GOLD PRICE PREDICTION USING 1-D GEOSTAT

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Summary
The 1000 days data set from **July 12, 1986** till **June 24, 1989** of High Gold Price is a subject of 1-D Geostat analysing where the dates were transforming into numbers according to the rule: year months day - *yyyymmdd*. The results leads us to three conclusions: ❶ The High Gold Price distribution could be describe as regionalized variable in the terms of Geostatistics: ❷Variography analysis identifies complex variogram structure which consists two structures 1st structure - Nugget effect - 125 ($/troy oz)^2; IInd structure - Gaussian model with Sill – 1930 ($/troy oz)^2 and Range - 480 days. ❸ Any consequence of High Gold Price inside the studied data and not longer than Practical Range = 831 days could be describe as distributed according to the normal (Gaussian) statistical law. All Geostatistical calculation was made by GeoEAS™.

Introduction

The 1000 days set of High Gold Price is a subject of 1-D Geostat analyzing. High Gold Price consequence was modelled as a vector with length 1000 days. The dates were transforming into numbers according to next rule: year months day - *yyyymmdd*.

1. The data

The data set consists the High Gold Price Data from July 12, 1986 till June 24, 1989.

1.1. General statistical parameters for the data set of 1000 days
The general statistical parameters of High Gold Price were shown in Table 1. and in the scatterplot on Fig. 1.

Table 1. Summary statistics of High Gold Price data set of 1000 days.

##	Statistics	Value
1	Minimum value, $ US/troy oz	348.00
2	Maximum value, $ US/troy oz	503.50
3	Mean value, $ US/troy oz	428.93
4	Variation, ($ US/troy oz)^2	1066.1
4	Standard deviation, $ US/troy oz	32.65
5	Coefficient of variation, %	7.61

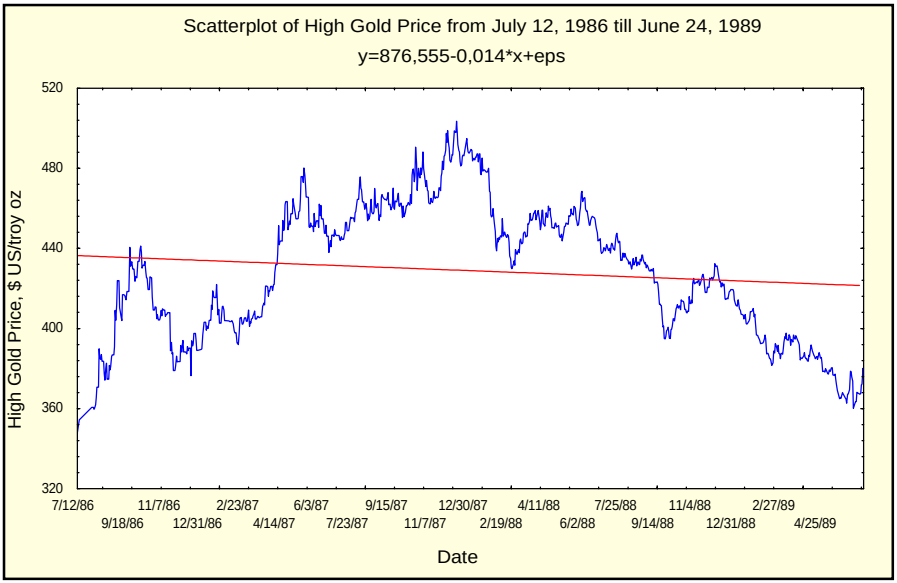

Fig. 1. Scatterplot of High Gold Price for 1000 days (from July 12, 1986 till June 24, 1989).

2. Variography: the Structure Identification

The structure identification leads us to the Gaussian variogram model.

2.1. Gaussian Variogram

The theoretical model of Gaussian variogram could be presented by expression

$$\gamma(h) = C\left[1 - \exp\left(-\left(\frac{\delta h}{a}\right)^2\right)\right]$$

$$\delta = \sqrt{2.996}$$

where: $\gamma(h)$ - the semivariogram, or variogram function, C – Sill, h – vector, a – range.

2.2. Non-conditional Gaussian Variogram simulation

To compare the shape of the experimental variogram with theoretical Gaussian variogram model, we will use variograms obtained by Non-conditional simulation - Fig. 2.

