

Analysis of soil at India

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Here we compare the outcome of a classical kriging against a cost-based kriging which takes into account the presence of a barrier.

Data description

```
'data.frame': 70 obs. of 5 variables:
$ sample: Factor w/ 70 levels "JIN10","JIN100",...: 28 45 66 1 16 22 25 26 27 29 ...
$ x      : num  13 12.5 13.5 13.5 13.5 14 13.5 14 14 14 ...
$ y      : num -11.5 -12 -12 -13 -11 -11.5 -10 -10.5 -13.5 -12.5 ...
$ Ca     : num 2.95 3.4 4.3 5.7 3.97 4.5 3.3 3.2 2.81 5.07 ...
$ Cu     : int 15 13 15 13 14 17 20 18 14 14 ...

    sample      x          y          Ca
JIN10  : 1  Min.   : 7.50  Min.   :-13.50  Min.   :0.660
JIN100 : 1  1st Qu.: 9.50  1st Qu.:-12.00  1st Qu.:2.490
JIN101 : 1  Median :11.50  Median :-11.00  Median :2.945
JIN102 : 1  Mean   :11.53  Mean   :-10.99  Mean   :3.106
JIN103 : 1  3rd Qu.:13.50  3rd Qu.:-10.00  3rd Qu.:3.697
JIN106 : 1  Max.   :16.00  Max.   :- 8.00  Max.   :5.700
(Other):64

    Cu
Min.   : 7.00
1st Qu.:11.00
Median :12.00
Mean   :12.39
3rd Qu.:14.00
Max.   :20.00
```

Figures 1 and 2 display the raw data, and an exploratory smoothed surface.

Euclidean kriging

The variogram model is Esponential. We choose to estimate the nugget effect, which may account for measurement error, for example.

Cost-based kriging

Some cost-based maps, for verifications purposes.

Comparison of method outcomes

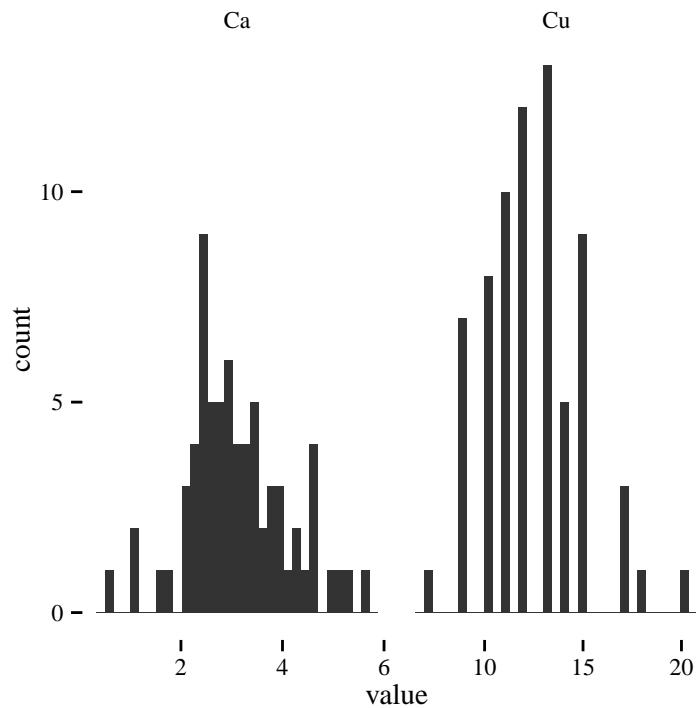


Figure 1:

