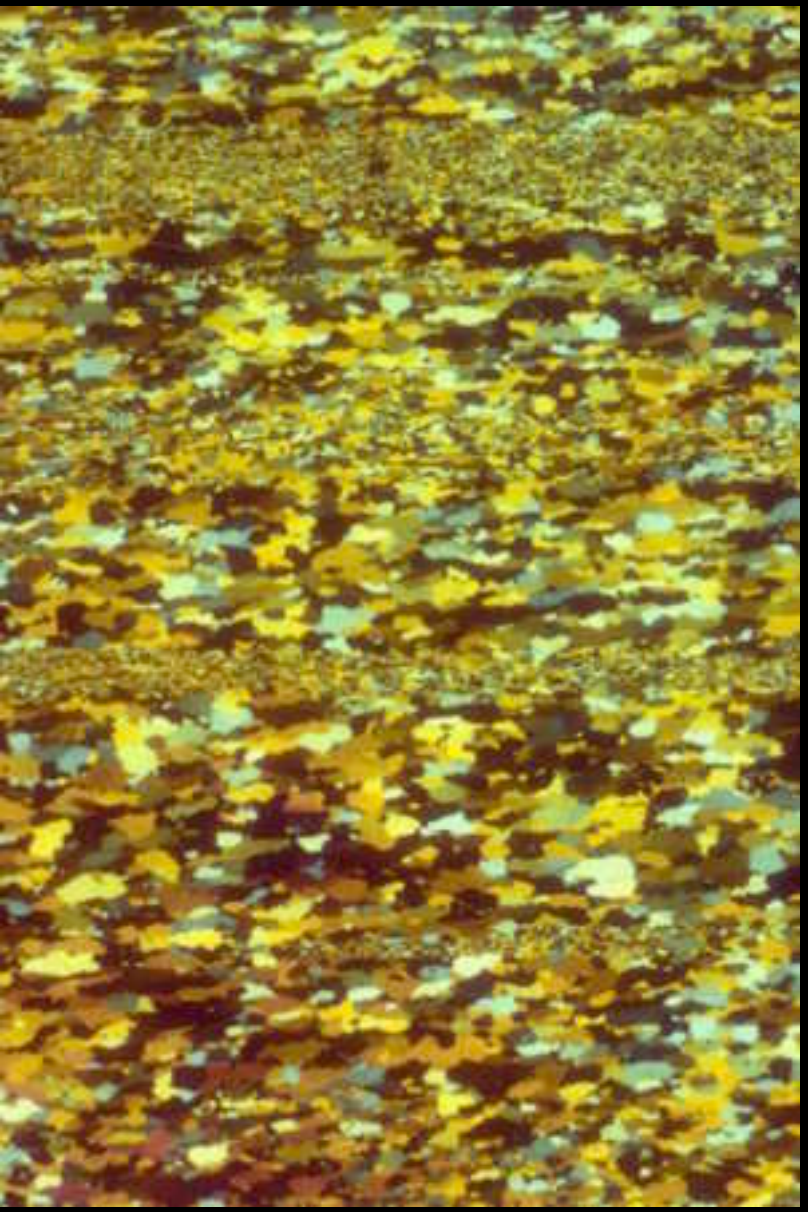
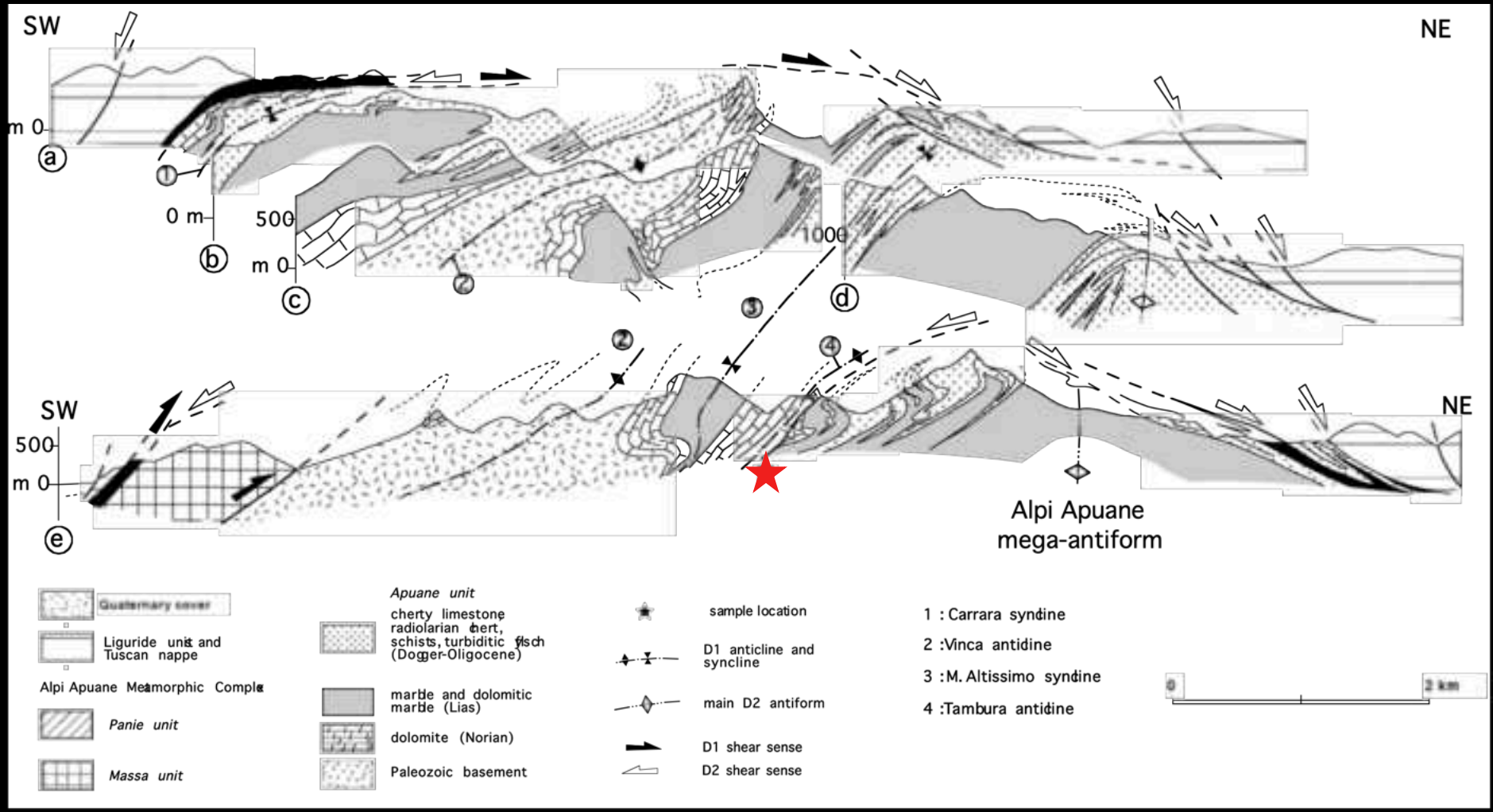


Microstructures, textures, and deformation mechanisms in highly sheared two-phase aggregates:
calcite – dolomite

Renée Heilbronner, Holger Stünitz, Nils Oesterling, Almar deRonde…
… and, of course, Jan Tullis

abstract

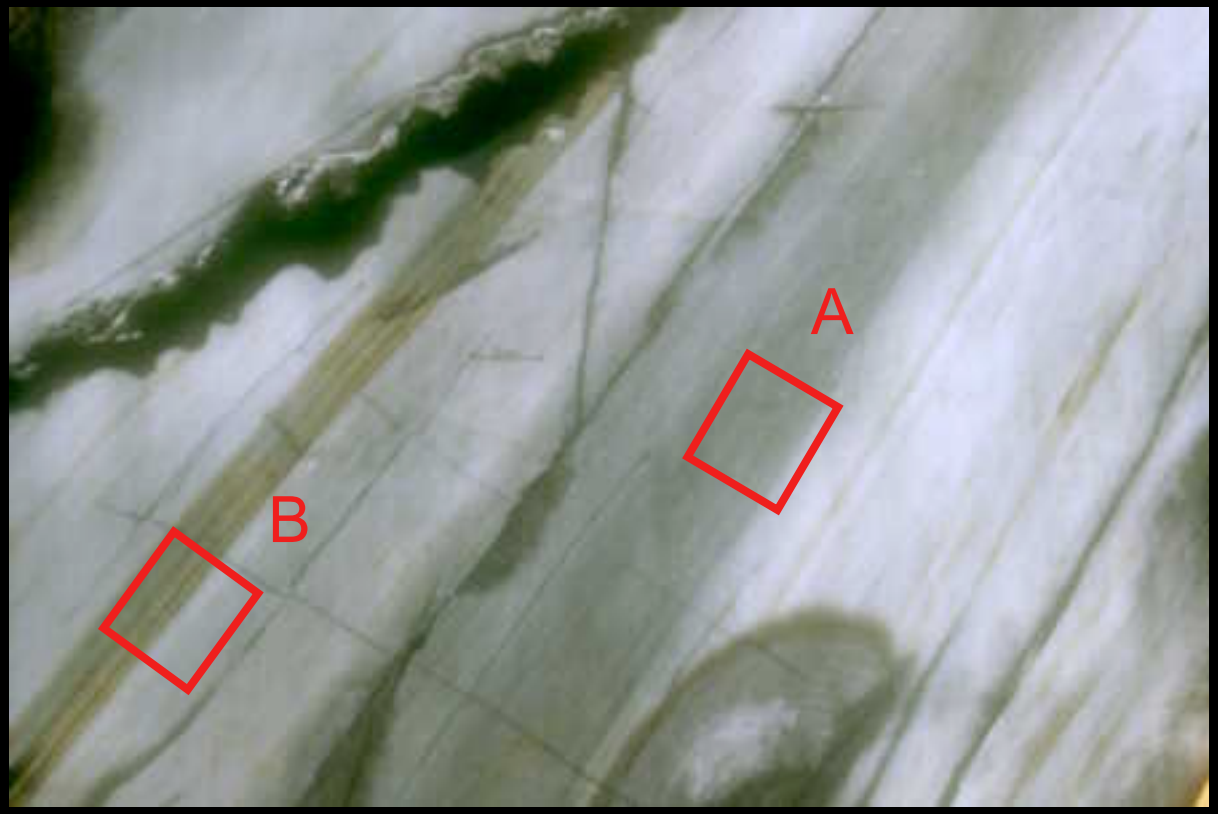
1. starting material
2. from low to high deformation (sampleA, B)
3. μ-structure as function of dolomite content (0-50%)
   - texture — cc texture index 3 ↘ 1.7
   - grain size — cc 140 ↘ 20 dolo = 20μm
   - spatial distribution — anti-clustered, horiz.>vert.
4. strain rate (cc, ~370°C) — ~10^{-12} s^{-1}



Alpi Apuane, modified after Molli et al. (2000).

