

51.5[°] N

51.0°N

51.5[°] N

51.0°N

1.5°₩.

 $1 \in W$

1.0°W

1.0°W

0.5°W

0.5°W

SPATIAL PROPERTIES OF SEASONAL RAINFALL IN SOUTHEAST ENGLAND

1. Introduction. Interpolated rainfall fields are important for agricultural, hydrological and ecological models and serve to enhance our understanding of environmental systems. Here we present two methods of estimation of rainfall depth (mm) at unsampled locations for southeast England; ordinary kriging (OK) and simulated annealing (SA).

2. Data. One year of daily rainfall totals at 437 stations were accumulated for a winter and a summer season (June-Aug and Dec-Feb, respectively). Data were made available via the website of the British Atmospheric Data Centre (http://www.badc.rl.ac.uk).

3. Variograms. Due to the presence of drift, low-order polynomials were fitted to the seasonal data. Directional variograms (0, 45, 90 and 135 degrees) were then calculated from the residuals (not shown). Both seasons showed anisotropic conditions, with a dominating W-E direction. To account for the directional variation of rainfall anisotropic variograms were calculated for each season (Figure 1).



Figure 1. Anisotropic variograms for (a) summer and (b) winter. Lag distance is 0.05 and range, spatially dependent sill and nugget are: 0.17*3 (0.31),335.4 (656.3) and 35.5 (232.9) for summer (winter).

1.0° E

1.0° E

0.5[°] E

0.5°E

1.5°E

15°E

350

300

250

200

150

100

50





Figure 2. Rainfall depth during (a) summer and (b) winter, as estimated using OK.

0.0

0.0

5. Conclusions

- Summer and winter rainfall exhibits anisotropic conditions with strong spatial dependence in the West - East direction.
- Anisotropic variograms show longer spatial dependence (range) but smaller variance (sill) in the residual field during summer compared to winter.
- One reason for the small range in winter is due to the study area being too small to capture the real scale of the rainfall processes, in particular frontal depressions.
- . The OK and SA maps have similar spatial features. However, the SA provides a more reasonable representation of the variability in rainfall depth compared to that of the smoothed OK maps.

Figure 3. Rainfall depth during (a) summer and (b) winter, as estimated using SA.



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