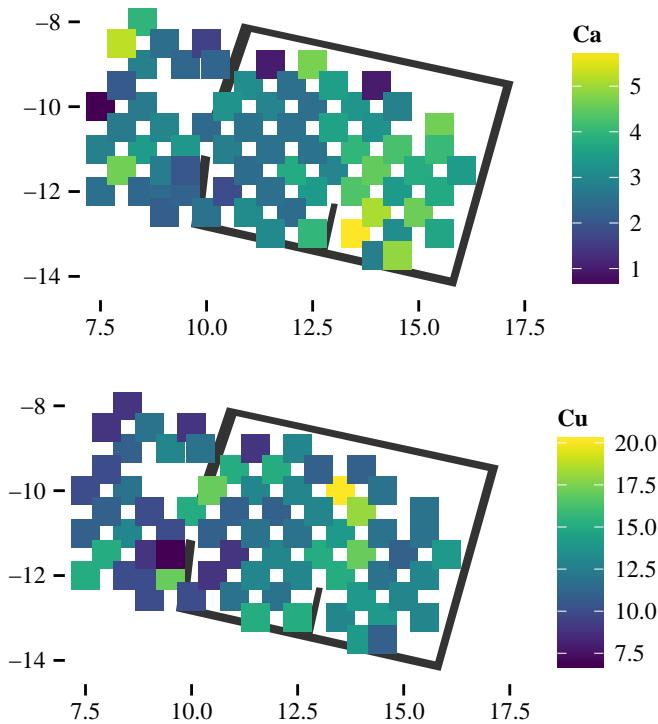


Figure 2: Measurement locations and observed values

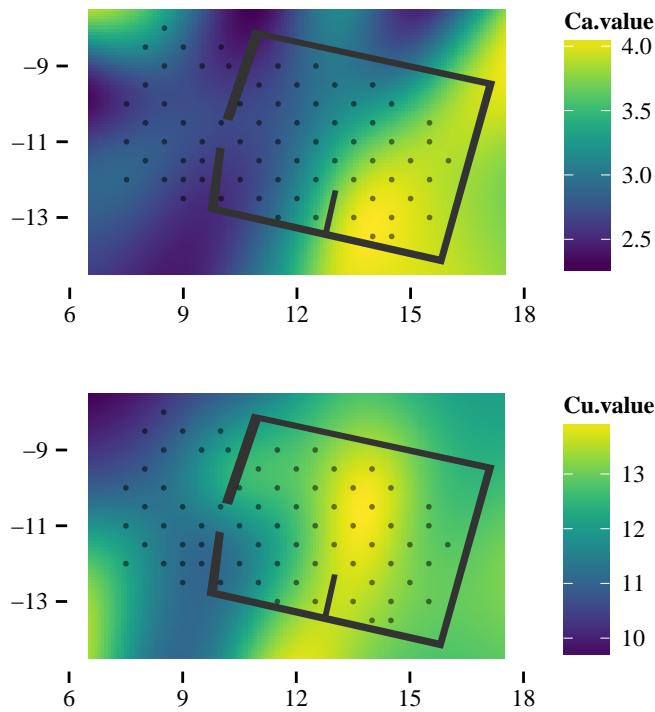


Figure 3: Exploratory kernel smoothing of the measurements

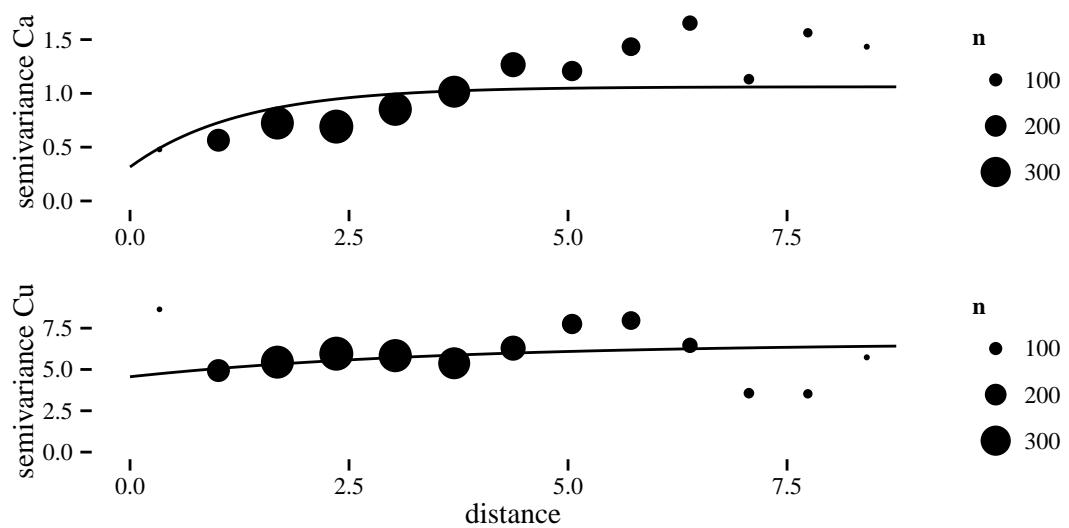


Figure 4: Empirical variogram and fitted model.

