

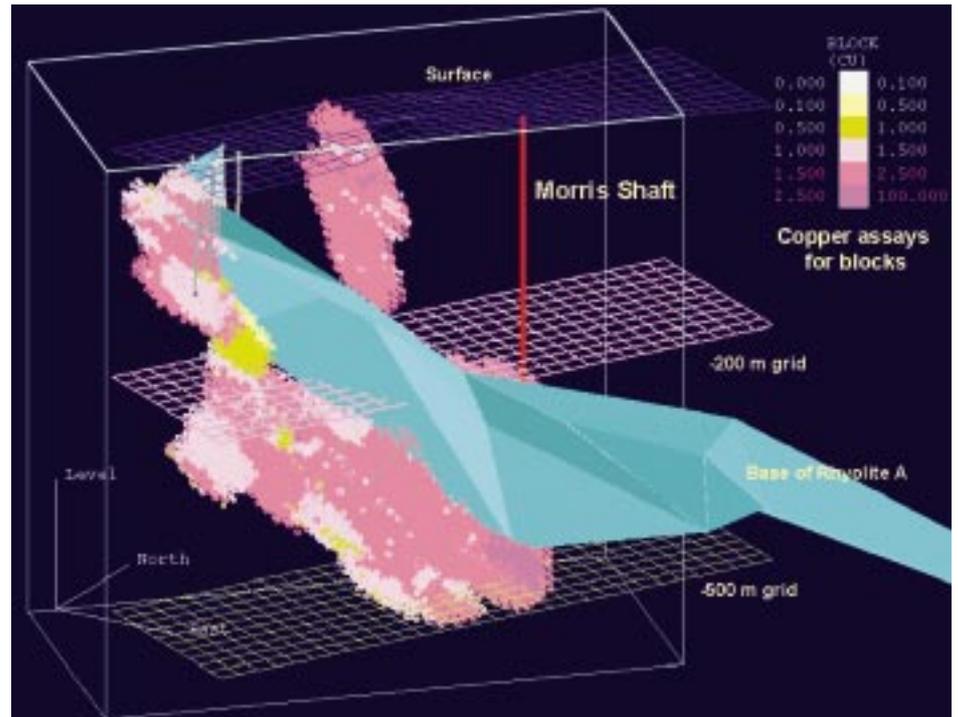


Visualising and assessing complex mineral deposits

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3D modelling



3D view of a block model of part of the Parys Mountain deposit, seen from the south-east. The blocks are coloured according to the copper assay value.

3D-visualisation and virtual-reality models are being used increasingly in all areas of life, from architecture to fighter pilot training, and current applications include mineral exploration and mine development. The BGS has the capability for 3D mineral deposit modelling and reserve calculation using VULCAN software. VULCAN is a dynamic, 3D geological modelling and mine-planning system, which has been used in applications as diverse as visual impact assessment for new mines, modelling the distribution of noise pollution around mine sites, and on-going calculation of ore reserves of worked deposits.

BGS staff have used the system to create a model of the structurally complex orebody at Foss Mine, Aberfeldy, Scotland on a project under the Technology Access Programme of the Department of Trade and Industry (DTI). Data were provided by the mine personnel in the form of mine plans, mine sections, surface geology, and geophysical, soil and borehole data. These data were integrated into a single model showing the proven extent of the orebody, and the current mine design, with driveages, declines and stopes.

From this model, reserves can be calculated, and the future mine development can be planned. The 3D model helps to optimise the extraction of ore.

Under another DTI Technology Access project, BGS staff have worked with Anglesey Mining plc and KRJA Systems Ltd on a model of the geology and mineralisation at Parys Mountain on

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Anglesey, North Wales, so that the underground geology can be better understood and new exploration can be targeted. A large number of boreholes have been loaded into the model, so that lithological, geochemical and PIMA (Portable Infrared Mineral Analyser) data can be displayed in 3D together with existing mine shafts, topographic data and structural surfaces. A preliminary block model of geochemical data in part of the mine property has been produced to indicate the distribution of

ore elements in this potential zinc, with lead and copper, mine.

3D modelling is also becoming extremely important in assessing the environmental impact of new developments. For example, it is possible to create a model of an open pit before it is dug, with appropriate landscaping to enable planning authorities to visualise the appearance of the site before, during and after working, from any possible angle. VULCAN software has also been used by the BGS in non-mining contexts. For example, the geology around the potential nuclear repository site at Sellafield in west Cumbria is complex and a full 3D structural model of the area was required, so that a better understanding of the hydrogeology and movement of groundwater could be gained. The model was constructed by integrating seismic reflection profile interpretations with lithological data from boreholes and surface outcrop mapping.

3D visualisation has always been an essential component of a geologist's interpretive skills. Now it is possible to develop rigorous computer models to aid the geologist in providing sound advice.