

On the indispensability of optic and haptic sensations with hand specimens – a plea for integrating rock collections into structural geology and tectonics teaching in the 21st century

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Experience from 5 years of teaching various structural geology and tectonics classes at both the Bachelor and Master level at the University Jena shows that the maintenance of an ample rock collection with hand specimens, which illustrate a large gamut of deformational fabrics, and its integration into ‘hands-on’ exercises forms a very welcome addition to traditional (and in the view of students sometimes soporific) classroom teaching. Vivid (and eventually convincing) teaching necessitates the illustration of the numerous natural deformation processes with representative hand specimens rather than with mere photographs of outcrops, samples or thin sections.

We started building a collection of deformed rocks shortly after appointment of the first (senior) author at the Institute of Geosciences in Jena in 2013. Back then, the institute was hardly in possession of any hand specimens illustrating the broad gamut (as well as the aesthetics) of deformation fabrics. At present, the collection contains c. 140 specimens, showing various types of tectonically induced strain fabrics (e.g. brittle vs. ductile fabrics, numerous types of foliations and lineations), igneous fabrics (magmatic flow textures, cumulate textures, intrusive contacts, migmatites) as well as examples of rock-fluid interaction (e.g. serpentinised peridotites or multiply veined carbonates). For selected specimens, thin sections are available to also study microstructures. Specimens were mostly collected during student field trips and own research campaigns across Germany, the Alps and Carpathians, the Balkan peninsula and Taiwan.

Our sample collection now portrays the rich spectrum of deformation fabrics acquired at both shallow-crustal conditions by dominantly friction mechanisms (such as extension and shear fractures, cataclasites or dilatational breccia) or during creep (crack-seal fabrics, various stylolites) as well as mid- to lower-crustal conditions by dominantly viscous mechanisms (numerous greenschist- to granulite-facies mylonites) or subordinately also frictional mechanisms (pseudotachylites).

Testimonies of our students suggest that studying traditional handouts during lectures along-side with hand specimens are a very welcome, more vivid addition to teaching. They provide students with much sought optic and haptic sensations that illustrate the large number of tectonic processes way better than field photographs (e.g. Outcropedia, outcropedia.tectask.org) or virtual 3D outcrops (e.g. eRock, www.e-rock.co.uk) alone can.

We hence conclude that the maintenance of a collection of hand specimens, displaying the spectrum of strain fabrics across a large range of both temperatures and strain rates is an indispensable (and well affordable) addition to traditional classroom teaching and not at all obsolete in the 21st century.