Ball Drop Example, Bias

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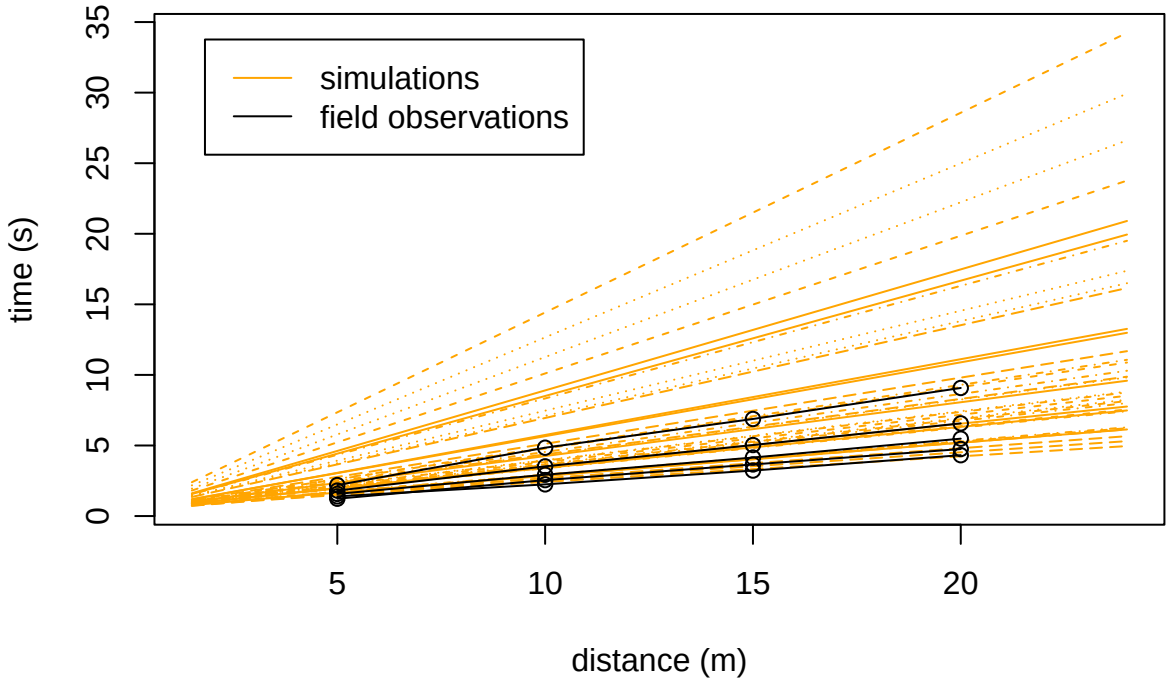
This example is an extension of the unbiased ball drop example where we now work with a biased simulator. We will generate our observations from the same function as before

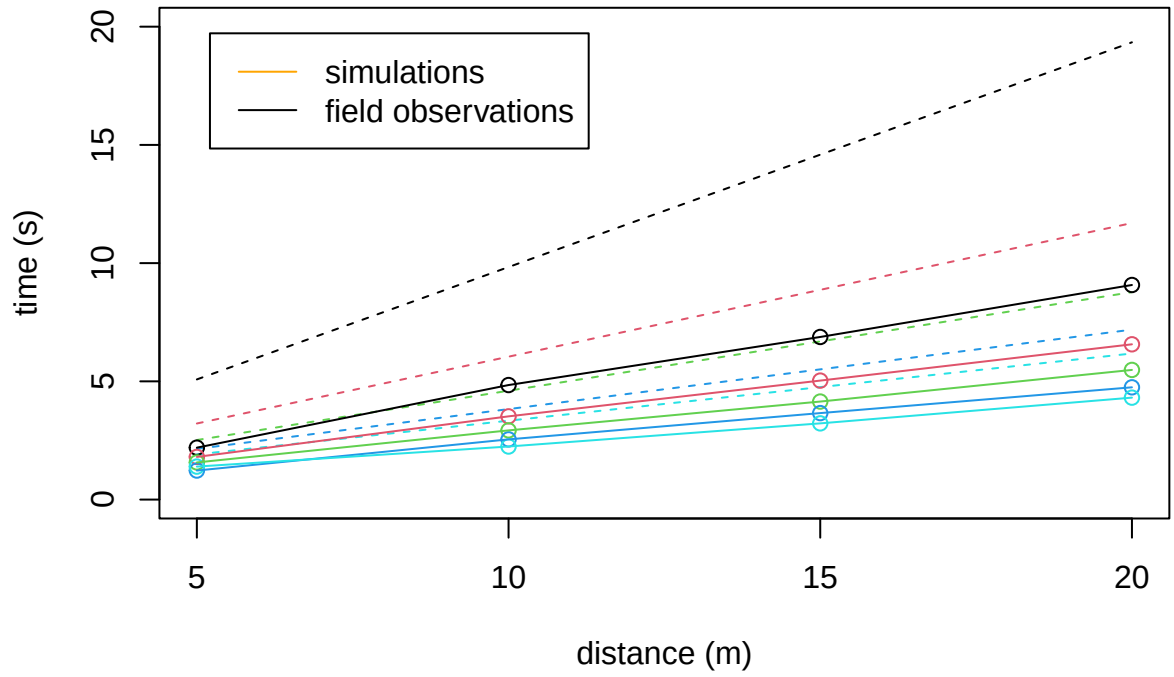
$$t(d) = \frac{acosh(\exp\{Cd/R\})}{\sqrt{Cg/R}}$$

