

ViP - A virtual polarizing microscopy system for microtectonics

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A major drawback of optical microscopy has been that results are reported and archived in a series of "stand-alone" images and it is difficult to relate these to the spatial coordinates of the object sampled and to other views of the sample. The development of digital photography has made this process much more rapid but has not solved the problem. Digital image databases and virtual microscopy are in their infancy, in contrast to the much more advanced GIS environments. The advances made in Virtual microscopy in life science applications are also opening new ways for other scientific areas, enabling new methods of collaboration and education.

We present a high resolution optical device and digital viewer for multi-scale virtual microscopy in transmitted and reflected light. This system displays images of thin sections at all settings of a conventional polarizing microscope from a highly compressed Gigapixel image file, in a platform-independent viewer, enabling for the first time a true virtual "Google Earth" like virtual polarizing microscope, including annotation mechanisms that are able to store and visualize scientific knowledge attached to certain regions of the image. Adaptive modules for multiscale automated petrographic analyses will be able to segment minerals, pores, pore cements and clay coatings, providing operator-independent results.

The functionality of the instrument will be demonstrated using thin sections from a number of our current research projects.

In the field of education, Virtual Microscopy will create a revolutionary (remote) learning environment with worldwide impact. Traditional microscopy courses center around student practicals, equipped with microscopes. Students use these microscopes alone, with limited interaction with the teacher. In the future, we envision a learning environment where students spend initially some time learning how to operate the microscope and continue the course using virtual microscopy in a Computer lab, allowing guided learning on the same thin section set, collaboration, publication of the teaching materials and development of user-generated content and fairer, more efficient examinations.