



## **Virtual Petrography (ViP) – A virtual microscope for the geosciences**

Simon Virgo (1), Torsten Heup (2), Janos L. Urai (1), and Thomas Berlage (2)

(1) RWTH Aachen University, Geologie - Endogene Dynamik, Aachen, Germany (s.virgo@ged.rwth-aachen.de), (2) Fraunhofer Institute for Applied Information Technology FIT, Sankt Augustin, Germany

Virtual Microscopy has advanced in recent years to a powerful versatile tool in the life sciences with many applications in research and teaching. We present the first virtual microscopy platform especially designed for geoscience applications. It was developed in a collaboration between RWTH Aachen University and Fraunhofer FIT under consideration of the demands of modern petrography.

The system consists of a fully automated polarisation microscope that can scan entire thin sections in very high resolution under various polarisation and illumination conditions to capture and digitise all information that could be extracted from the section with classical polarised microscopy. The data is processed to extract the polarisation behaviour of each pixel as continuous functions that are fitted for each pixel based on images taken under different polarisation angles. This information is stored in a newly developed format that allows fast access and offers a very good degree of compression.

The datasets can be viewed with a virtual microscopy software (TileViewer) that is easy to operate and allows fluent zooming and browsing through the thin section as well as rotation of the polarisers and switching between illumination conditions.

The viewer software is platform independent and requires no special hardware, rather it operates well on a standard laptop. Besides navigation and image adjustments the TileViewer Software offers the possibility to create annotations, visualise the data based on certain characteristics (for example extinction direction), and offers a basic module for image segmentation.

For further analysis the data can be exported to Matlab, ArcGis or other image analysis environments. The information density of each dataset (including the extinction behaviour) and the high resolution over very large continuous areas allows for new methods of automated and semi-automated analysis that was not possible before with single image acquisition and analysis.

Virtual Petrography has proven itself as excellent for teaching due to the ease of use and many further advantages to classical microscope based teaching. It is our goal to build a community of geoscience lecturers and professionals in which samples and datasets are shared for teaching and research.