

# Microstructural, petrological and geochemical records of pervasive melt transport in the crust

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To understand better:

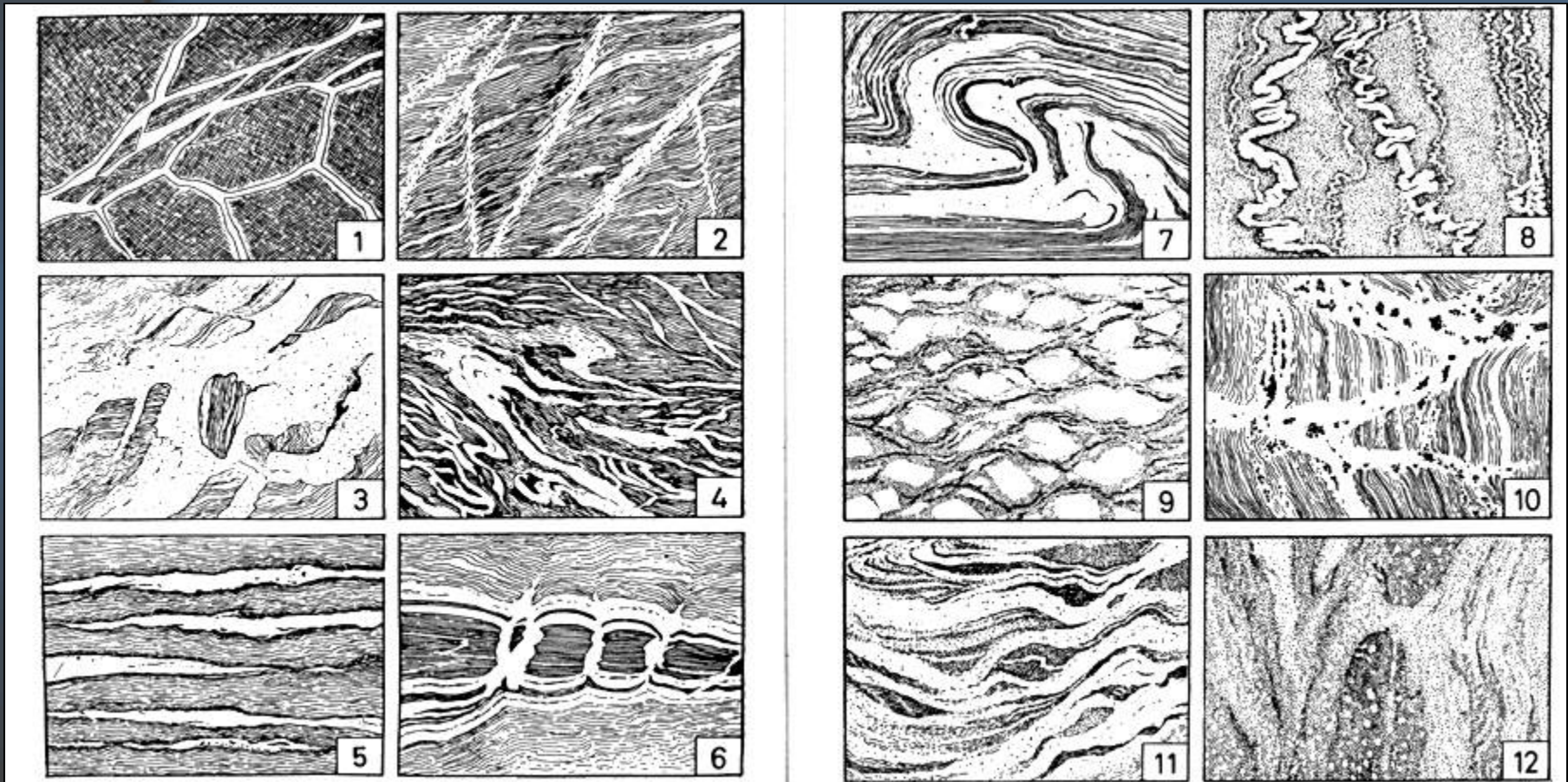
- Origin of migmatites
- Melt segregation and transport in the crust