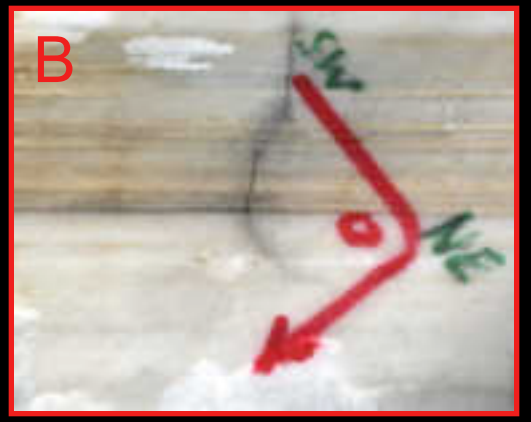
Panie unit: calcite matrix (dark gray) dolomite veins (light gray, yellow)

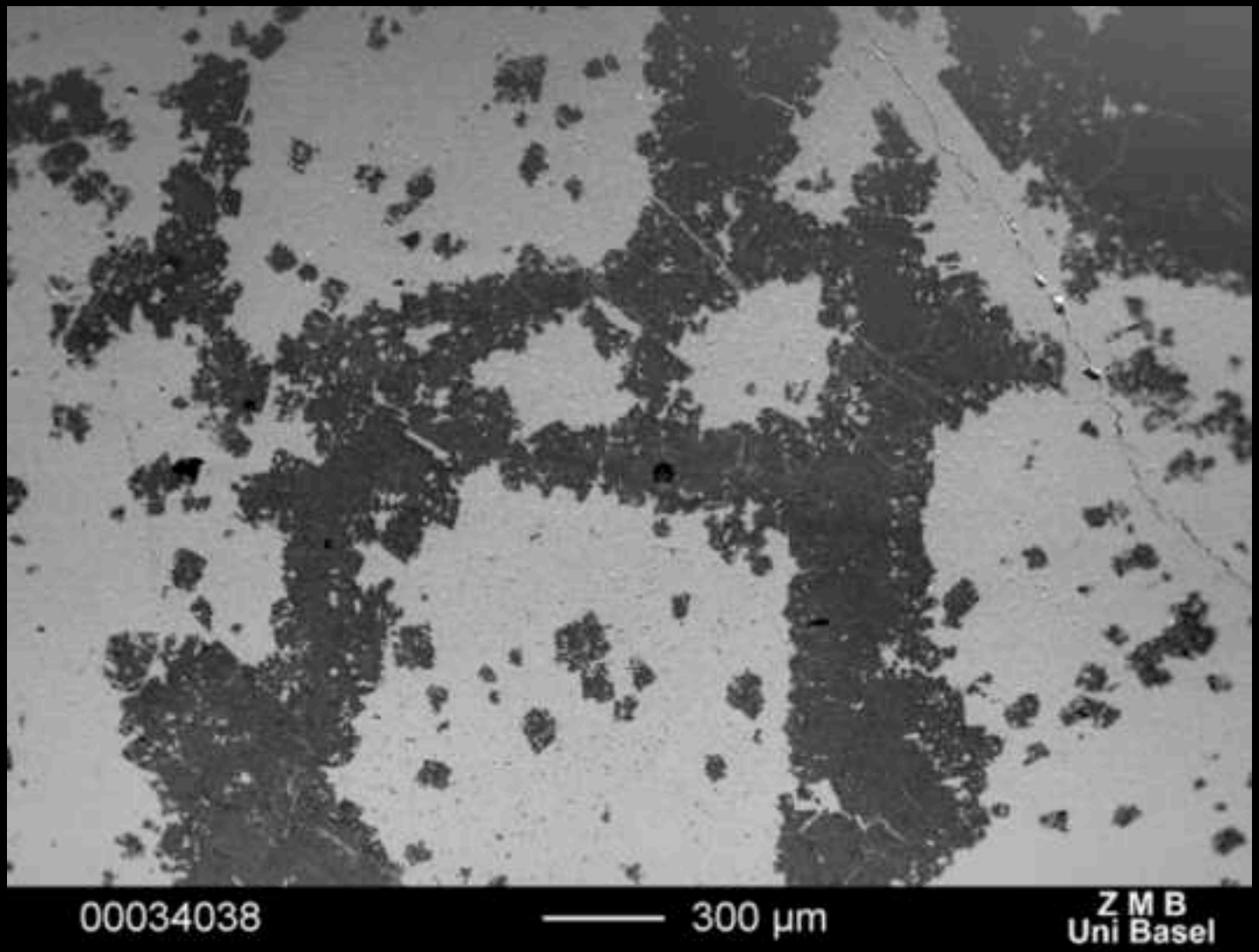
D1 deformation, 366°C



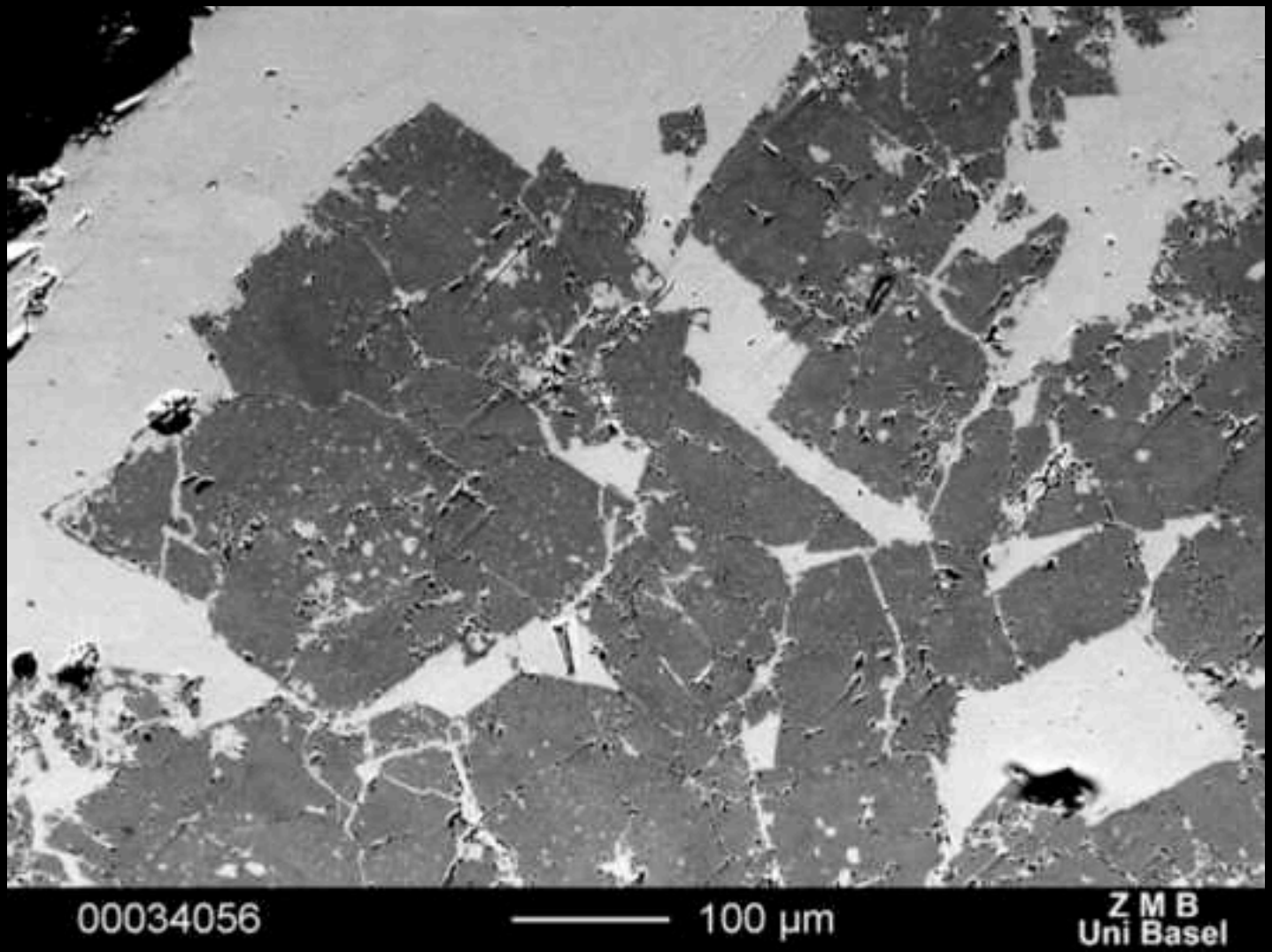