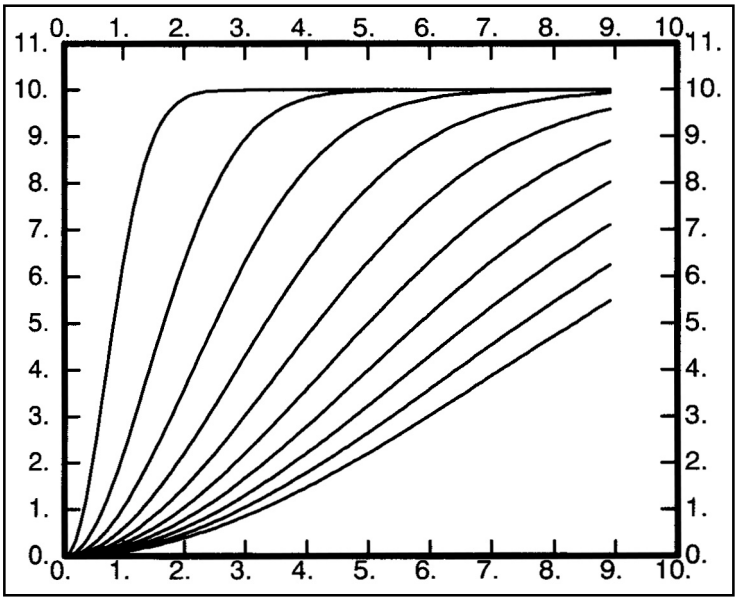

Fig. 2. Non-conditional simulation of Gaussian Variogram with a practical range of 10, *after Isatis Software Manual, 2001.*

3. 1-D Variography of High Gold Price Data

3.1 The Structure Identification

The structure identification was based on experimental variograms include two High Gold Price's data set: for 1000 and 500 days.

3.1.1. Raw Variogram

Raw variograms for the two days' data set (1000 and 500) was obtained as follows:

- for the range of 1000 days;

The numbers of pairs involved in variogram calculation is 14973, and the raw variogram was shown on Fig. 3.

- for the range of 500 days

For this High Gold Price's data set numbers of pairs involved in variogram calculation is 11635, and the raw variogram was shown on Fig. 4.

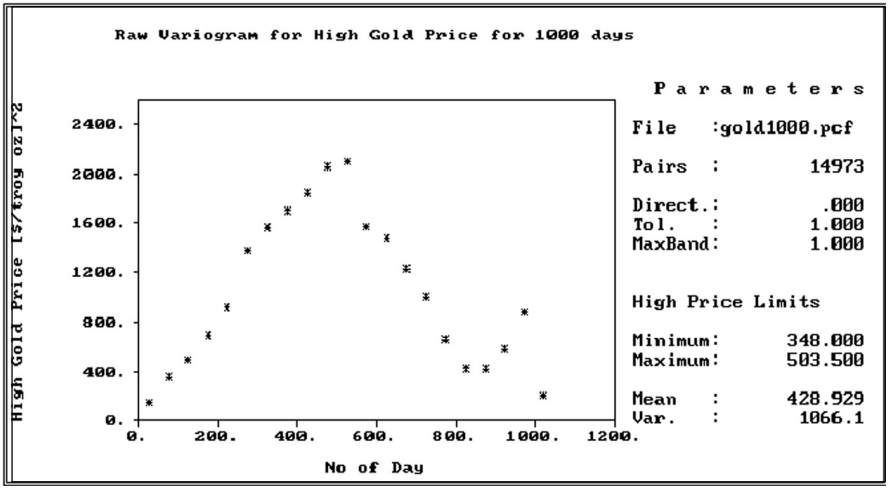

Fig. 3. Raw Variogram for High Gold Price's data set of 1000 days.

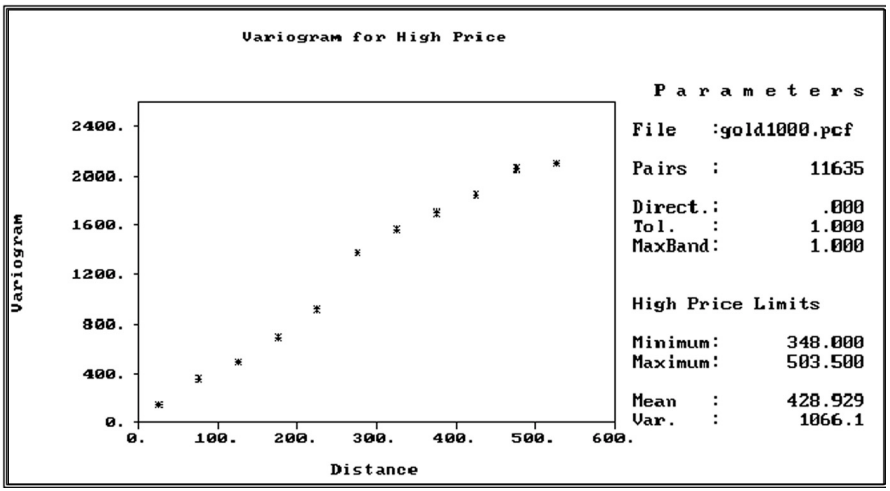

Fig. 4. Raw Variogram for High Gold Price's data set of 500 days.

