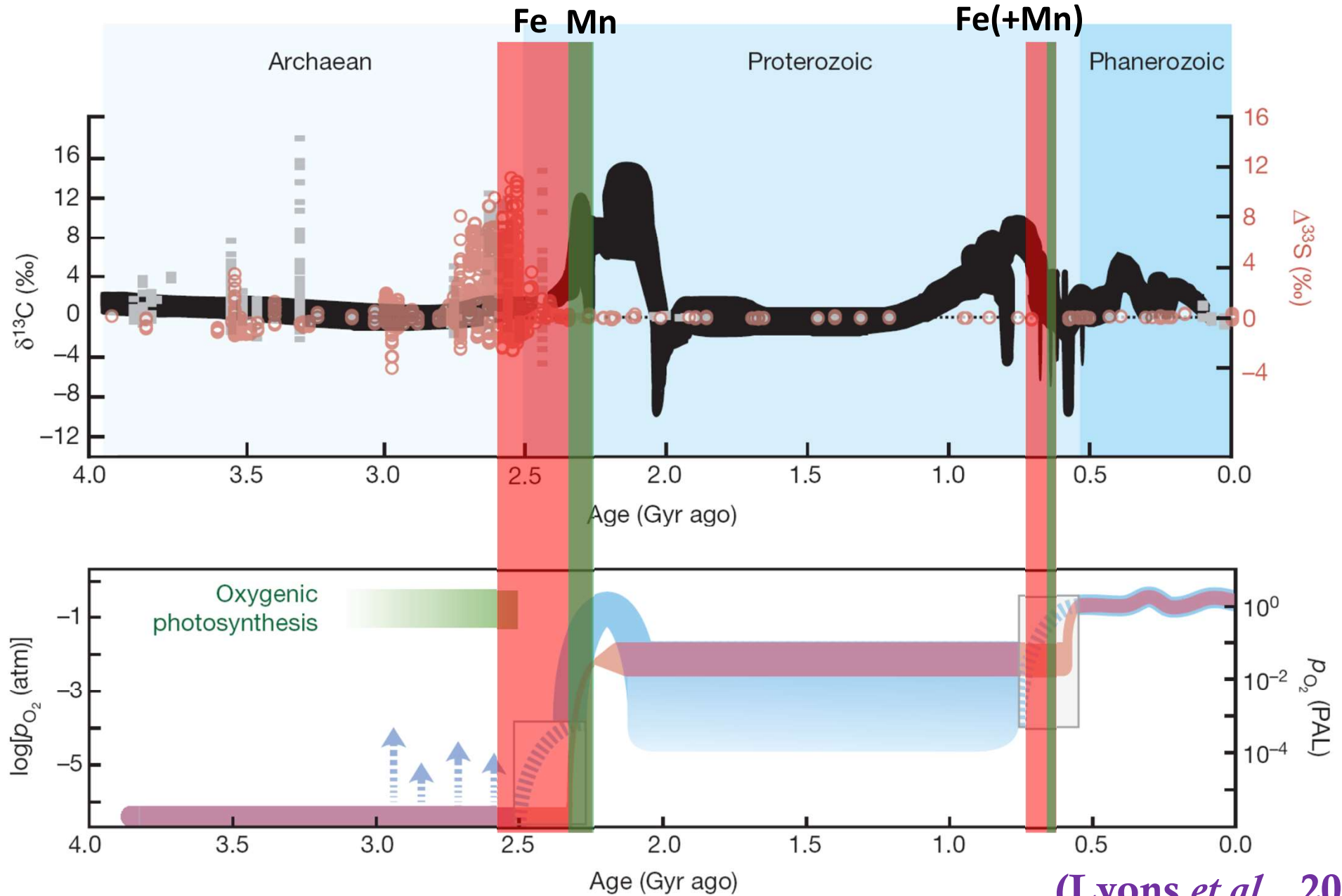


Διεργασίες μεταλλογένεσης - γενικά

Εφαρμοσμένη και περιβαλλοντική
γεωχημεία – 2023-24



Fe και Mn και η περιβαλλοντική εξέλιξη της γης

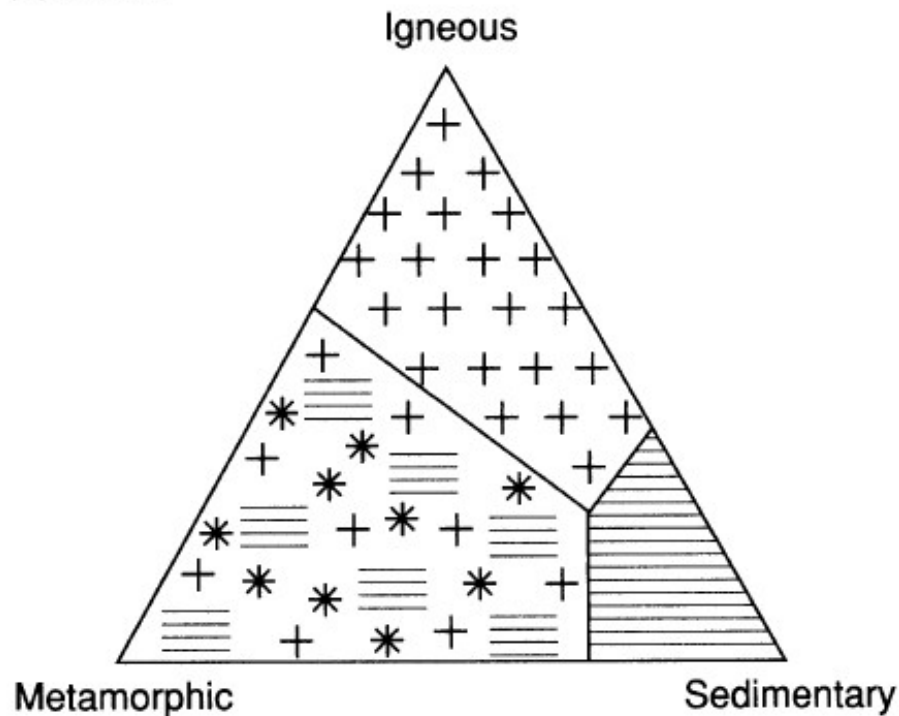


(Lyons *et al.*, 2014)