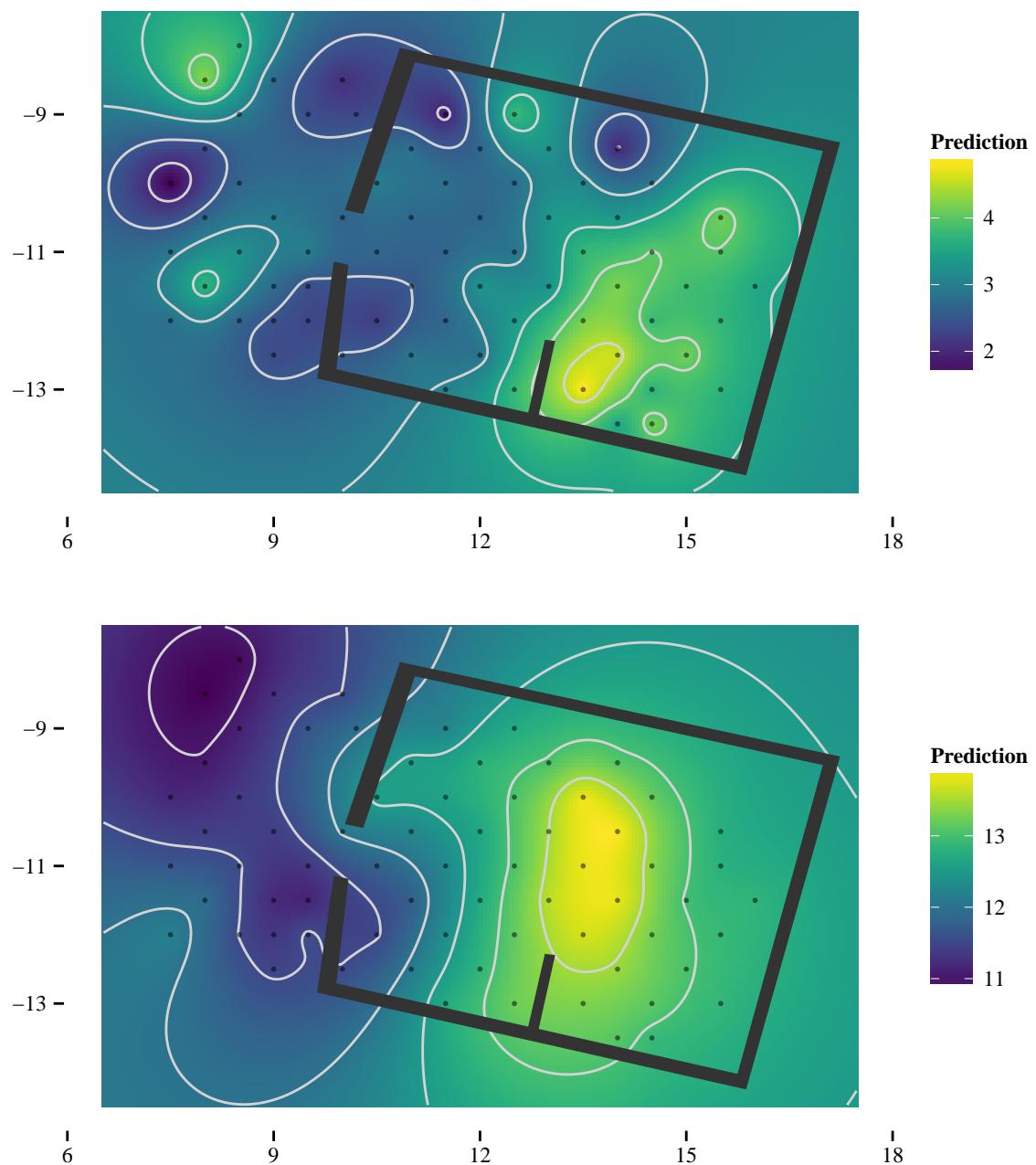


Figure 5: Euclidean kriging prediction

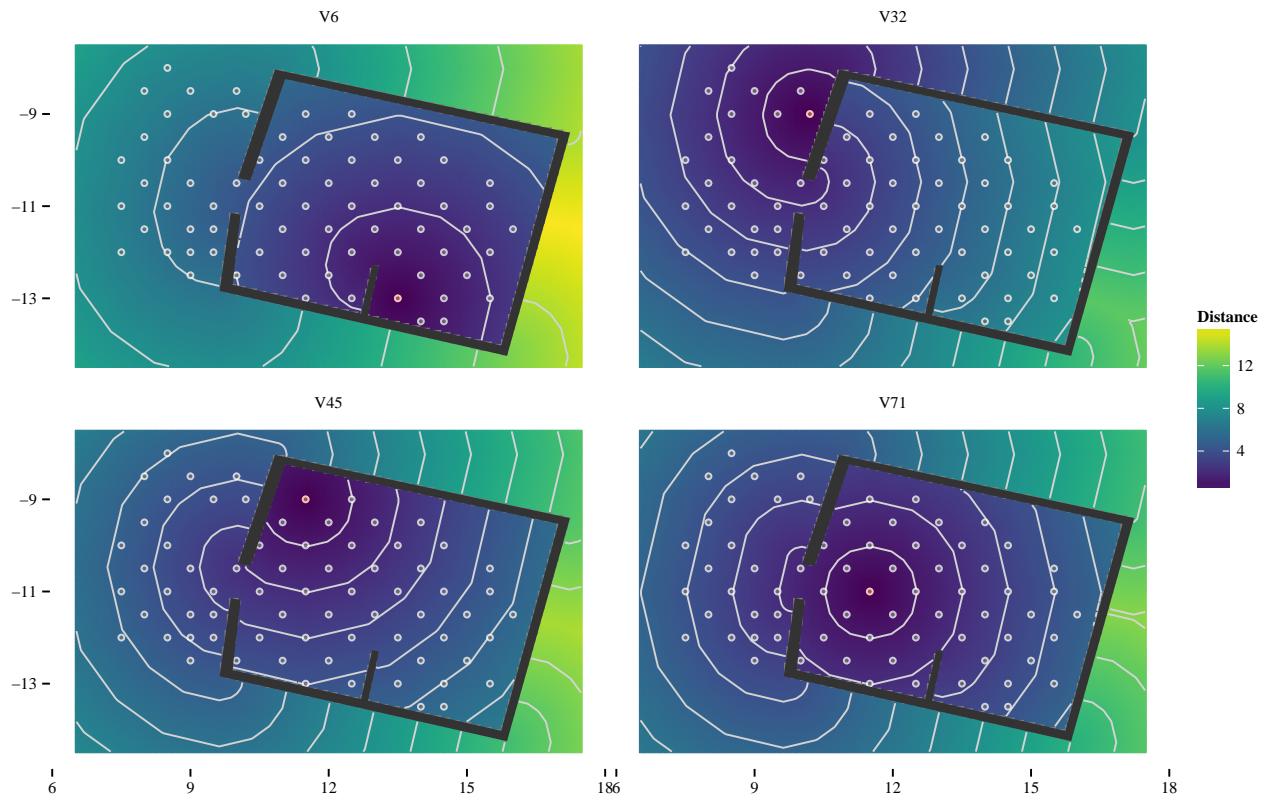


