

# Shifting spaces: which disparity or dissimilarity measurement best summarise occupancy in multidimensional spaces?

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## Supplementary material 4: full results

```
## Loading required package: knitr
## Loading required package: rmarkdown
## Loading required package: dispRity
## Registered S3 method overwritten by 'geiger':
##   method      from
##   unique.multiPhylo ape
## Loading required package: momo
```

## Simulation data

This section contains all the results and calculations (and plots them). The whole analysis takes approximately 30 minutes to run (single core 2.2 GHz).

## Measurements analysed

The measurements analysed are the Average squared pairwise distance (dtt::dtt), Average pairwise manhattan distance (dtt::dtt), Median pairwise distance, Median pairwise manhattan distance, Procrustes variances (geomorph::morpho.disparity), Median distance from centroid, Median manhattan distance from centroid, Sum of variances, Sum of ranges, Sum of quantiles, Product of variances, Product of ranges, Product of quantiles, Ellipsoid volume, nBall volume, Minimum spanning tree average length, Average minimum neighbours distance, Average minimum neighbours manhattan distance, Function diversity, Functional evenness, Functional dispersion, Average displacement, Average manhattan displacement, Median distance from centre, Median manhattan distance from centre.

## Running the simulations for the 25 metrics

## Running the empirical data for the 25 metrics

## Load all the data

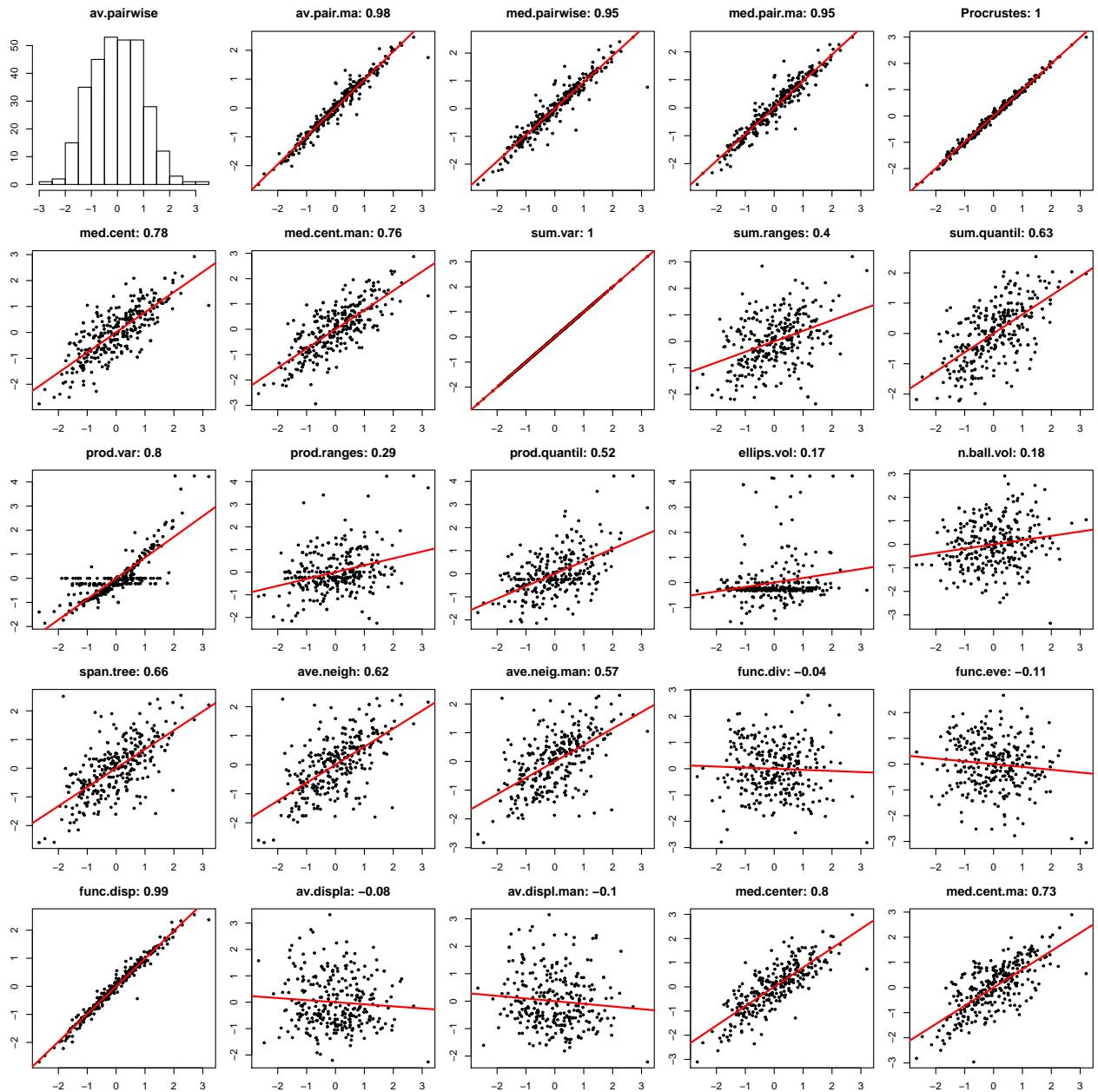
```
## Load all the data
all_metrics_remove_02 <- load.results("all_metrics_remove_02")
all_metrics_remove_05 <- load.results("all_metrics_remove_05")
```

```
all_metrics_remove_08 <- load.results("all_metrics_remove_08")
all_metrics_empirical_results <- load.results("all_metrics_empirical_results")
```

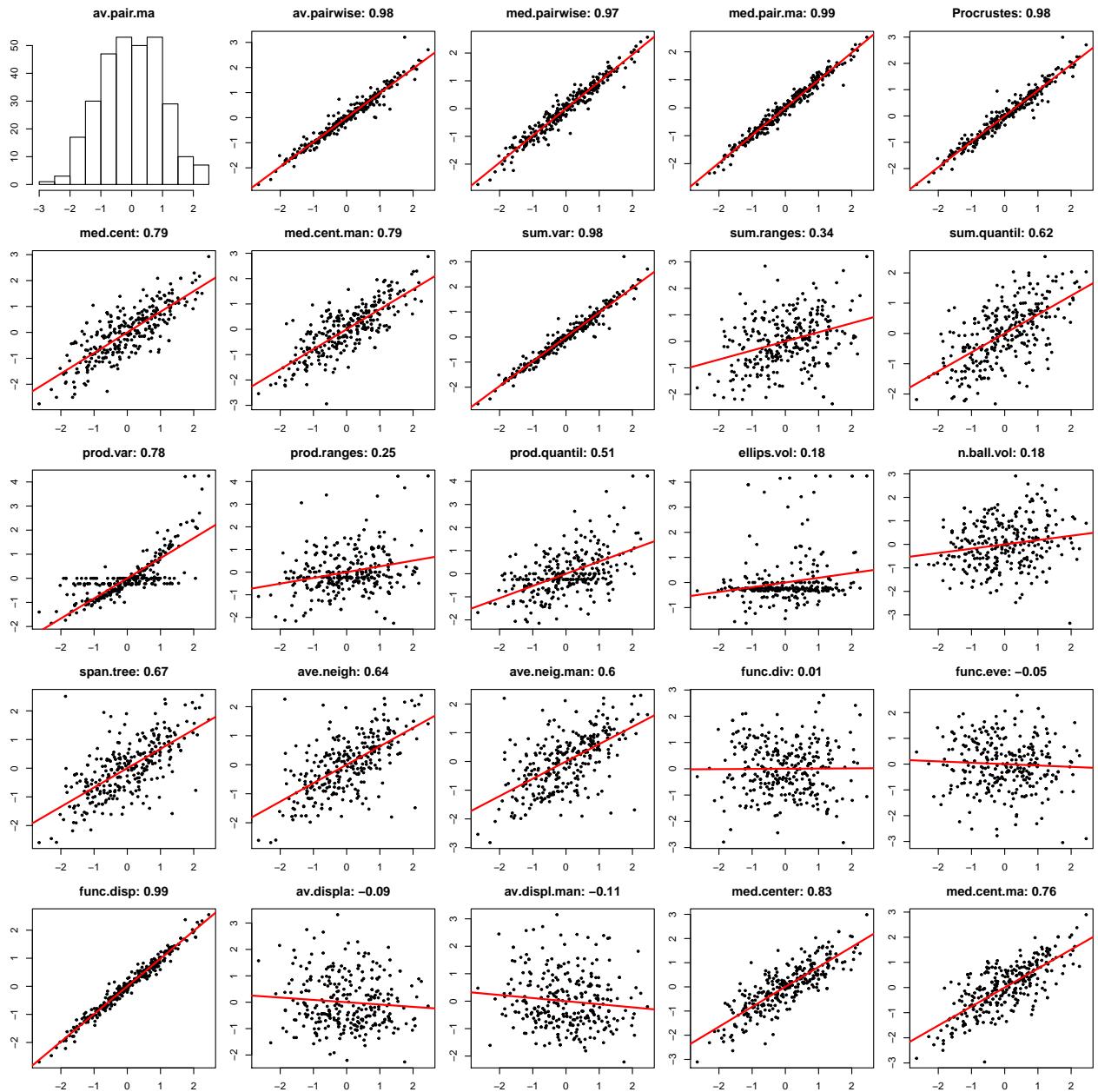
## Measurements pairwise comparisons

```
## getting the results to loop through (independent of the removal)
results_pairwise <- all_metrics_remove_02

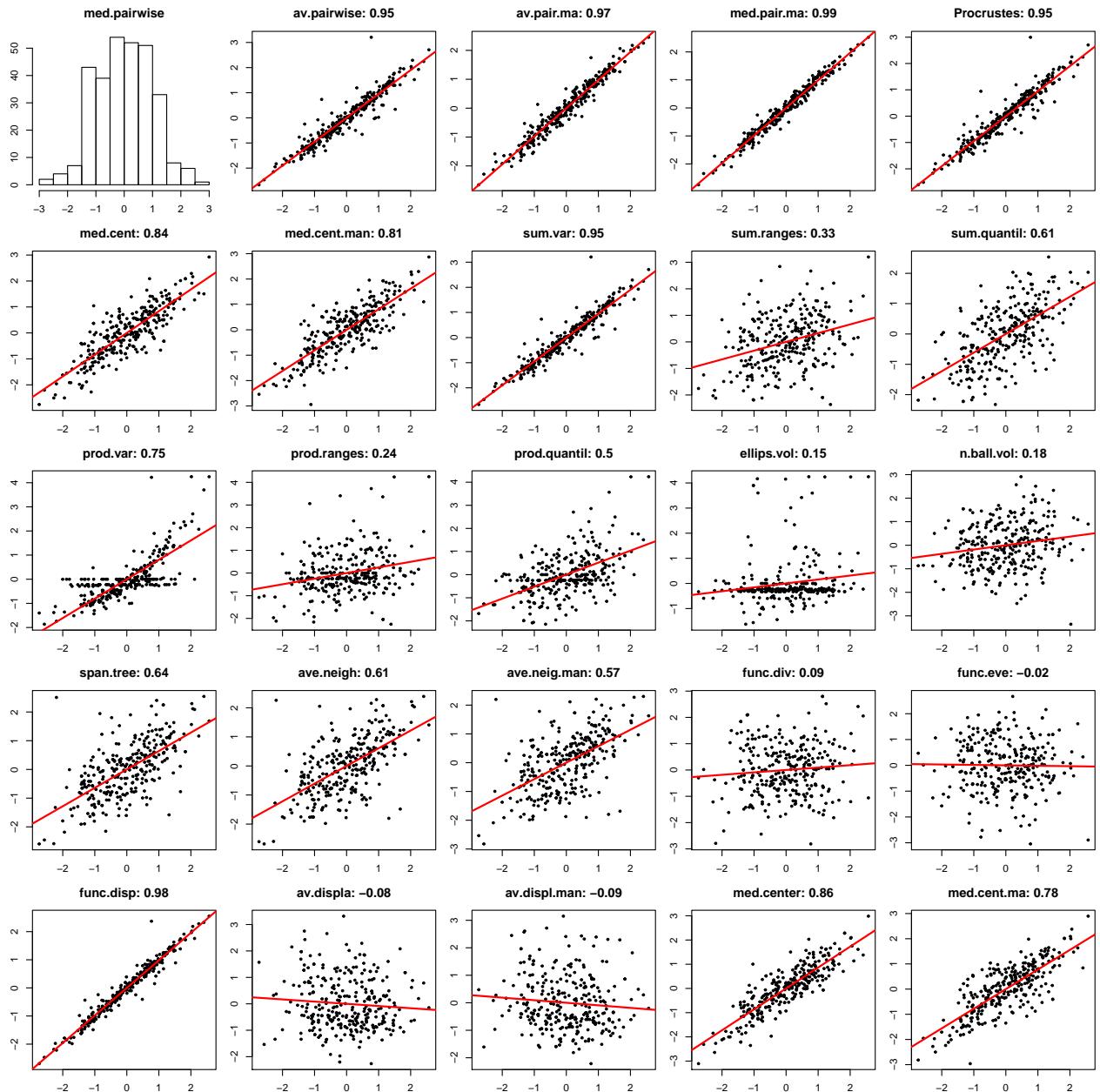
## Plotting the pairwise results
for(metric_ID in 1:length(all_metrics_names)) {
  pairwise.plot(results_pairwise, scale = TRUE, type = "base", plot = metric_ID)
  cat(paste0(all_metrics_names[metric_ID], "\n"))
}
```