Methods:

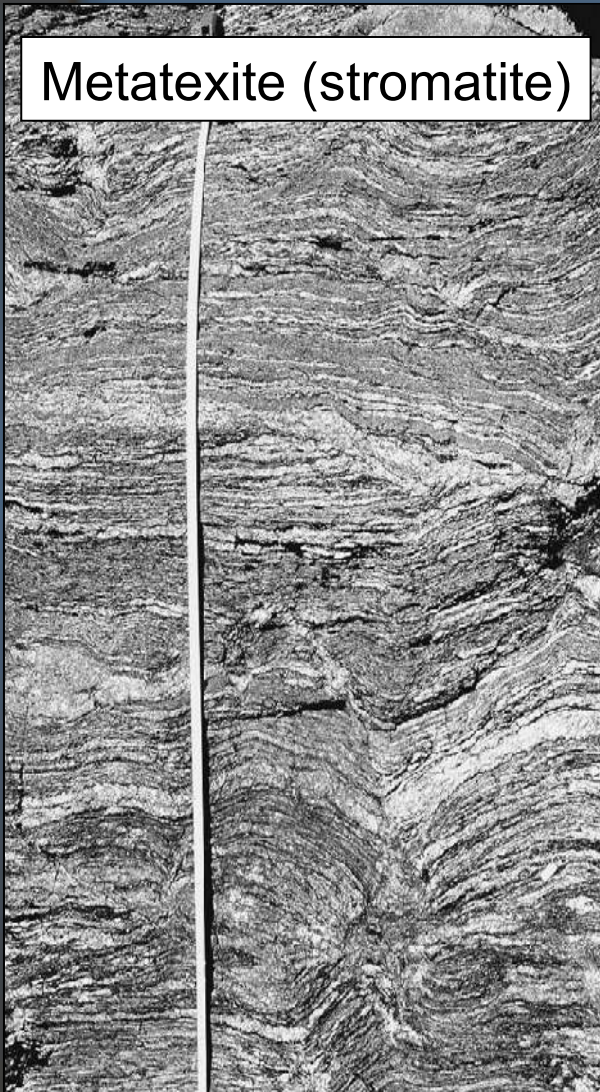
- field data
- microstructural observations and quantifications
- petrological data
  - P-T conditions
  - Open system modelling
- geochemical observations
  - Whole-rock and isotopic data
  - Mass-balance modelling



**Migmatite** = a mixed rock involving igneous and metamorphic components (leucosome and mesosome  $\pm$  melanosome) (Brown, 1973)



Metatexite (stromatolite)