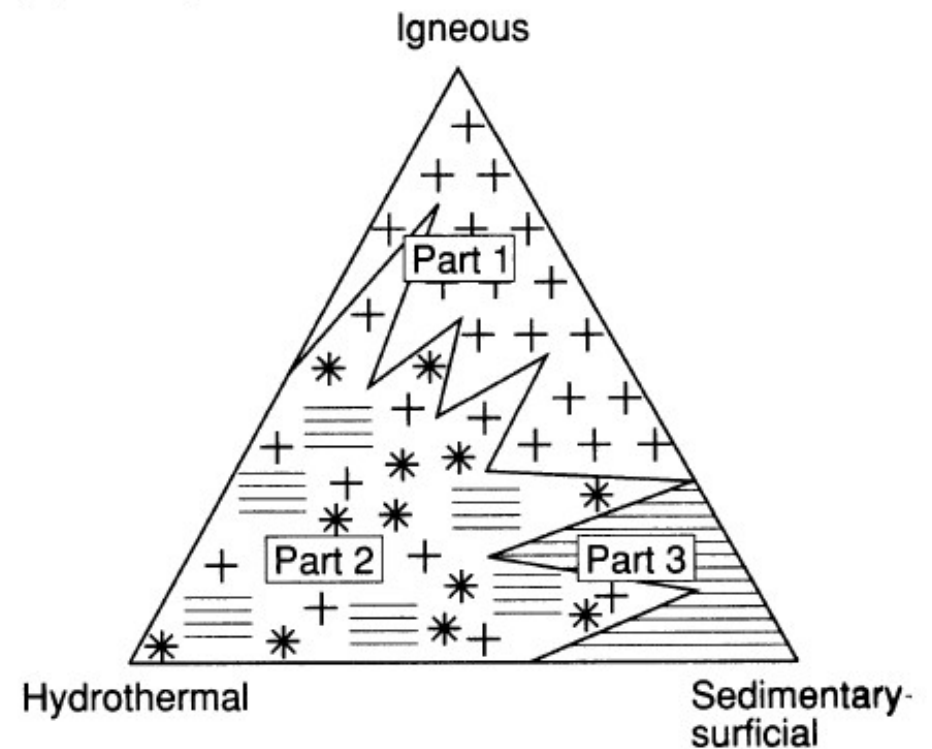


Ταξινόμηση κοιτασμάτων

(a) Rocks



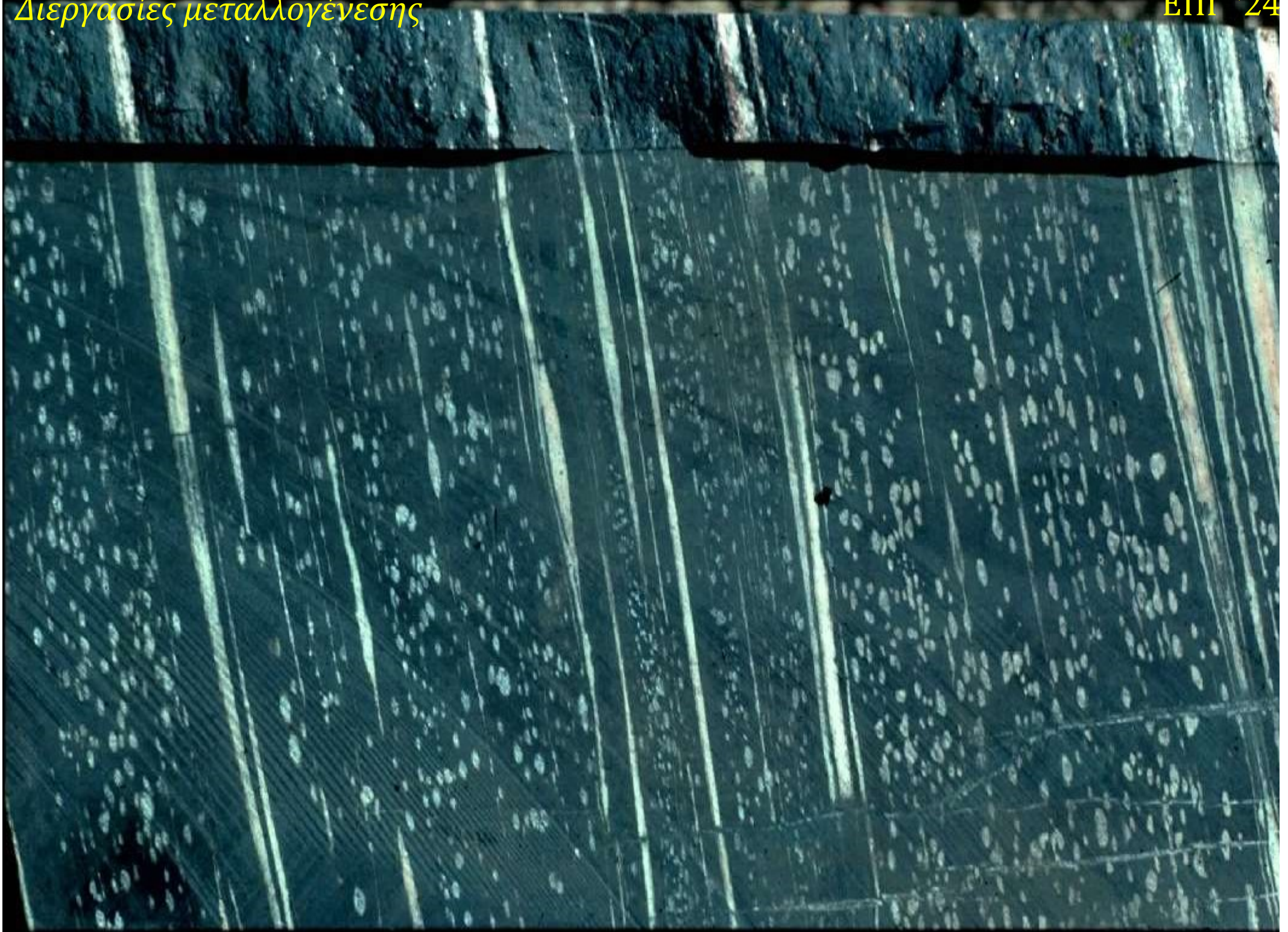
(b) Ore deposits



Syngenetic = Συγγενετικό

Epigenetic = Επιγενετικό

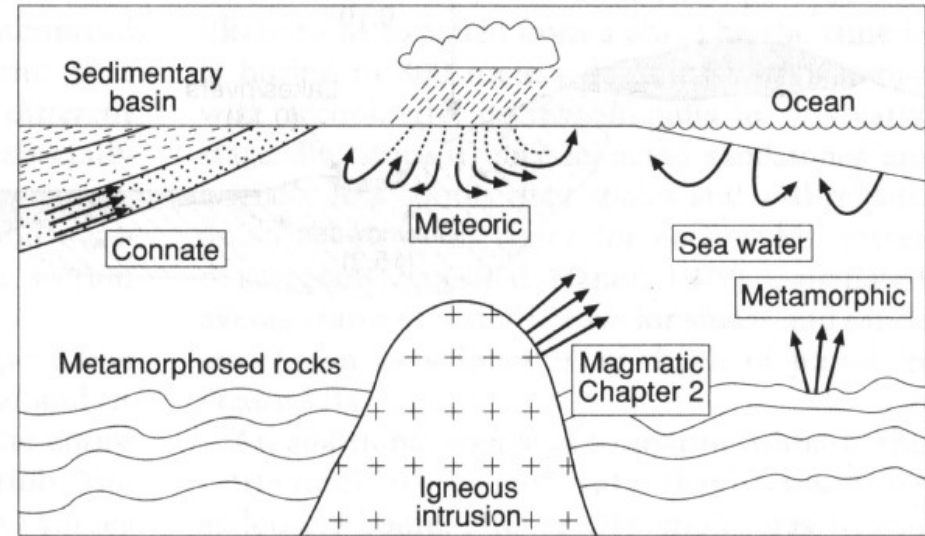




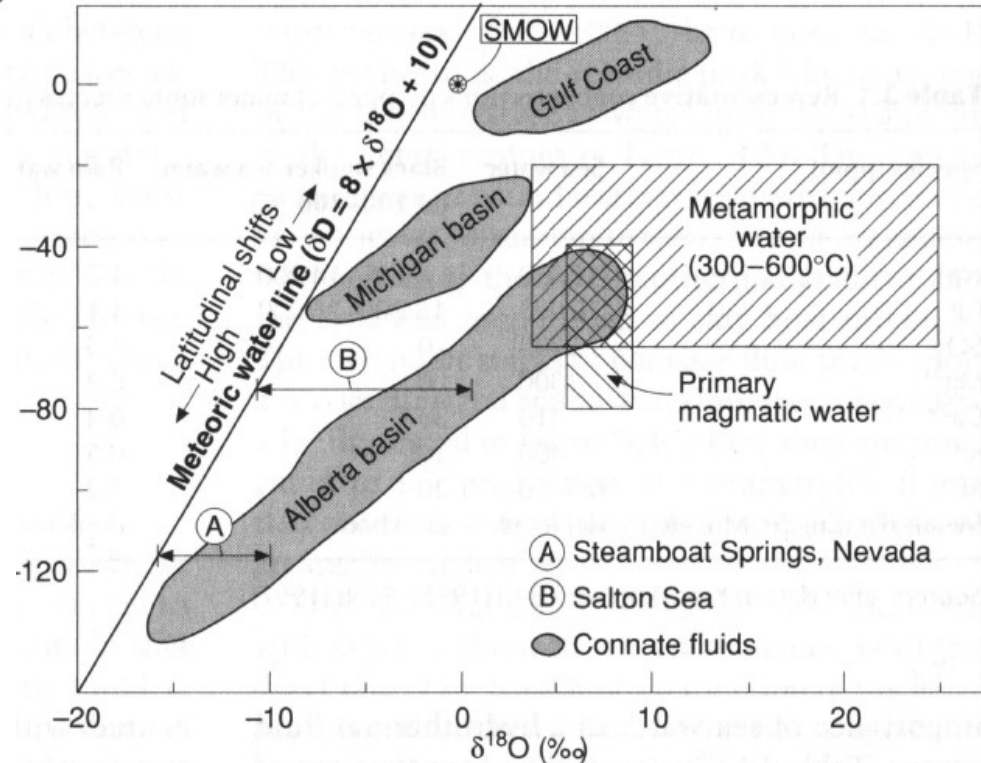
Πηγές υδροθερμικών ρευστών

- Μαγματισμός
- Μεταμόρφωση
- Διαγένεση
- Μετεωρική δράση
- Θάλασσα

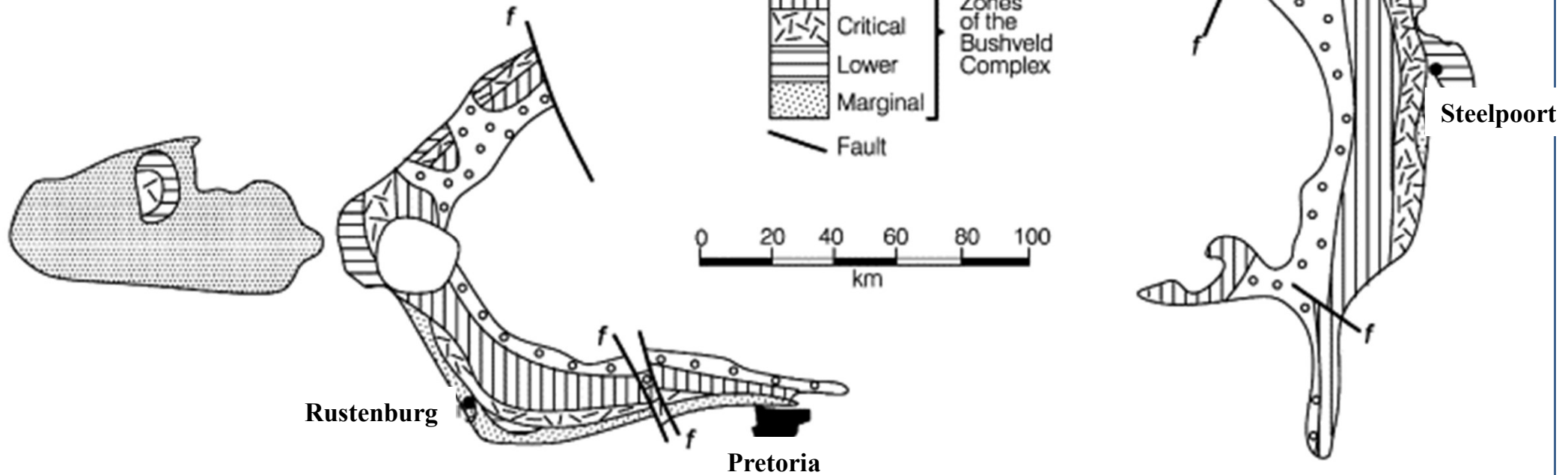
(a)



(b)



Το μαγματικό σύμπλεγμα Bushveld





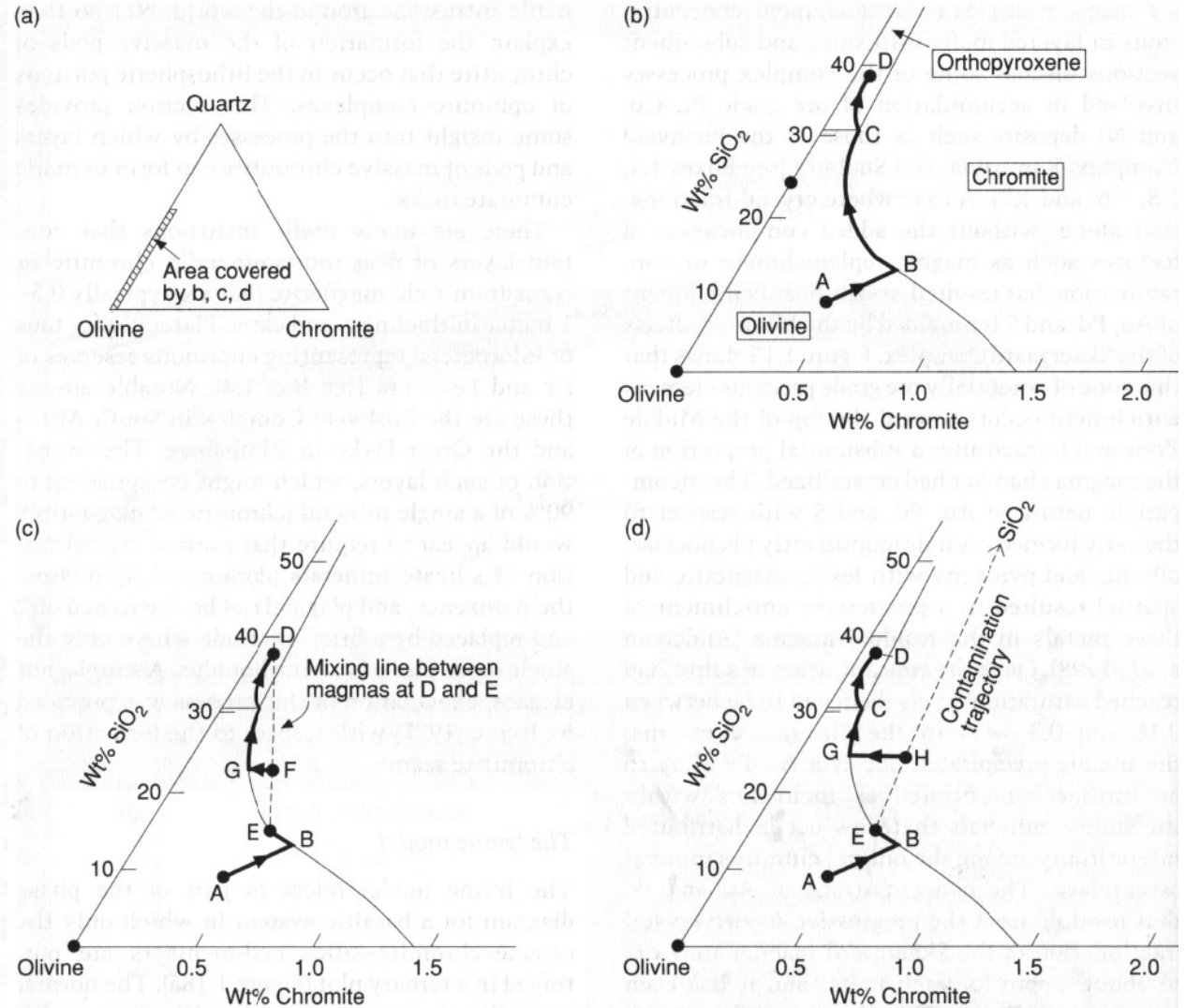
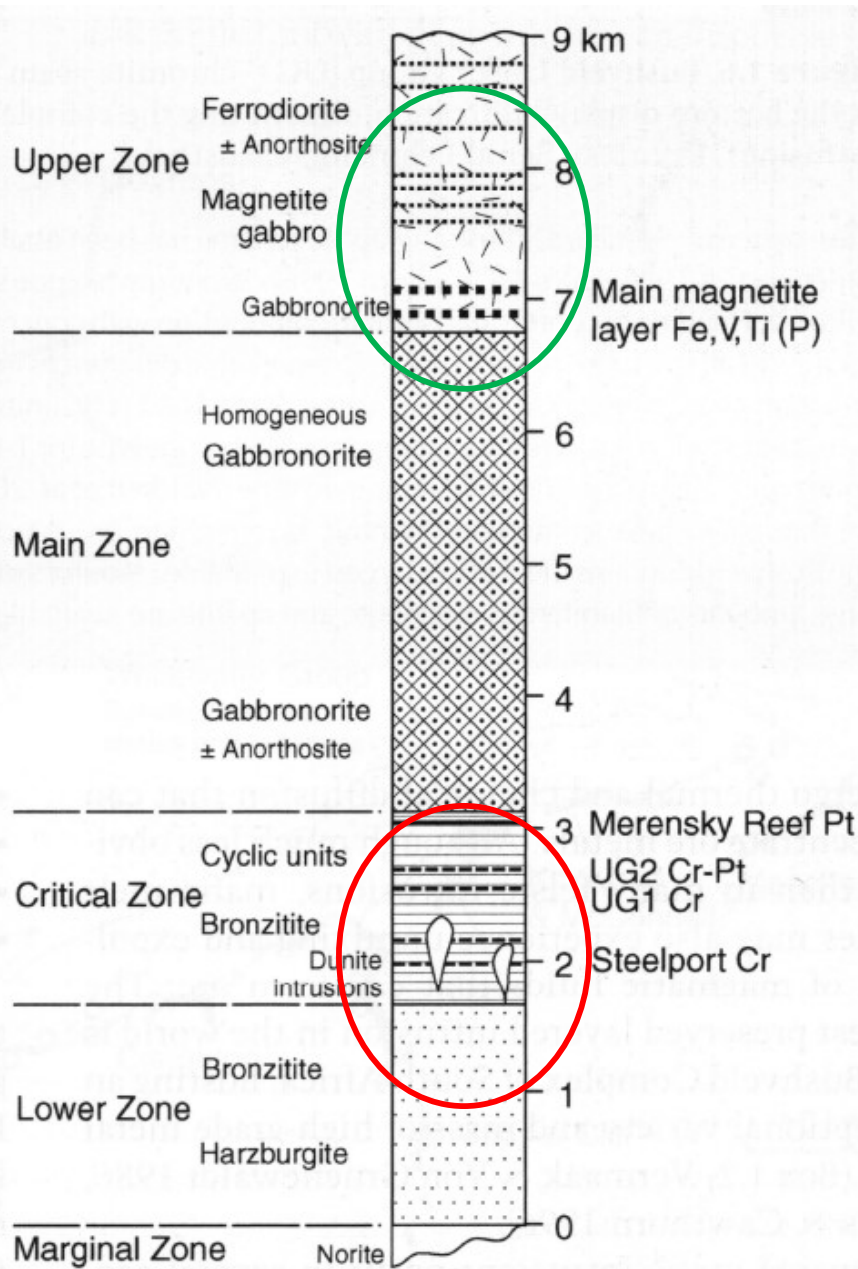
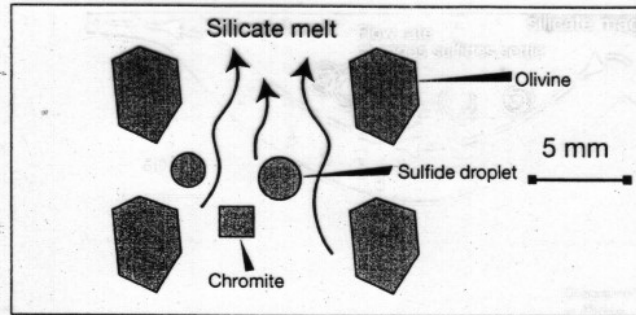


