Introduction

Mineral Deposits EPSC 452

Clarke of metal concentration; factor by which metal must be concentrated to be exploitable

Substance	Average Crustal Abundance	Concentration Factor
Al (Aluminum)	8.0%	3 to 4
Fe (Iron)	5.8%	6 to7
Ti (Titanium)	0.86%	25 to 100
Cr (Chromium)	0.0096%	4,000 to 5,000
Zn (Zinc)	0.0082%	300
Cu (Copper)	0.0058%	100 to 200
Ag (Silver)	0.000008%	~1000
Pt (Platinum)	0.0000005%	600
Au (Gold)	0.0000002%	4,000 to 5,000
U (Uranium)	0.00016%	500 to 1000

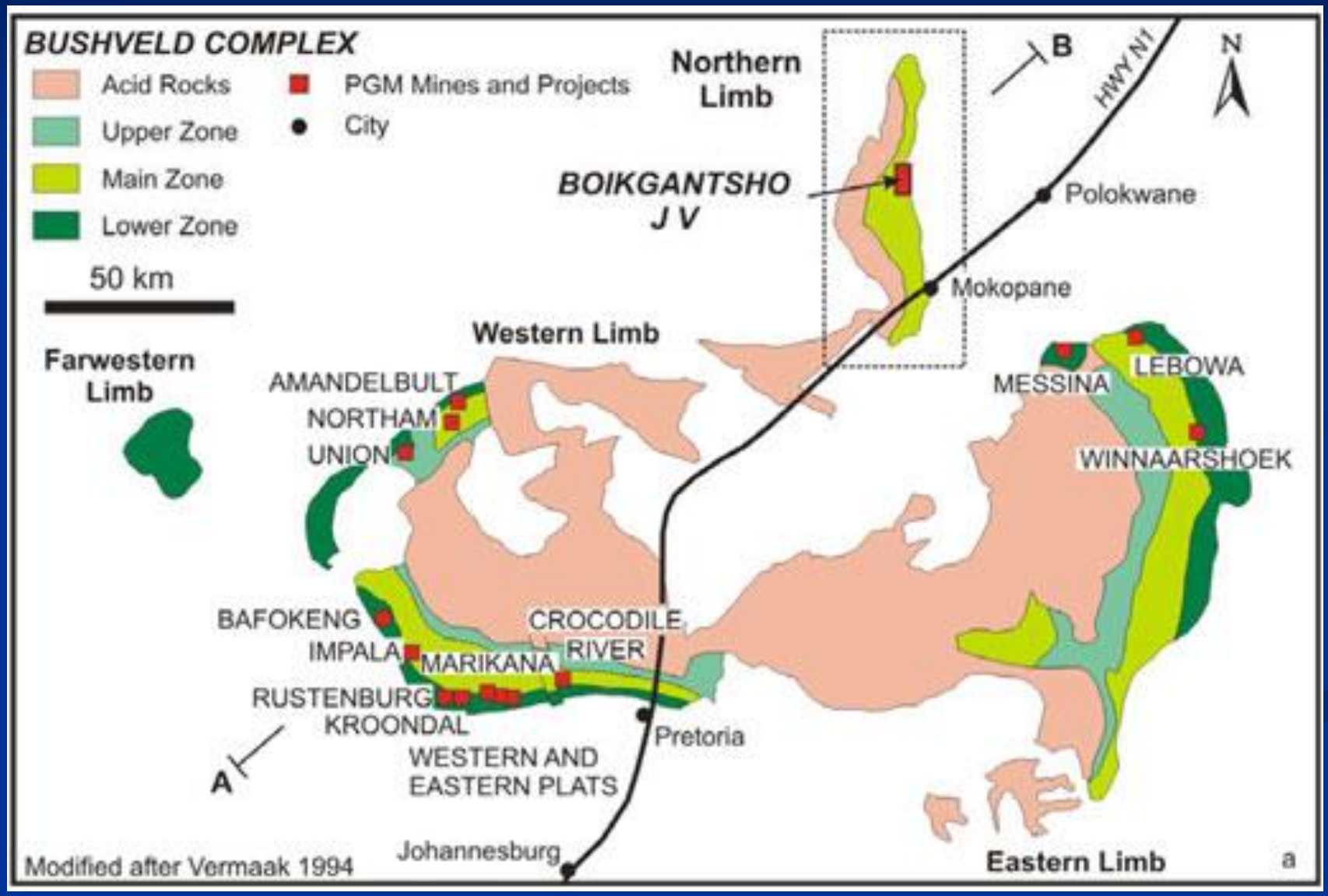
Major Classes of Ore Deposits

Magmatic

Sedimentary

Hydrothermal

Bushveld Igneous Complex (BIC)