low def

high def

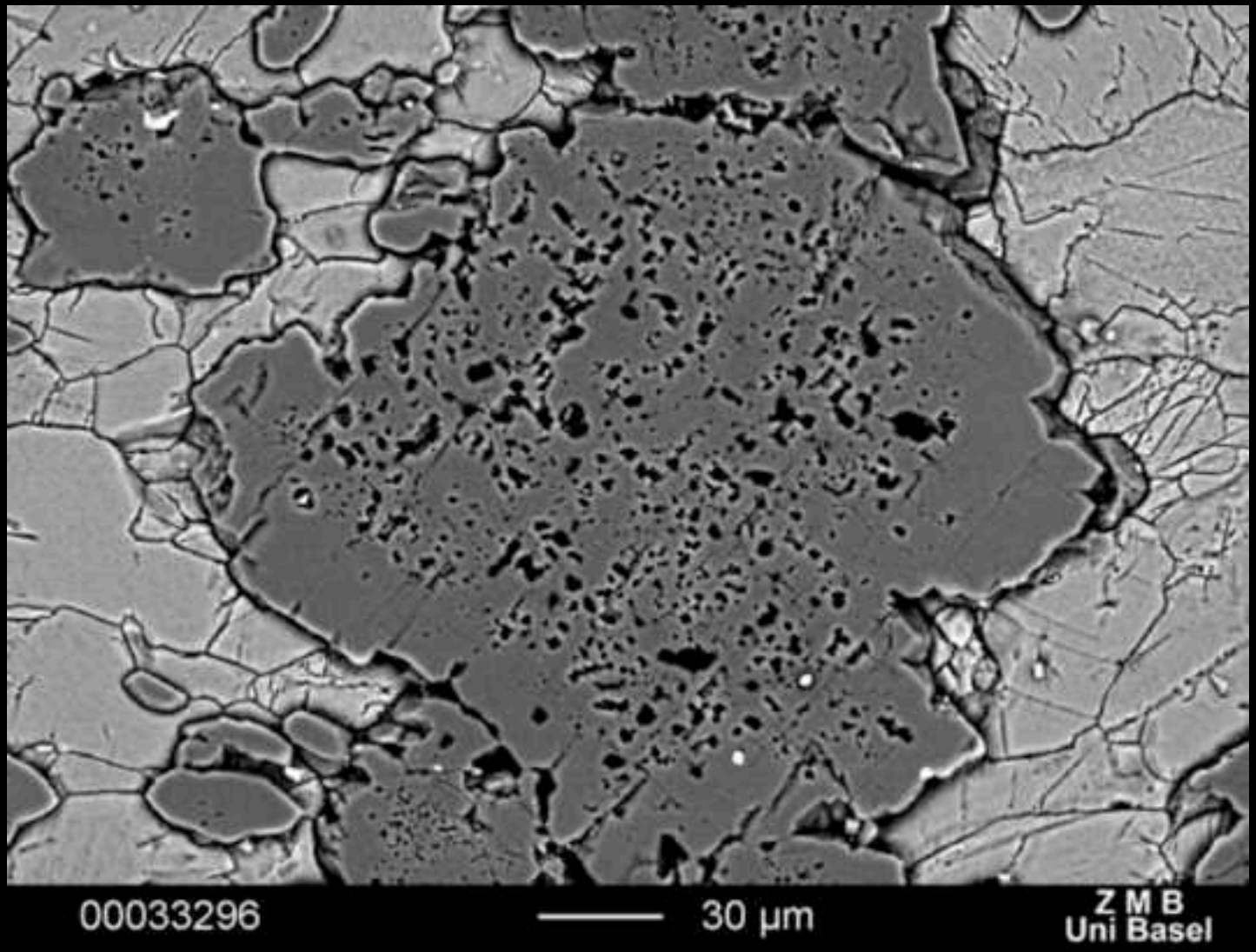




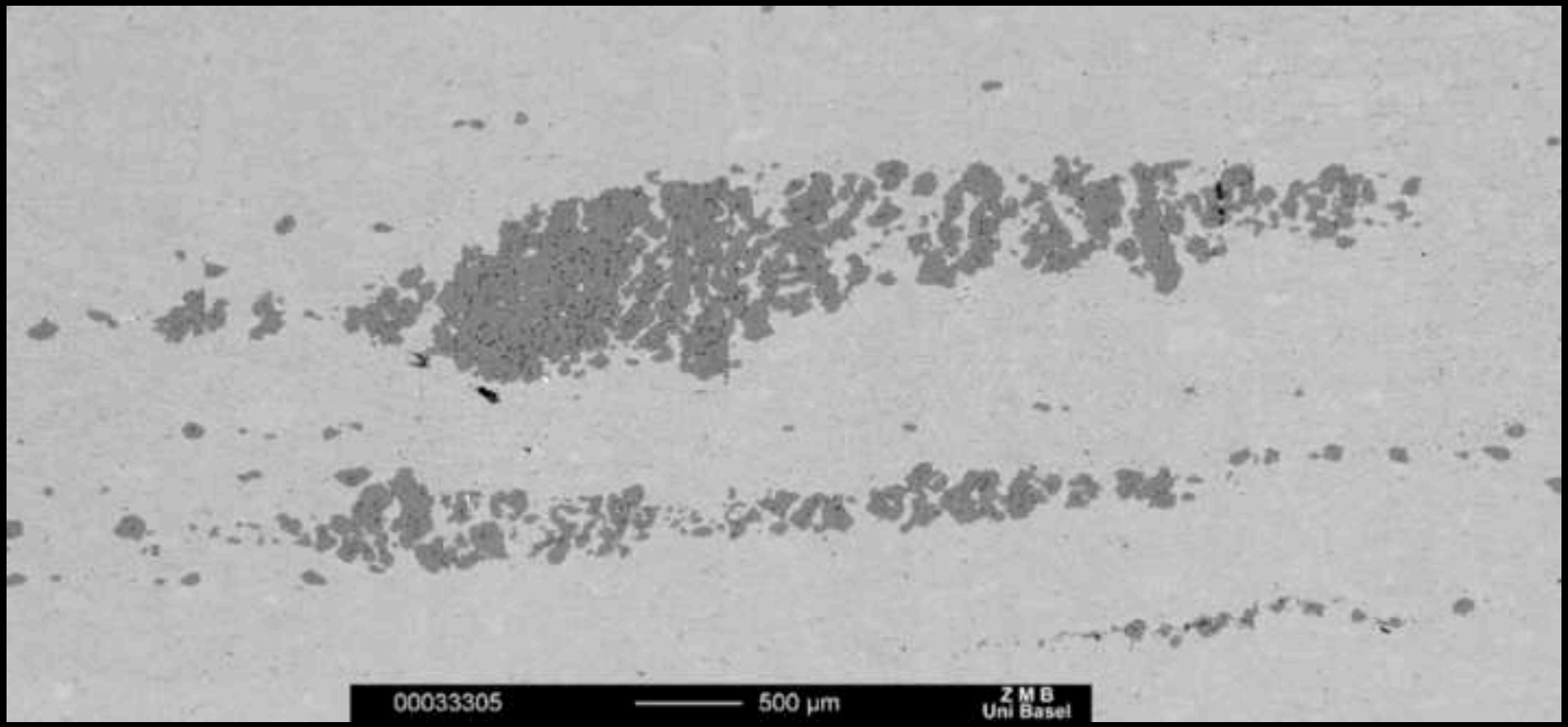
dolomite (dark) - calcite (light)



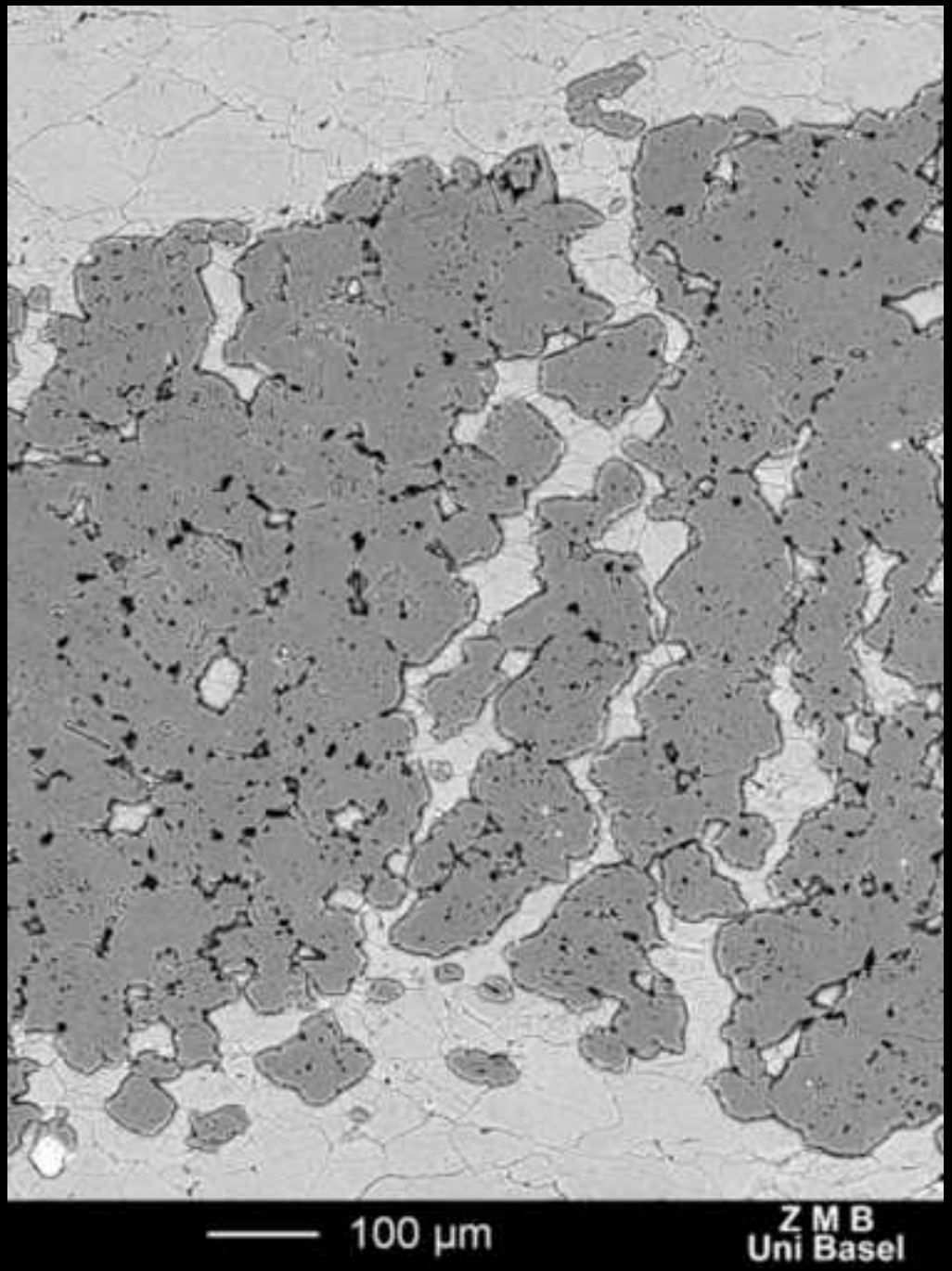
dolomite (dark) - calcite (light)