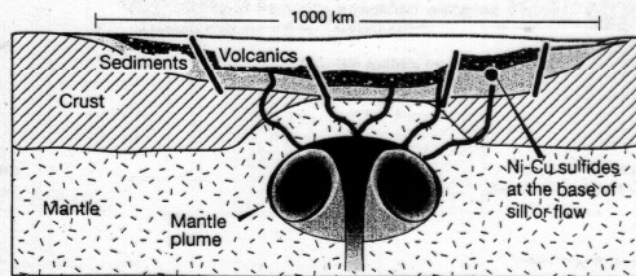
Figure 1.18 A portion of the ternary system quartz–olivine–chromite (a) showing the nature of crystallization in a mafic magma (b). Scenarios in which magma mixing (c) and magma contamination (d) occur as mechanisms for promoting the transient crystallization of only chromite are also shown (after Irvine, 1977).

Γενετικό μοντέλο μαγματικών μεταλλοφοριών Ni-Cu

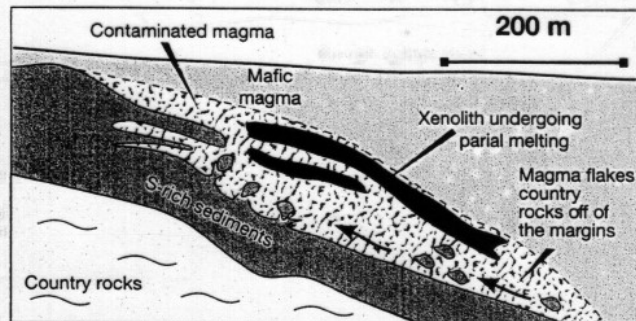
a) Partial melting of mantle, high degree of partial melting needed to release Ni from olivine



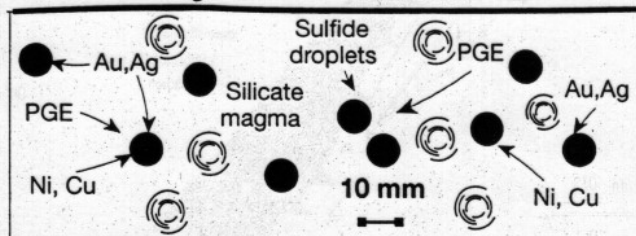
b) Transport of magma into the crust



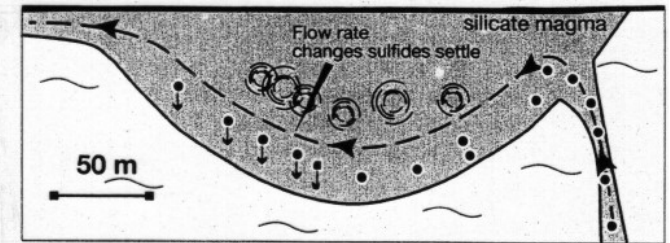
c) Contamination of the magma brings about sulfide saturation



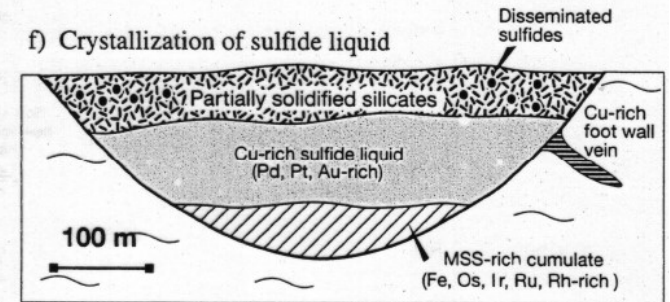
d) Collection of the metals by sulfide liquid
Vigorous convection raises silicate to sulfide liquid ratio resulting in Ni and PGE rich ores



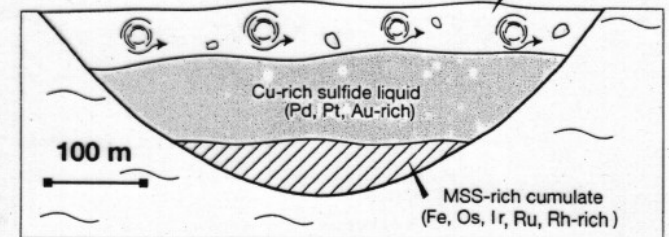
e) Collection of the sulfides in some structural trap



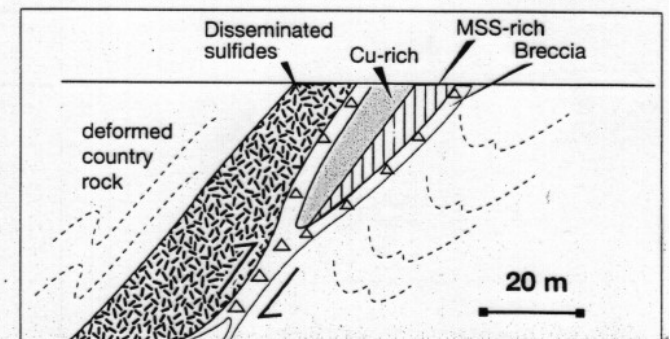
f) Crystallization of sulfide liquid



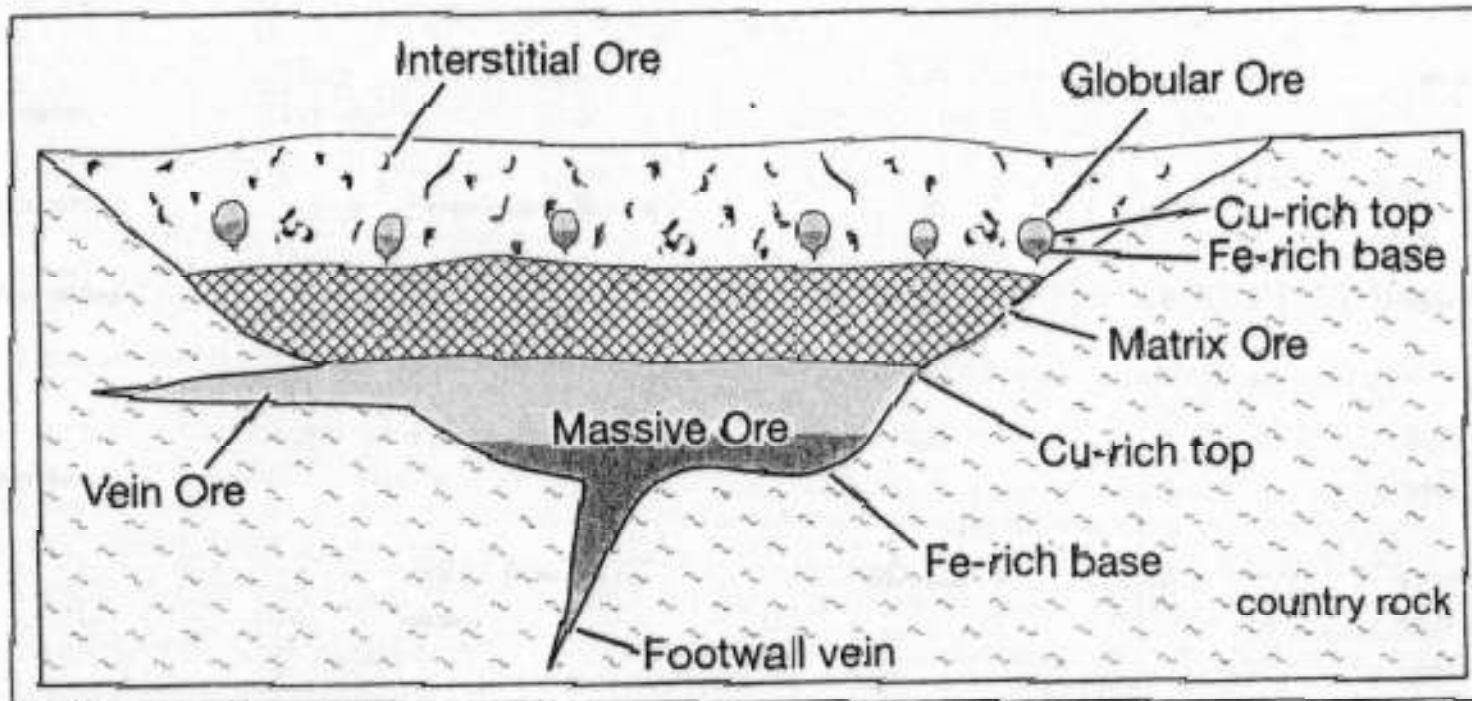
g) Introduction of new magma
New magma picks up some sulfide liquid



