

The tectono-metamorphic evolution of basement
rocks as revealed by combining optical, 3D
neutron diffraction and x-rays synchrotron
microstructural analyses

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Microstructures are fundamental keys to the interpretation of geological processes at various scales and times. In this contribution we will discuss quantitative approaches to microstructural analysis to investigate active processes, their physical conditions and geodynamic environment in basement rocks from the Alps.

Two main parts constituting the rock fabric are investigated by mean of quantitative 3D techniques: shape preferred orientation (SPO) and lattice preferred orientation (LPO).

- The SPO is quantified by means of **image analysis at 2D or 3D** combining orthogonal thin sections or by **X-ray synchrotron micro-tomography** allowing 3D investigation over a relatively small sample.

- The LPO quantification is performed by **neutron diffraction texture analysis** allowing a complete statistical coverage of large volumes of the order of 1 cm³.

We will discuss the investigation of natural cases from the Alps and their effect on the reconstruction of the tectono-metamorphic evolution of these lower and middle crust rocks during alpine subduction and collision.