can attribute to the identification of mineral phases in rock thin sections. OBIA as a method for image analysis has been originally introduced in the realm of remote sensing. Due to the fact that with higher spatial resolution classic methods of pixel based image processing and analysis were not satisfying, object based approaches approved to be an alternative. In contrast to pixel based approaches OBIA uses spatially contiguous image objects as the building blocks for image analysis. For the generation of these image objects arbitrary methods of image segmentation can be used. In GIScience, image analysis of remote sensing data is widely used to generate or update geo-datasets stored in geo-information systems (GIS).

In fact, one of the strengths of OBIA is to analyse image objects beyond their spectral properties, that is, by their shape properties and their spatial relationships to other image objects (e.g. neighbourhoods, distances, common borders etc.). Additionally, spatial hierarchical relationships between image objects can be used for analysis, such as being-part-of or consists-of-relationships. However, in many cases the initial image segmentation is rather sub-optimal in terms of representing objects of interest in the image. In the most cases, it is necessary to stepwise enhance the initial segmentation results by focusing on dedicated objects and sometimes to re-assign objects according to their changing properties. Meanwhile OBIA is been applied in a variety of image analysis fields, such as life sciences and medical image analysis. In the context of petrography a particular advantage of OBIA is given by diverse shape describing properties that allow a more objective and thus a more comparable description of grains in a specimen.

Assessing the neotectonic activity of the Hluboká Fault (Southern Bohemia) by mapping and dating of Pleistocene terraces of the Vltava River

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The Hluboká fault is part of the Jáchymov (Joachymstal) shear zone crossing the Bohemian Massif from NW to SE characterized by very low seismicity but also by some suspicious morphological features pointing to its neotectonic activity. The fault delimits the sedimentary fill of the Bud?jovice basin from its Moldanubian crystalline basement NE of it. Flowing from the S to the N, the Vltava River together with its tributaries accumulated fluvial terraces of different horizontal and vertical extent on both sides of the fault. By mapping and dating of fluvial sediments on both sides of the fault, potential vertical displacement along the fault since the Pleistocene can be reconstructed. Fluvial sediments in the floodplain of the Bud?jovice basin (hanging wall of the fault) show ages ranging from ~ 90 ka to the Holocene. In contrast, fluvial sediments in the floodplain NE of the Hluboká fault (foot wall) show only Holocene ages and sediments dated to ~ 23 ka were found above the floodplain. These results point to a relative subsidence of the Bud?jovice basin fill with respect to the crystalline basement as a result of a vertical movement along the Hluboká fault. Further dating of fluvial sediment from the recent floodplain NE of the Hluboká fault should bring more light into this topic.

Observations and calculations on 3D computer models of the Vienna Basin and its basal detachment

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Former Alpine thrusts were reactivated in the Middle Miocene to form the basal detachment of the Vienna Basin. In order to gain insight into its geometry and topography, the detachment was mapped at the base of the allochthonous Molasse, Flysch and NCA units on digitized and geo-referenced geological cross sections. A TIN-(triangulated irregular network)-surface was then generated from these two-dimensional curves using the 3D geomodelling software GOCAD. The combination of this 3D detachment surface and a 3D structure model of the Miocene basin floor allow the observation, measurement and calculation of geologically significant items. The detachment drapes over the curved and ramped shape of the former passive margin, which is basically made up by the Bohemian Massif. This has an influence on the large (ca. 40 km) offset of the basin boundary faults that have a length of up to 120 km each. On the other hand, the general basin shape follows the detachment topography. Depocenters develop preferably above steps within the detachment, which is overall inclined by 5-10°. The 3D basin model further allows a relatively exact calculation of present day (“post-extensional”) sediment volumes (ca. 12.800 km³). Using this value, calculations based on a simplified trapezoidal "box geometry" for the basin result in pre-extensional rock volumes of 21.700 km³ in between the boundary faults and in a total miocene slip of around 40 km.

3D Structural Modeling for Open Pit Mine Design - Examples from the South American Cordillera

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Open pit mine design requires a profound knowledge of the anticipated geotechnical conditions, including geology, hydrogeology, rock mass and structures. These four components are the basis for the design at bench scale, interramp scale and at the global pit scale.

In particular for large open pits, the knowledge about the geometry and characteristics of structures with high persistence, such as faults, shear zones and large joints, is essential as they influence the stability at the interramp and the global pit slope. Shortcomings or even misinterpretations in the structural conditions within the pit may cause severe risks for the mine development.

Several steps are necessary, in order to establish a structural model for an open pit mine, including: (1) knowledge about the tectonic-structural history of the area, (2) identification of first-order structures, (3) determination of structural domains within the pit area, (4) definition of minor faults and joints that occur in each of the structural domains, (5) definition of geomechanical properties for each structural type.

Today 3D-structural modeling is a requirement in many mining projects, in particular for large open pit mines or for projects with known geotechnical risks. Acquired structural data, from surface outcrop and exploration or geotechnical drilling, can be readily managed, visualized and analyzed. Available 3D-modeling tools enable fast recognition of potential risks and help pinpoint new drillings for further data acquisition.

Cordilleran-type bulk minable mineral deposits have been subject to 3D structural modeling for subsequent geotechnical stability analysis. The presented examples show the importance of systematic structural data acquisition and of detailed knowledge about the tectonic-structural history of the area, and the 3D structural modeling as a tool for decision making in the development of the mining plan.

Geologische Karte von Bayern 1:25.000 Blatt Nr. 8435 Fall - grenzüberschreitende Zusammenarbeit und Geologie

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Die Neukartierung des Grenz-Kartenblattes 8435 Fall erfolgte im Rahmen des vom Freistaat Bayern finanzierten und EU-kofinanzierten Projektes „Informationsoffensive Oberflächennahe Geothermie" mit dem Bayerischen Landesamt für Umwelt (LfU; siehe auch www.lfu.bayern.de/geologie/hydrogeologie/iogi) in Kooperation mit der Geologischen Bundesanstalt Wien (GBA).

Das Kartiergebiet zeigt einen Ausschnitt aus dem nordöstlichen Karwendel und der südlichen Benediktenwand-Gruppe. Geologisch umspannt das Gradabteilungsblatt mit Teilbereichen der Wamberger Antiklinale und der sich südlich anschließenden Karwendel-Synklinale einen „Hot Spot" des nördlichen Kalkalpins. Letztere erfährt hier eine dramatische flexurelle Richtungsänderung durch die „Achentaler Schubmasse" von W-E-gerichteten zu S-N-verlaufenden Strukturen. Ungeachtet der aktuellen tektonisch-strukturgeologischen Diskussionen bietet das Blatt Fall mit einem obertriassischen bis unterkretazischen Schichtenspektrum einerseits Einblicke in die marine Entwicklung des Kalkalpins, andererseits zeigen überdeckende quartäre Lockergesteine Relikte der letzten Eiszeit, die dem Gebiet gleichermaßen den letzten „Schliff" gaben. In den postglazialen bis jüngsten, gar historisch fassbaren Zeitbereich fallen ausgedehnte Massenbewegungskörper im Bereich des Dürrach- und Bächentales.