h) Deformation of sulfides to form brecciated sulfides

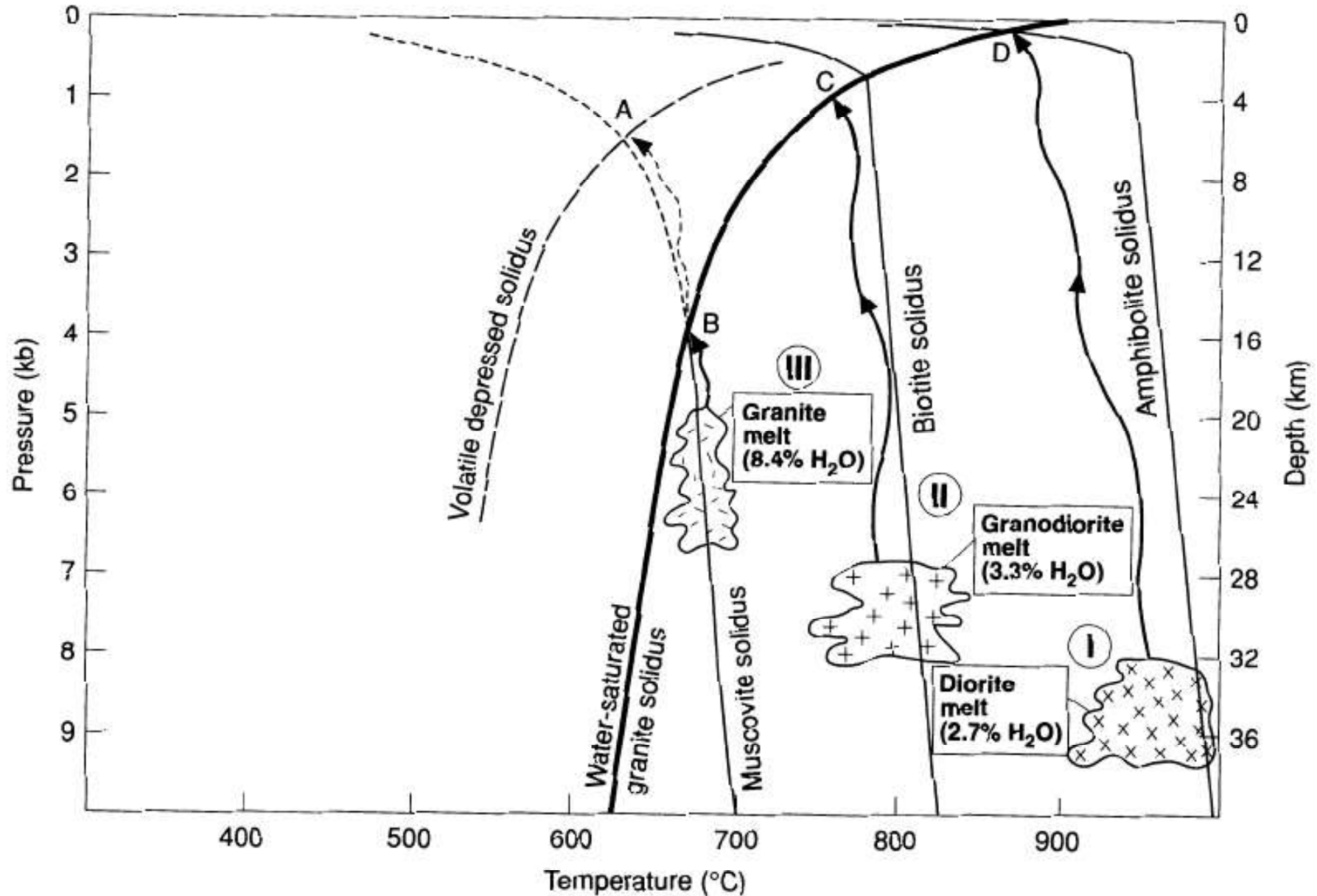


Ανατομία κοιτάσματος θειούχων Ni-Cu

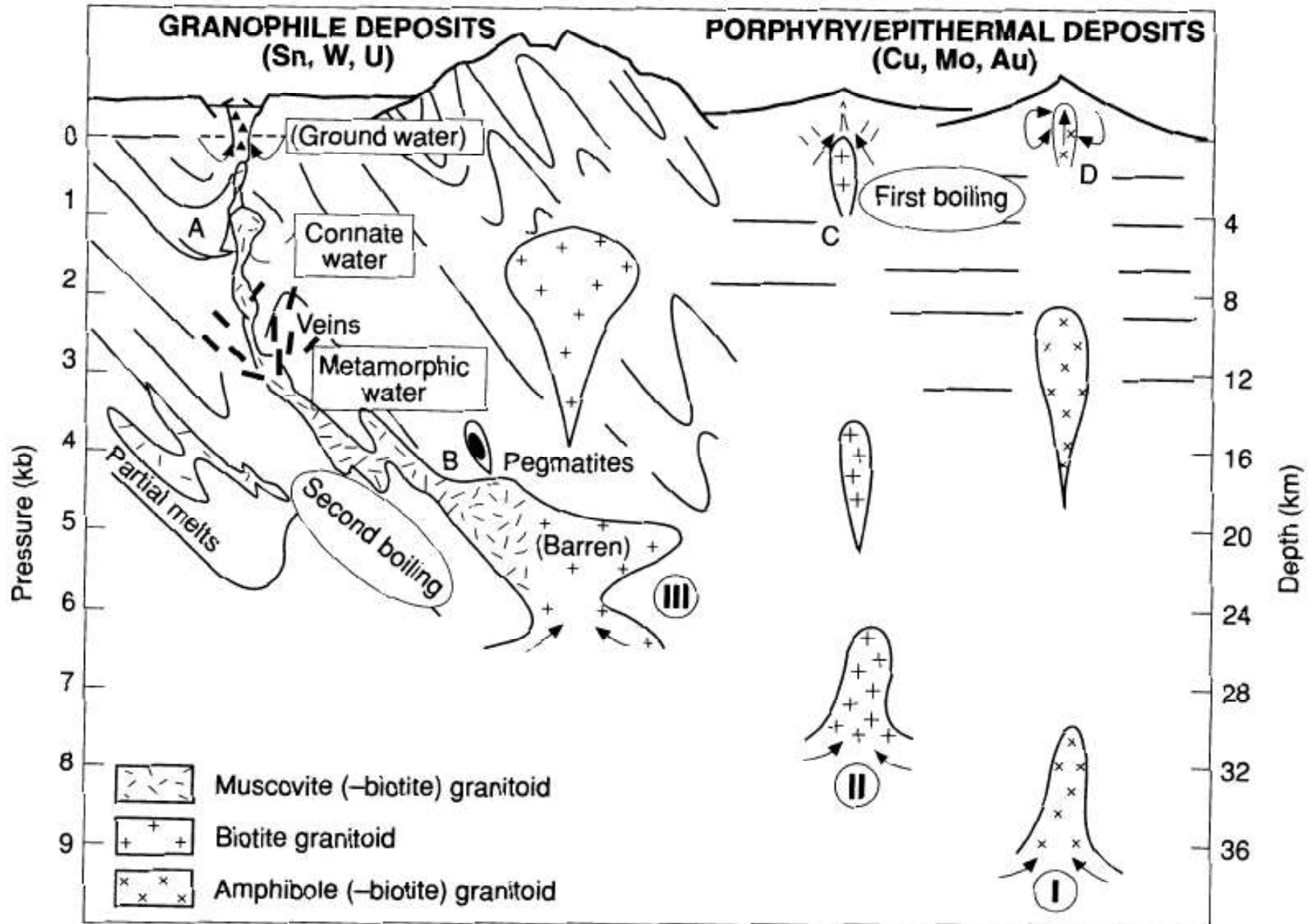


Idealized sketch of the relationship between massive, matrix, disseminated, and vein sulfides (modified after Barnes et al., 1997b).

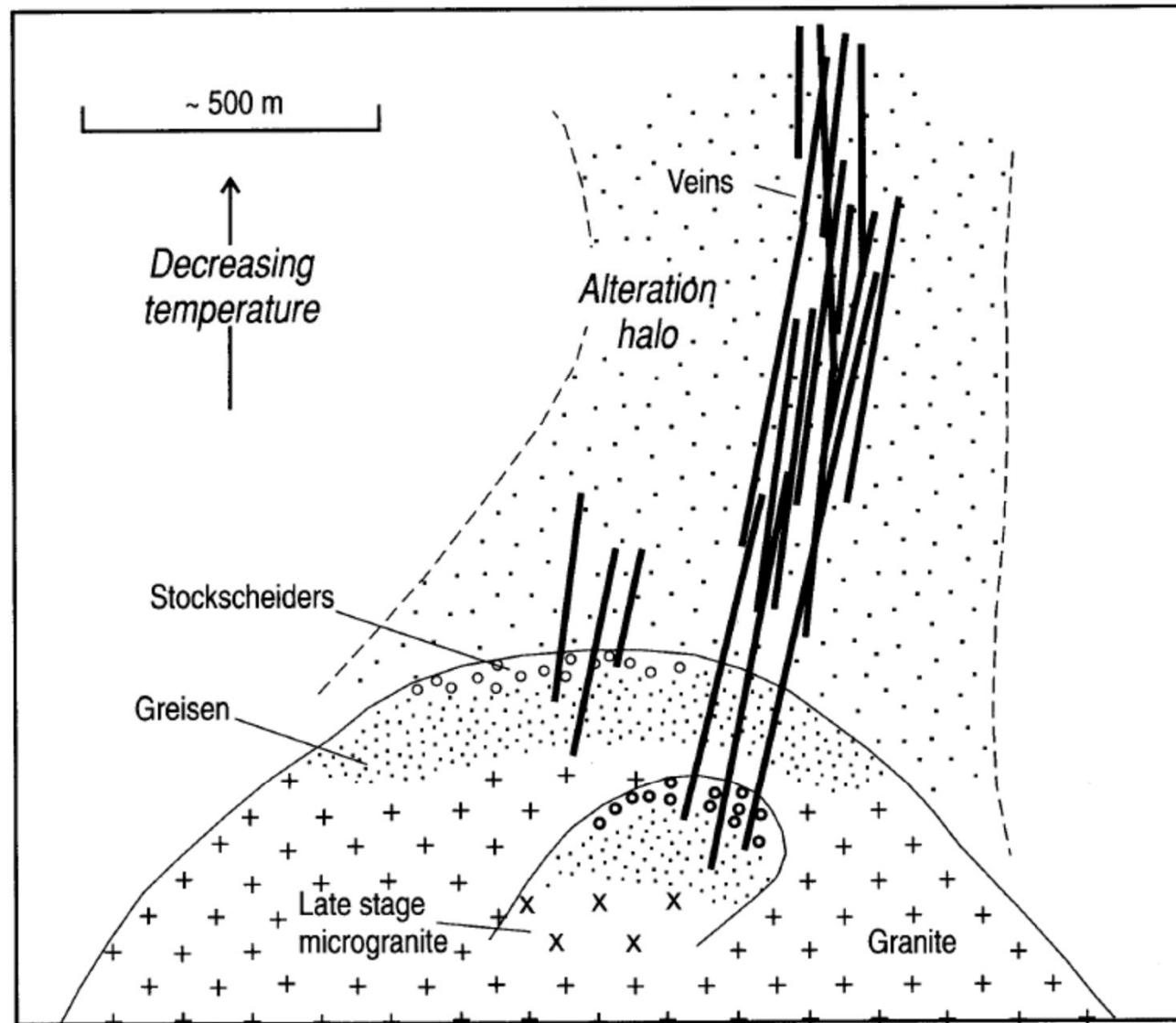
Granite-related ore-genesis: the role of water