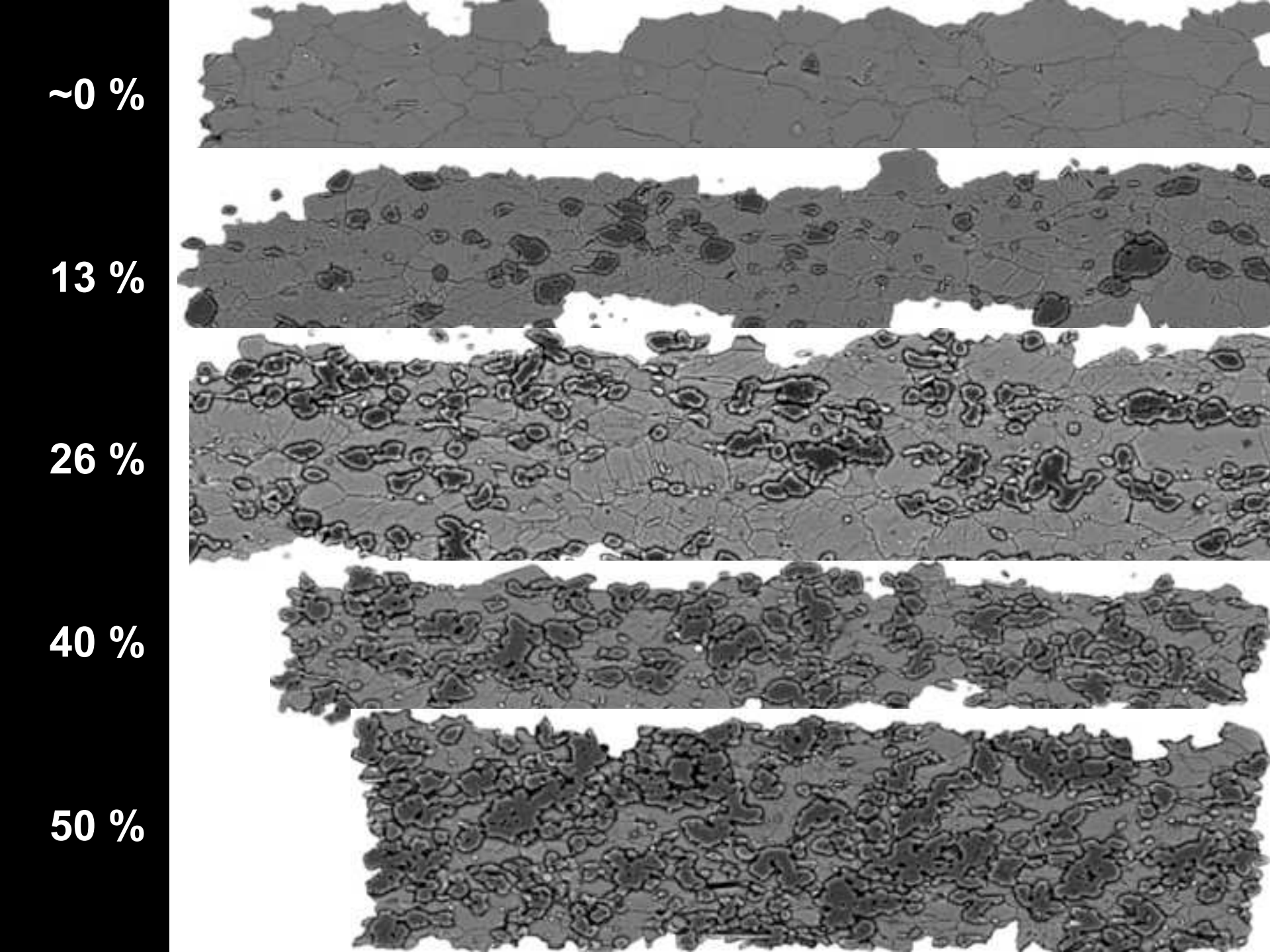
dolomite (dark) - calcite (light)



dolomite (dark) - calcite (light)

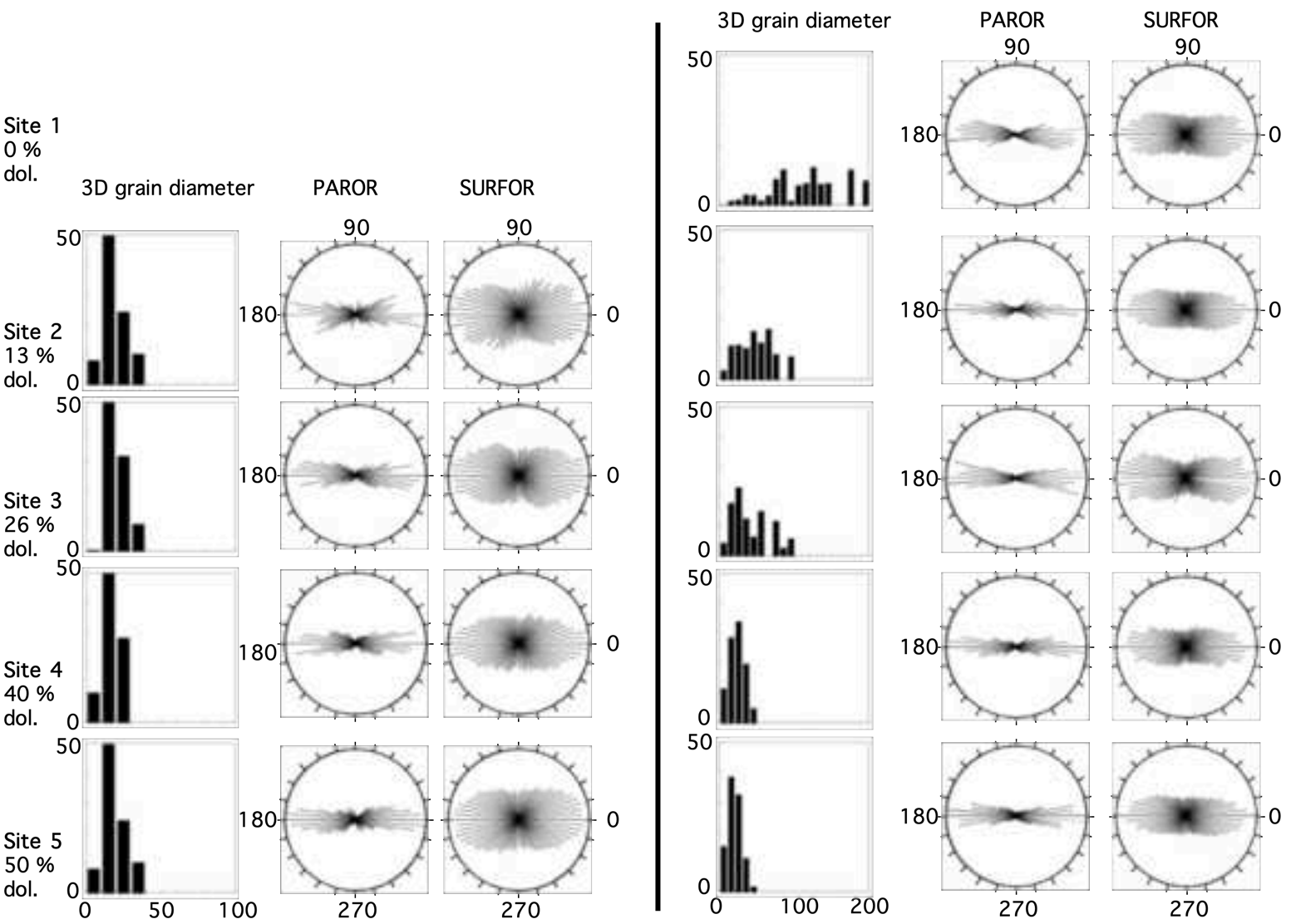


dolomite (dark)
calcite (light)