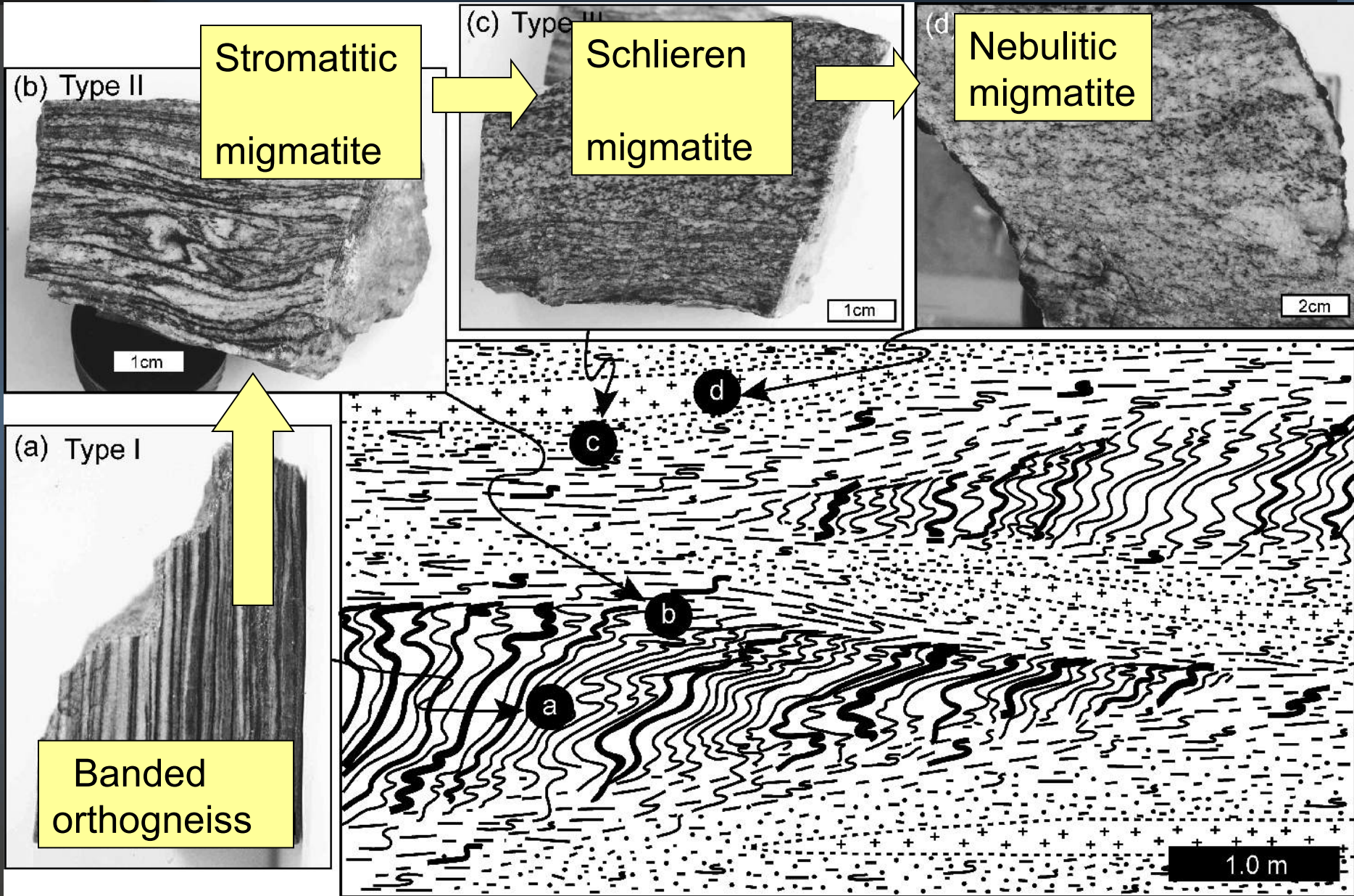
Diatexite (nebulite)



Mehnert (1971)  
Brown (1973)

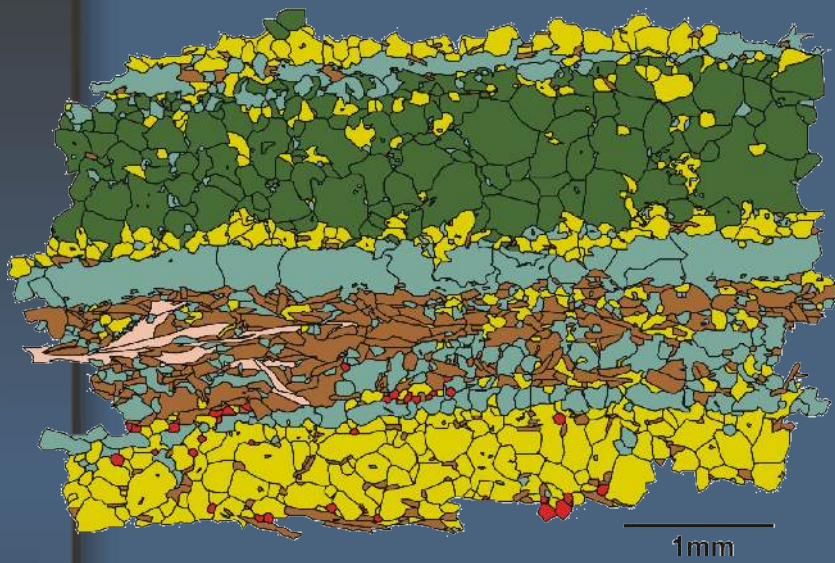
- 1, In-situ anatexis
- 2, Injection complexes