Figure 6:

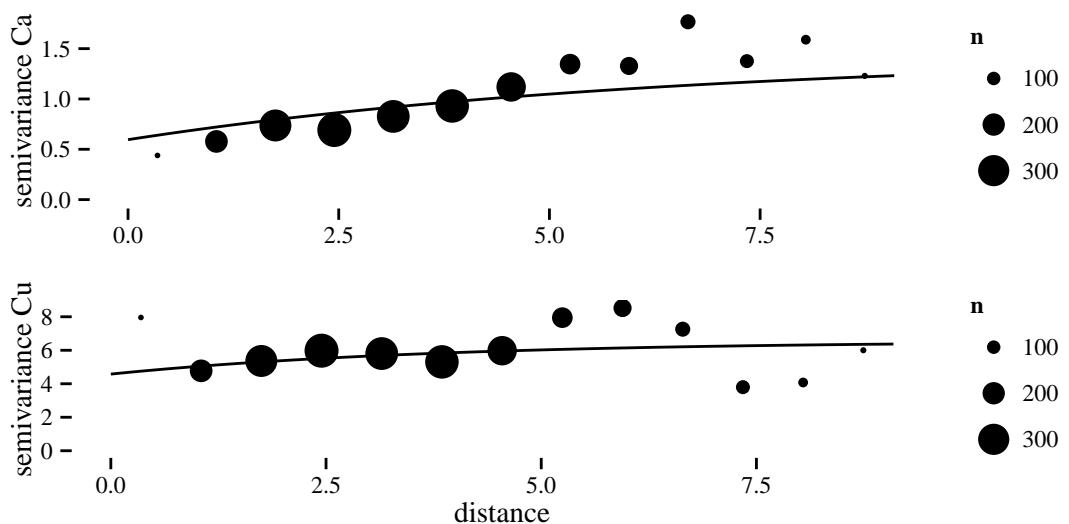


Figure 7: Empirical cost-based variogram and fitted model.