Cross-Section of the Bushveld Igneous Complex

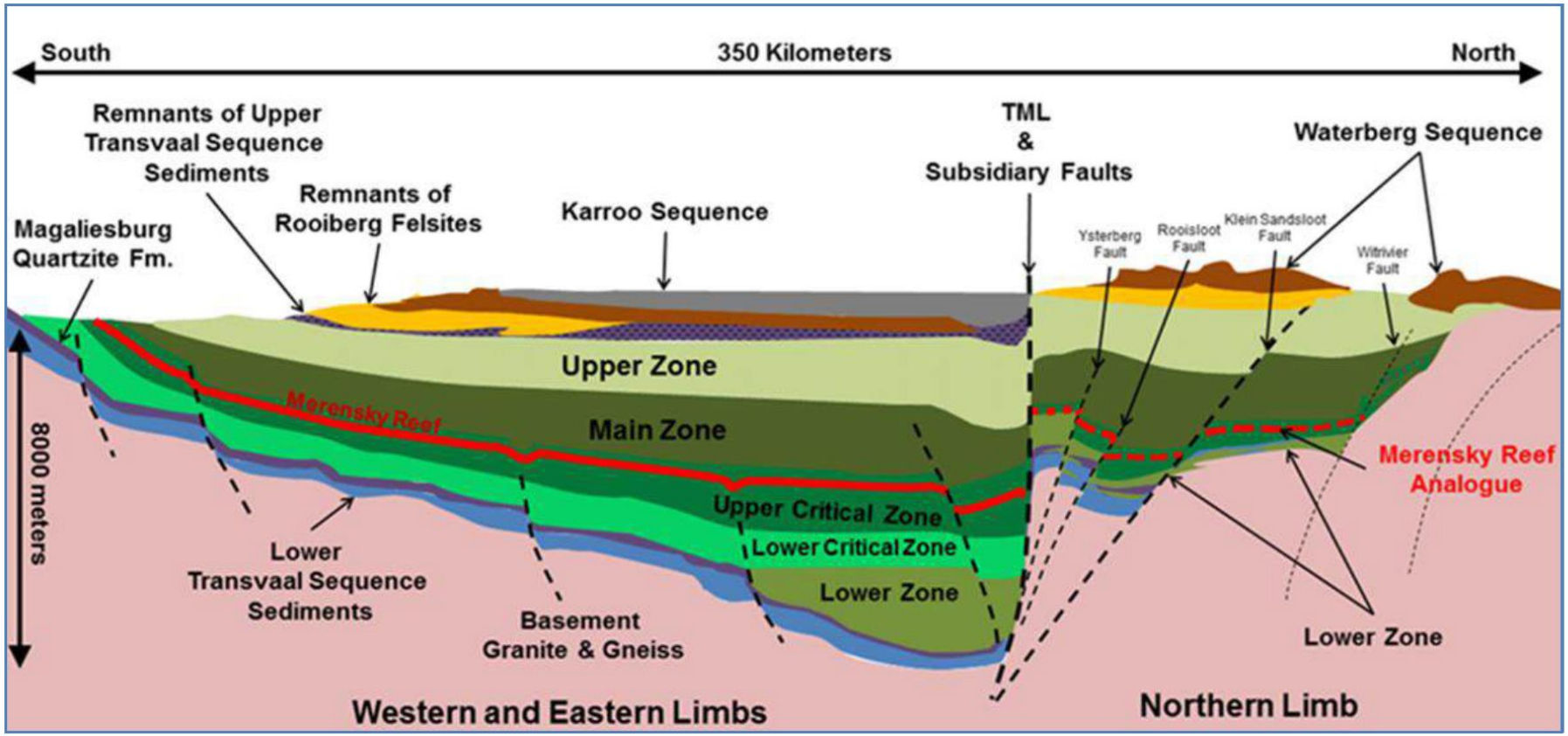
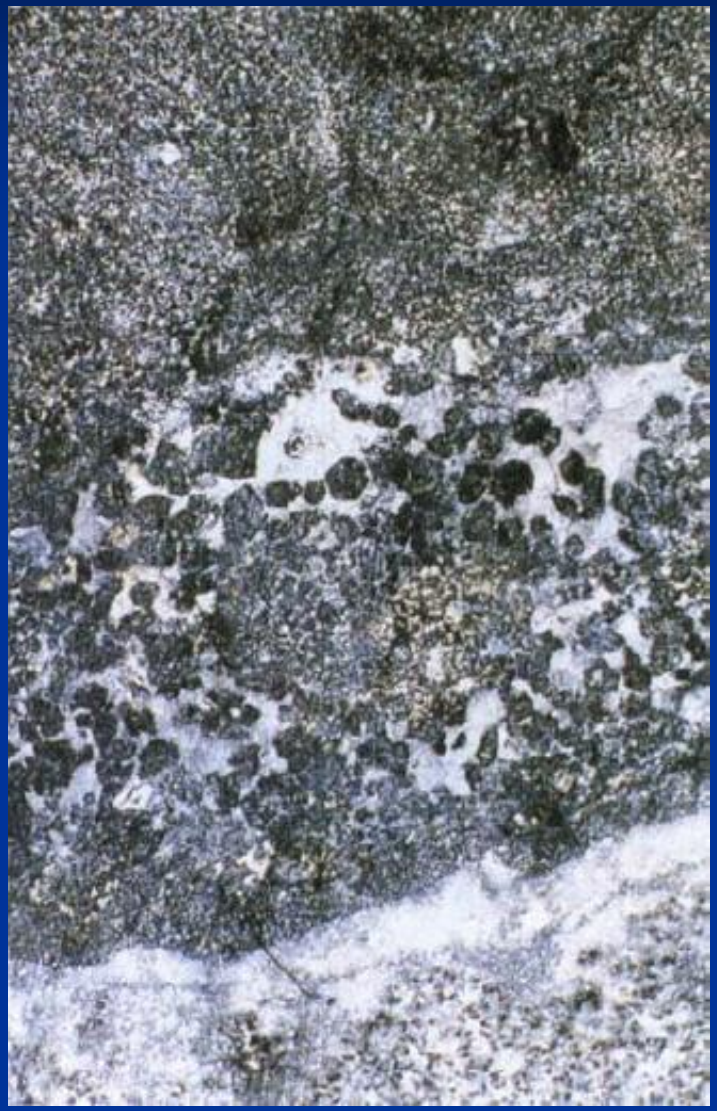