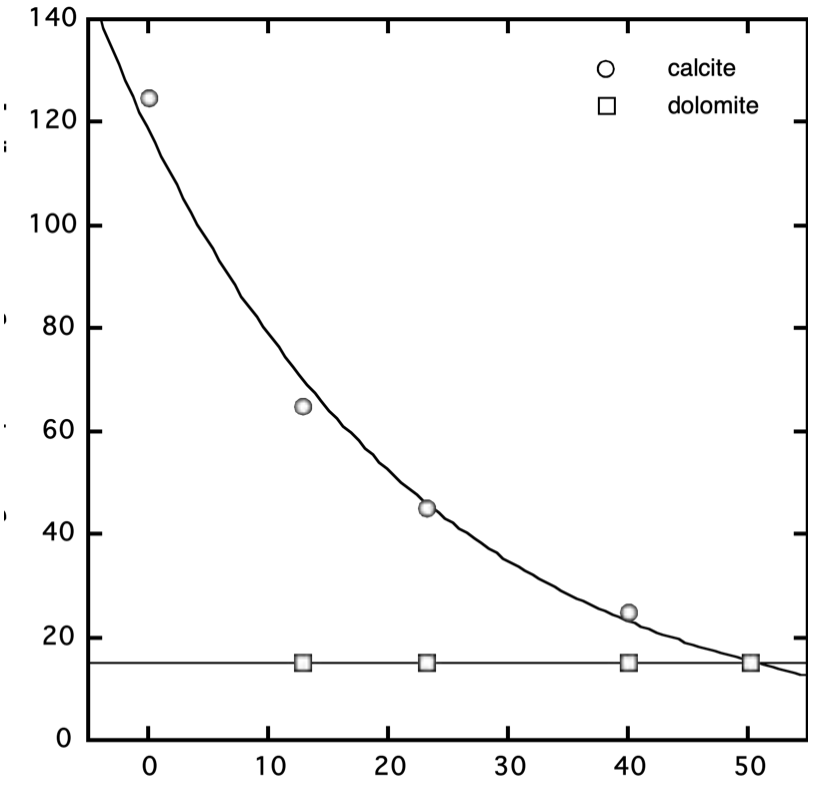

~0 %
13 %
26 %
40 %
50 %

dolomite

calcite

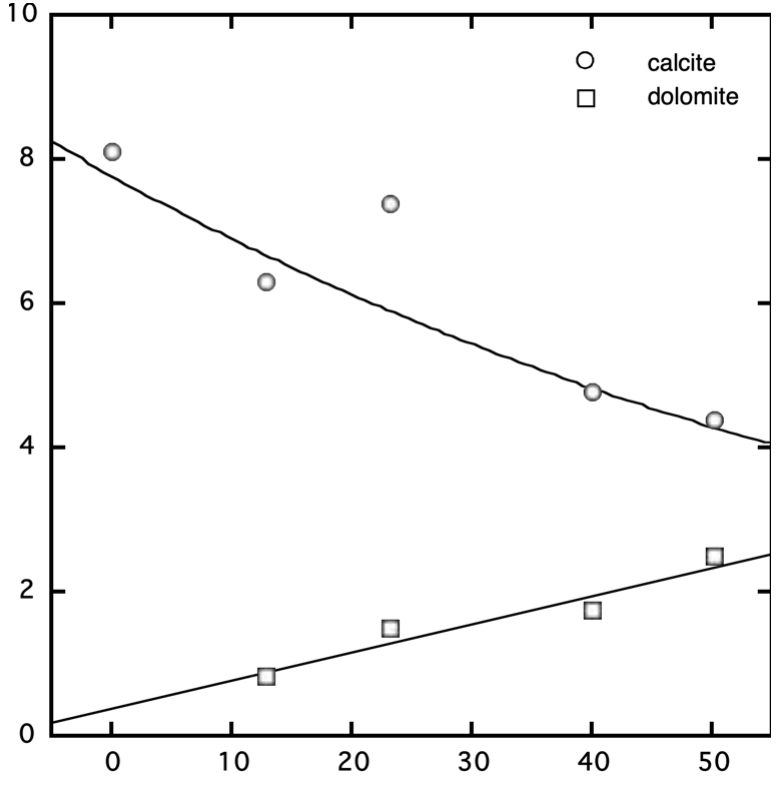


grain size (3-D, vol%)

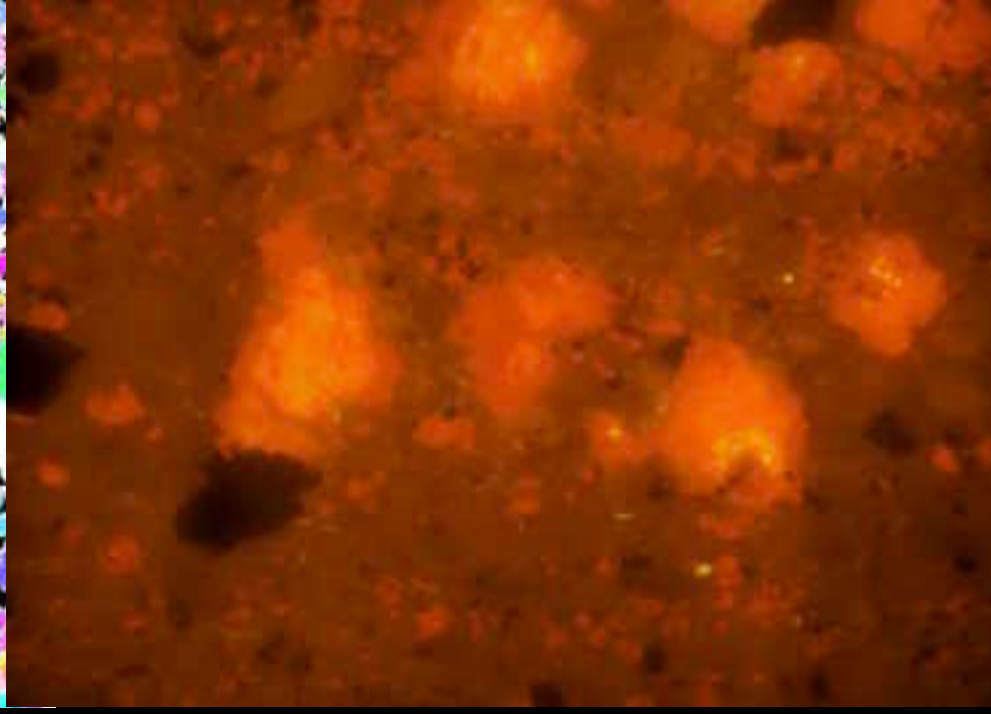


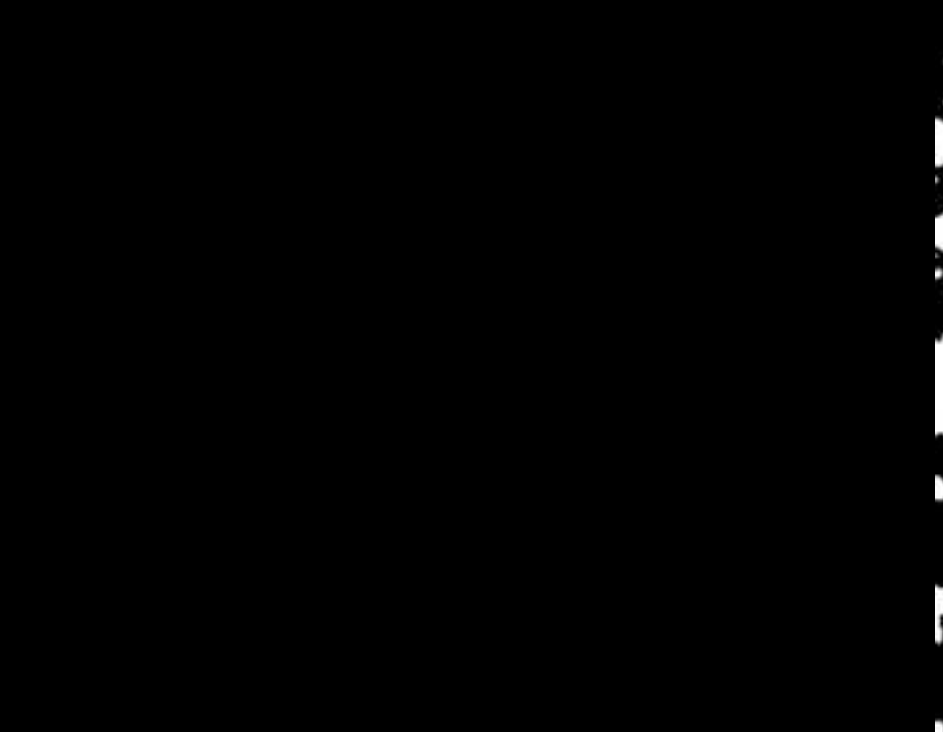
average grain diameter (μm)
dolomite content (vol %)

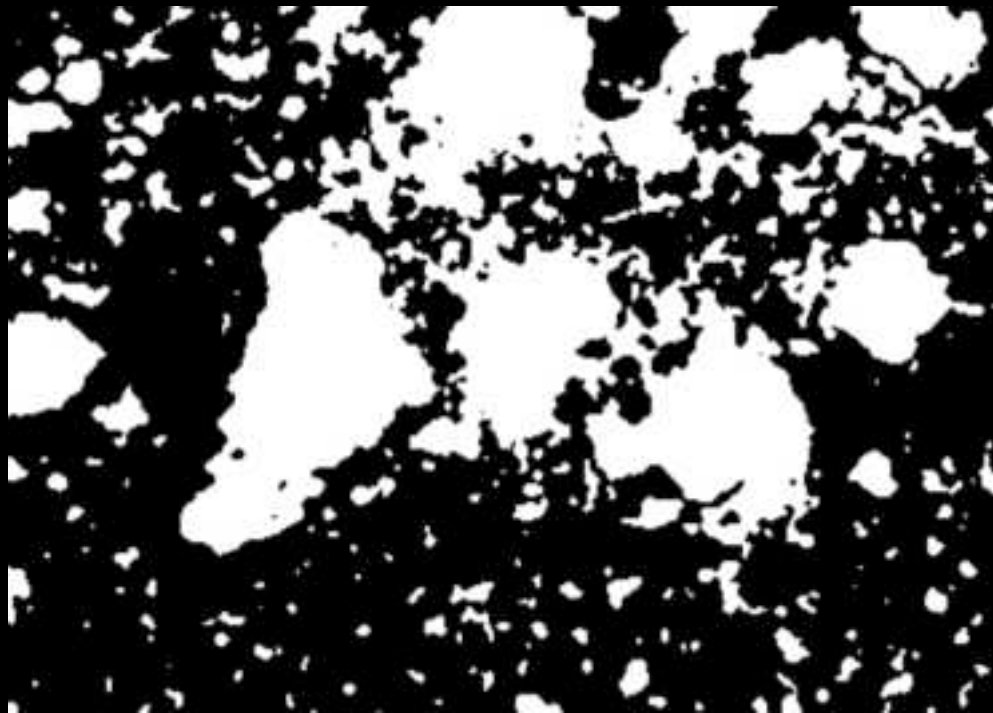
shape (PARIS factor)

