Sustaining ore production by reducing significant grade variability in ore polygons

Study of an open pit mine

Introduction

- A Gold mine looking doing a study to understand and reduce the huge variability in grade fed to the plant to sustain a good gold production on daily basis by analyzing the grade control drill spacing to make sure Ore polygons are well covered by the drilling campaign.

- Analysis done on one Open Pit project under conversion from exploration target to a new open cast mine (advanced drilling 20*20 to 10*5 drill spacing).

- Tools and software used for the conversion: Vulcan software,

Methodology

- 10*5m spacing is drill within an area of dimension 100*25m.

- Update or wireframe and all other necessary needs.

- Run the all Geostat study needed by the study

- Run the ore tonnes estimation for each spacing and compare which one gives the closest prediction to the reality by making profit of course.

- The study of the Variance of the Ore block is also important for that study.

Location of the study area
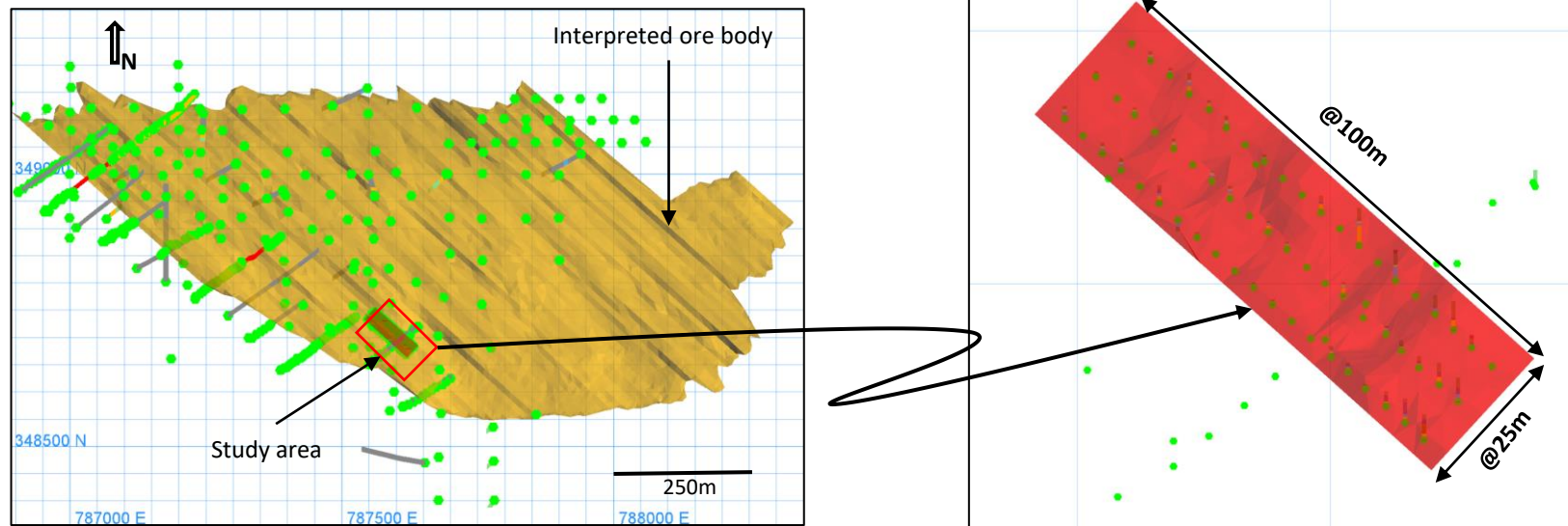
- ❑ Green dots are data location (drill holes, trenches, pits etc…).

- ❑ 60 GC holes spaced 10m along strike and 5m across are drilled within the study area