Field observations

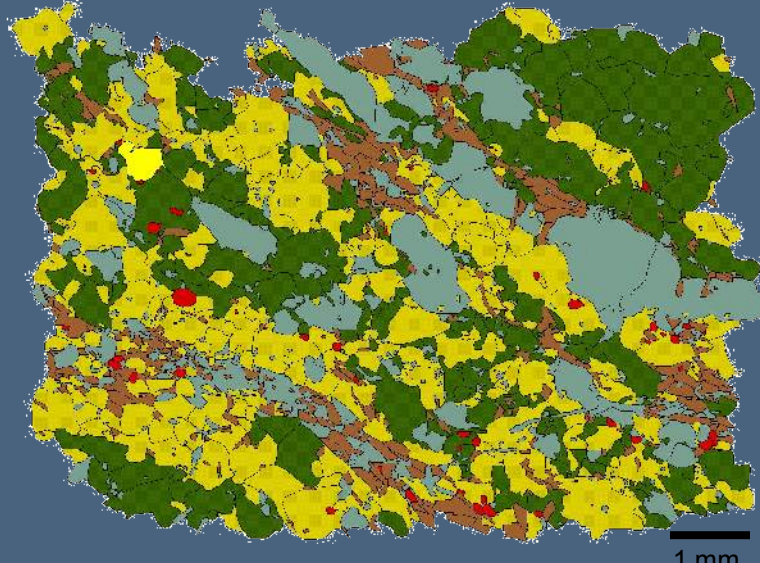


# Microstructural observations

Banded orthogneiss (Type I)



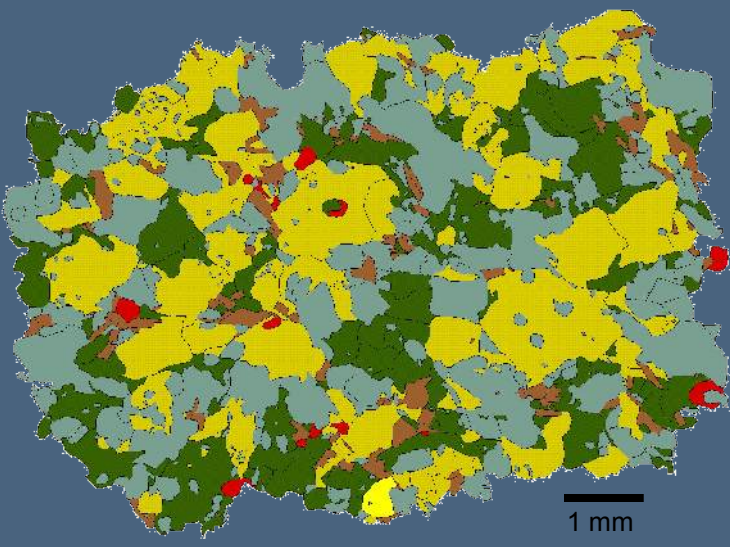
Stromatitic migmatite (Type II)



„Schlieren migmatite“ (Type III)



Nebulitic migmatite (Type IV)