and our simulations from

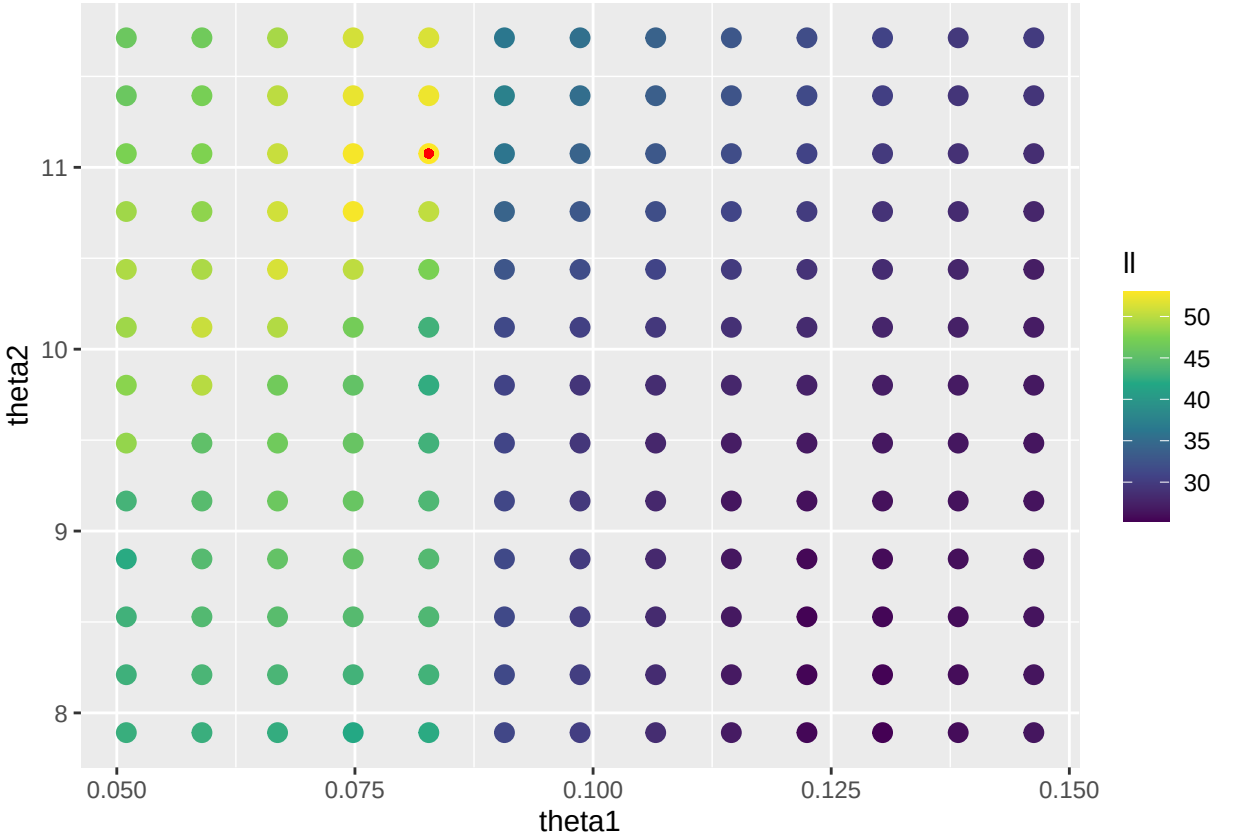
$$t(d) = \frac{acosh(\exp\{Cd/R\})}{(Cg/R)^{1/4}}.$$



Lets visualize the discrepancy by comparing sim data and obs data at the same inputs. Obs data is shown as solid lines and sim data as dashed lines.