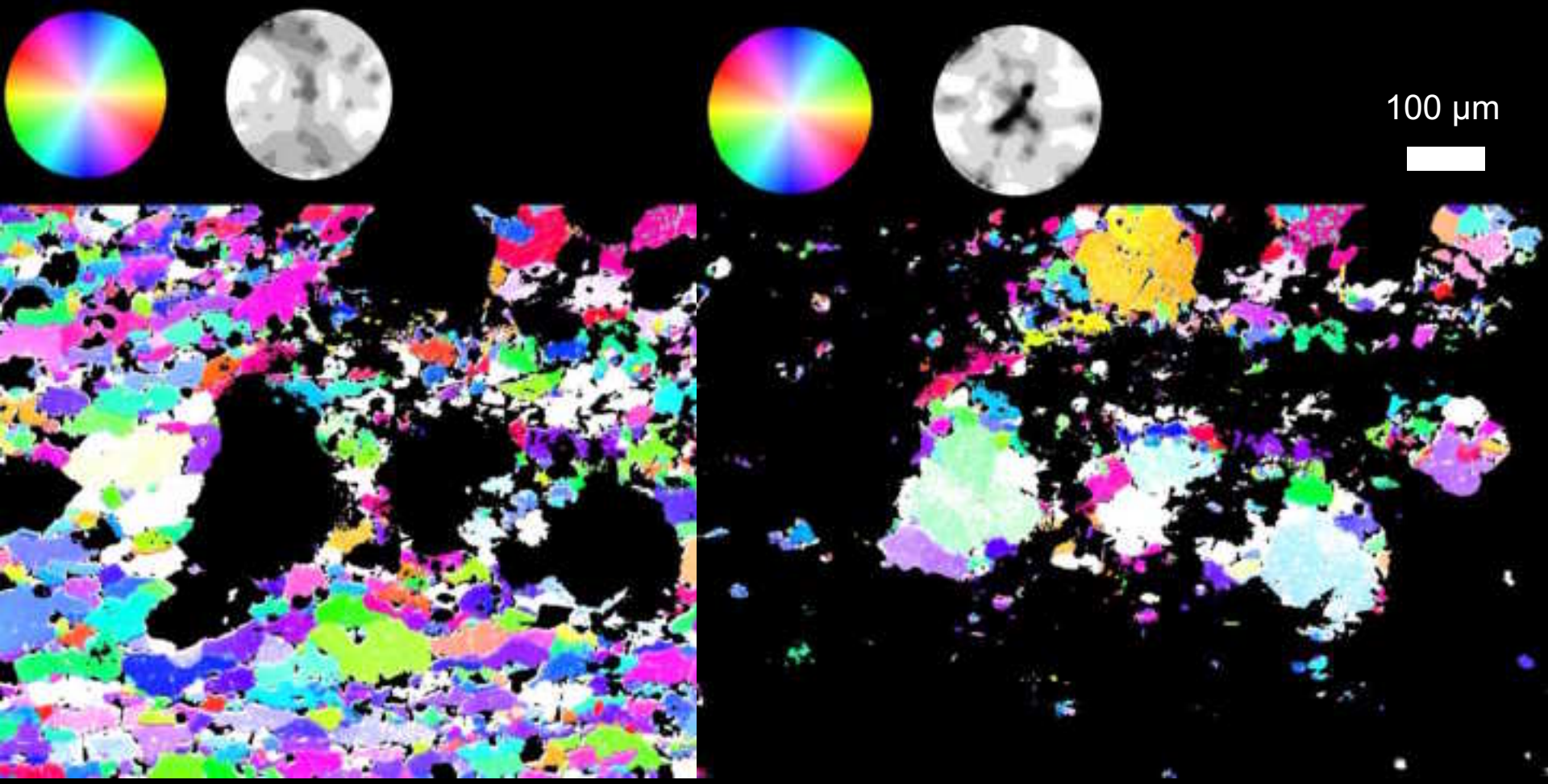


PARIS factor (%)
dolomite content (vol %)








