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Practical Exercise on Data Assimilation

a) Read README to get to know the folder structures and to learn how to run the assimilation and to plot the results.

b) Edit task.nam with the following entries. Then run the assimilation and plot the results.

```
anamode = 1           eigvalmode = 1
rx       = 0.1        preconmode = 0
ry       = 0.1        obsabs   = 5.   5.   15.
eb       = 1.0        locats   = 5 5  9 9  13 13
eo       = 1.0
```

c) Try the same configurations with the 2D-var method.

d) Now change the observation error to 1.5 and 1.9. Do you recognize any changes?

e) At first set the influence radius in x- and y-direction to 0.8. Secondly, see what happens, when $rx = 0.8$ and $ry = 1.2$. Run this configuration also with optimal interpolation.

f) Handling the code.

The subroutine *covmatB* defines and inverts the covariance matrix \mathbf{B} , where presently the Balgovind weighting function (Balgovind et al., 1983) is implemented, with L being the radius of influence or (de-)correlation length

$$w(x) = \left(1 + \frac{|x|}{L}\right) \exp\left(-\frac{|x|}{L}\right).$$

This function ensures that \mathbf{B} is positive definite. This is also granted by the Gaussian

$$w(x) = \exp\left(-\frac{x^2}{2L^2}\right).$$

Replace the Balgovind function by the Gaussian and repeat the last exercise. Do you identify differences?