# A New Method in the Geologic-Tectonic-Hydrogeologic Documentation of Shafts and Tunnels

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The base of the documentation is a photo series with known and programmable camera models made by the self-developed ImaGeo® Photorobot equipment. This equipment is combined with a laser distance measurer which measures wall distances in a programmable density. A self-developed software displays the composite image in 3D and evaluates the images from a geologic-tectnic-hydrogeologic point of view. The composite image and the evaluation are oriented by means of geodesic measurements.

The development of this new method was triggered by the project aimed to find an underground final disposal place for the low and intermediate level radioactive waste produced in Hungary. Within the frame of this project, two shafts are being driven near Bátaapáti (Geresd Hills, SW Hungary) in the Mórágy Granite Formation.

The base of the documentation is the photo series of each advance taken of the front wall and the shaft wall. The photos are taken by the self-developed ImaGeo® Photorobot, which takes each photo with a known and adjustable camera model. The camera model includes the focus and measured distance values, the spatial angle of the camera, and the exposition values as parameters. All these parameters can be programmed in the photorobot. Since the photorobot can be rotated around two axes, it is able to take photos in any spatial angles. Besides the rotating mechanics and the control electronics, it also contains a laser distance measurer, which measures distances within a photo in programmable numbers and places. The places of the measurements can be identified in the photos, and the distance data can be assigned to the matching the pixels. These distance data provide a mass of points in space, onto which the surface of the front wall and the shaft wall can be fitted. This is our shaft wall model. With the help of the camera models, the photoseries are fitted onto the shaft wall model, which becomes 3D this way. The geologic-tectonic-hydrogeologic documentation can be fixed in this 3D model. The model is placed into a georeferred space by doing geodesic measurements in three points on the shaft wall and one point on the front wall. Therefore, the photos of the advances can be fitted together and the documentation can be connected through several advances.

The ImaGeo Photorobot is served by also self-developed softwares. Besides the controlling software, CoreDump has been developed, in which the composite images are made from the individual photos and fit into the shaft wall model. The software makes it possible to draw objects on the composite images. Thus, a spatial system of lines results, where the objects belonging to different pnenomena can be placed on separate layers. The objects may be appended by a database. A line can be appended by a plane, a geologic-tectonic classification, an azimuth, a dip degree, surface parameters, a geometry, infillings, hydrogeological parameters, etc. The database can be shaped according to the actual research project, quieries can be made, and the results can be visualized: stereograms, pole distribution diagrams, density histograms can be made.

The database is exported from CoreDump to AutoCad, where the final geologic-tectonic evaluation and the plotting is done.

# Reconstructing Post-Carboniferous History of the Krkonoše Piedmont Basin Using Detrital Apatite Fission-Track Data

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The Krkonoše Piedmont Basin (KPB) belongs to a system of post-orogenic extensional / transtensional basins of the Bohemian Massif. The age of the KPB sedimentary basin fill (non-marine red beds) spans between Westphalian D to Lower (or ?Middle) Triassic (ca. 305–240 Ma). The older parts of the KPB fill underwent partial deformation during the formation of the Trutnov-Náchod sub-basin (TNSB, Saxonian-Triassic age). Post-Variscan history of the KPB was documented only by indirect evidence: 1) post-Variscan left-lateral brittle to semi-brittle kinematics on the West Sudetic fault zones (Aleksandrowski et al. 1997), 2) Palaeogene deformation of the Lusatian fault zone (Coubal 1990) and 3) Upper Cretaceous kinematics based on sedimentary depocenter migration (Uličný 2001). This study brings a new low-temperature geochronological evidence of the post-Carboniferous history of