100 µm

calcite dolomite

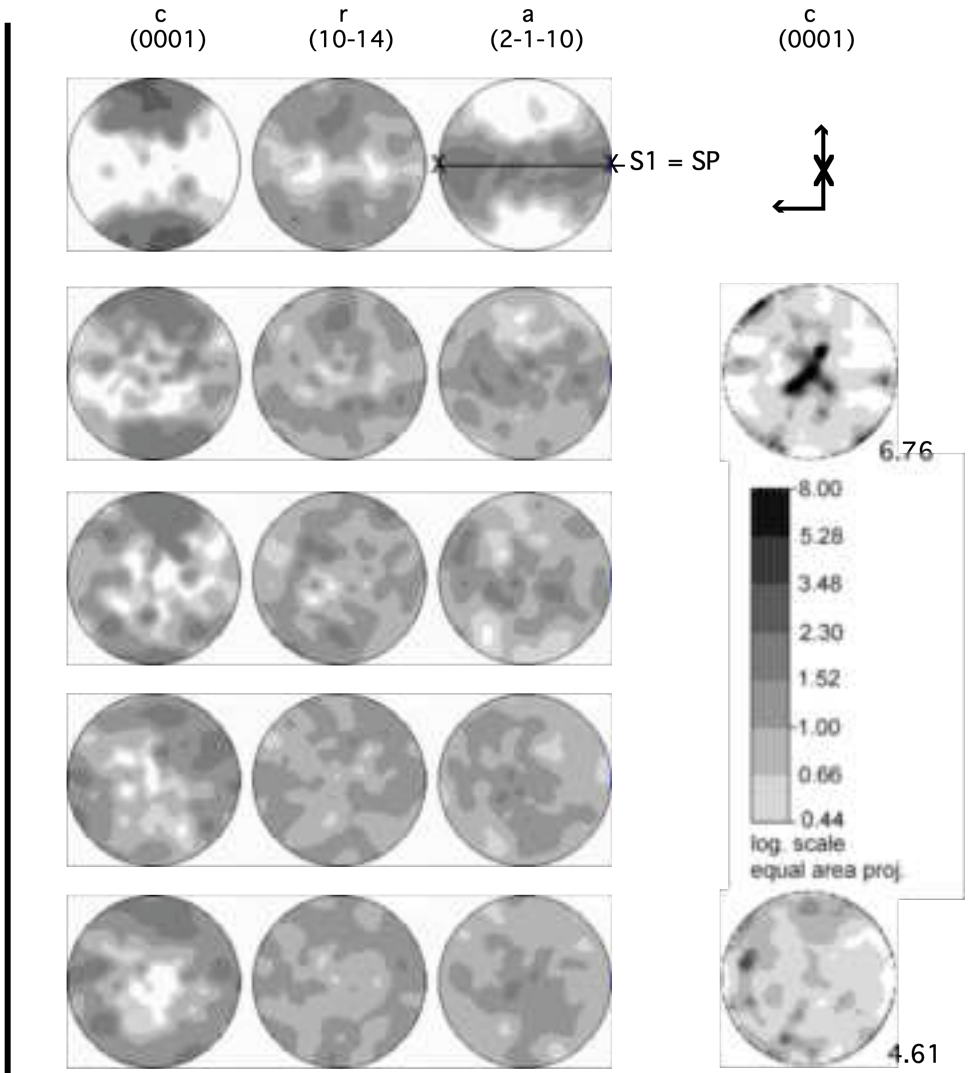
~0 %

13 %

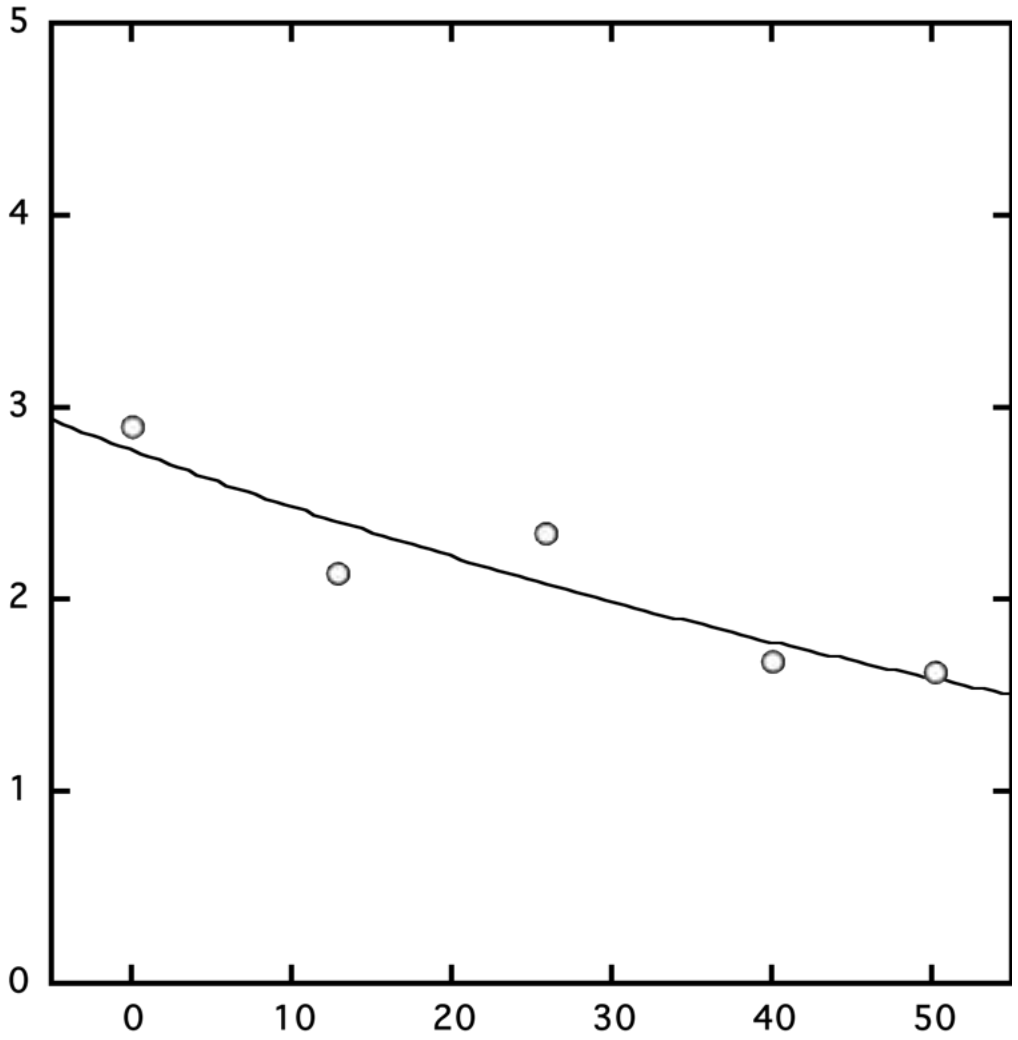
26 %

40 %

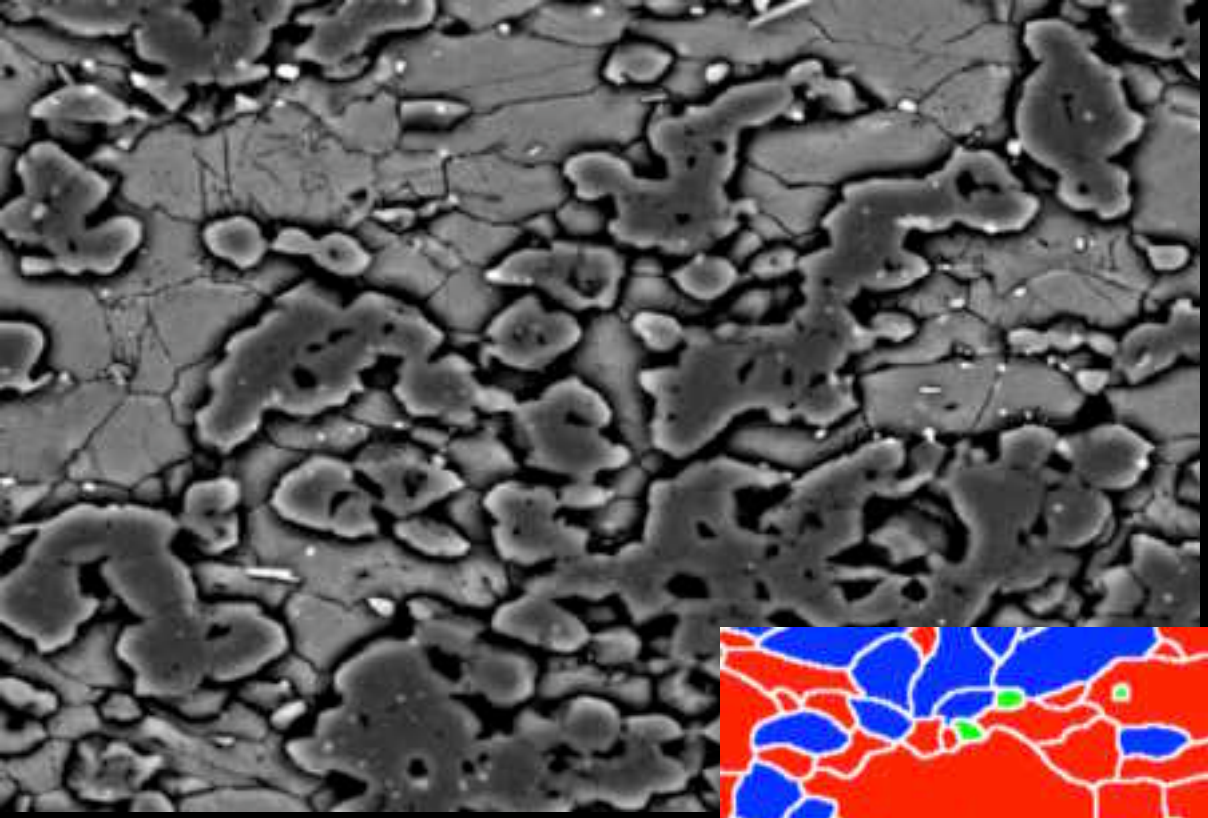
50 %

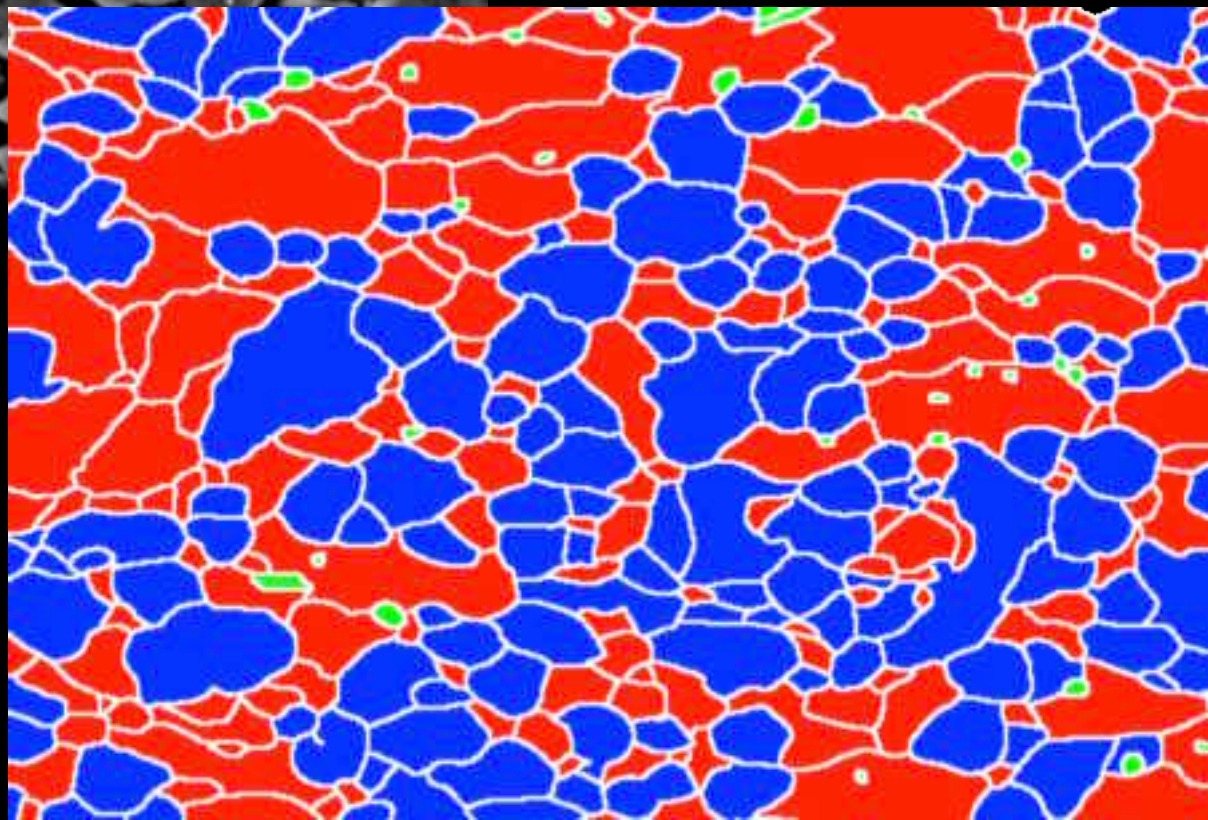


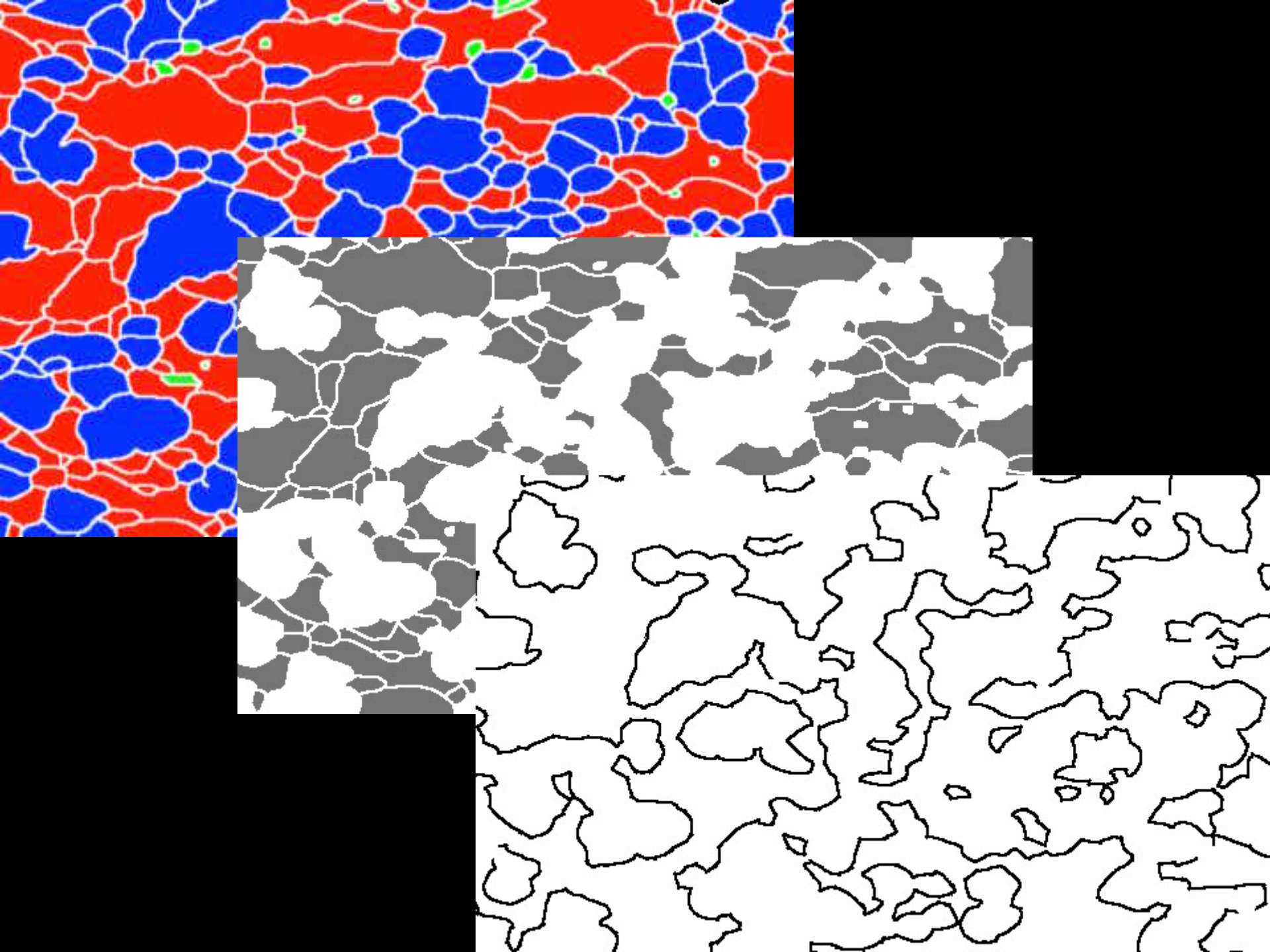
texture index (J) of calcite, EBSD



dolomite content (vol %)

