

The scallops dataset is available online. The variable of interest is the *tcatch* which has a skewed distribution. The variable $Z = \log(tcatch + 1)$ has approximately a normal distribution. We will fit the following model

$$Z(\mathbf{s}) = \mu + \epsilon(\mathbf{s})$$

where μ is a constant and $\epsilon(\mathbf{s})$ is stationary Gaussian with mean 0 and an exponential covariogram with a nugget effect

$$C(h) = \begin{cases} \sigma^2 + \tau^2 & \text{if } h = 0 \\ \sigma^2 \exp(-h/\theta) & \text{if } h > 0. \end{cases}$$

1. Find the maximum likelihood estimates for μ , τ^2 , σ^2 and θ .
2. Plot the empirical semivariogram and the fitted semivariogram in one graph.
3. Choose and show a sensible polygon inside which the ordinary kriging will be carried out.
4. Carry out the ordinary kriging for Z at grid points inside the polygon; Draw contour plots for the predicted value and prediction variance.

Turn in your work and computer programs. Note that you are required to come up with your own programs even though you are encouraged to discuss with each other. Identical programs from different people are all unacceptable.