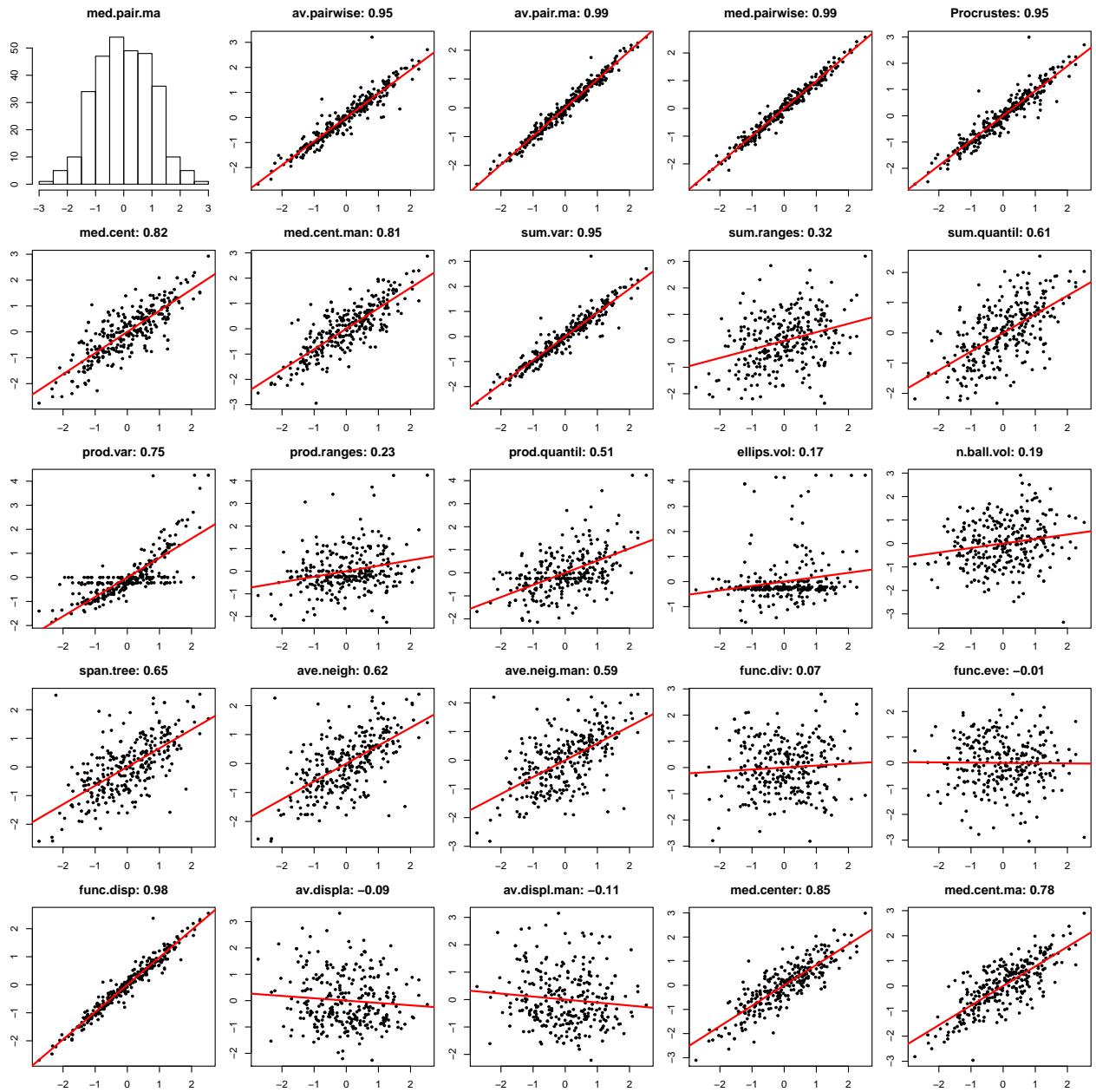
```
## Average squared pairwise distance (dtt::dtt)
```



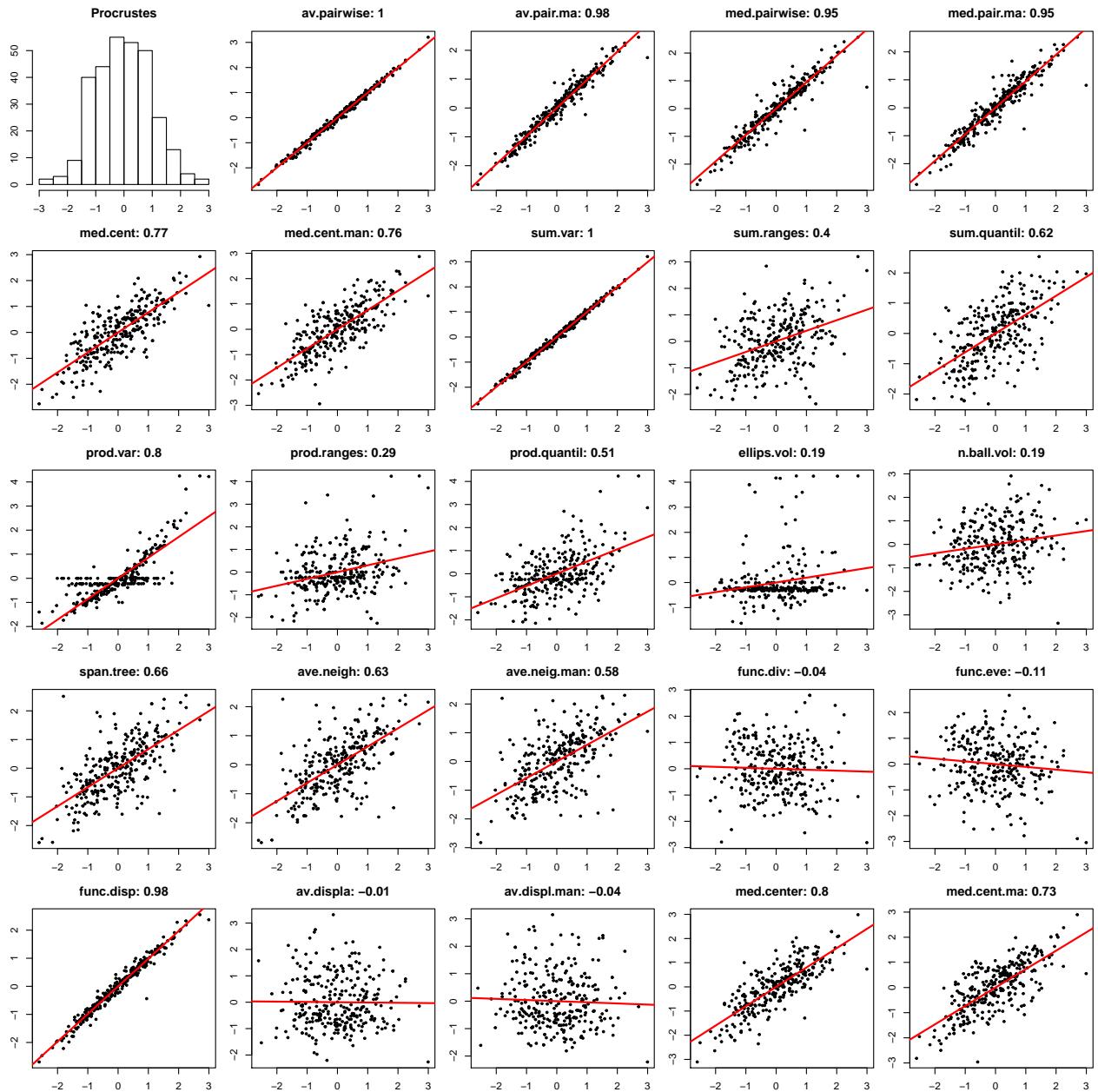
```
## Average pairwise manhattan distance (dtt::dtt)
```