- bt
- grt
- kfs
- plg
- q
- sill

## 1, Quantification: (using O. Lexa Arcview GIS Poly-LX extension & MATLAB Poly-LX toolbox (2000, 2003))

-

- ▶ Grain size statistics, CSD distribution
- ▶ Grain and grain boundary preferred orientation (SPO, GBPO)
- ▶ Grain contact frequency (Kretz 1969)

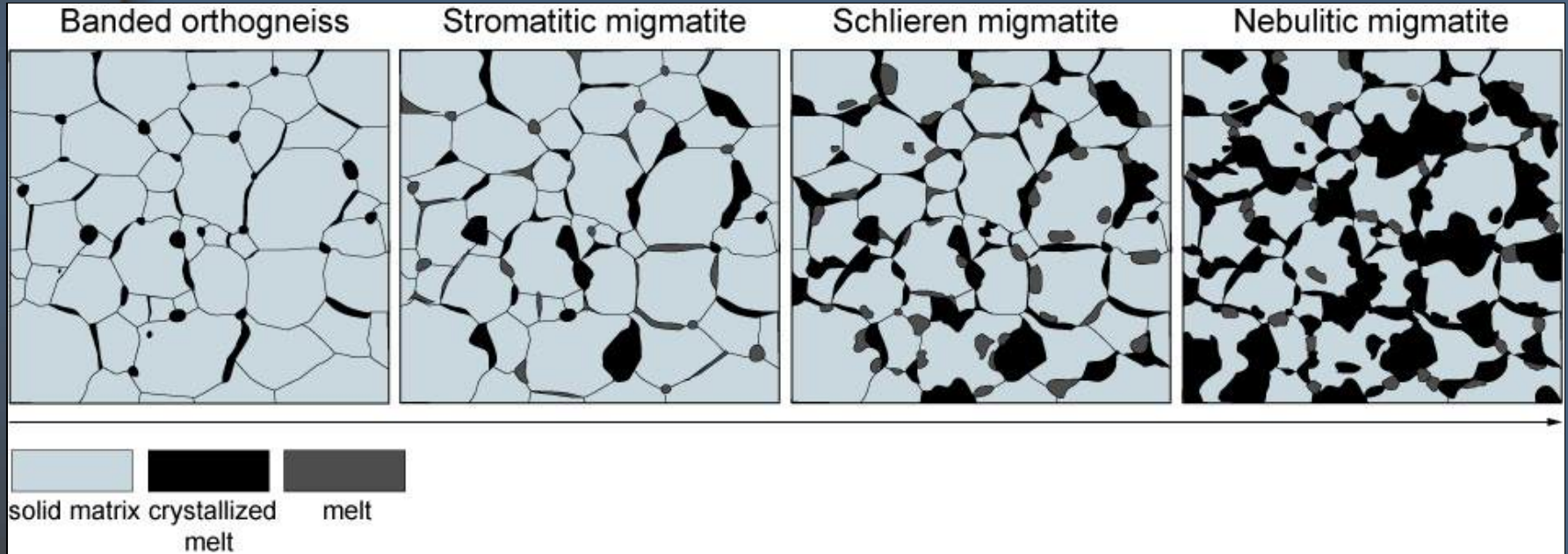
Why?

In order to understand and quantify the microstructural changes

Amount of melt involved in this process and the deformational behaviour

## Melt infiltration model (open-system)

**Melt infiltration:** from external source where melt passes pervasively along grain boundaries through the whole rock volume and changes macroscopic and microscopic appearance of the rock.



