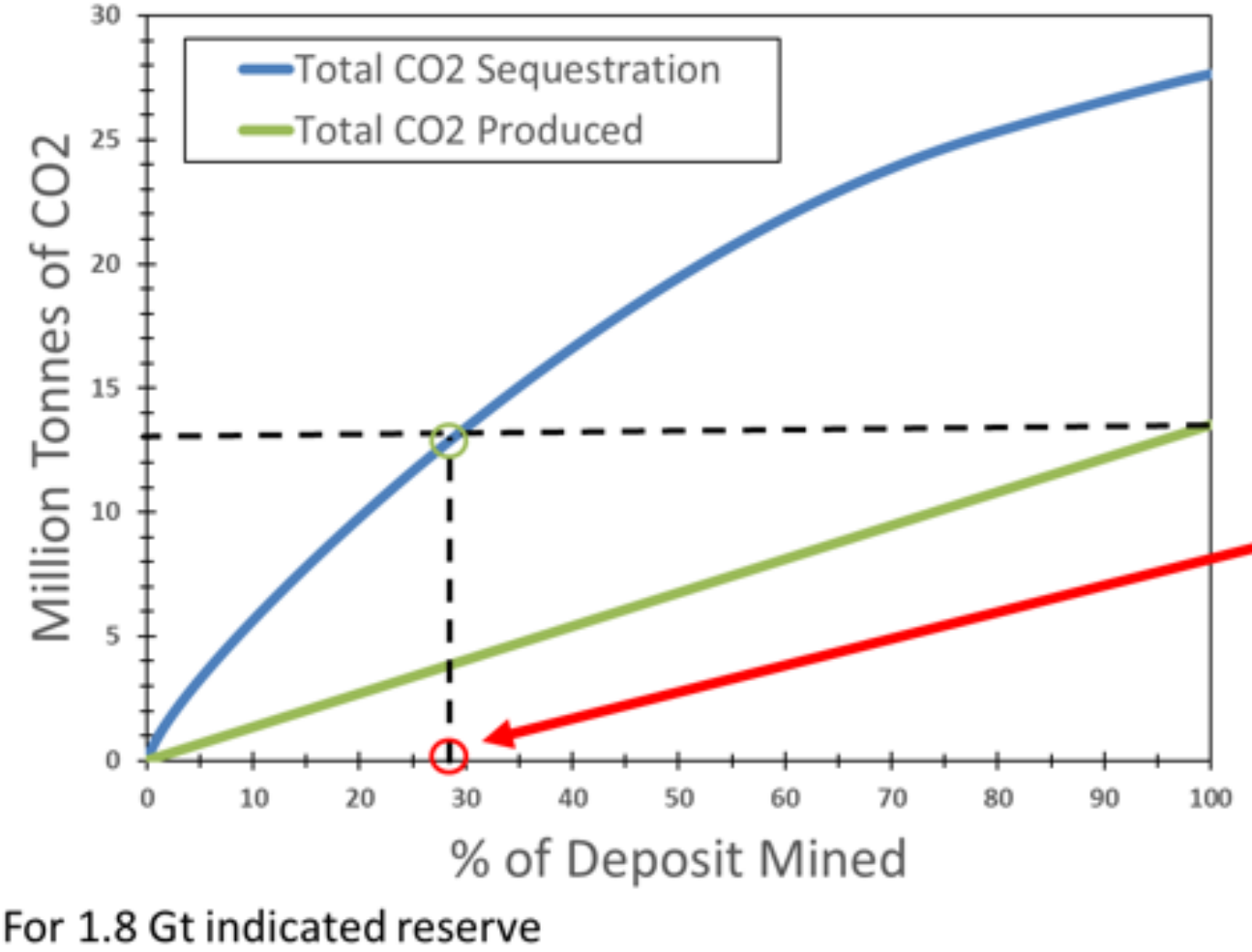
(Modified after Harrison et al., 2013, *ES&T*)

Embracing Geological Diversity

Focus interventions on the most reactive tailings
Baptiste Deposit, B.C.

