



Evaluation of rock mass classification schemes: a case study from the Bowen Basin, Australia

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The development of an accurate engineering geological model and adequate knowledge of spatial variation in rock mass conditions are important prerequisites for slope stability analyses, tunnel design, mine planning and risk management. Rock mass classification schemes such as Rock Mass Rating (RMR), Coal Mine Roof Rating (CMRR), Q-system and Roof Strength Index (RSI) have been used for a range of engineering geological applications, including transport tunnels, “hard rock” mining and underground and open-cut coal mines. Often, rock mass classification schemes have been evaluated on subaerial exposures, where weathering has affected joint characteristics and intact strength. In contrast, the focus of this evaluation of the above classification schemes is an underground coal mine in the Bowen Basin, central Queensland, Australia, 15 km east of the town of Moranbah. Rock mass classification was undertaken at 68 sites across the mine. Both the target coal seam and overlying rock show marked spatial variability in terms of RMR, CMRR and Q, but RSI showed limited sensitivity to changes in rock mass condition. Relationships were developed between different parameters with varying degrees of success. A mine-wide analysis of faulting was undertaken, and compared with in situ stress field and local-scale measurements of joint and cleat. While there are no unequivocal relationships between rock mass classification parameters and faulting, a central graben zone shows heterogeneous rock mass properties. The corollary is that if geological features can be accurately defined by remote sensing technologies, then this can assist in predicting rock mass conditions and risk management ahead of development and construction.