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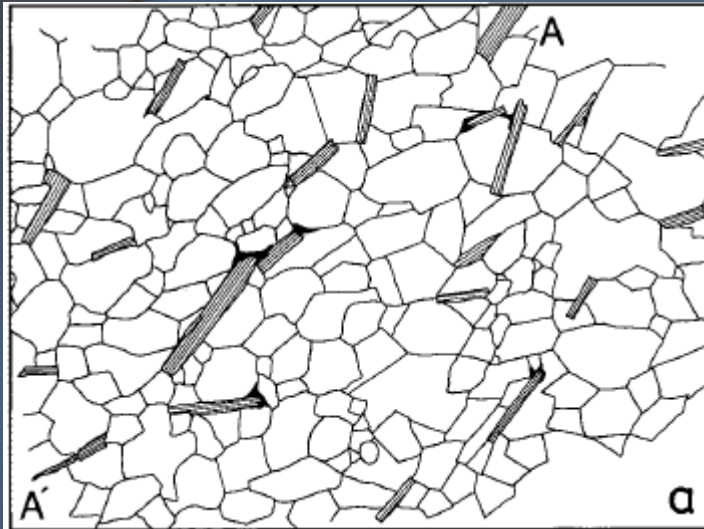
In order to understand and quantify the microstructural changes

Amount of melt involved in this process and the deformational behaviour

## 2, Modelling of melt infiltration

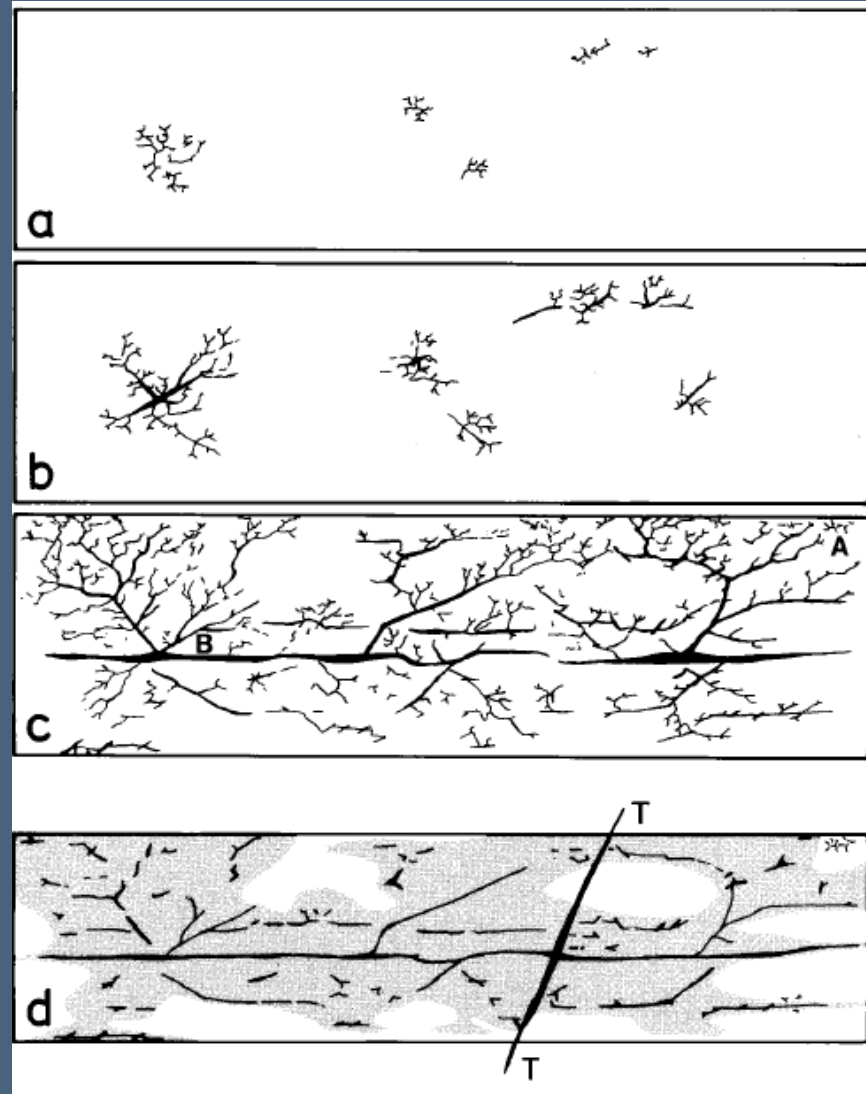
- melt composition
- metasomatism by melt
- addition of melt