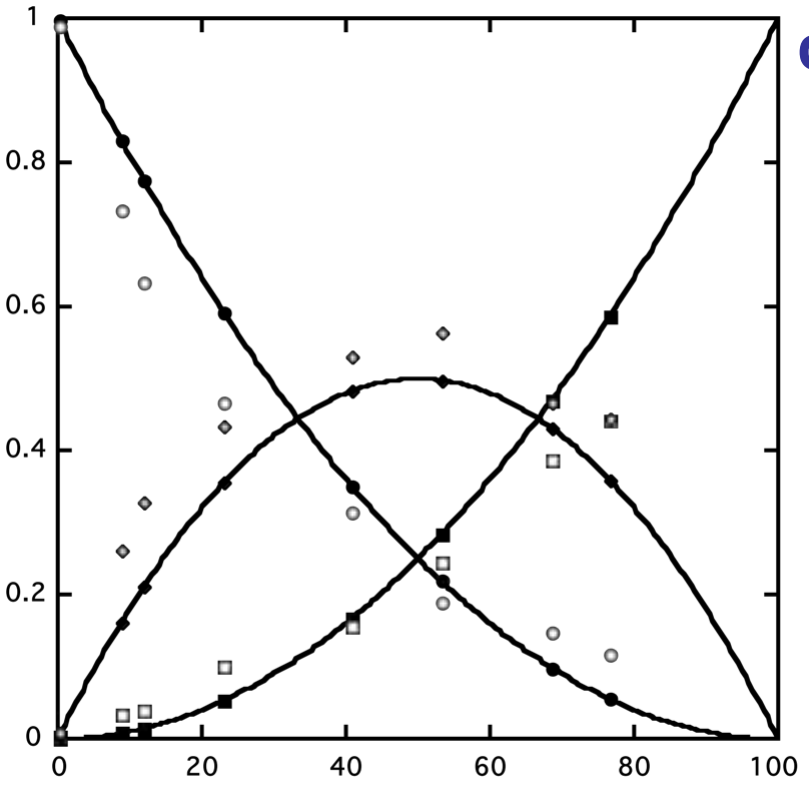






phase and grain boundaries

calcite-calcite



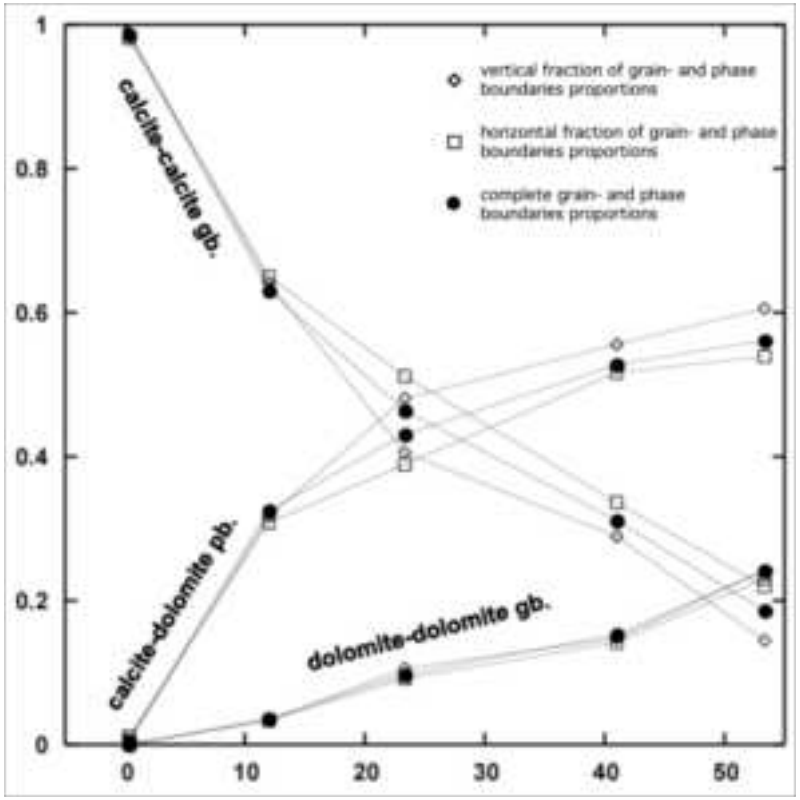
dolomite-dolomite

dolomite-calcite

dolomite content (vol %)

vertical and horizontal grain boundaries

calcite-calcite

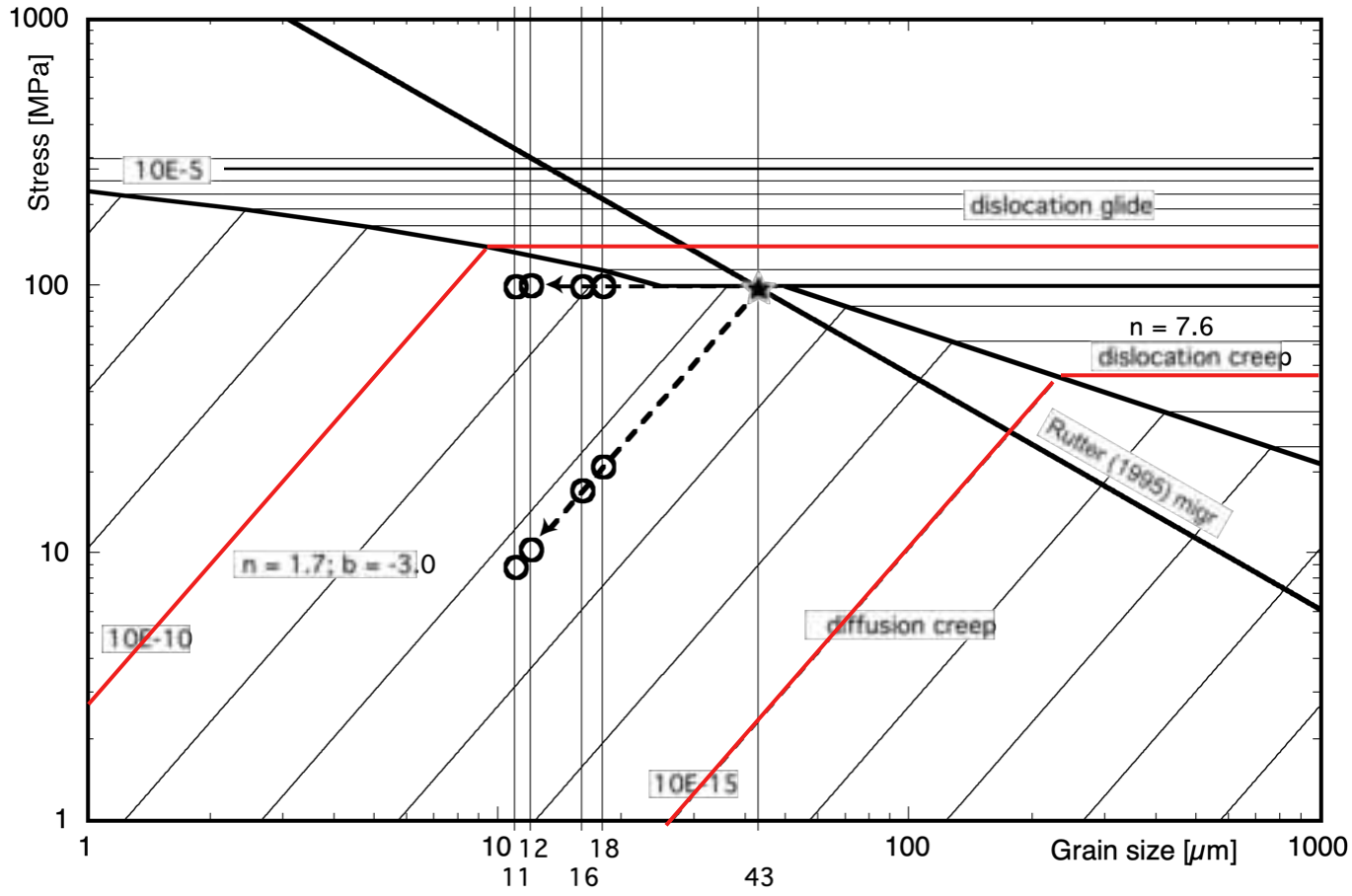


dolomite-calcite

dolomite-dolomite

filled symbols = all outlines
open diamonds = vertical boundaries
open squares = horizontal boundaries

increasing dolomite content ← decreasing calcite grain size



after Schmid et al. (1977), Schmid et al. (1980), Rutter (1995)

open questions

- how to decribe def.mech of polyphase

- how to quantify μ-structure of mixing
- how to quantify intensity of localization
- description of texture
  - ✓PDI
  - ✓misor tracking