Stochastic block economic value modelling

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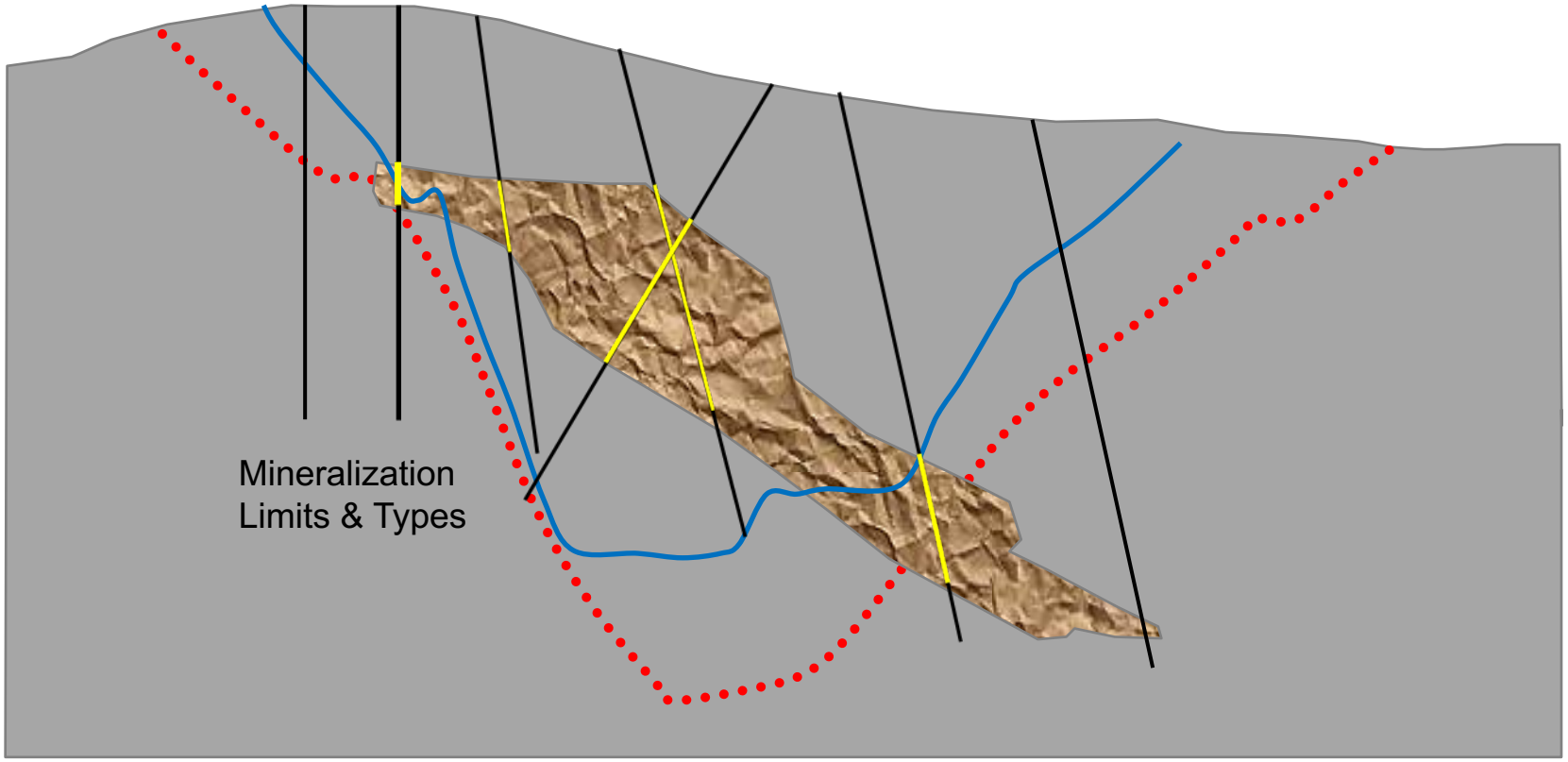
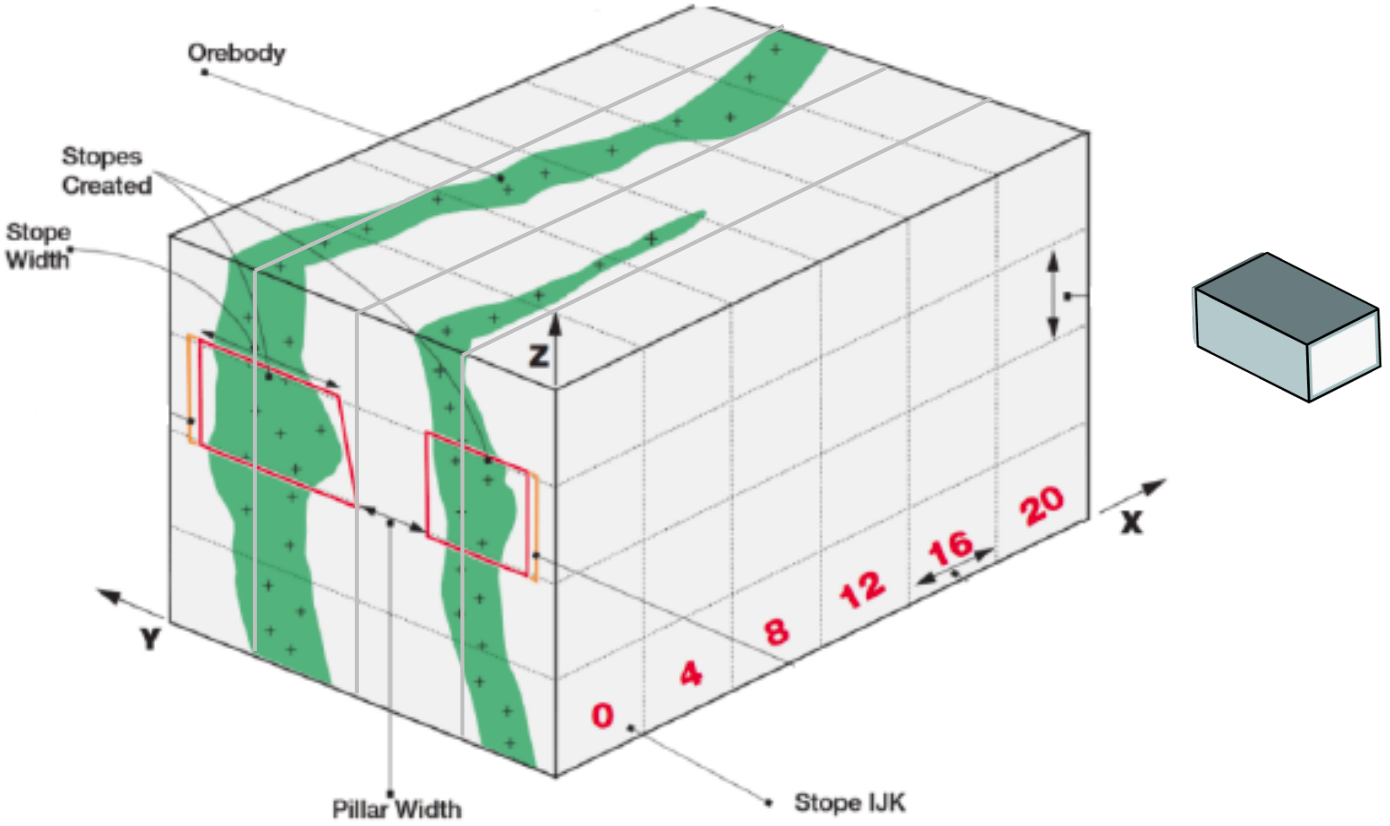