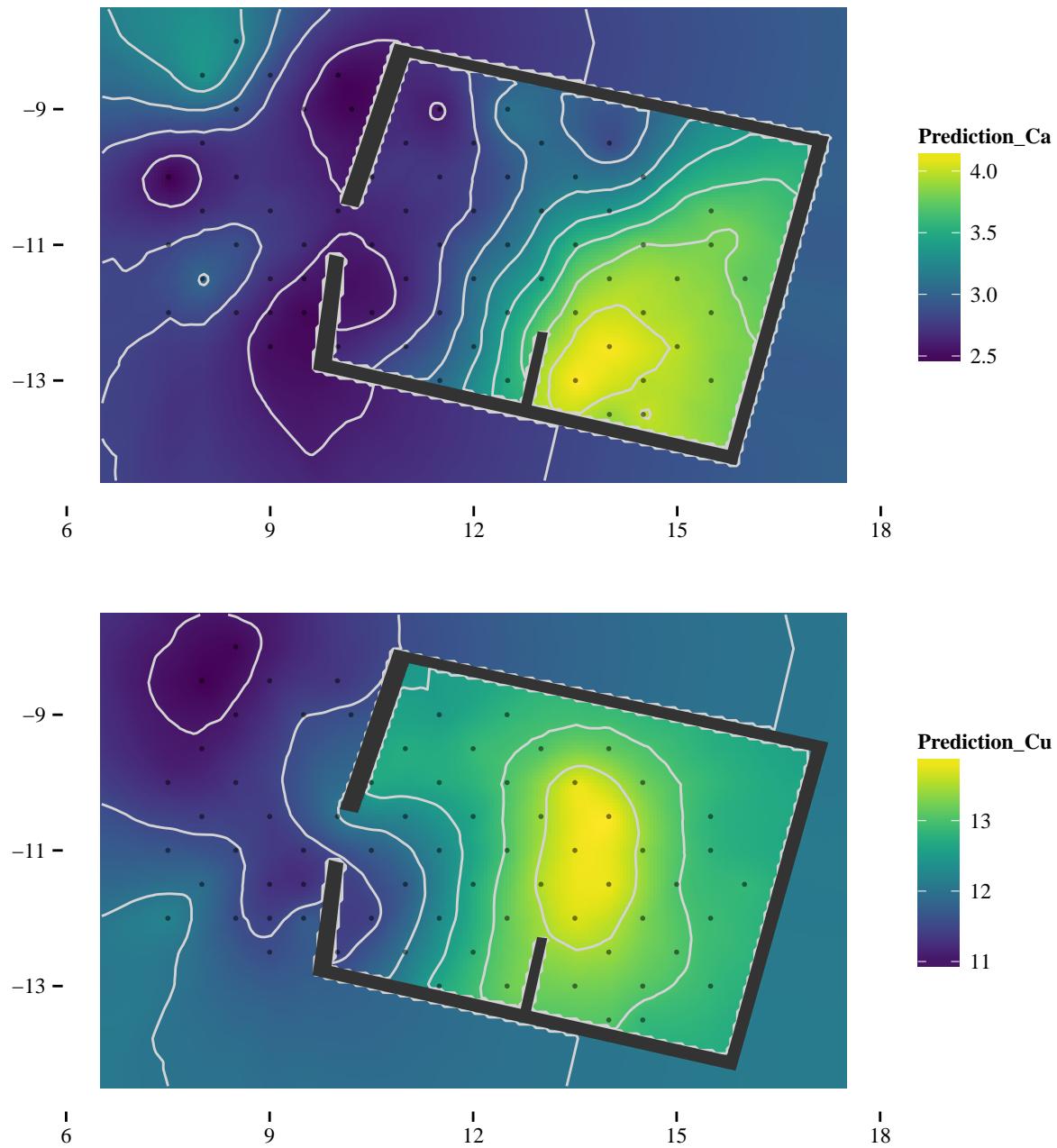


Figure 8: Cost-based kriging prediction

	Euclidean_Ca	Cost_Ca	Euclidean_Cu	Cost_Cu
Intercept	3.12	3.17	12.13	12.14
Nugget	0.32	0.60	4.56	4.58
Partial sill	0.75	0.85	2.03	1.98
kappa	0.51	0.51	0.51	0.51
phi	1.25	6.53	3.58	3.81
Pract. range	3.75	19.56	10.73	11.43

In the scatter plot, the horizontal patterns correspond to predictions on observed values. Otherwise, the differences are negligible.