Figure courtesy Ivanhoe, 2012; modified after Kruger, 2005. Figure is schematic and not to scale. Section line illustrated is shown on Figure 7.1.

Chromitite Layers in the BIC

Merensky Reef



Thin (tens of cm) chromitite bounded unit, semi-continuous over 300 km, hosts much of the World's platinum.

Product of the immiscibility of a sulphide liquid from a gabbroic magma.

Chemical Sediments
Banded Iron Formations

Responsible for the production of most of the World's iron ore.

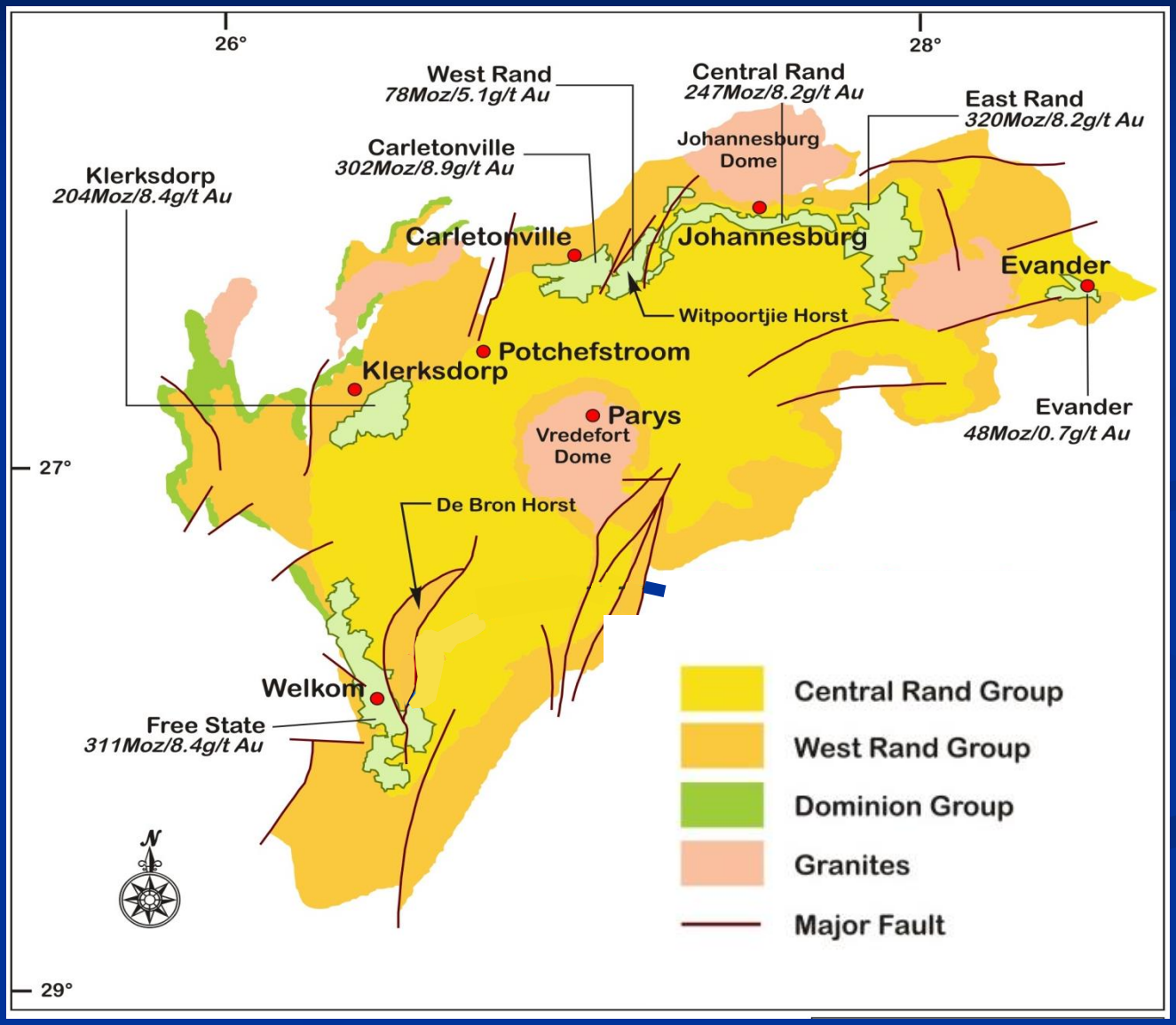
Formed during the great oxidation event when soluble $FeCl_2$ was oxidised to insoluble magnetite and hematite.