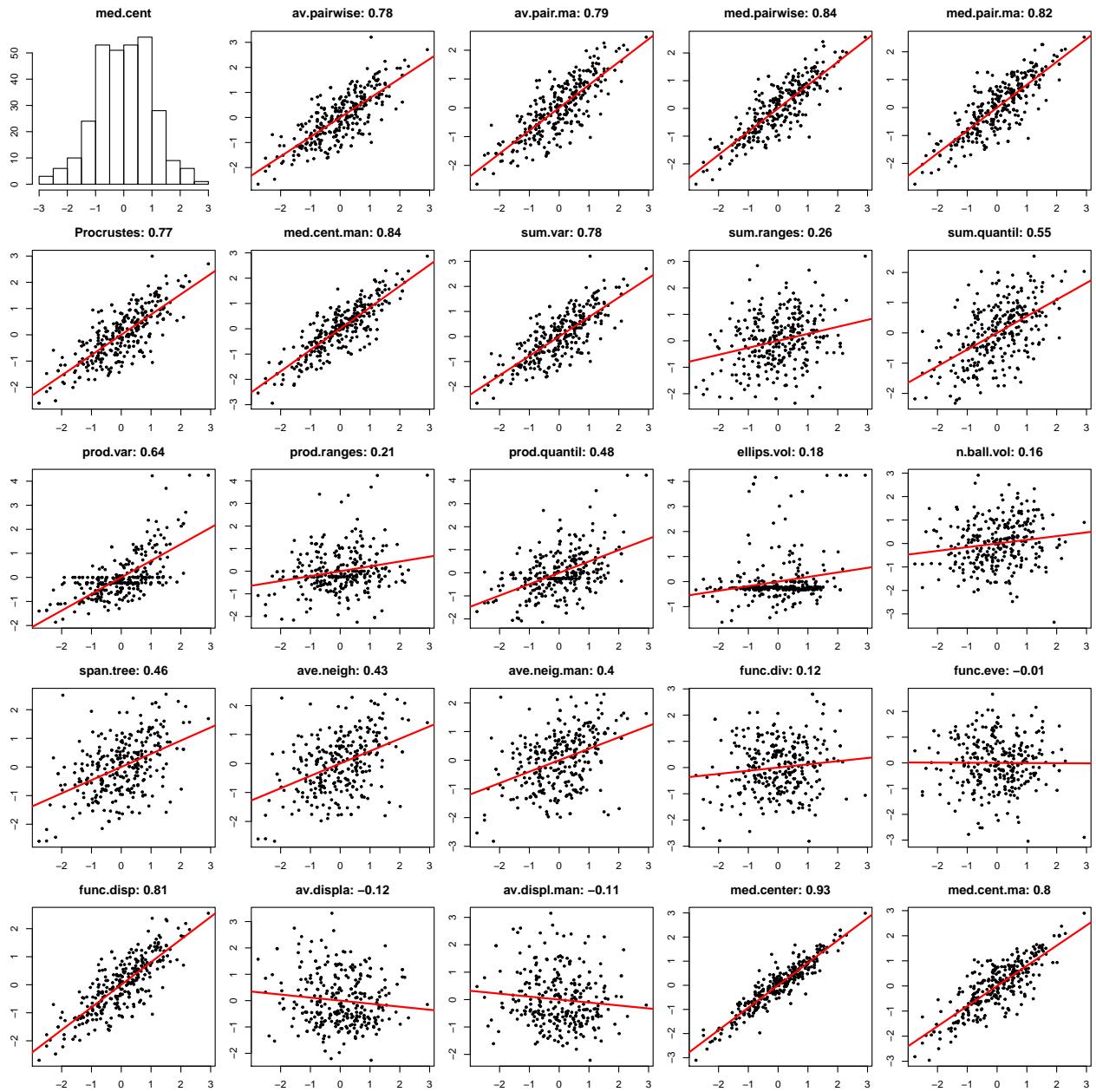
```
## Median pairwise distance
```



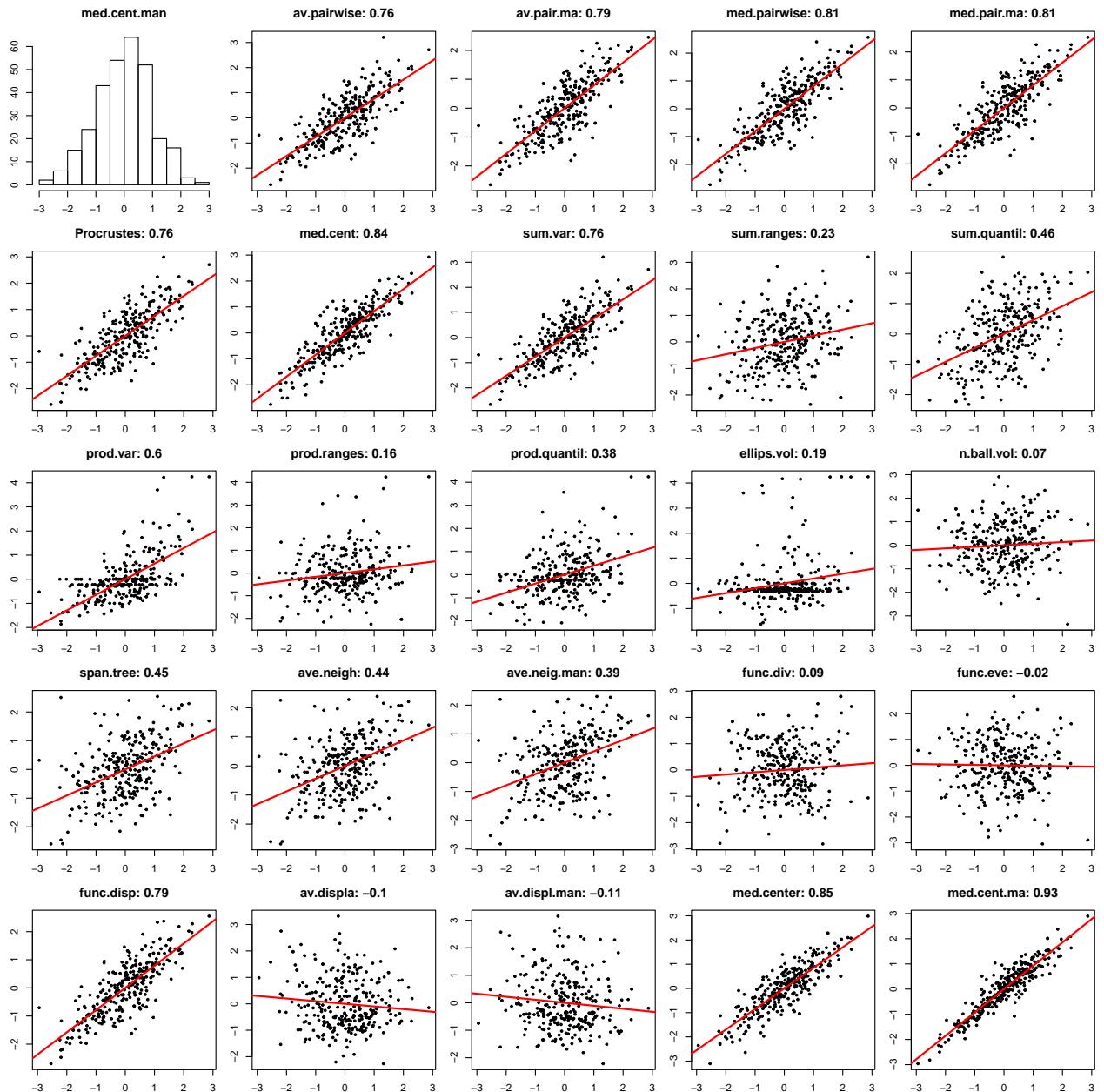
```
## Median pairwise manhattan distance
```

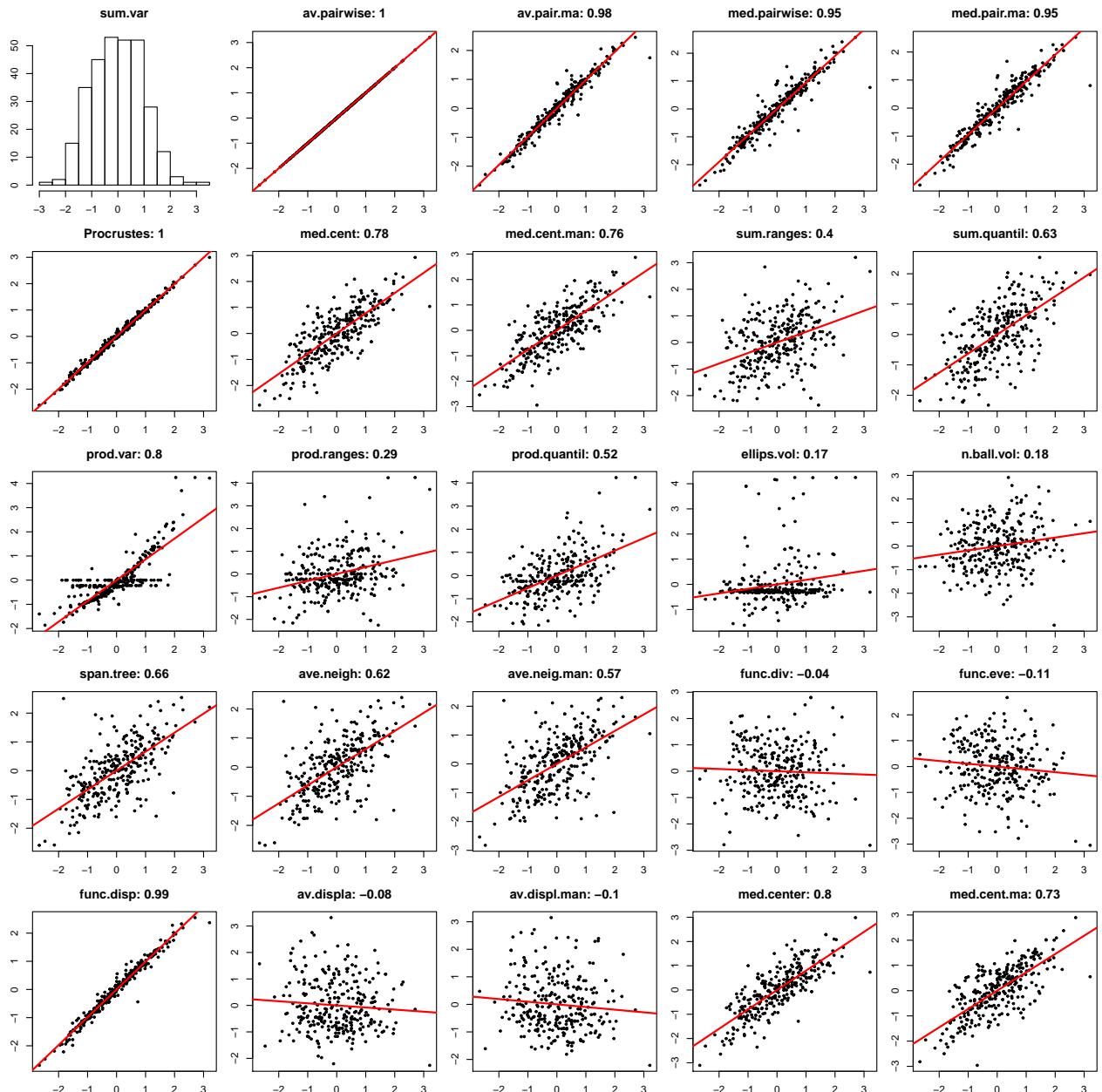


```
## Procrustes variances (geomorph::morpho.disparity)
```