Data stat
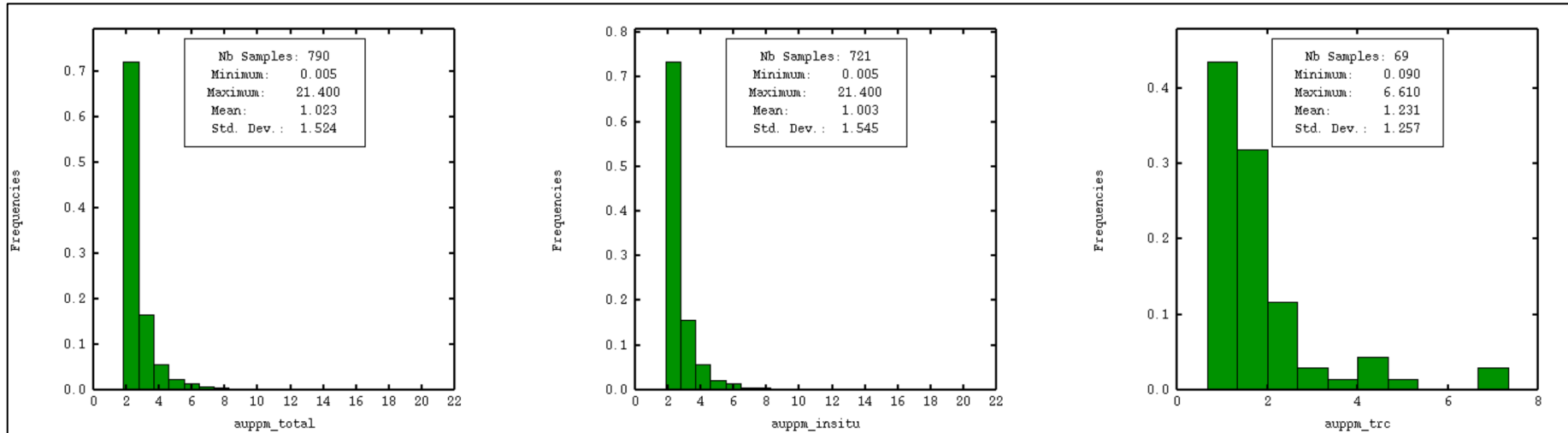
Variable	Count	Min	Max	Mean	Std Dev	Var
Auppm Total	790	0.005	21.4	1.02	1.52	2.32
Auppm Insitu	721	0.005	21.4	1	1.55	2.39
Auppm trc	69	0.09	6.61	1.23	1.26	1.58

❑ Data distribution are very skewed but shows continuous LogN distribution.