Banded Iron Formation

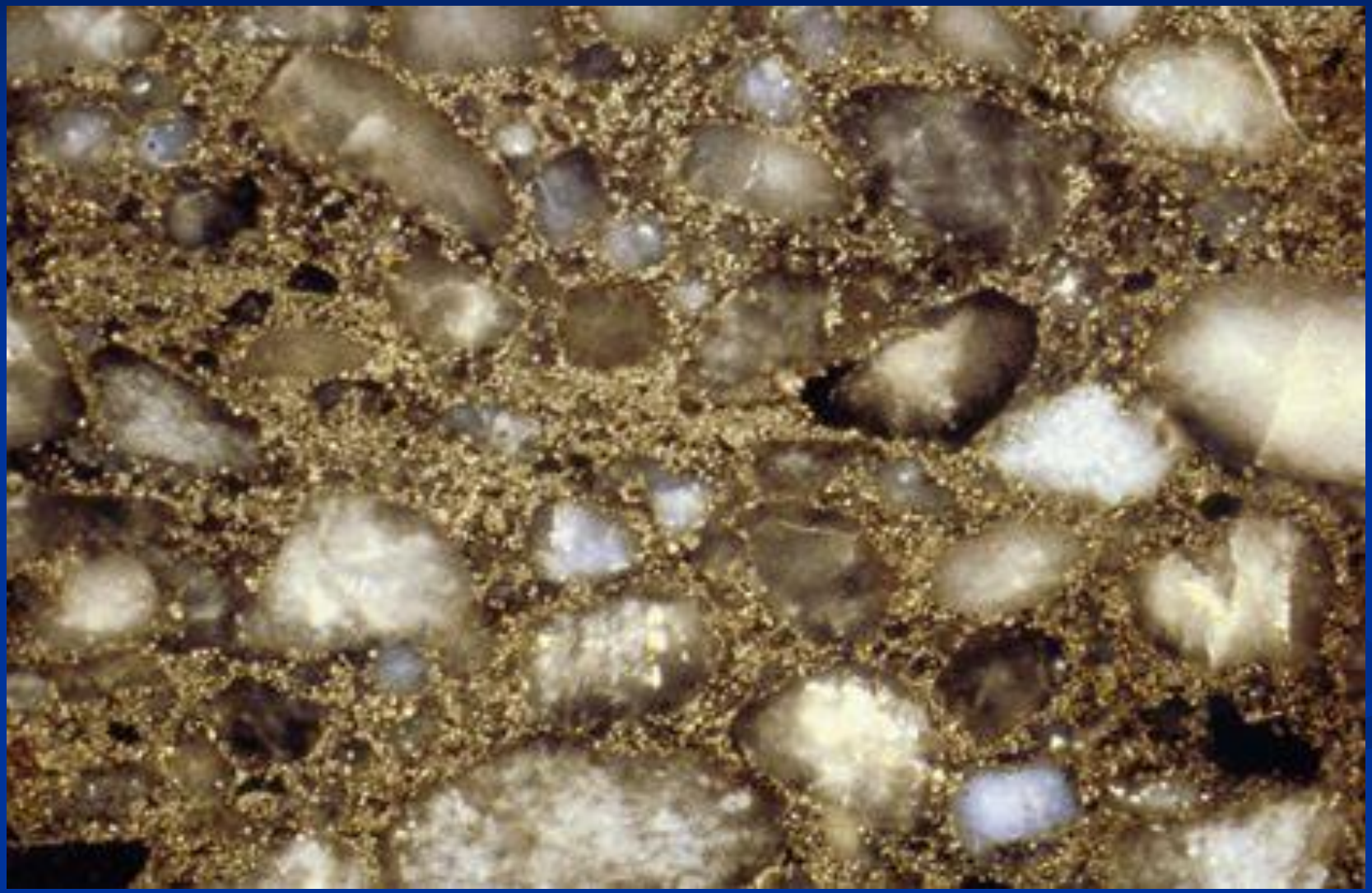
Alternating layers of magnetite, hematite and chert