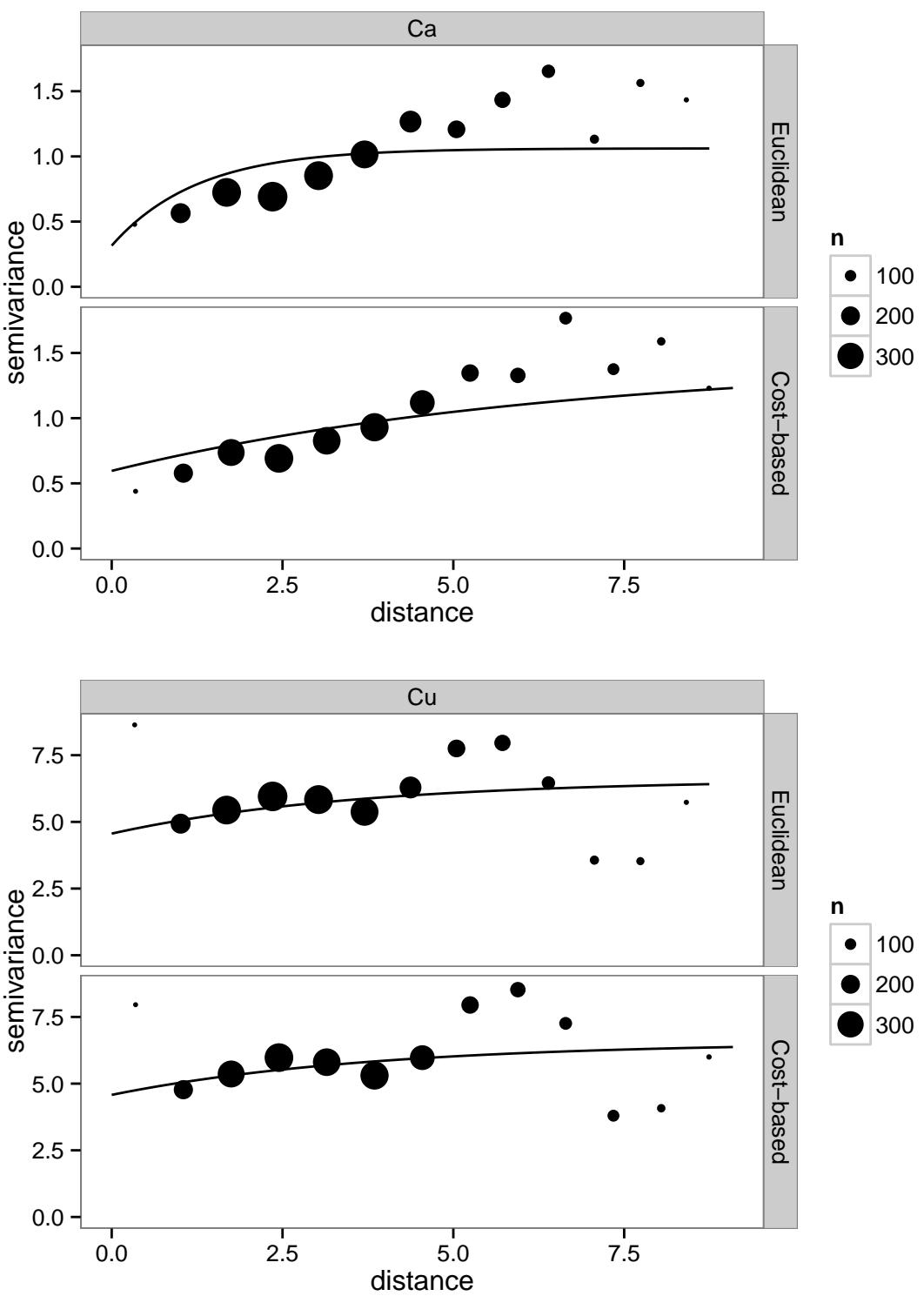


Figure 9: Empirical variogram and fitted models by method and variable.