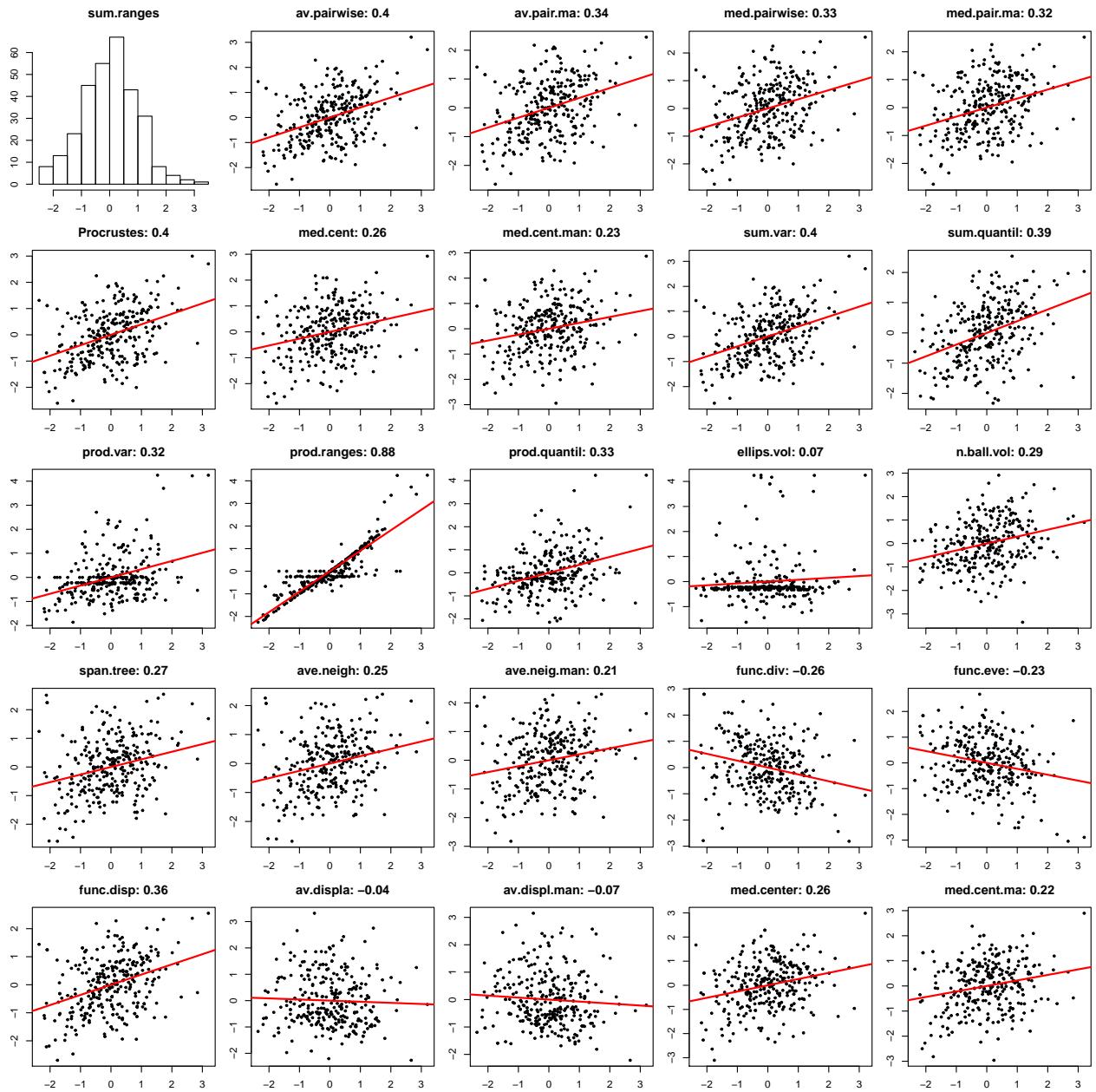


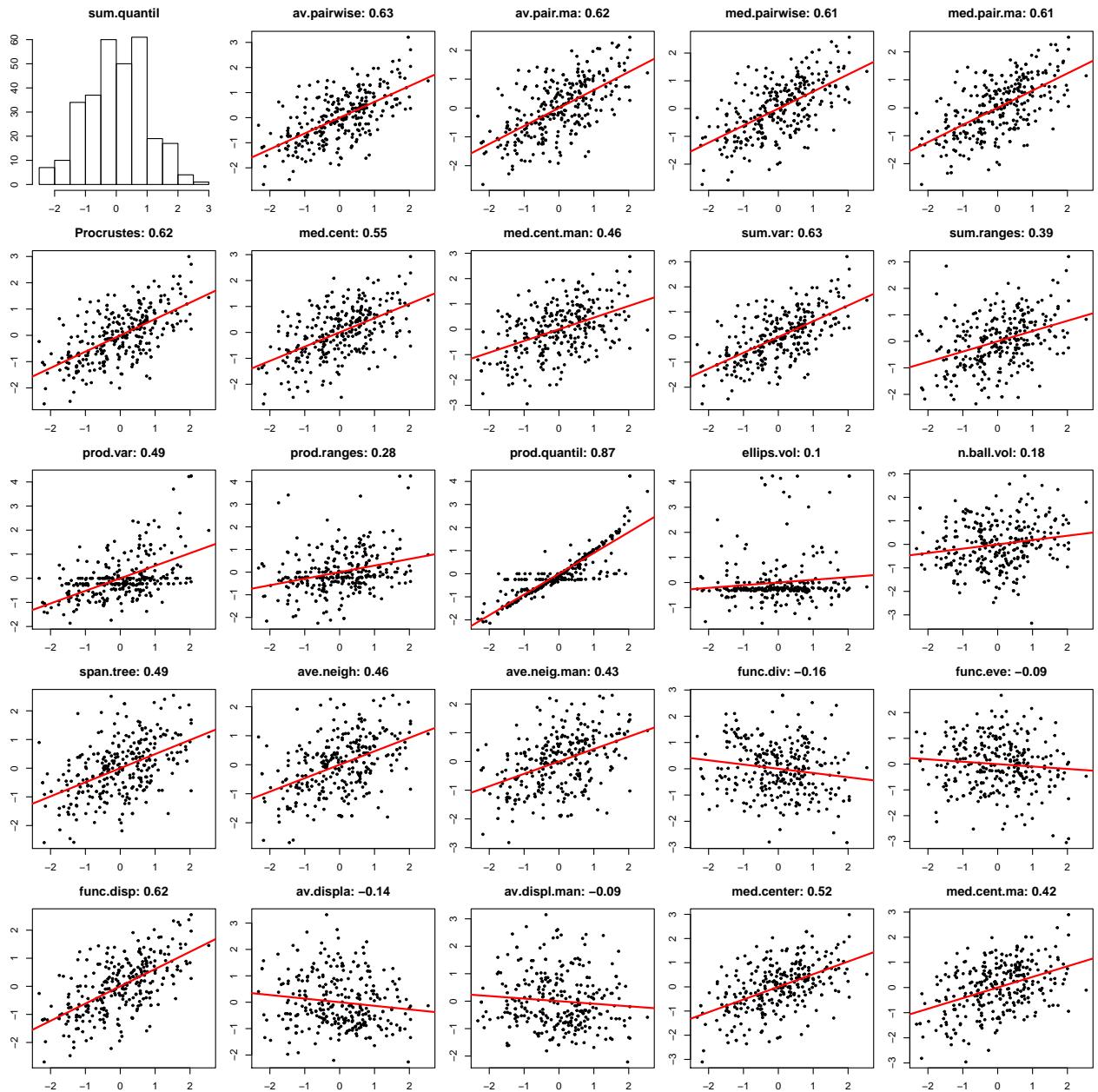
```
## Median distance from centroid
```