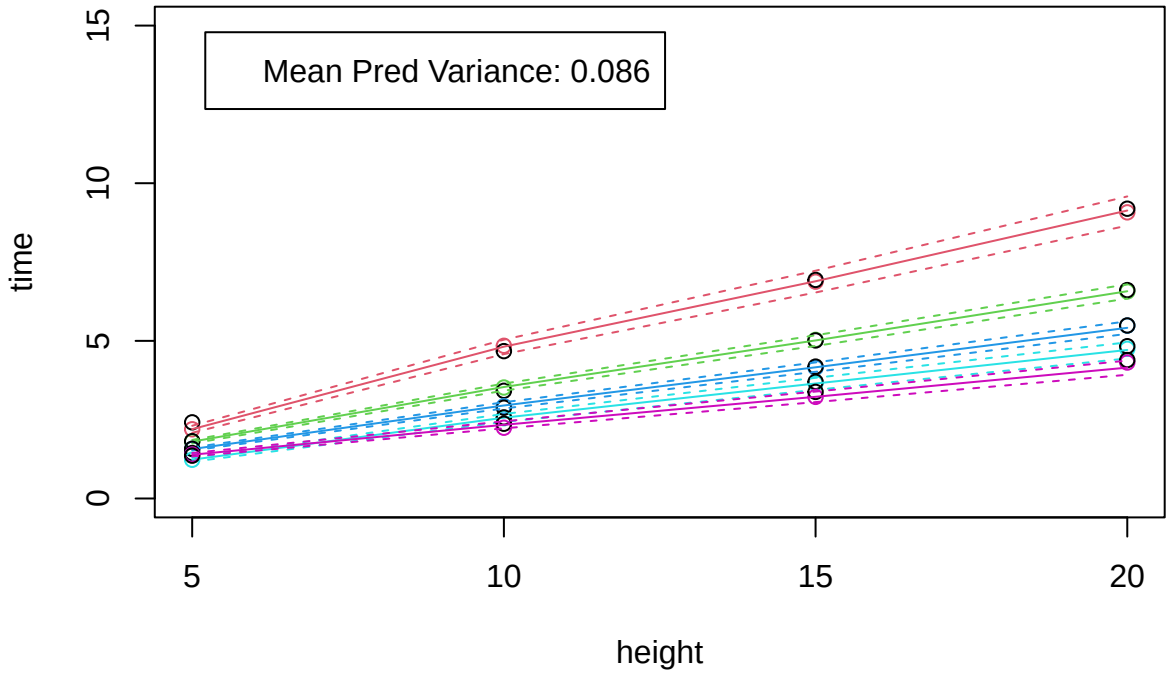
The calibration likelihood has some interesting gradients which may be due to different number of PC's being chosen for the discrepancy basis.



We can see that our estimate of the error variance from the discrepancy GP is too small indicating that the discrepancy GP is over-fitting.