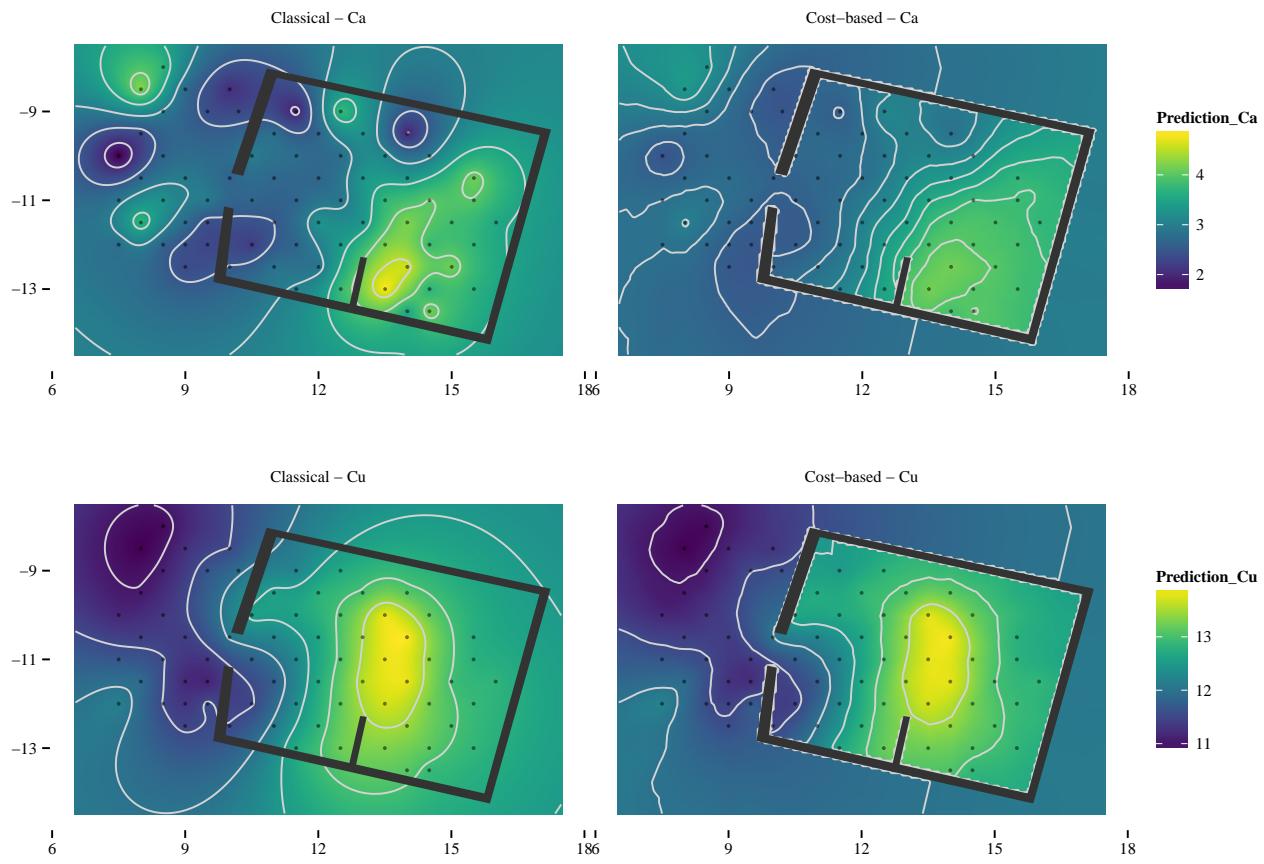


Figure 10: Comparison of Kriging estimates.

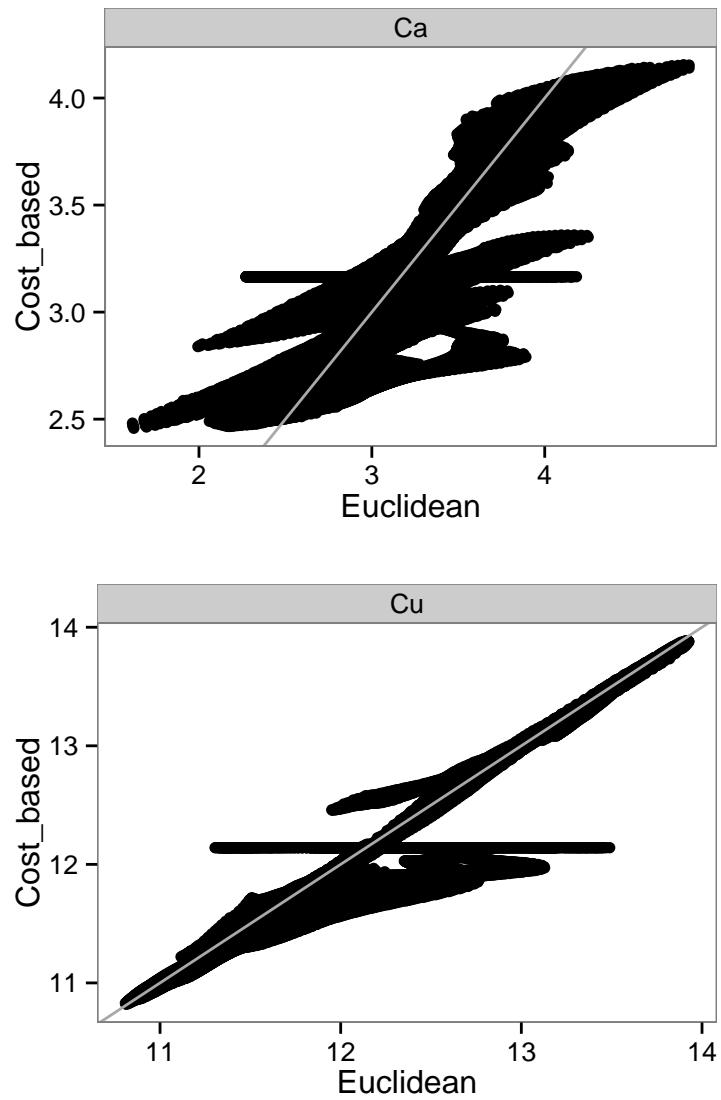
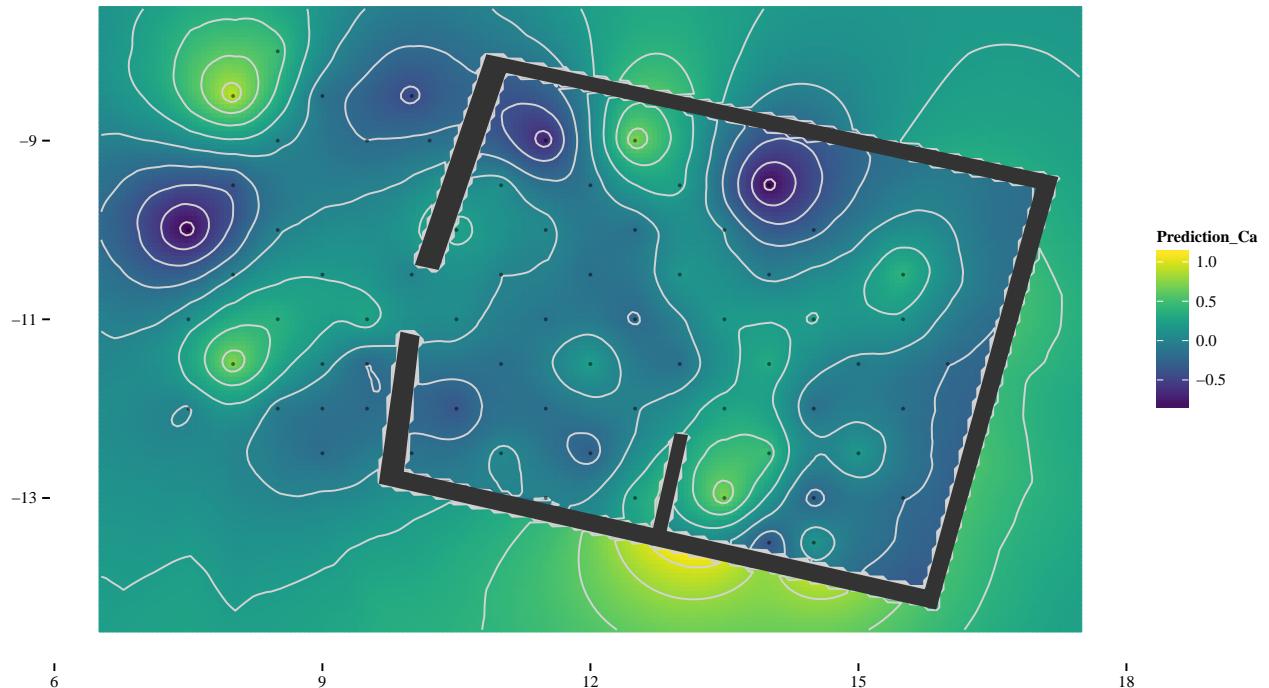