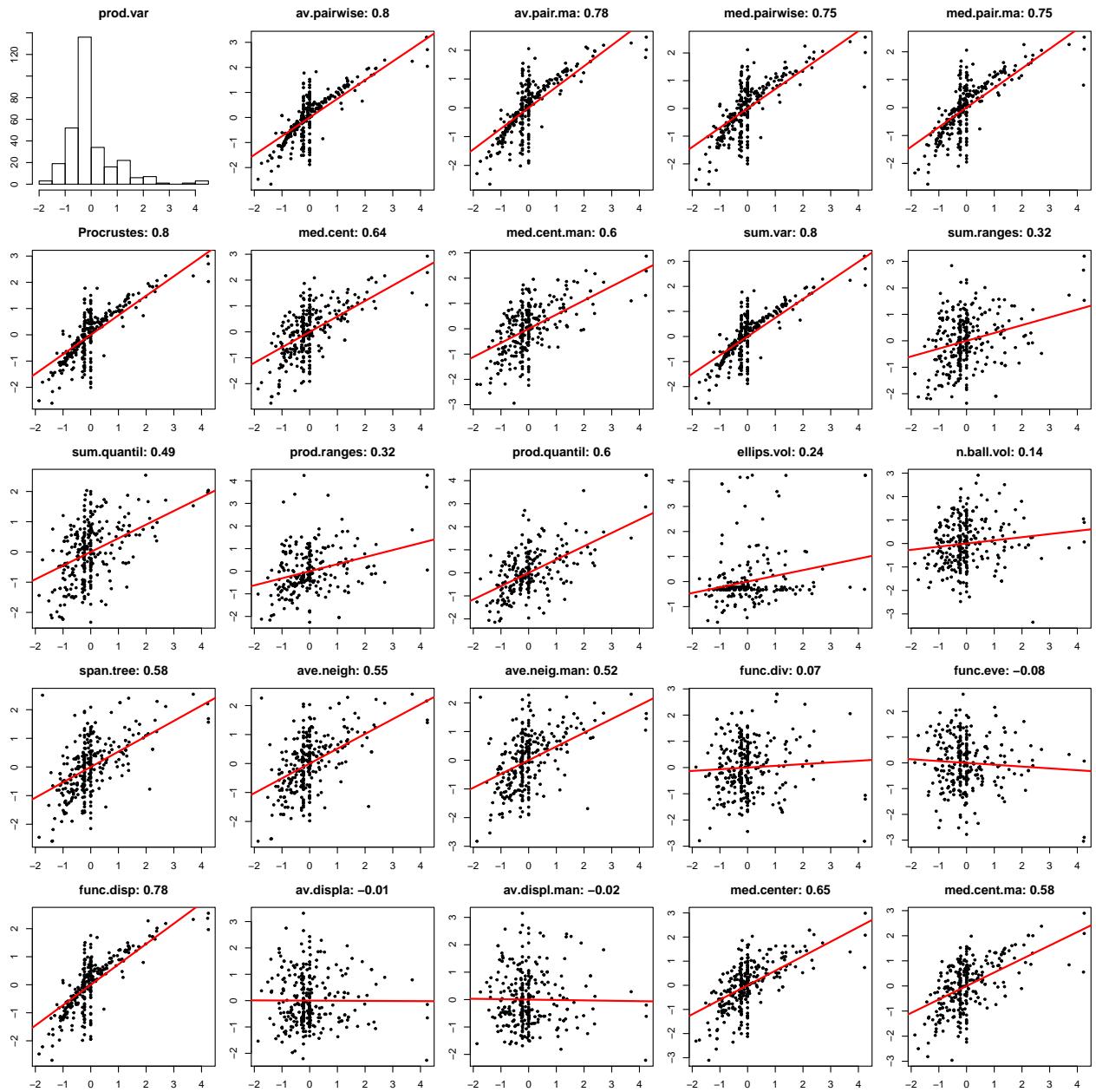


## Sum of variances

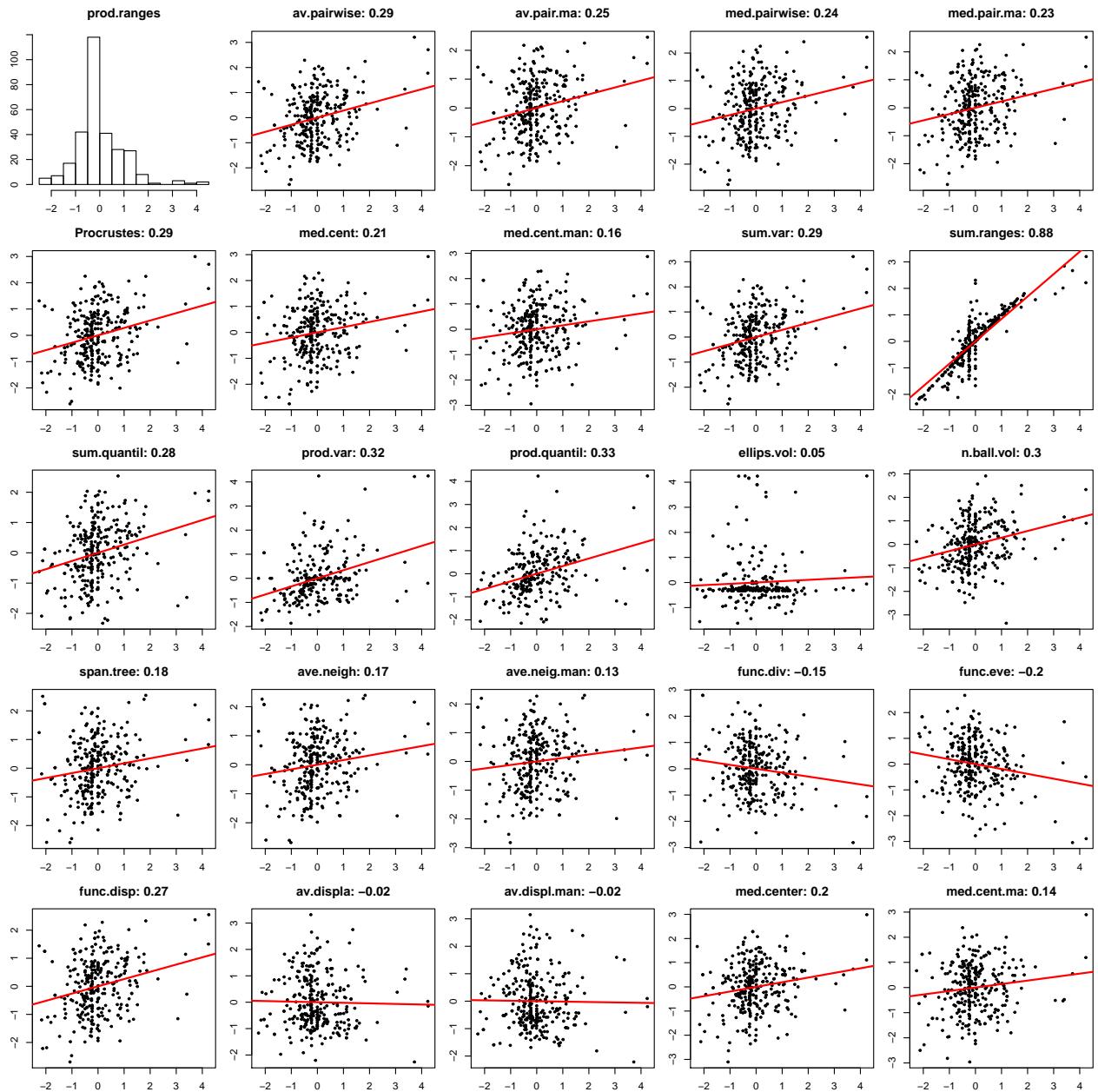




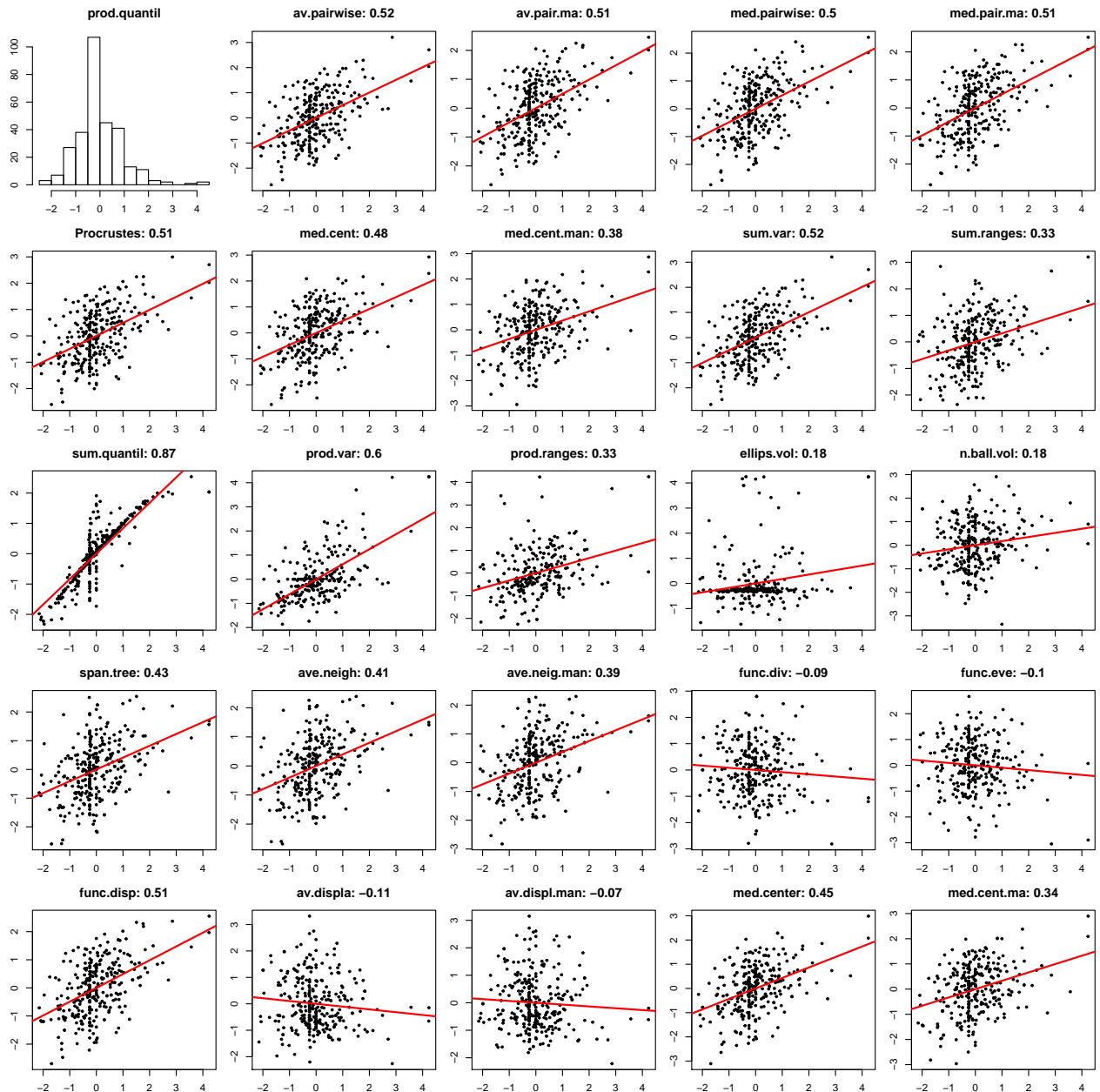
## Sum of quantiles



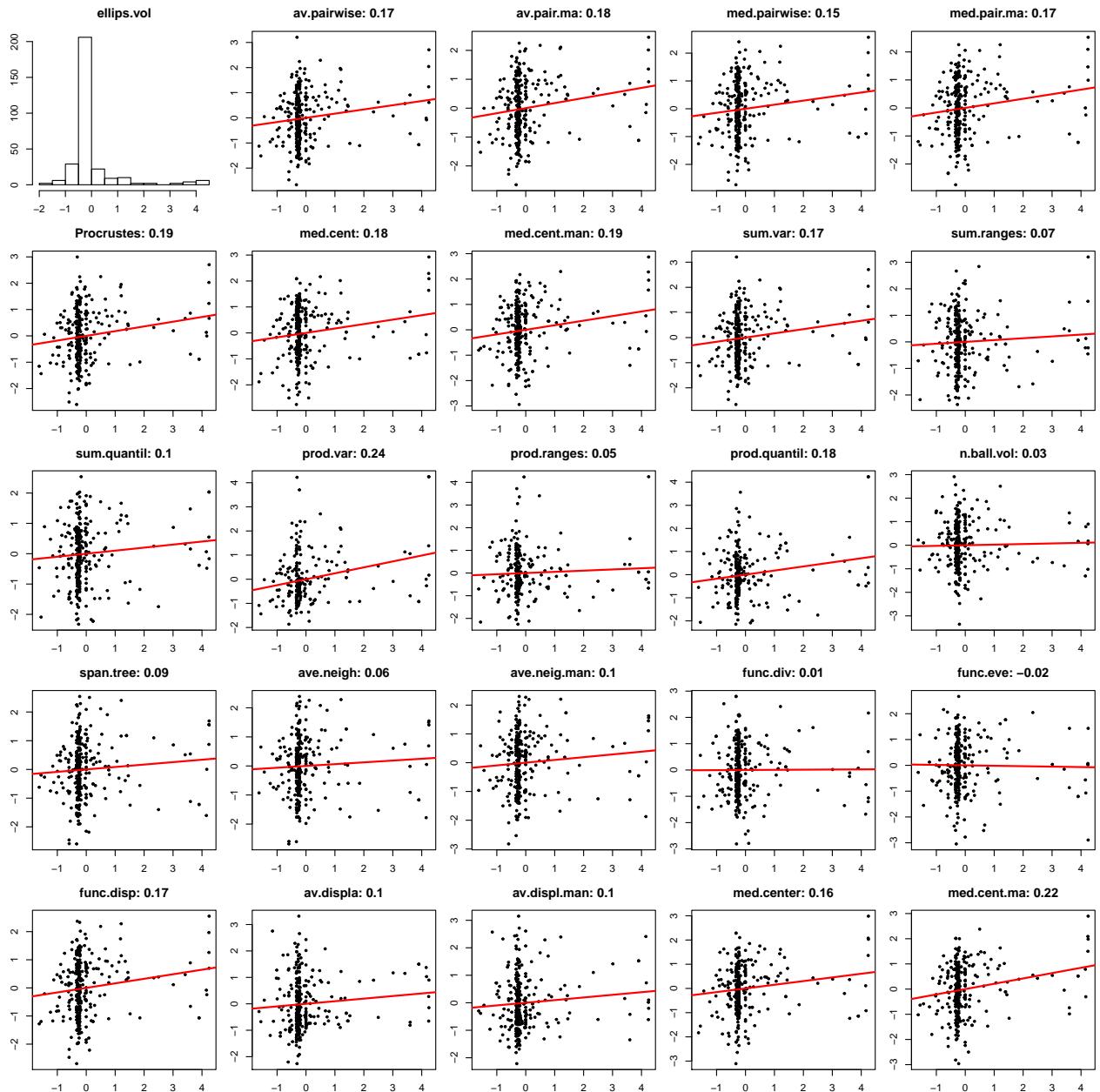