Clastic Sediments Paleoplacers

The Witwatersrand Goldfields

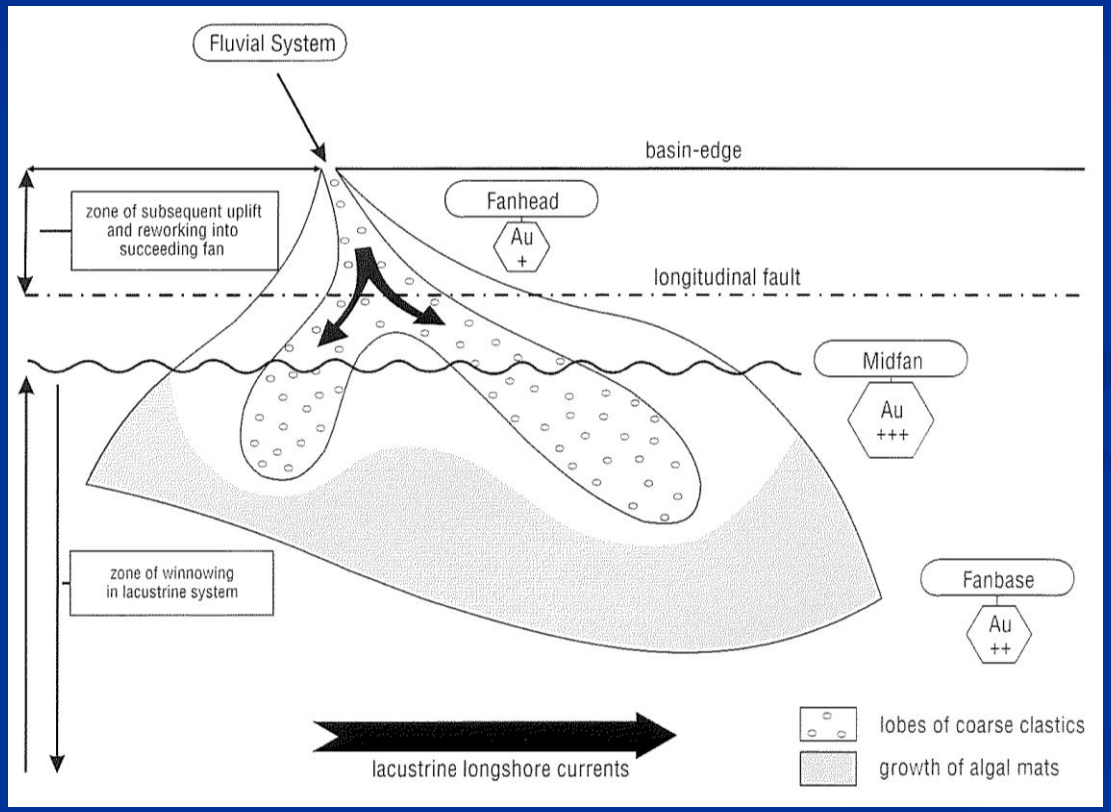


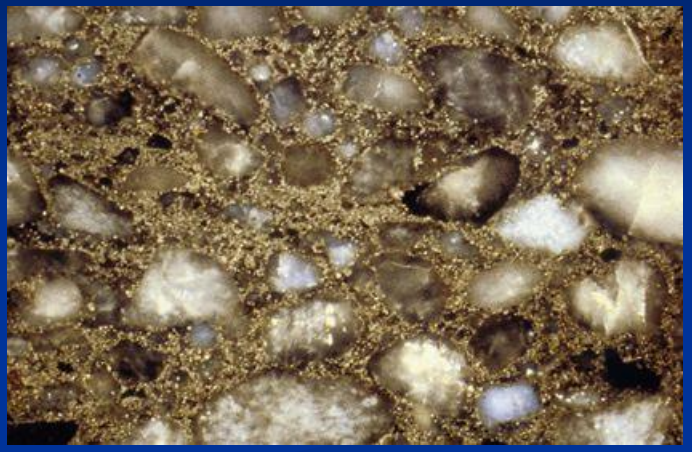
Gold-bearing Pyritic Conglomerates

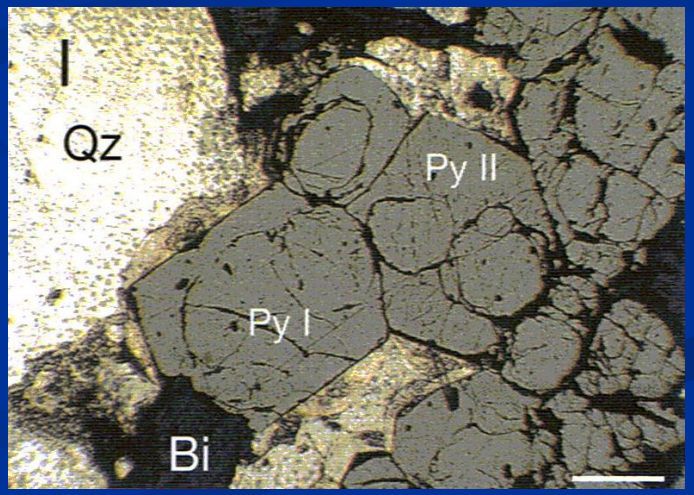


Modified paleoplacer model