Granites and mineralisation

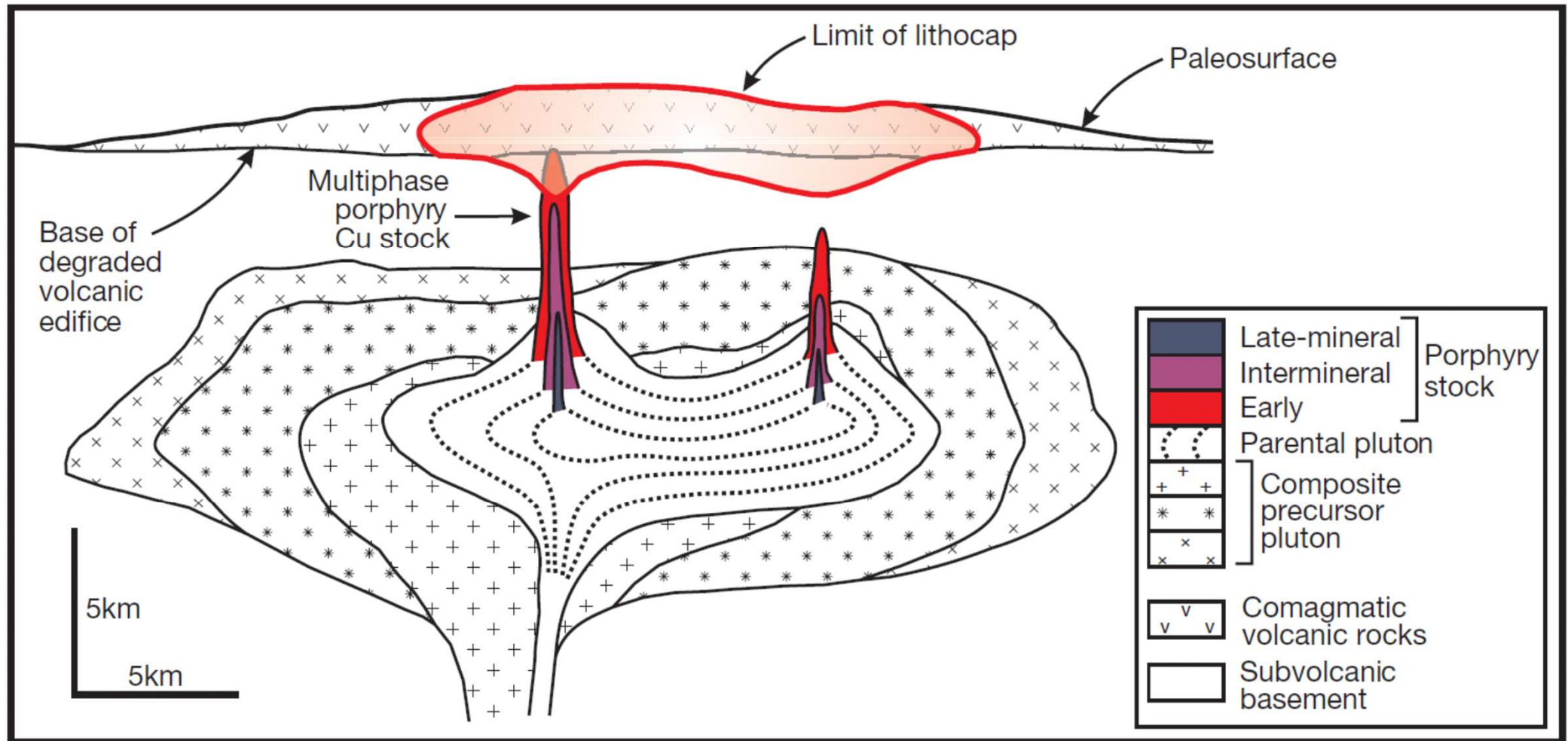


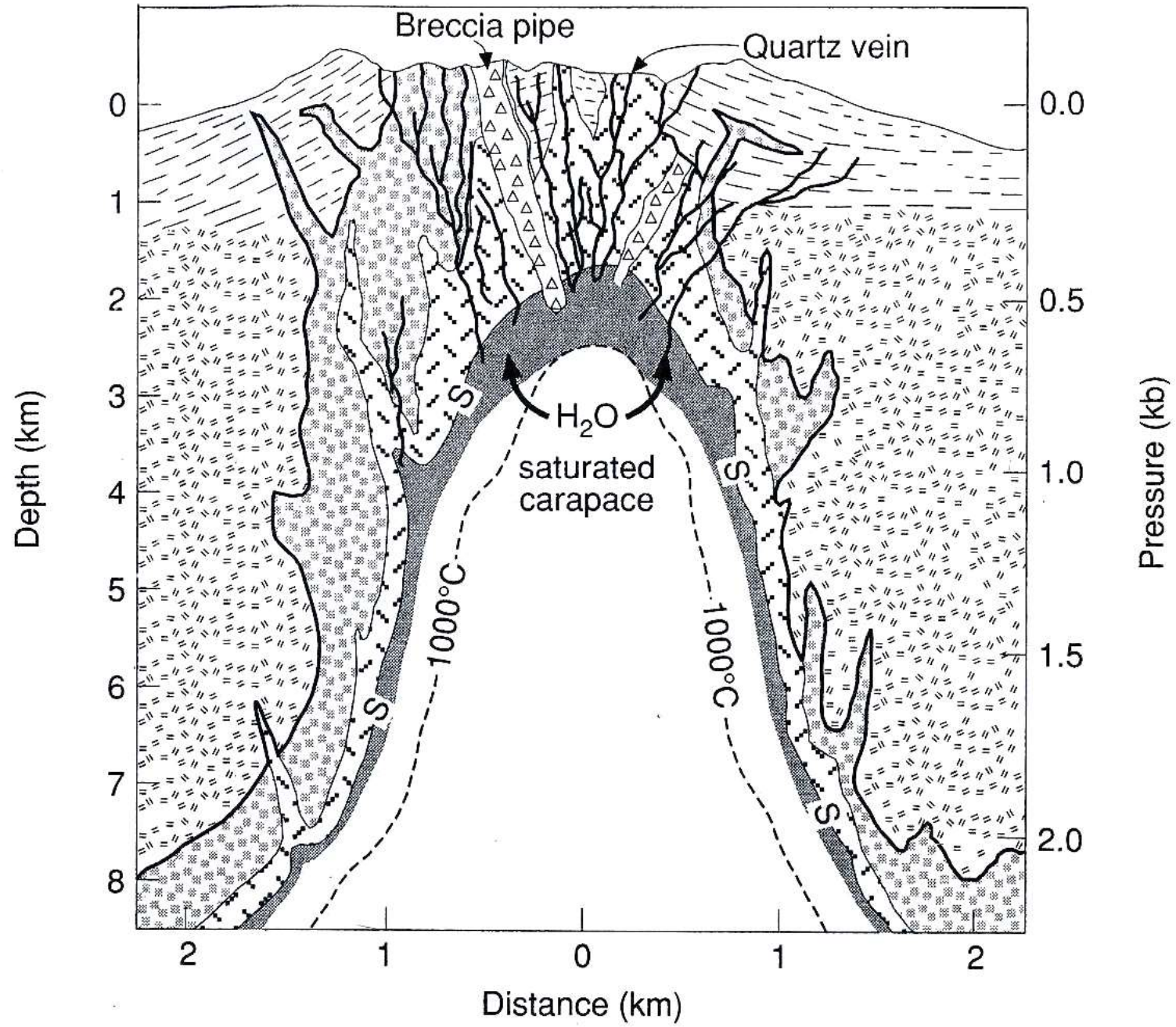
Υδροθερμικά κοιτάσματα γρανιτών τύπου S



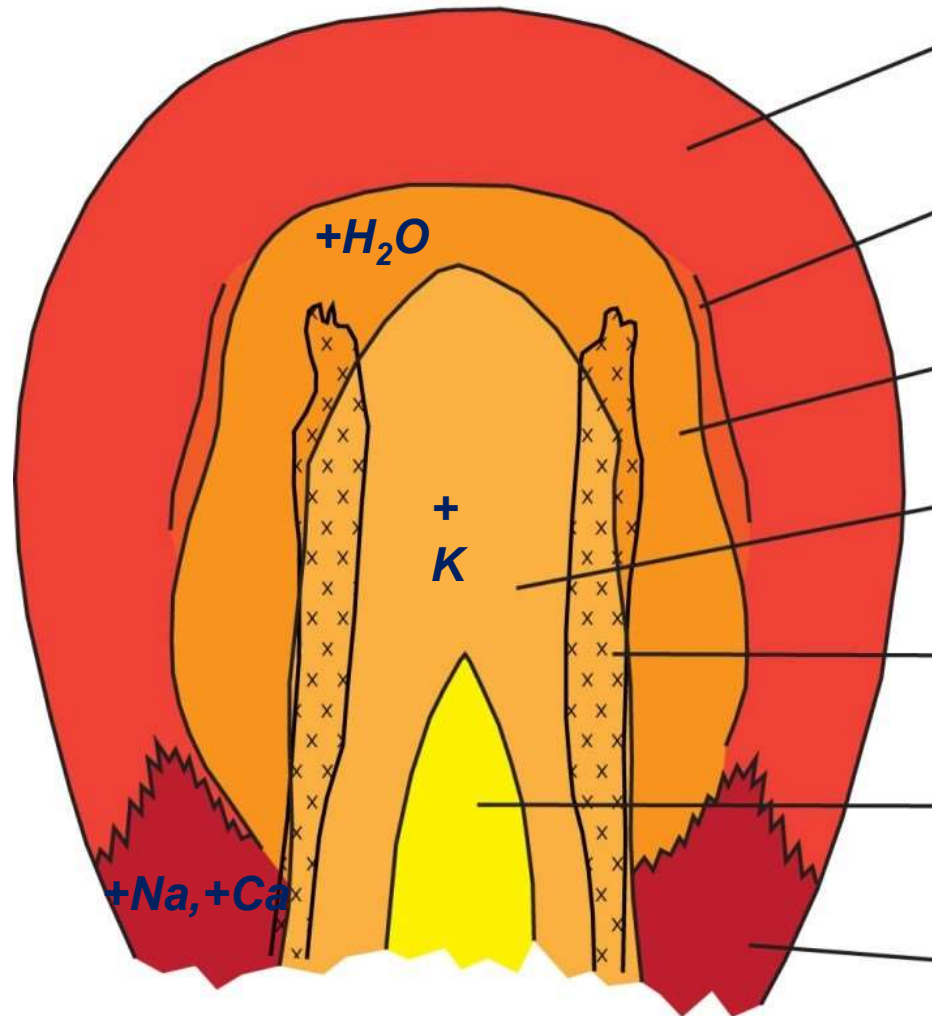
Schematic vertical section across a typical hydrothermally mineralized granite cupola, showing salient features of shallow granite-related Sn-, W-, and Mo-mineralized systems.

Γρανίτες τύπου I και συστήματα πορφυρικού Cu





Ζωνώδης εξαλλοίωση σε γρανιτικό σύστημα τύπου I



Προπυλιτική εξαλλοίωση
(χλωρίτης, ασβεστίτης, επίδοτο, κτλ.)

Αργιλική εξαλλοίωση
(αργιλλικά ορυκτά, π.χ. καολινίτης)

Υδρολυτική εξαλλοίωση
(χαλαζίας, μοσχοβίτης, σιδηροπυρίτης)

Καλιούχος εξαλλοίωση II (βιοτίτης)

Μεταλλοφορία χαλκού

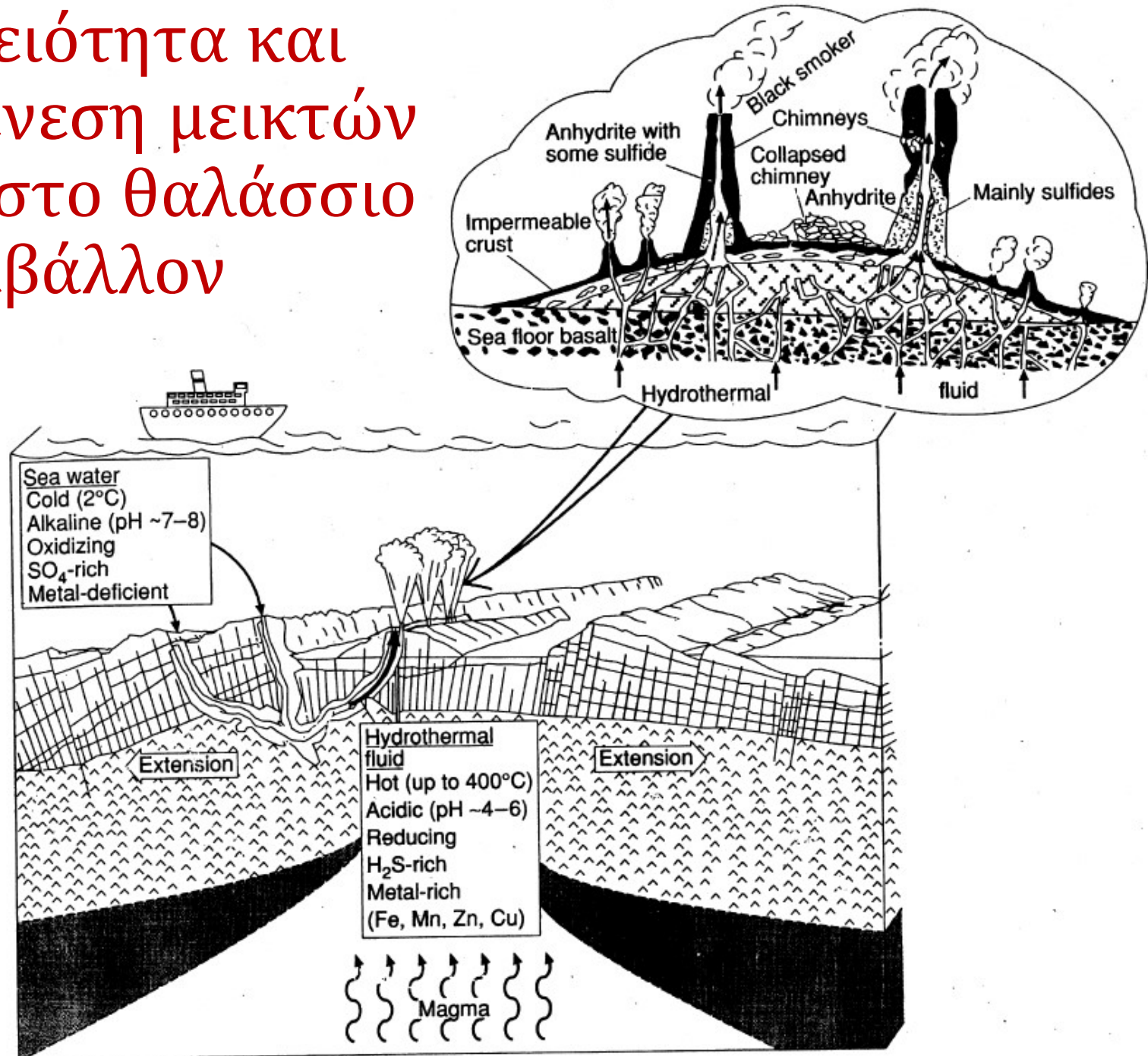
Καλιούχος εξαλλοίωση I (Κ-άστριος)

Νατρούχος-ασβεστούχος εξαλλοίωση
(κυρίως αλβίτης)