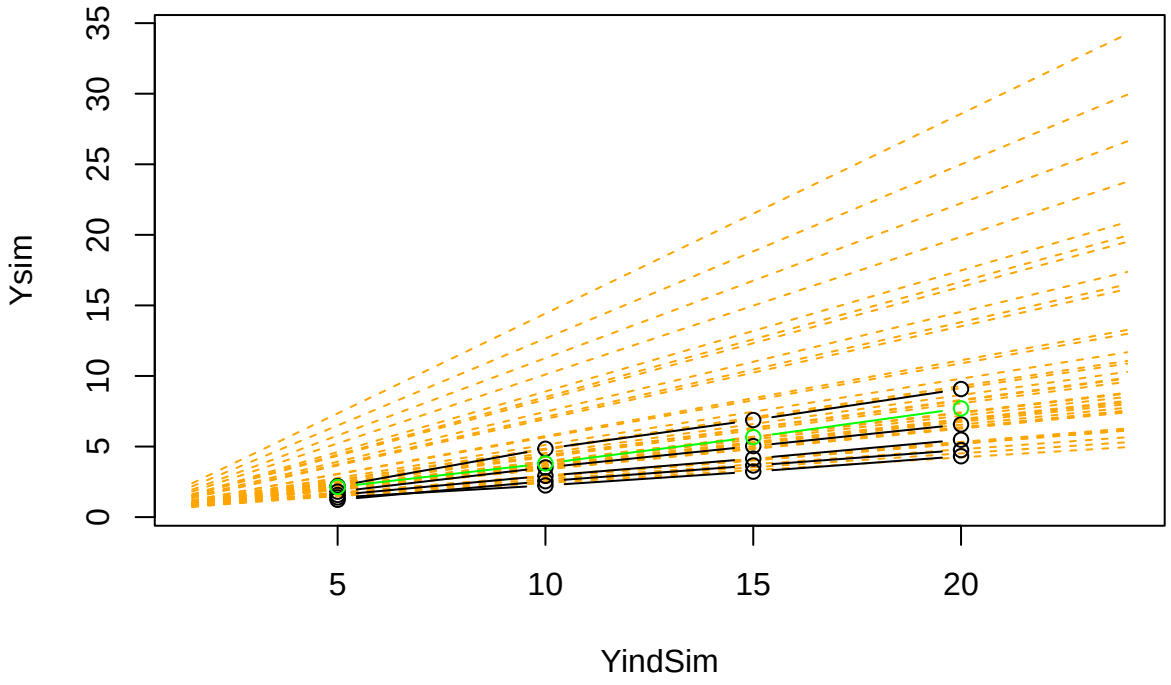
```
## Error Variance Estimation
## true sd: 0.1
## est sd : 0.0477
```

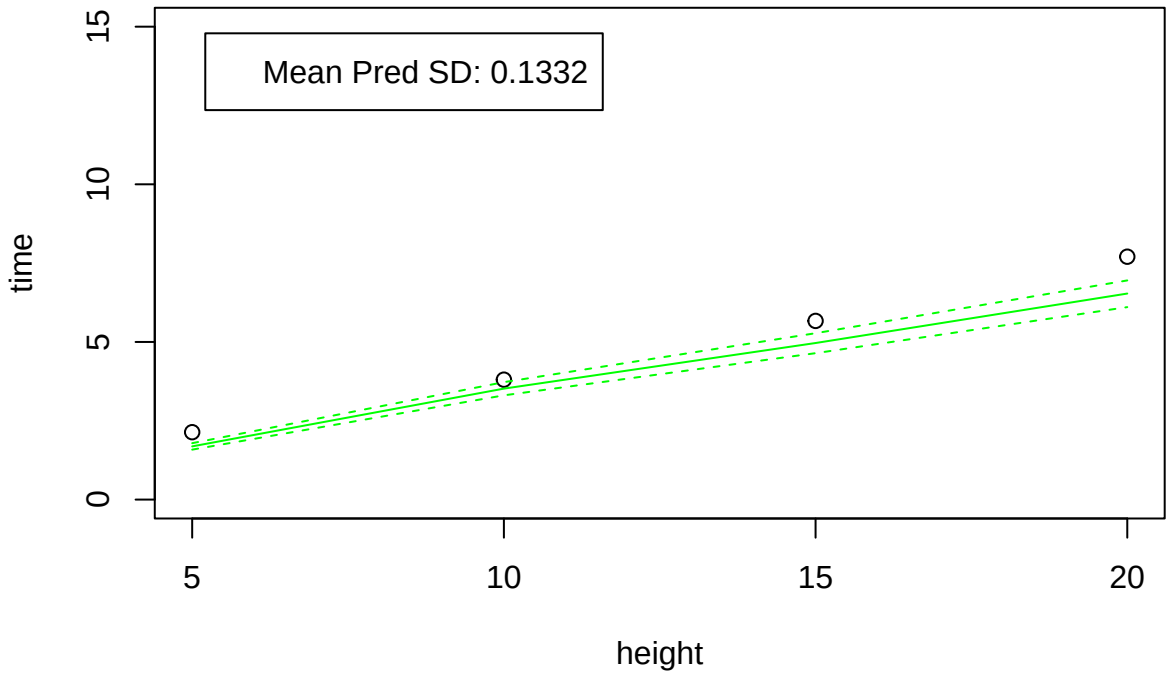
Unsurprisingly we get good prediction for the data points used to train the discrepancy model.



Prediction at new location

However, prediction is much worse at a new location. This may the the best we can hope for using a flexible discrepancy model like a GP trained on 5 data points.




Mean Pred SD: 0.1332
time
height
0
5
10
15
5
10
15
20