FPX Nickel Corp.
TSX-V:FPX

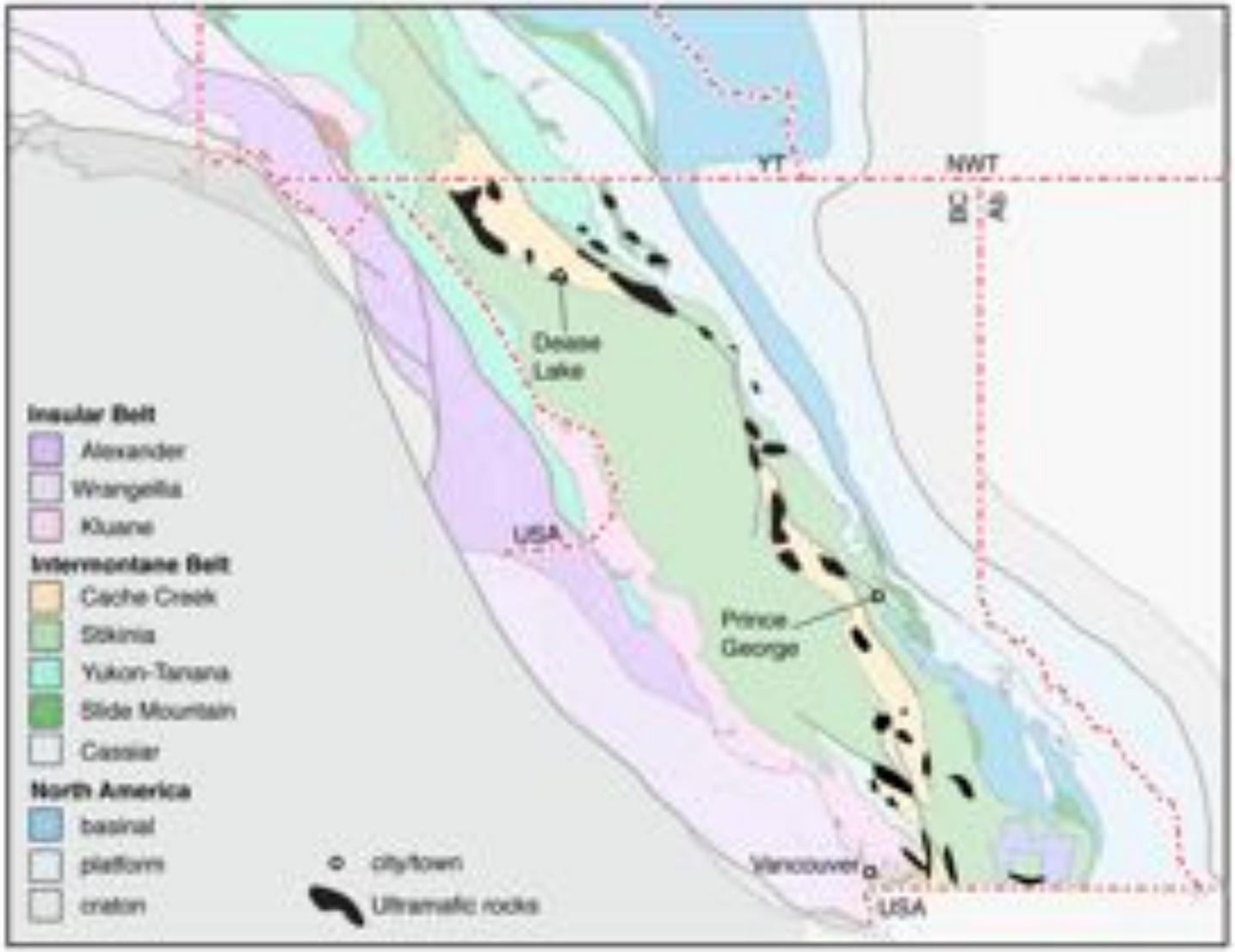




For 1.8 Gt indicated reserve

(Vanderzee et al., 2019)

Ultramafic rocks in BC



Ophiolites

Fragments of the ocean floor, including the **underlying upper mantle**

Intrusions

Crystallized magmatic systems

Goals

Use geologic maps, chemistry, and remote sensing to quantify carbon sequestration capacity of ultramafic rocks

1. **Constrain physical property responses to alteration**
    - Magnetic Susceptibility
    - Density
    - Conductivity/resistivity
2. **Establish 3D models of ultramafic rocks for mineralization using geophysical inversions**
3. **Establish carbon sequestration (through mineralization) potential index for BC**

A B.C. Perspective: (L)NG Transport