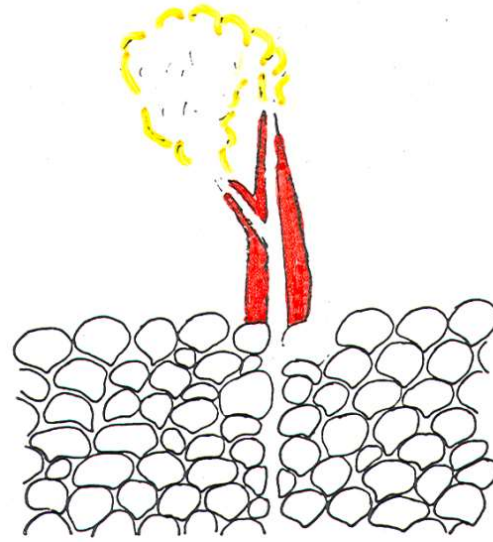




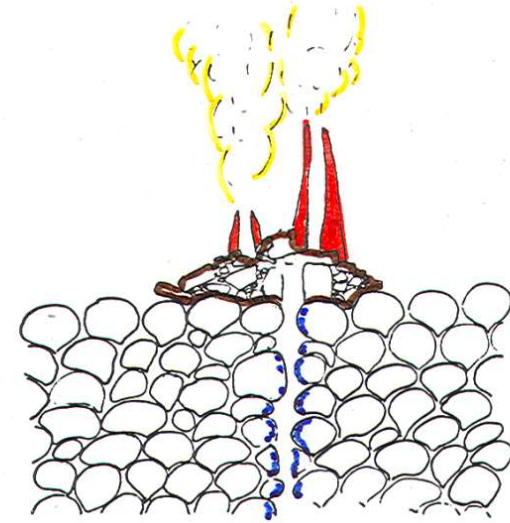
Ηφαιστειότητα και μεταλλογένεση μεικτών θειούχων στο θαλάσσιο περιβάλλον



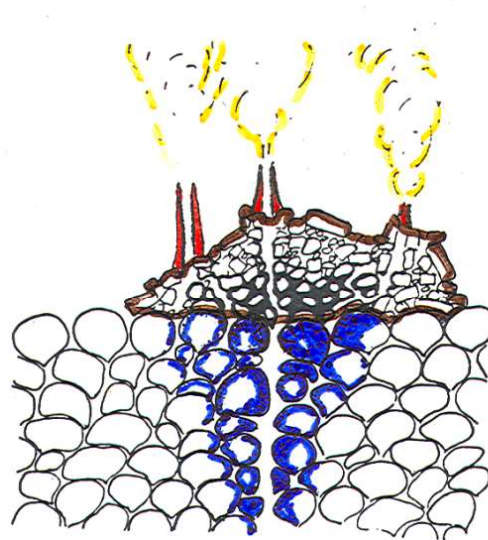
Η εξέλιξη μιάς
μελανοκαπνίζουσας
τάφρου στο χρόνο



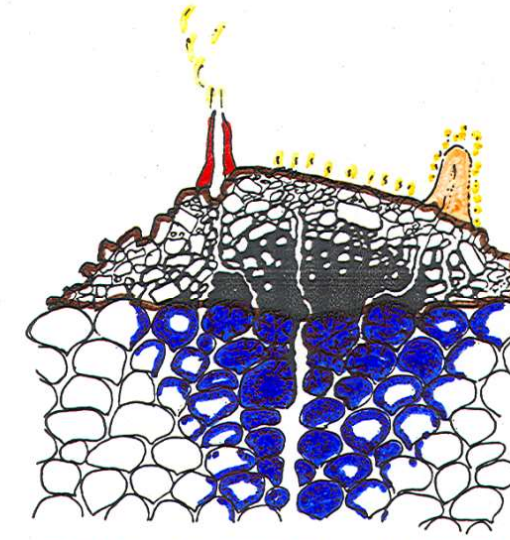
1. Initiation of hydrothermal discharge and chimney growth



2. Collapse of old chimney and growth of new chimneys



3. Growth of mound by accumulation of chimney talus and defocussing of hydrothermal discharge



4. Decrease of mound permeability and intramound sulphide precipitation, replacement and remobilization

LEGEND:



Chimney talus



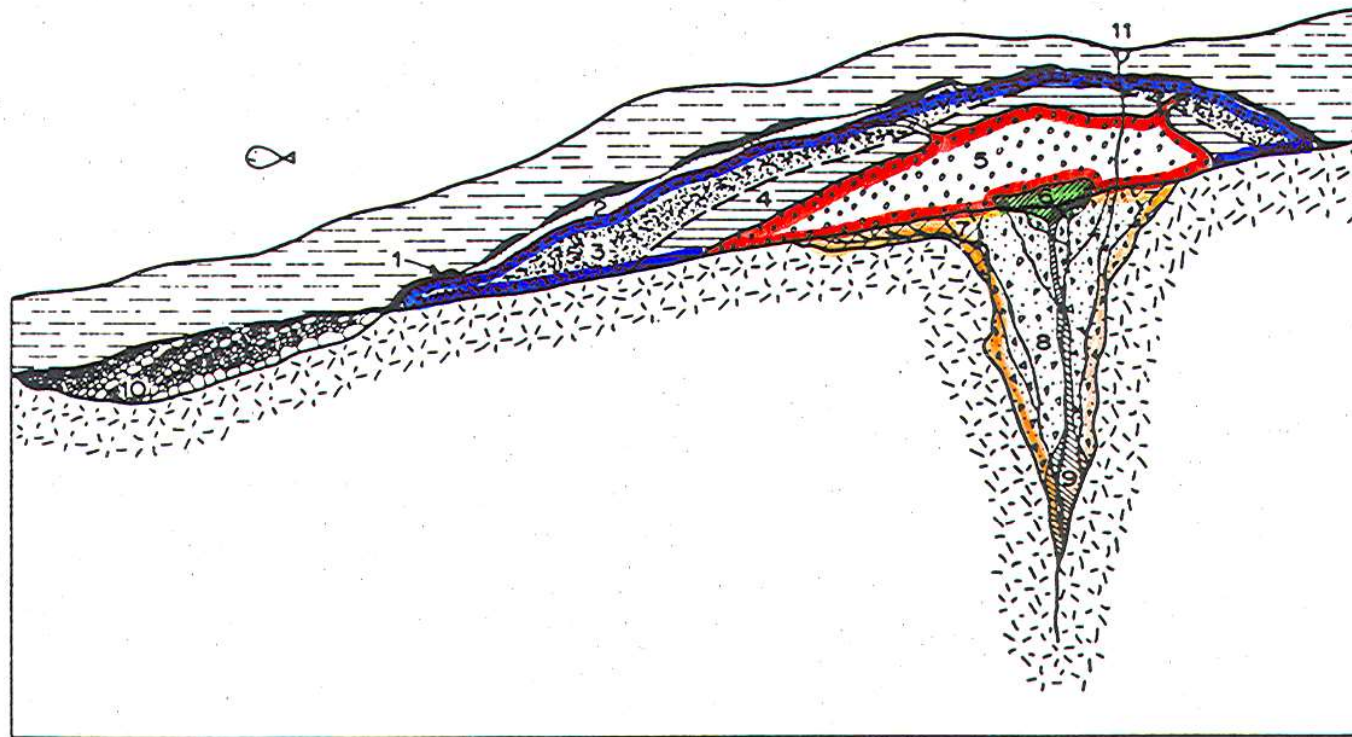
Sulphide infilling, replacement and/or remobilization