```
## Product of variances
```



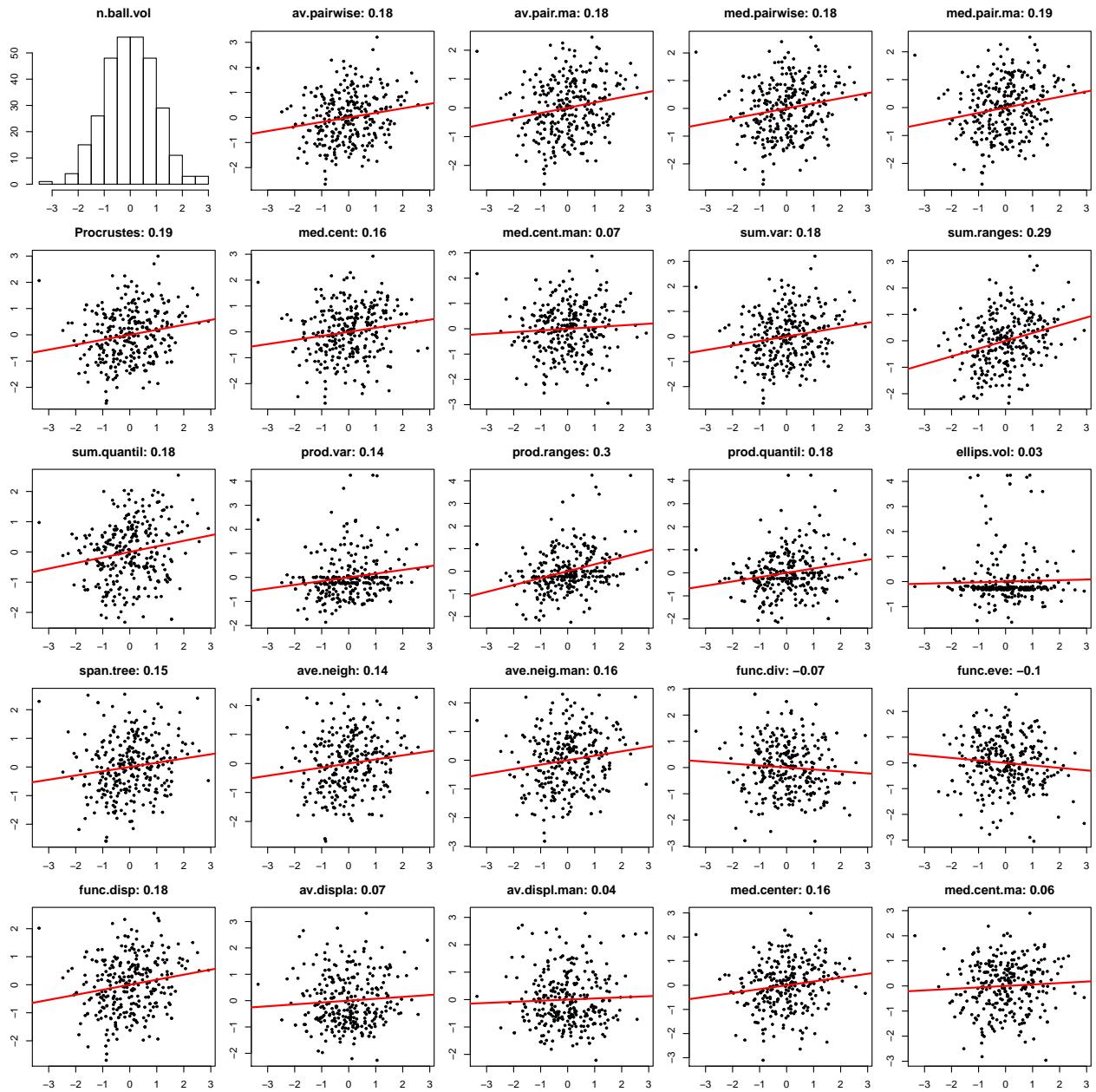
```
## Product of ranges
```



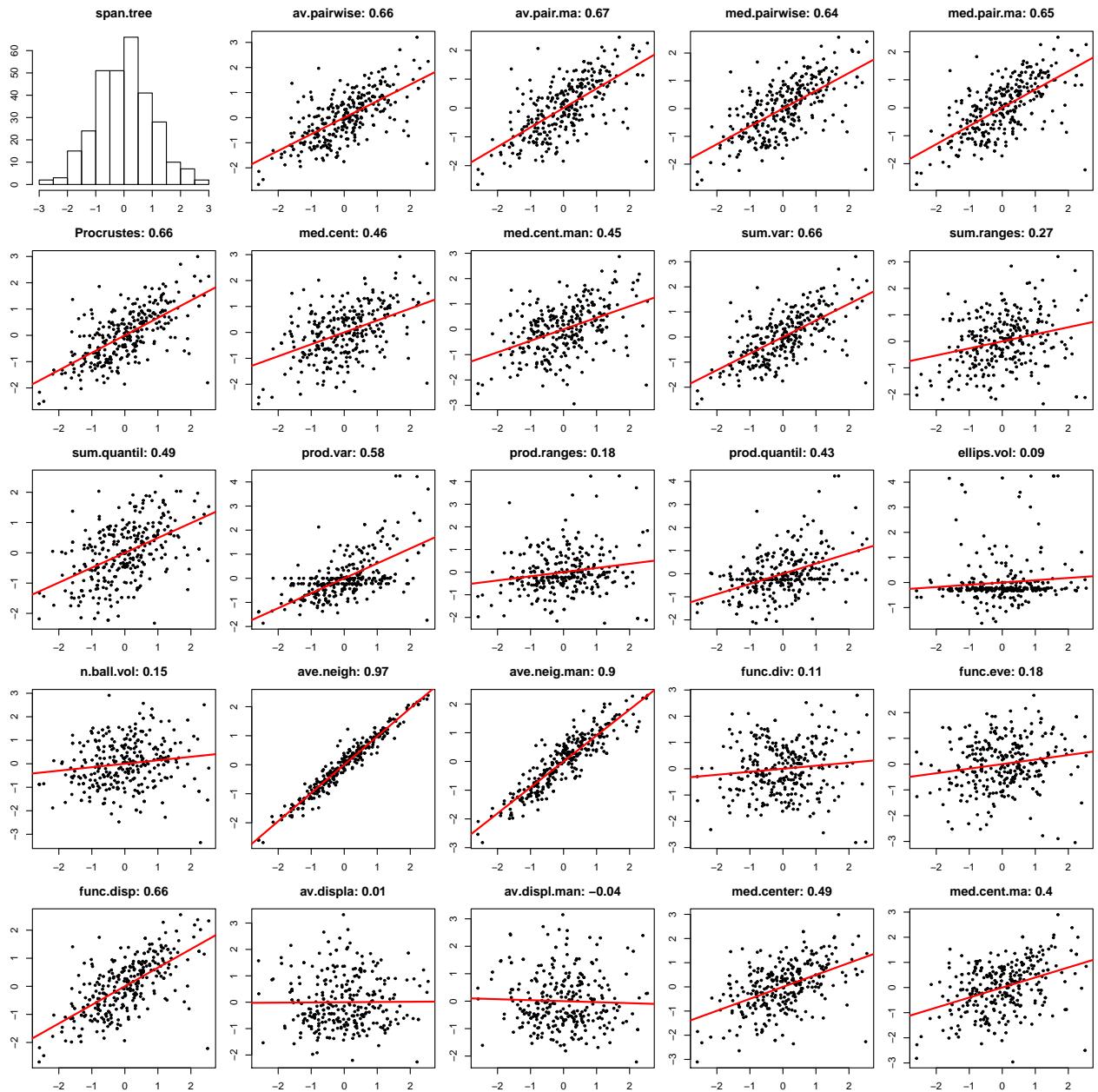
```
## Product of quantiles
```