Mineralization
Limits & Types

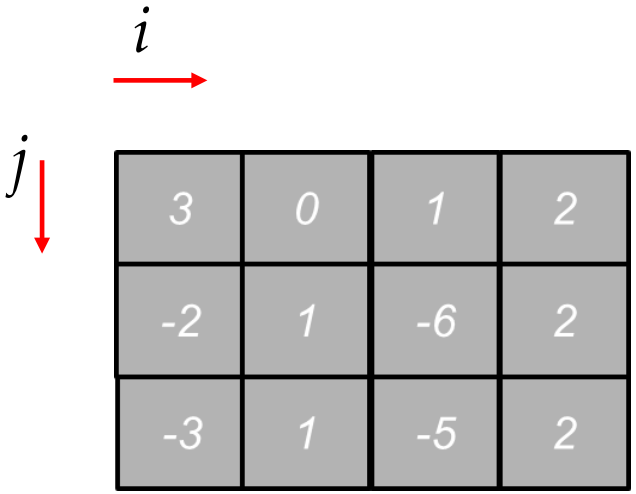
Geological block model



$$Block\ economic\ value\ (BEV) = Block\ revenue - cost$$

$$BEV = [Block\ tonnage * grade * recovery * price - (Mining\ cost + Processing\ cost)]$$

$$BEV_{ij} = [(T_{ij} * G_{ij} * R_{ij} * P_{ij}) - (MC_{ij} + PC_{ij})]$$



Where;
T_{ij} is tonnage of block B_{ij}
G_{ij} is the grade of block B_{ij}
R_{ij} is the % of metal recovered from block B_{ij}
P_{ij} is the unit price of the metal
MC_{ij} is the cost of mining block B_{ij}
PC_{ij} is cost of processing block B_{ij}

