

A summary of Some Geostatistical Software Conventions

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Last changed: XXX

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Exponential Model

1. semivariogram = $c[1-\exp(-h/a)]$ (a = theoretical range)

Case for: SAS, Surfer, GSLIB(1992), GSTAT, ARCGIS 8.X version of ARCGRID and Practical Geostatistics 2000 software

2. semivariogram = $c[1-\exp(-3h/a)]$ (a = practical range equal to the distance at which 95% of the sill has been reached)

Case for: GS+, Variowin, GSLIB(1998), S+, GEO-EAS, ARCGIS Geostatistical Analyst

If you use an exponential model to fit experimental semivariograms with Variowin, you must divide a (vw) by three to do a kriging with Surfer.

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Gaussian Model

1. semivariogram = $c[1-\exp(-(h/a)^2)]$ (a = theoretical range)

Case for: SAS, Surfer, GSLIB (1992), S+, GSTAT, ARCGIS 8.X version of ARCGRID and Practical Geostatistics 2000 software

2. semivariogram = $c[1-\exp(-3(h/a)^2)]$ (a = practical range equal to the distance at which 95% of the sill has been reached)

Case for: Variowin, GS+, GEO-EAS, ARCGIS Geostatistical Analyst

3. semivariogram = $c[1-\exp(-3(h/a)^2)]$ (a = the distance at which 99.99 % of the sill has been reached)

Case for: GSLIB (1998)

If you use a Gaussian model to fit experimental semivariograms with Variowin, you must divide a (vw) by the square root of three to krig with Surfer or multiply a (vw) by the square root of three to krig with GSLIB (1998). "Yvan Pannatier was perfectly right alerting us about the impact of the "new" definition of the Gaussian model range in the 1998 edition of GSLIB: that range value now corresponds to 99.99% of the sill. Practical ranges should stay at 95% of the sill." - Andre Journel

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Exponential and Gaussian Models

The practical ranges should be reported in the literature.

h = the separation vector

a = the range, practical range, effective range or range parameter

The difference between the different choices of the parameters in the exponential and Gaussian variogram models is the difference between a parameter and an effective/ practical range. This distinction has long been known in the geostatistical literature, the problem arises because neither the exponential nor the Gaussian has a true range, i.e., a distance at which the variogram is constant (as occurs with a spherical model). Instead the effective/practical range is the distance at which the value of the variogram is 95% of the sill (D. Myers).

GS+ uses exponential model #1 and Gaussian model #1 computationally (they refer to a as the range parameter). But GS+ has been put in class # 2 for both models because you enter and read the range ($3 * a$ for the exponential model and $\sqrt{3} * a$ for the Gaussian) and to make this document less confusing.

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Comments on direction.

Surfer, Variowin, and GEO-EAS consider the East direction to be 0 degrees and direction to increase counterclockwise.

GS+, GSLIB (1992, 1998), SAS, S+, GSTAT, ARCGIS Geostatistical Analyst and Practical Geostatistics 2000 Software consider due North to be 0 degrees and direction to increase clockwise.

The ARCGIS 8.X version of ARCGRID uses isotropic models only

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