Hydrothermal alteration of pillow lavas

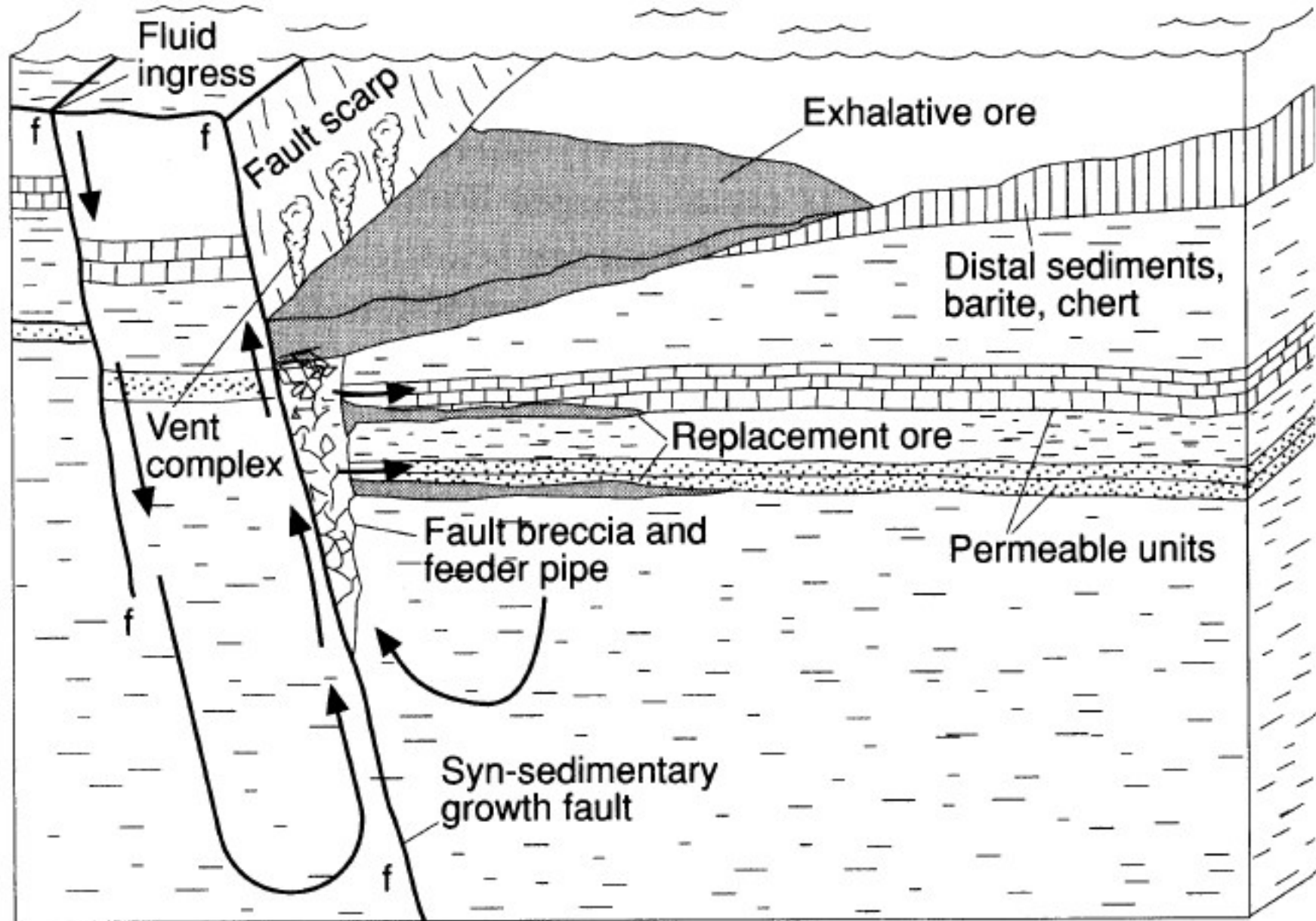
10 meters

Ανατομία ενός κοιτάσματος τύπου Kuroko

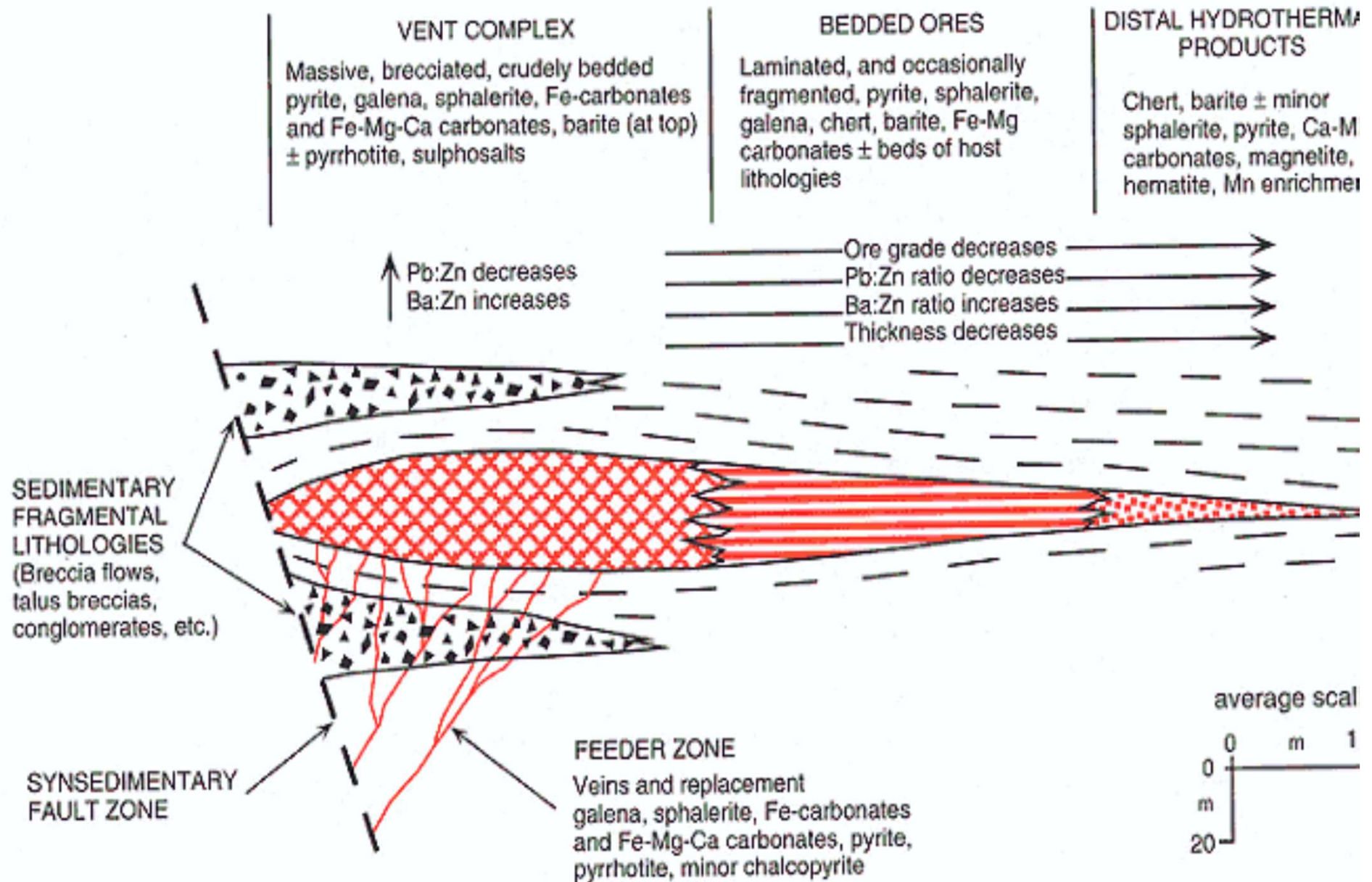


An idealized representation of a relatively undisturbed Kuroko deposit. 1 = tetsusekiei or chert-hematite layer, 2 = barite ore, 3 = massive black ore (sphalerite + pyrite + galena + barite) where the fine dotted line separates the overlying fine-grained ore from the coarser grained ore below, 4 = massive semiblack ore (sphalerite + pyrite + chalcopyrite), 5 = massive yellow ore (chalcopyrite + pyrite), 6 = massive pyrite ore (pyrite + quartz), 7 = siliceous black ore (sphalerite + pyrite + galena + quartz) 8 = siliceous yellow ore (chalcopyrite + pyrite + quartz), 9 = siliceous pyrite ore (pyrite + quartz), 10 = transported, fragmental massive ore (mostly black), 11 = late-stage sulfide veins which can be either black or yellow ore. Though gypsum ore is often present underneath and peripheral to massive ores, we did not examine any in this study and have chosen to delete it for the sake of simplicity.

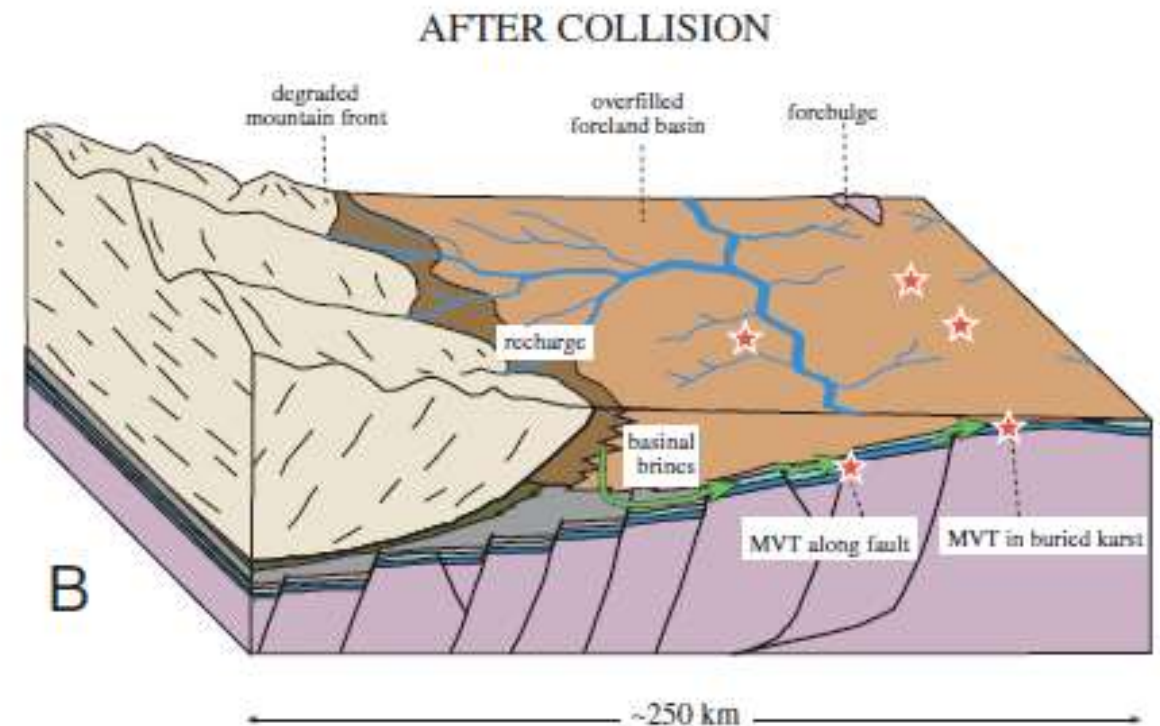
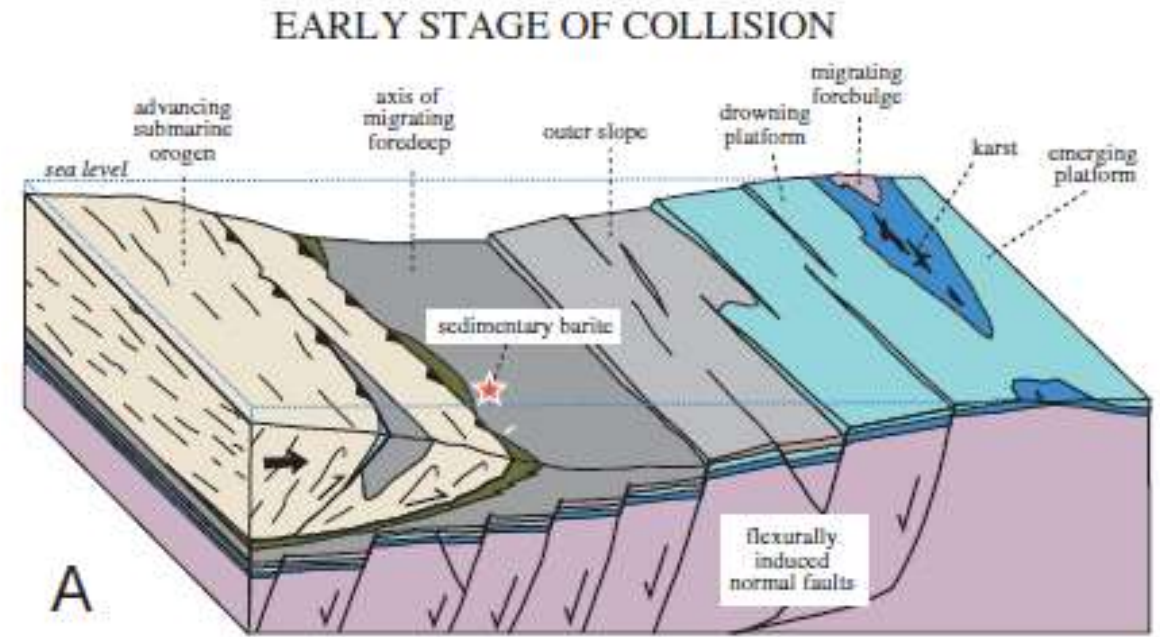
Μεταλλοφορίες τύπου SEDEX