$i, j \in Z$

If BEV is positive-economic to mine, otherwise its uneconomic

Problem

$$BEV_{ij} = [(T_{ij} * G_{ij} * R_{ij} * P_{ij}) - (MC_{ij} + PC_{ij})]$$

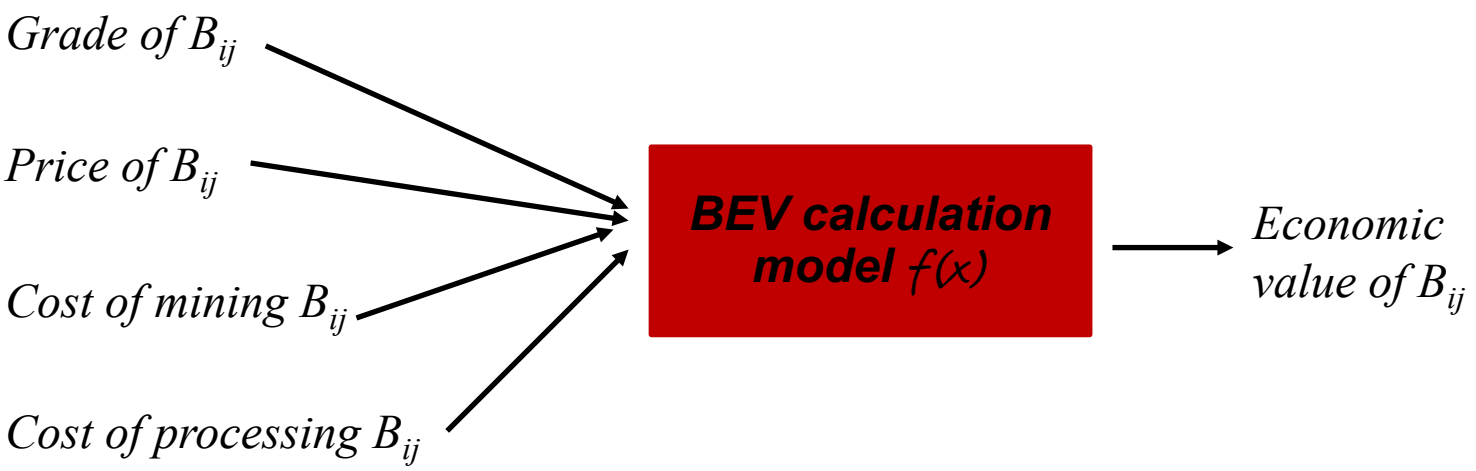
Where; T_{ij} *is tonnage of block* B_{ij}
G_{ij} *is the grade of block* B_{ij}
R_{ij} *is the % of metal recovered from block* B_{ij}
P_{ij} *is the unit price of the metal*
MC_{ij} *is the cost of mining block* B_{ij}
PC_{ij} *is cost of processing block* B_{ij}

$i, j \in Z$

Deterministic model

*Values used are assumed to be **known fixed values** not subject to uncertainty*

Single and static BEVs

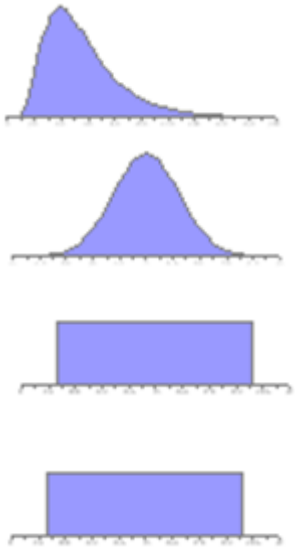


In reality, BEV are functions of uncertain variables (grade, price, costs)

Stochastic model

Uncertainty of variables is represented by a probability distribution

BEVs are probability distributions of the possible values which could occur



$Grade\ of\ B_{ij}$

$Price\ of\ B_{ij}$

$Cost\ of\ mining\ B_{ij}$

$Cost\ of\ processing\ B_{ij}$

BEV calculation model *f(x)*

$Economic\ value\ of\ B_{ij}$