❑ The insitu data present better continuity than the one in the TRC which show some dispersion.
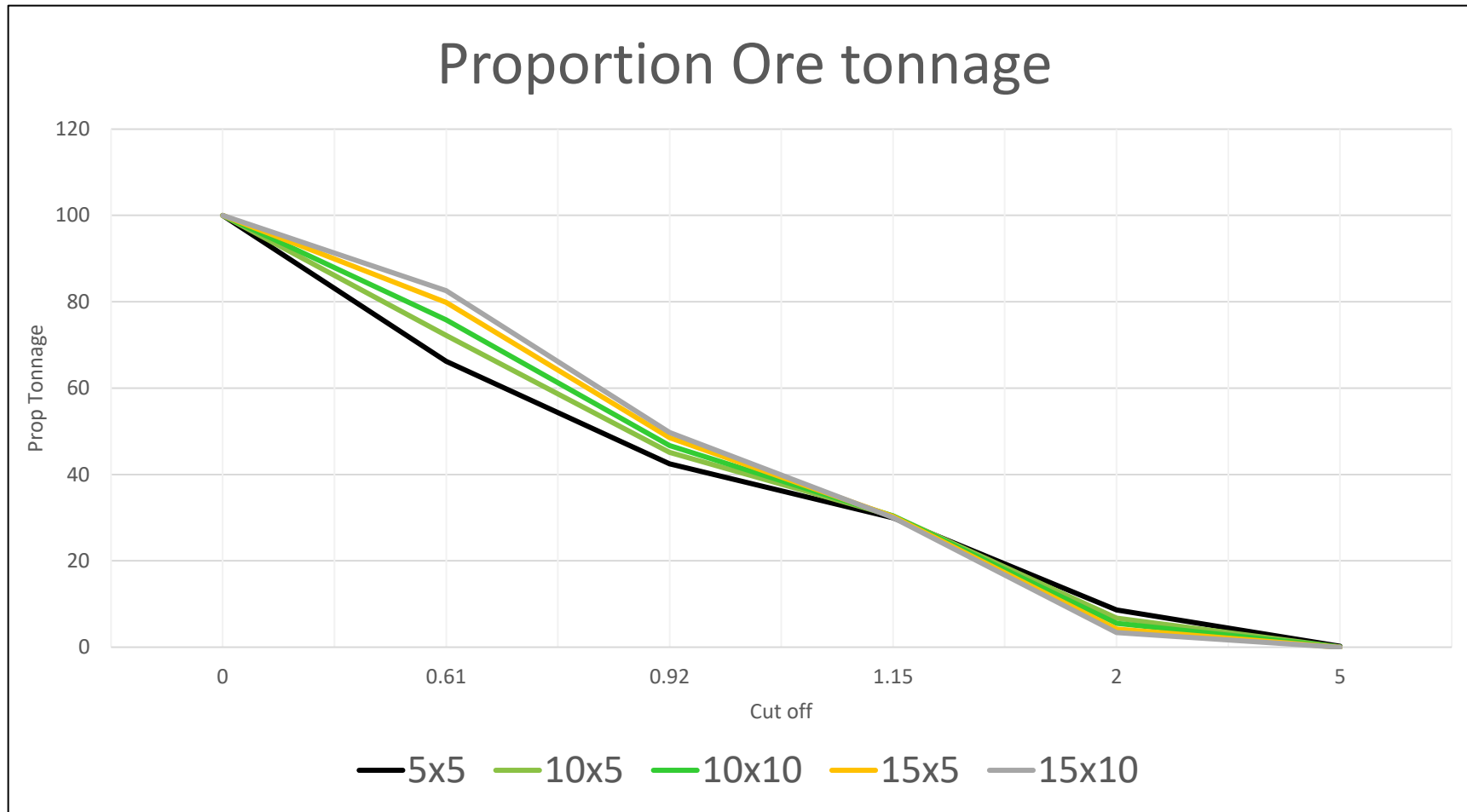
Grade tonnage at 10*5m spacing
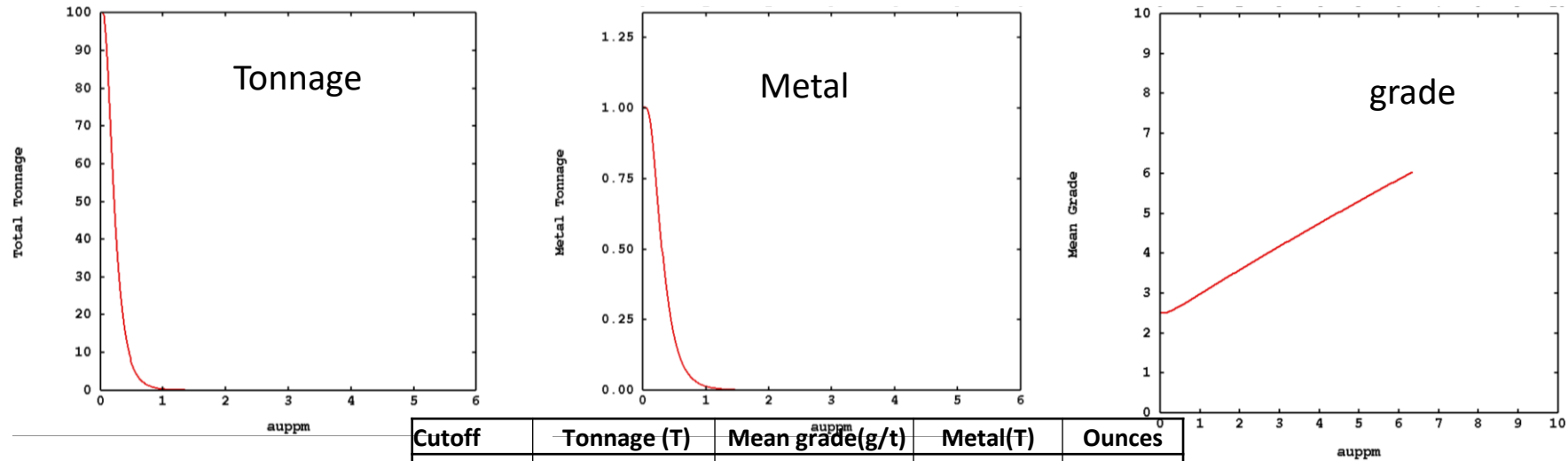
Cutoff	Tonnage (T)	Mean grade(g/t)	Metal(T)	Ounces
0	76,666	1.00	0.077	2,465
0.61	50,753	1.31	0.066	2,138
0.92	32,545	1.61	0.052	1,685
1.15	23,000	1.86	0.043	1,375
2	6,601	2.79	0.018	592
5	192	6.02	0.001	37

❑ Data mean grade 1.003g/t, estimated mean grade 1.00g/t (**-0.2% diff**).

❑ Different spacing have been tested. The general remark is, the the selectivity decrease with the size of sampling. So the study point out spacing up to 10m*5m

Grade tonnage

10*5m spacing reports is good tonnage and grade.

conclusion

- **10*5m** is enough good to go for **GC** and therefore **20*20m** for **AdvGC**.

- This is based on the selective mining unit of 5*5*2.5.

- The project is presenting a geometry anisotropy relating sometimes a second order stationarity. This bring the total variance of data almost constant in a certain distant.

- From the variograms calculation, this distant is greater than 5m. So no need to drill such a close space.

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