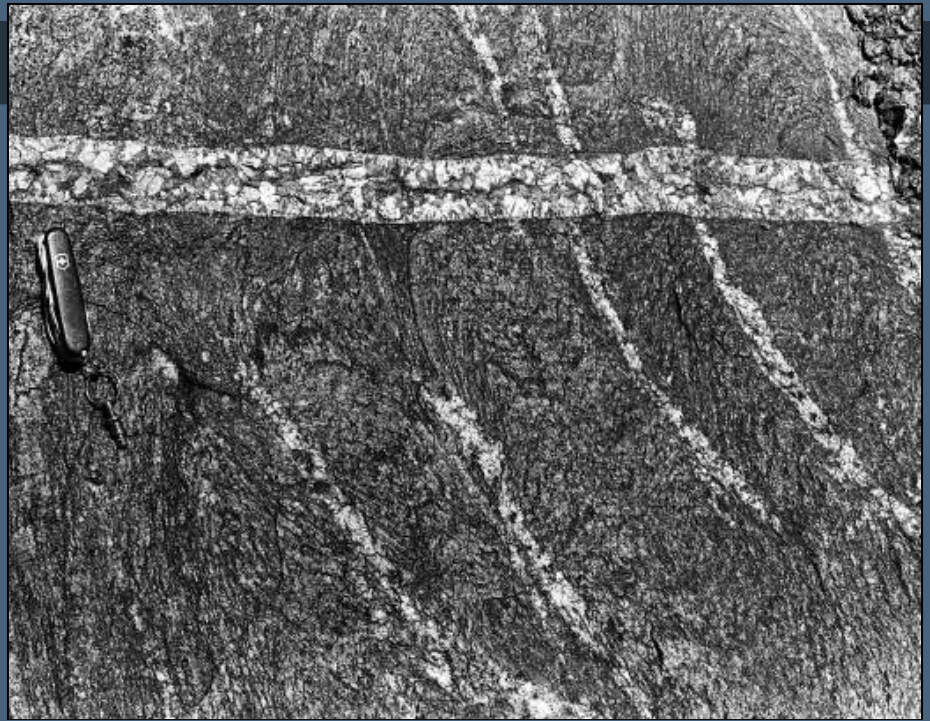
## Melt transport in the crust:



In-situ melt formation

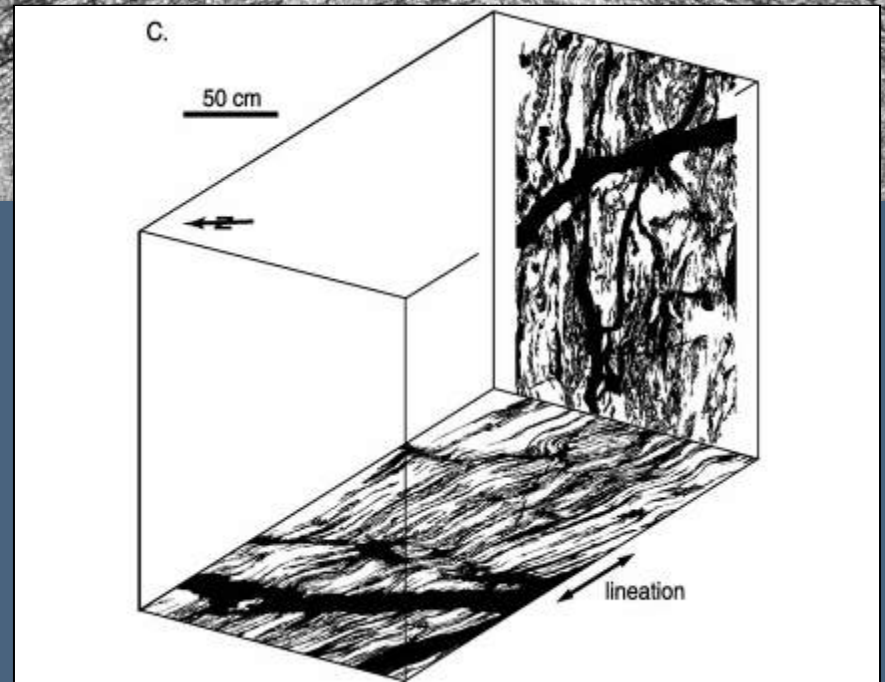
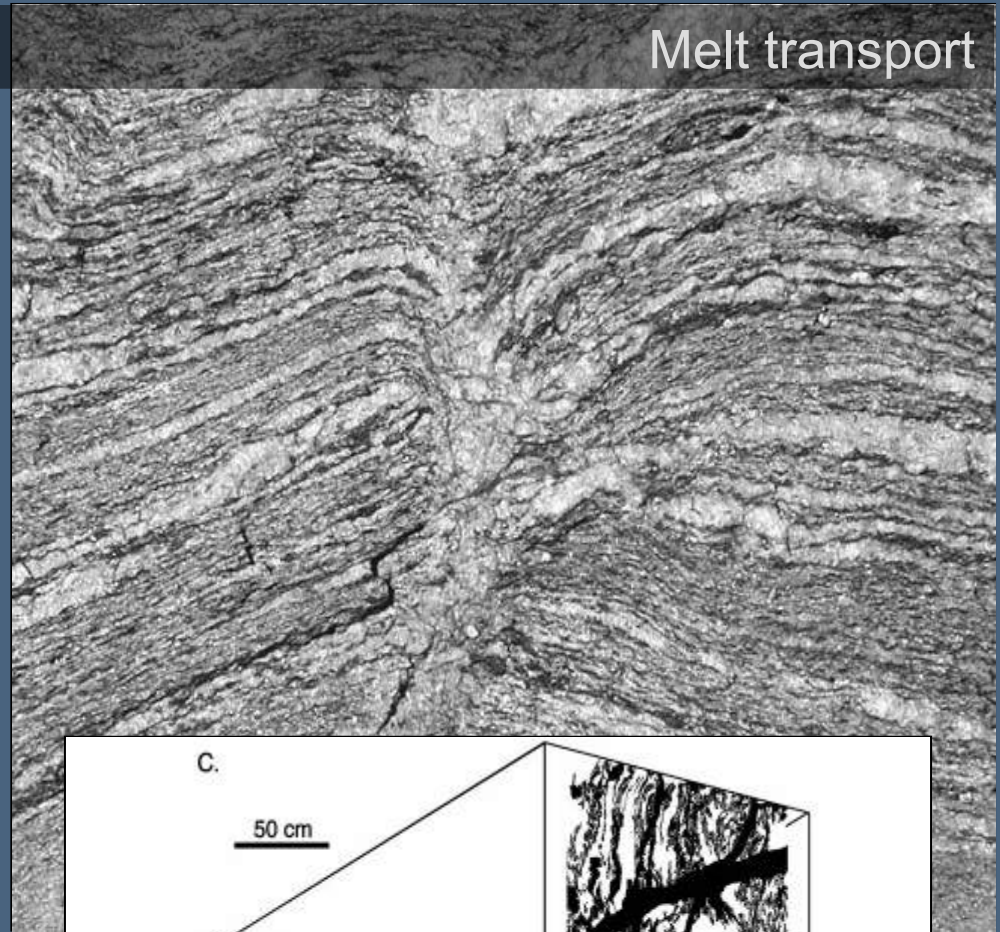
- segregation from grain boundaries
- into melt assisted sites (leucosomes, shear bands....)
- interconnected network and localized melt transport





Greenfield et al. (1996), Vernon (2001),

Melt transport



And now ????