- Gold introduced as detrital grains
- Remobilized hydrothermally

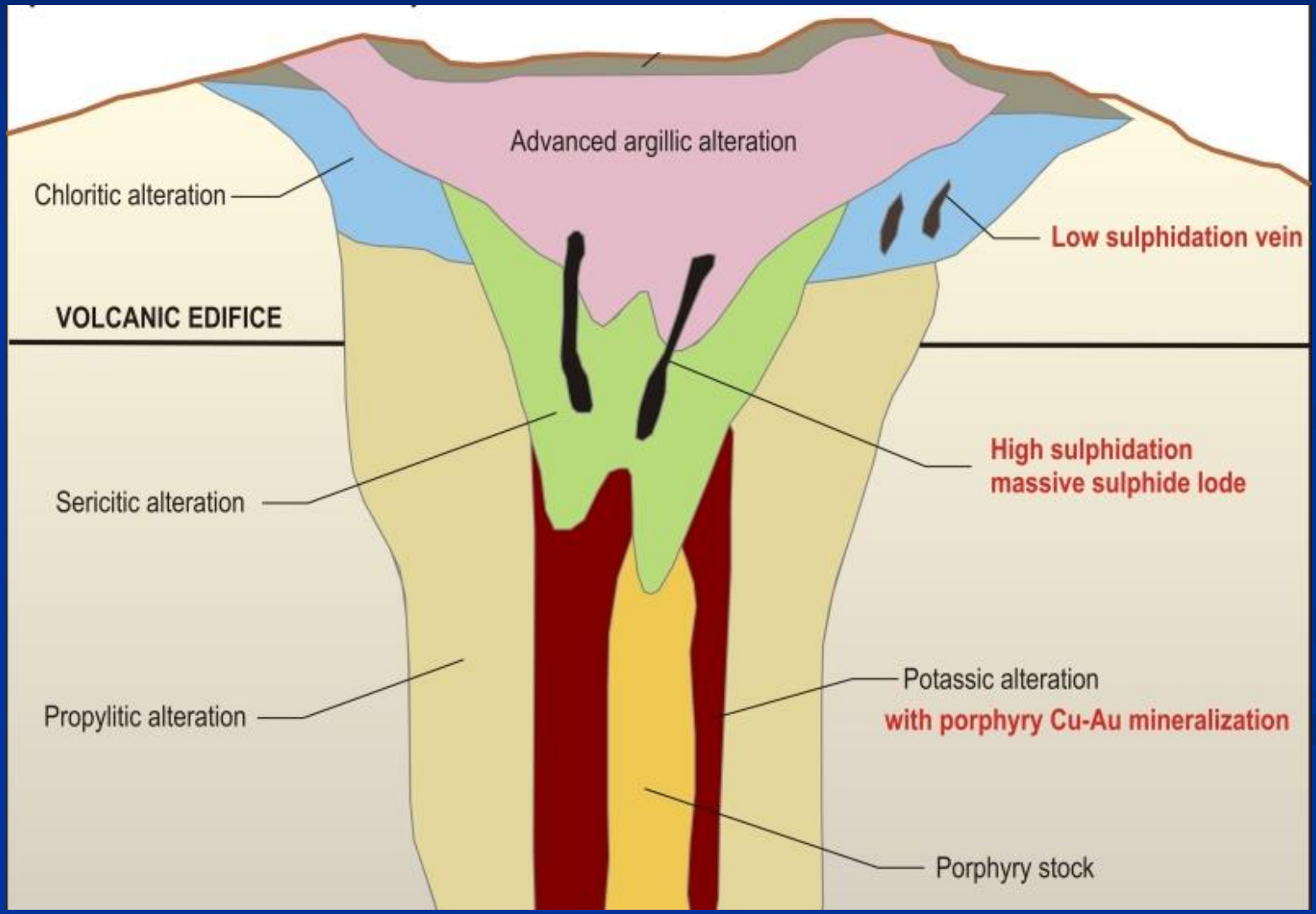






Hydrothermal Deposits

Porphyry-Epithermal Deposits



Porphyry Mo Ore

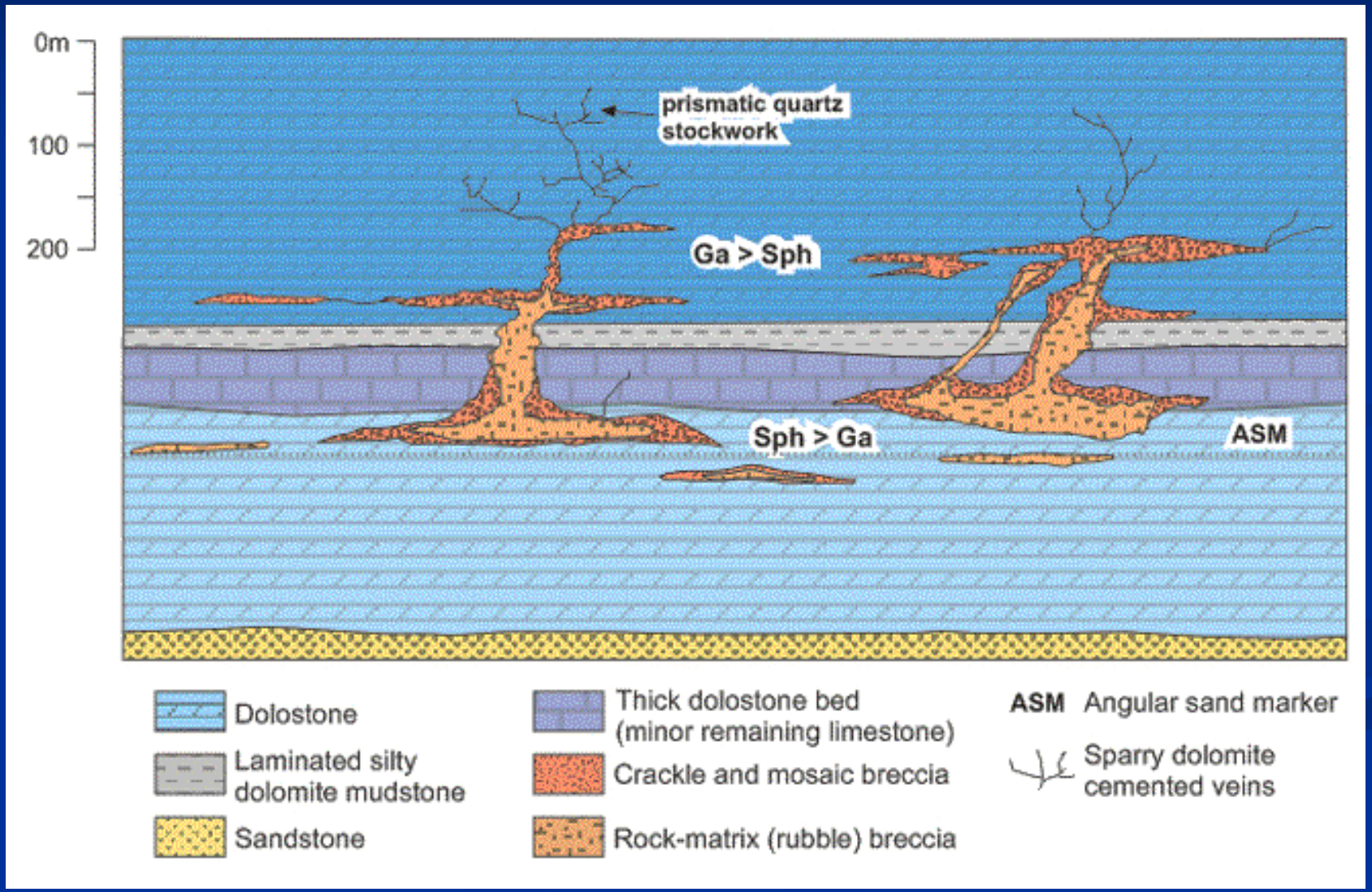
Potassically altered granite (pink) cut by molybdenite-bearing quartz veins

Epithermal Gold-Silver Ore

Quartz electrum (Au-Ag alloy) vein cross-cutting sericite (muscovite)-pyrite altered volcanics.

Mississippi Valley Type Pb-Zn Deposits

Robb-Lake – Karsts, caves and ores



MVT Pb-Zn (Galena-Sphalerite Ore