Figure 11:

Difference – Ca



Difference – Cu

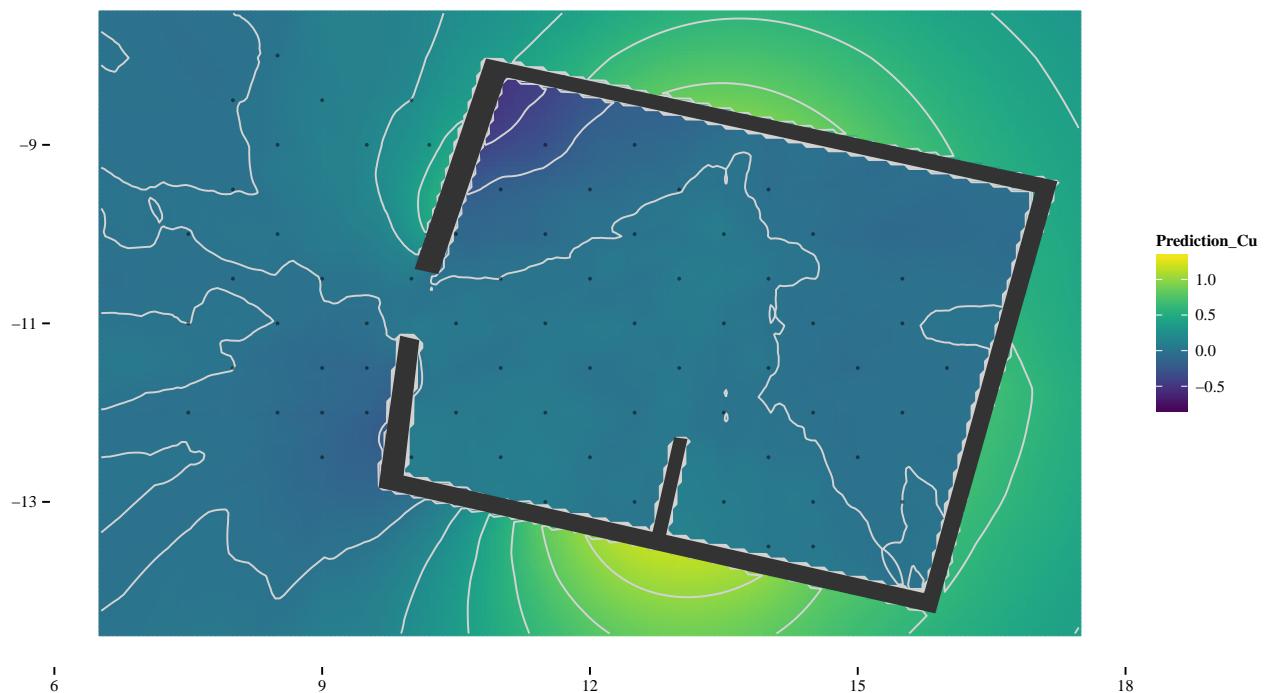


Figure 12: Difference between the cost-based prediction and the Euclidean prediction