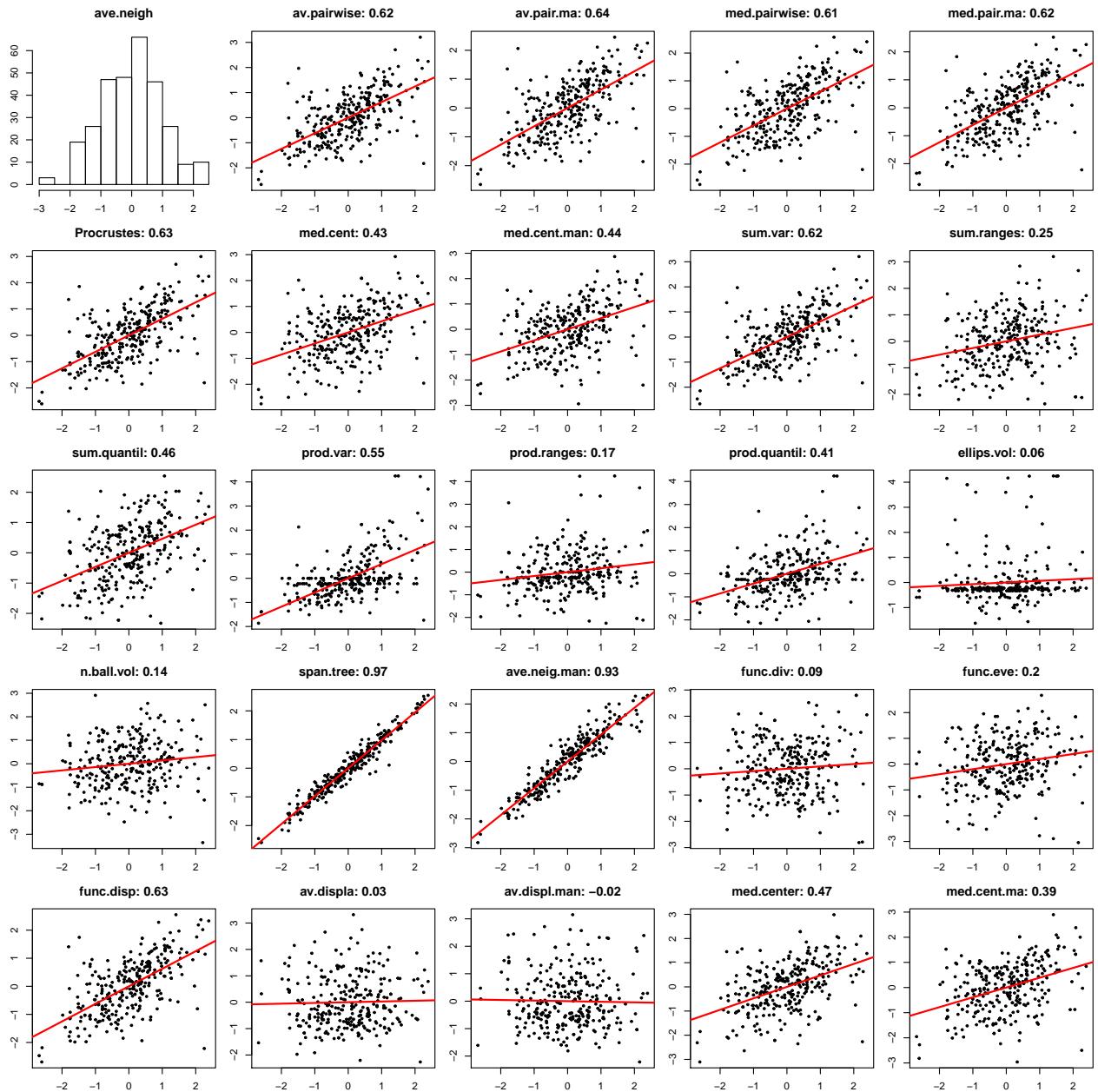
```
## Ellipsoid volume
```



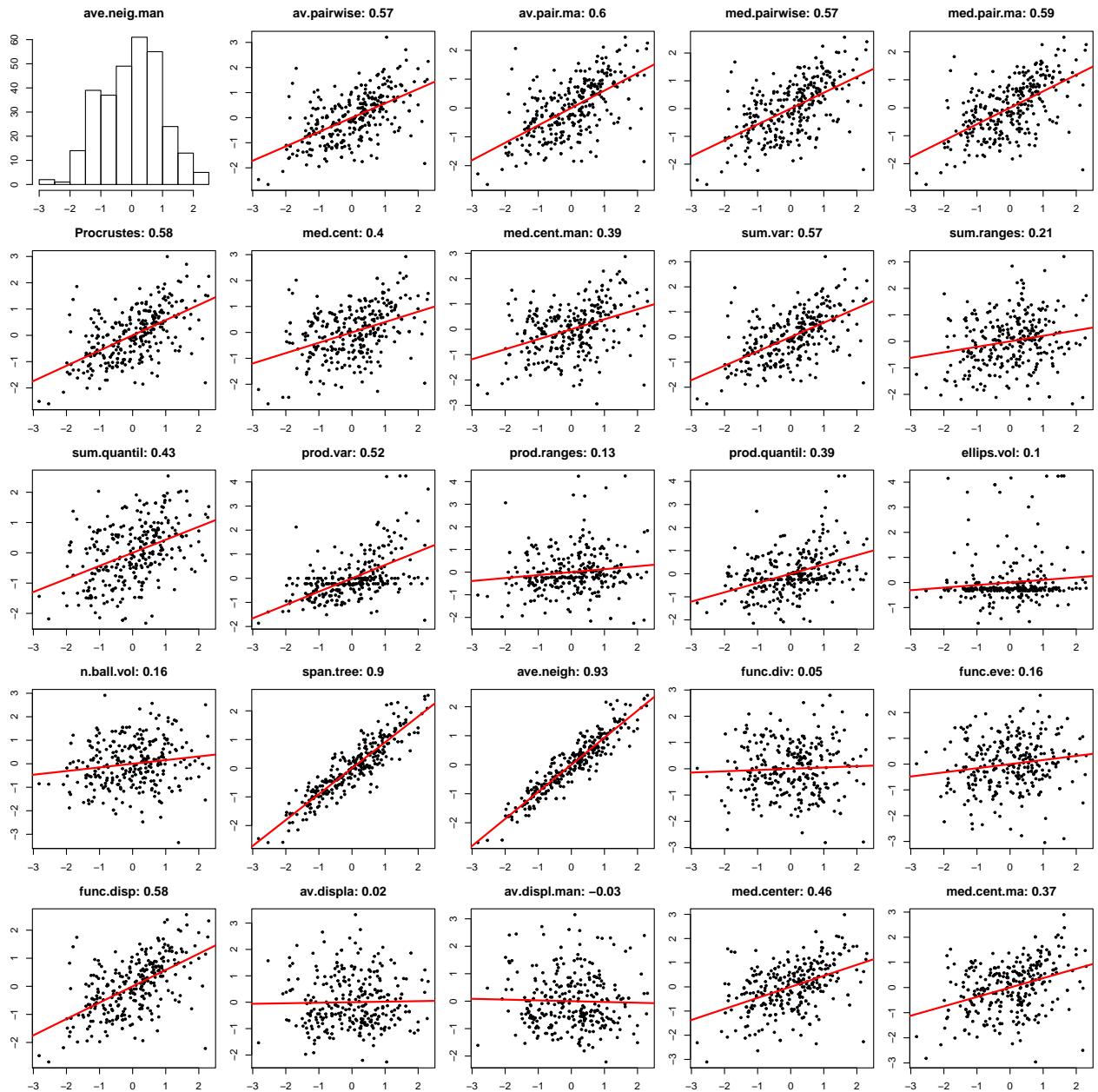
```
## nBall volume
```



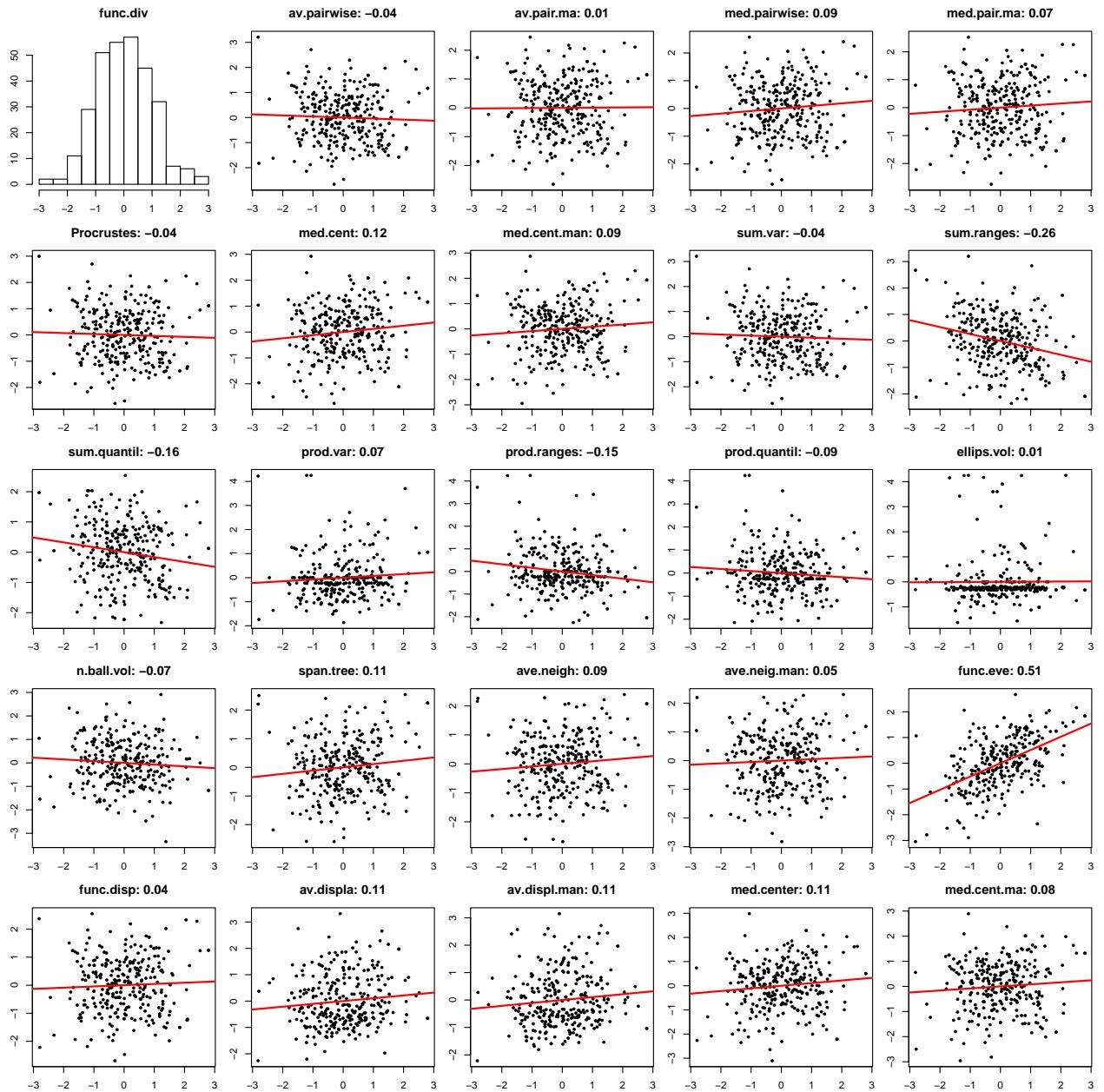
```
## Minimum spanning tree average length
```