3.1.2. Experimental Variogram

- for the range of 1000 days

A model with two structures - nugget effect and Gaussian variogram has been fitted to the 1000 days' experimental variogram, Fig. 5.

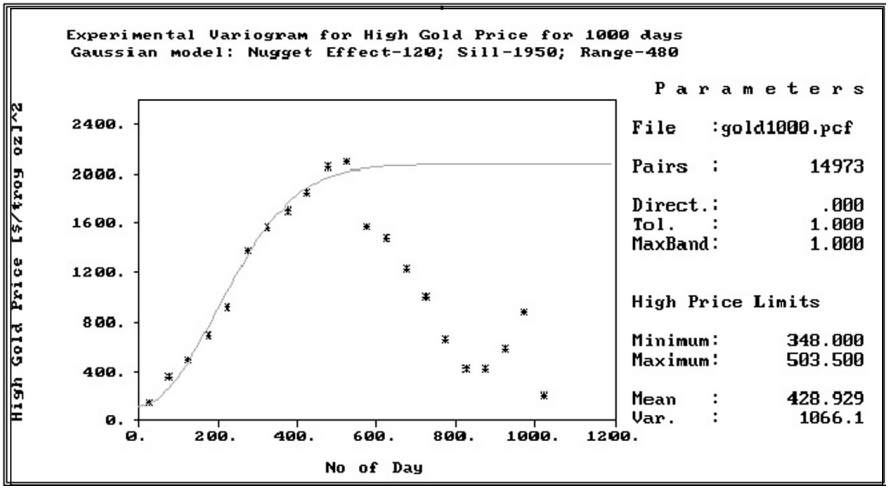

Fig. 5. Experimental Variogram for High Gold Price's data set of 1000 days with a Nugget effect - 120 ($/troy oz)^2, Sill – 1950 ($/troy oz)^2 and Range - 480 days.

Ist structure - Nugget effect - 120 ($/troy oz)^2;
IInd structure - Gaussian model with Sill – 1930 ($/troy oz)^2; Range - 480 days.

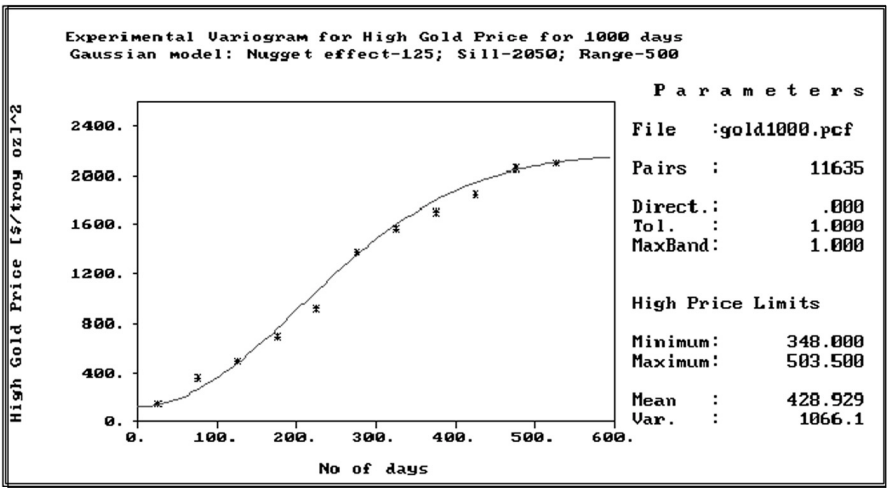

Fig. 6. Experimental Variogram for High Gold Price's data set of 500 days with a Nugget effect - 125 ($/troy oz)^2 , Sill – 2050 ($/troy oz)^2 and Range - 500 days.

The practical range is equal to

$$a' = a\sqrt{3},$$

where: *a'* is a practical range and *a* is a range.

So the practical range *a'* will be

$$a' = 480\sqrt{3} = 480 \times 1.73205 = 831 \text{ days.}$$

- for the range of 500 days

On the analogy of experimental variogram fitted by Gaussian model with a nugget effect for the 1000 days High Gold Price's data set, the same procedure was performed for the 500 days' data set, Fig 6. The parameters of the variogram's structures are as follows:

Ist structure - Nugget effect - 125 ($/troy oz)^2;
IInd structure - Gaussian model with Sill – 2050 ($/troy oz)^2;
Range - 500 days.

Conclusions

The results of research 1-D Geostat study of Gold price show us two conclusions. The Gold price distribution could be described as regionalized variable in the terms of Geostatistics. Variography analysis identify complex variogram structure which consists two structures as follows:

Ist structure - Nugget effect - 120 ($/troy oz)^2;
IInd structure - Gaussian model with Sill – 1950 ($/troy oz)^2;
Practical Range - 831 days.

And any consequence of High Gold Price inside the studied data and not longer that 831 days could be describe as distributed according to the normal (Gaussian) statistical law.