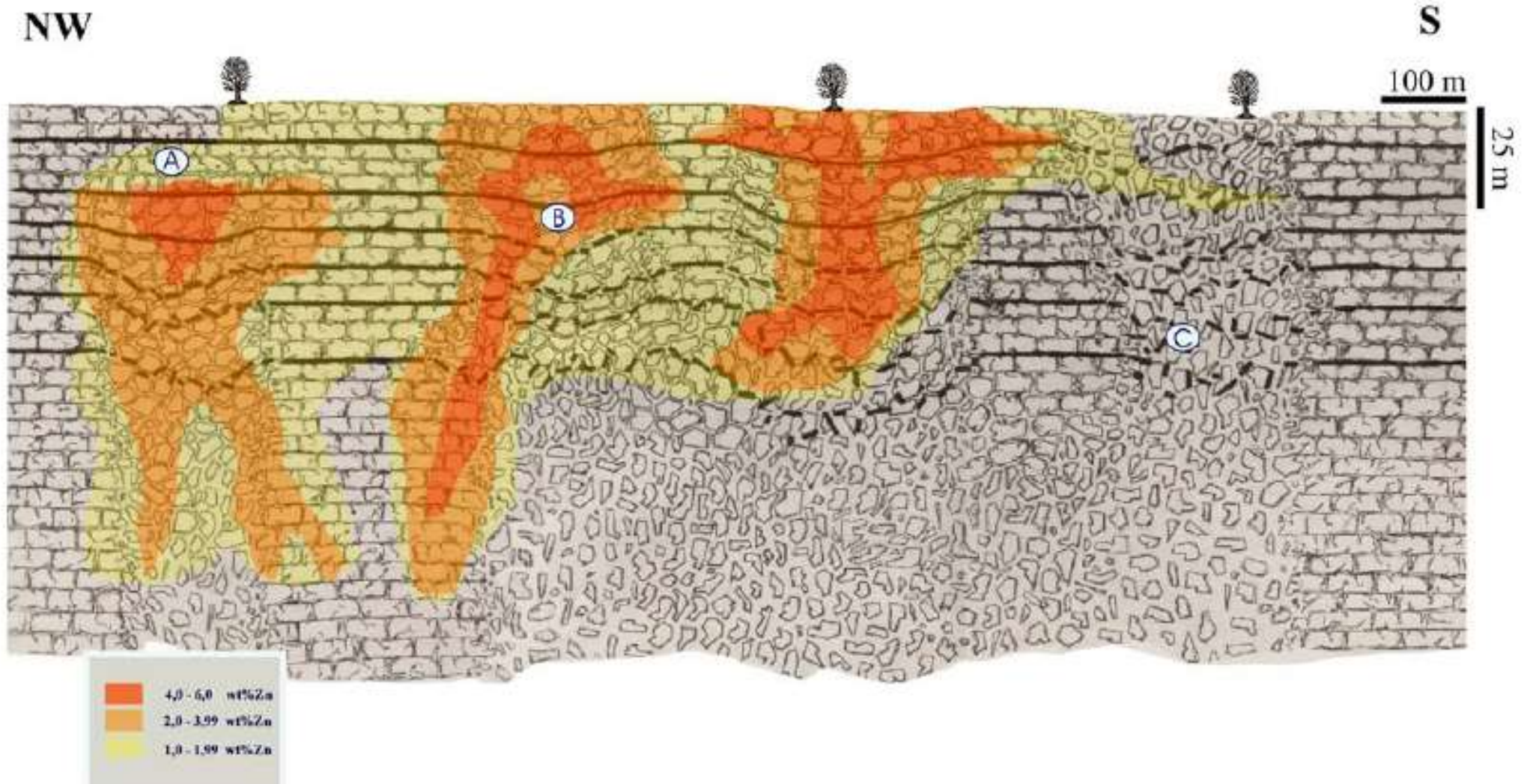


Ανατομία ενός κοιτάσματος SEDEX

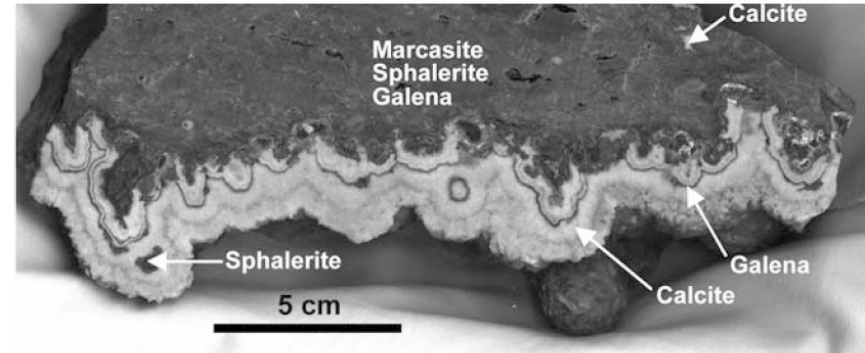


Γεοτεκτονικό
πλαίσιο
κοιτασμάτων
τύπου MVT

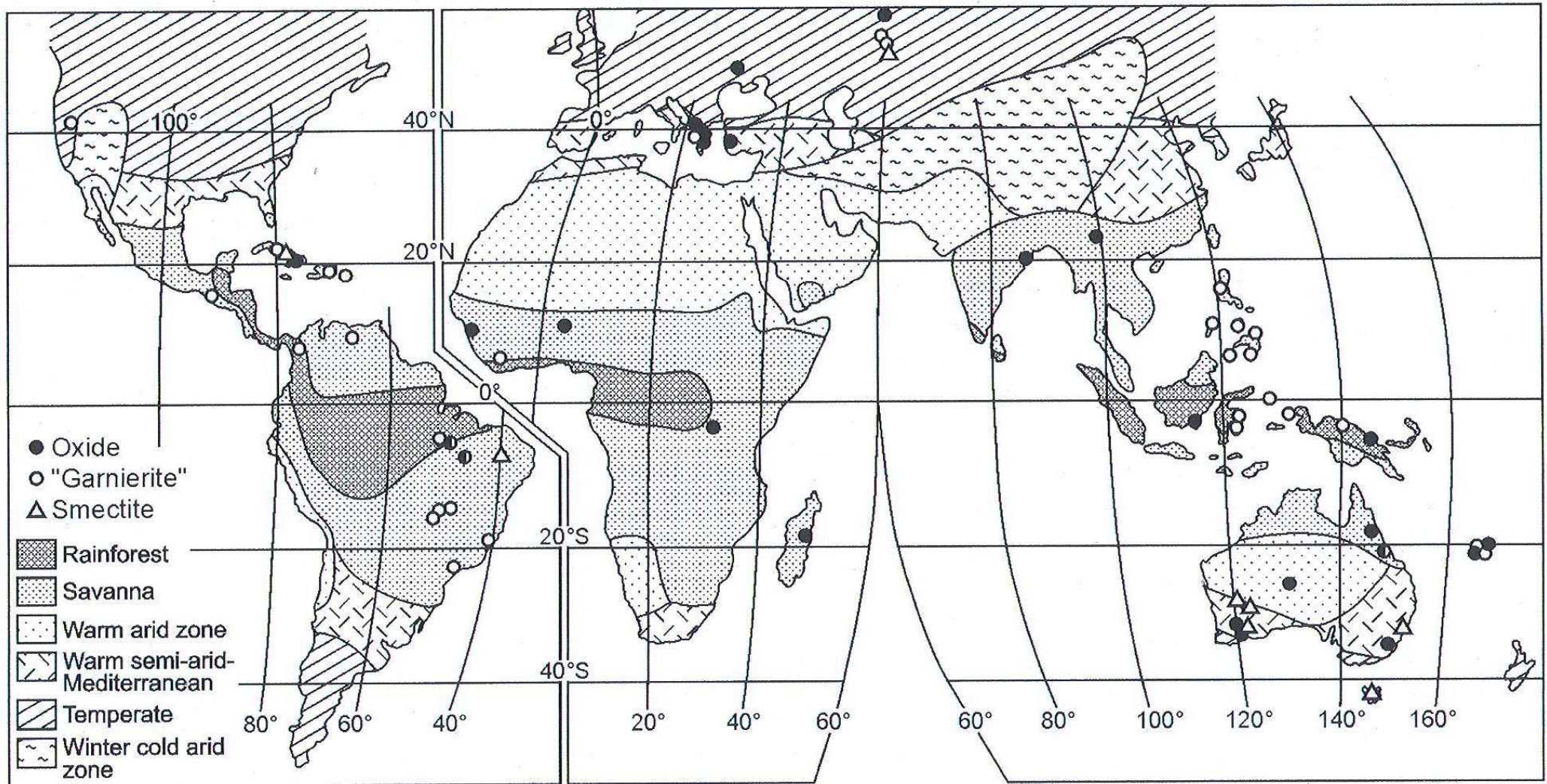




Idealized NW to S directed cross section through the Pering deposit. Note the obvious slumping of thin carbonaceous shale marker beds into the subvertical breccia bodies. Note also the close relation between style of brecciation and grade. Highest grades are restricted to the margins and roof zones of breccia bodies, where chemical breccia and mosaic breccia styles prevail. (A) denotes typical occurrence of crackle breccia, (B) of mosaic and chemical wear breccia and (C) of pyritic rock matrix breccia

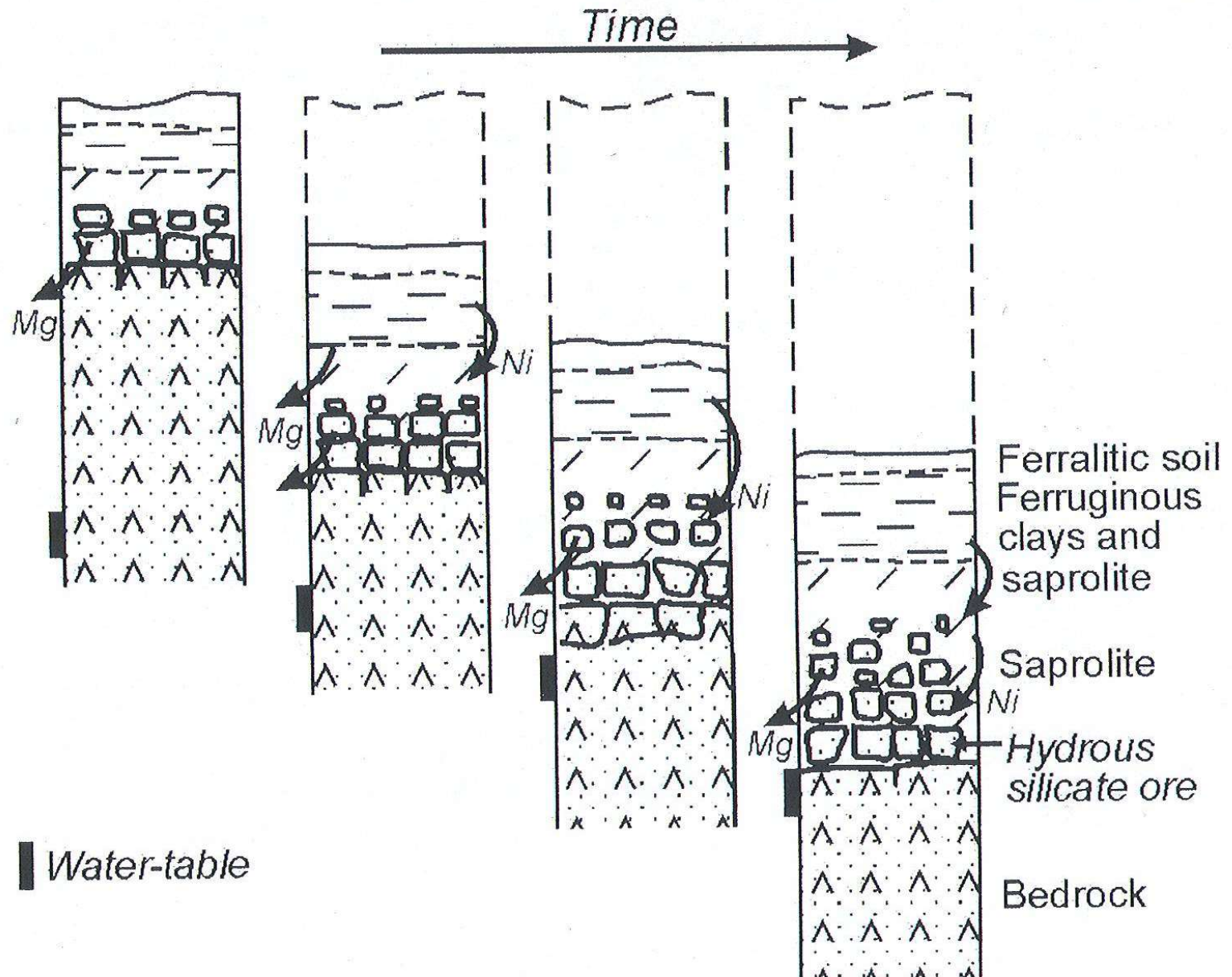


Γεωγραφική κατανομή Ni λατεριτικών εμφανίσεων

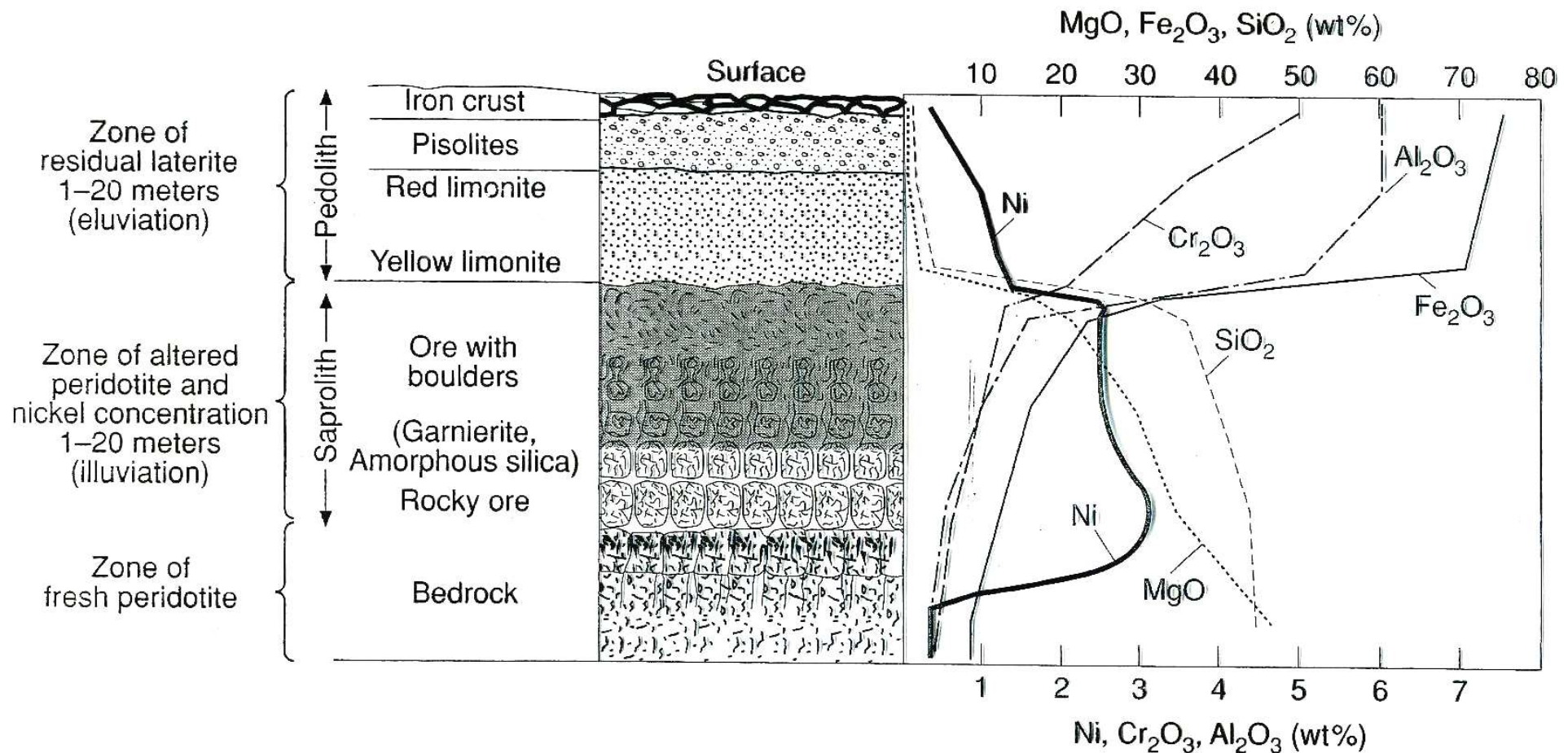


Global distribution of Ni laterite deposits, classified according to principal deposit type, on a morphoclimatic map (modified after Budel, 1982).

Λατεριτίωση και συγκέντρωση Νικελίου



Ανατομία ενός Νικελιούχου λατερίτη



Descriptive profile and Ni ore distribution in a lateritic regolith typical of the New Caledonian deposits. The chemical profile clearly distinguishes the ferruginous/aluminous residual zone where Si, Mg, and Ni are leached, from the saprolith where illuviation has resulted in concentration of Ni (after Troly *et al.*, 1979; Guilbert and Park, 1986).

Key textbook

Robb, L. (2005)

Introduction to ore-forming processes

**– Εισαγωγή στις διεργασίες
κοιτασματογένεσης**

Blackwell Science Ltd.

373p.