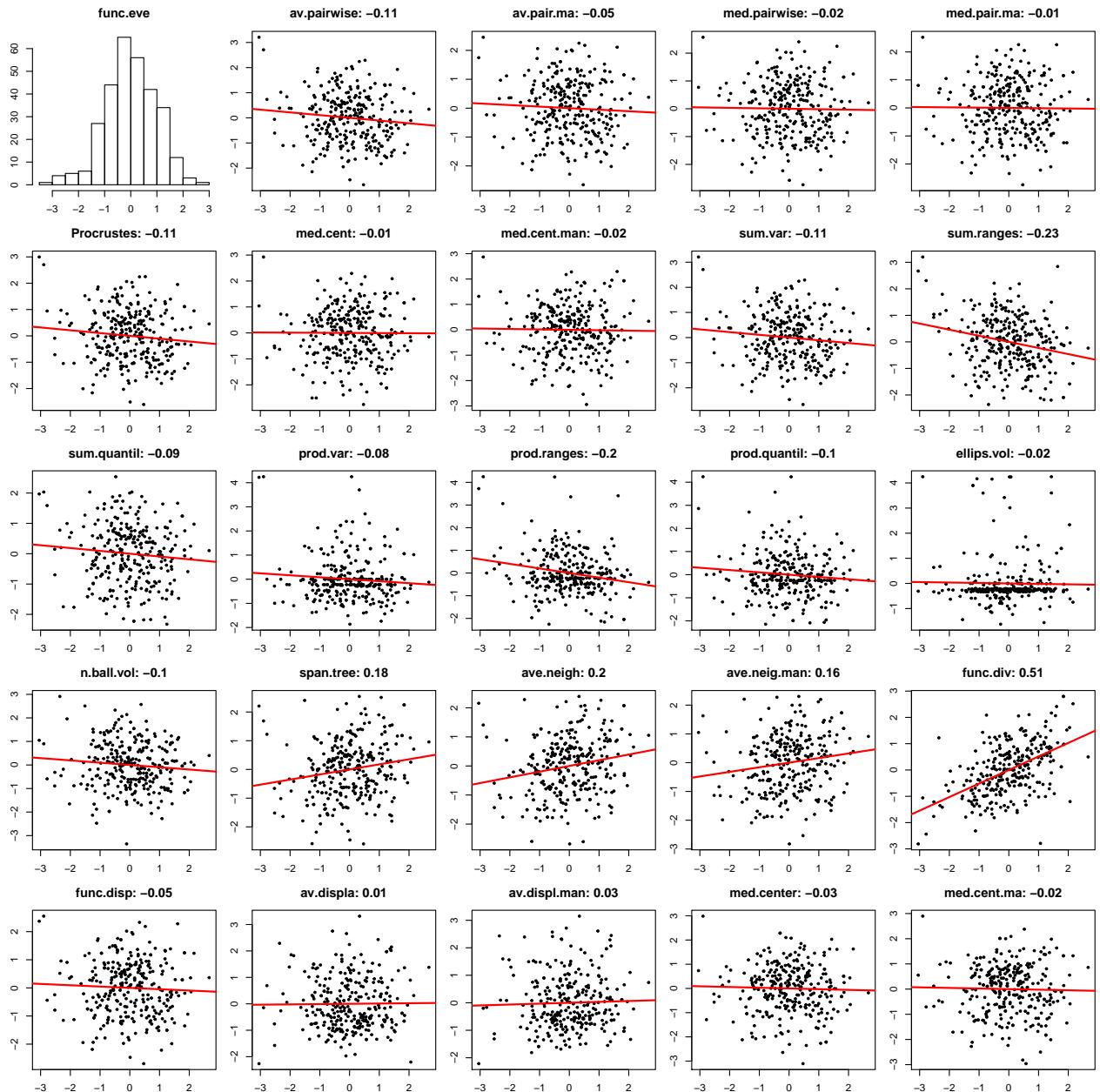
```
## Average minimum neighbours distance
```



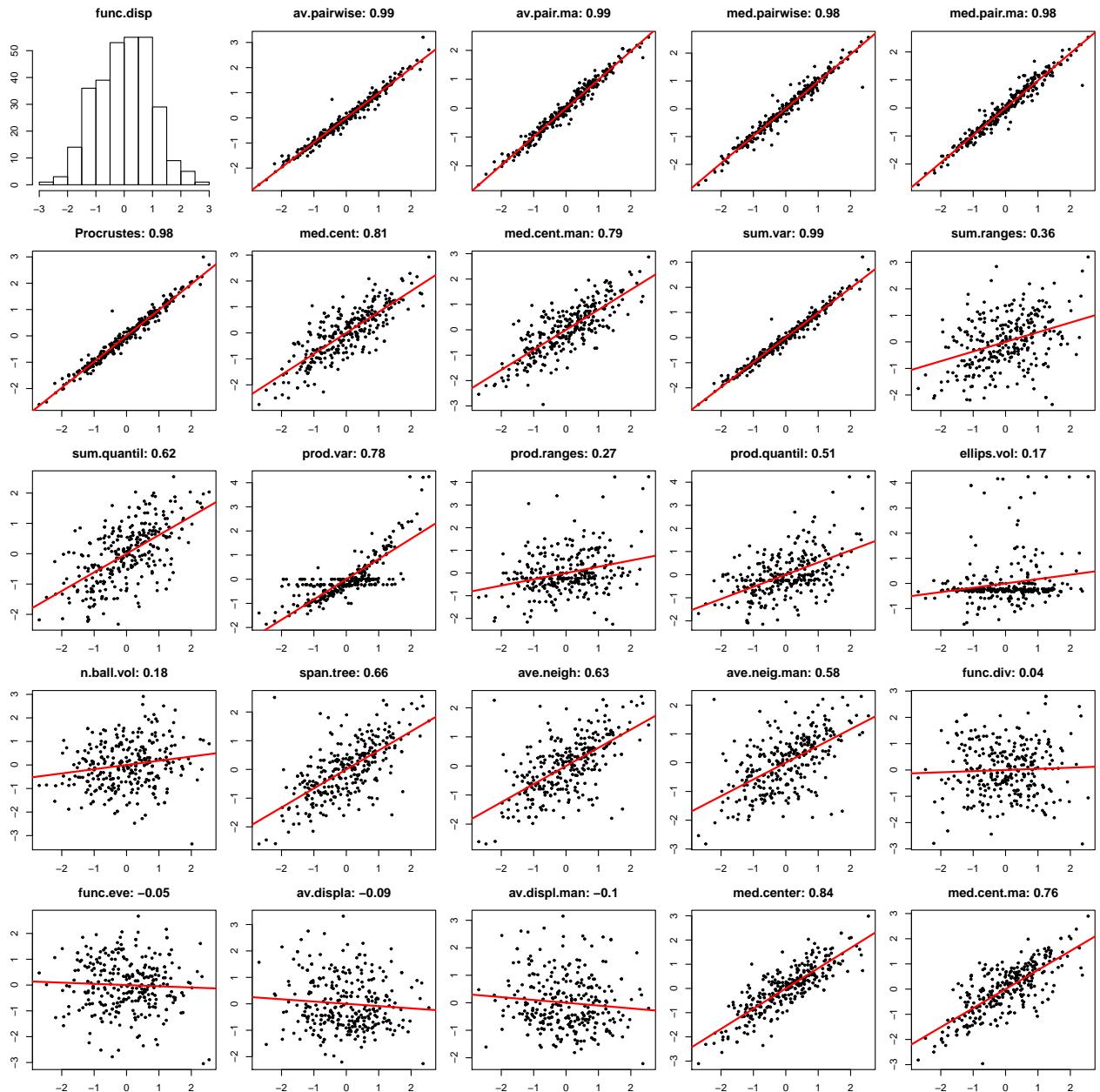
```
## Average minimum neighbours manhattan distance
```



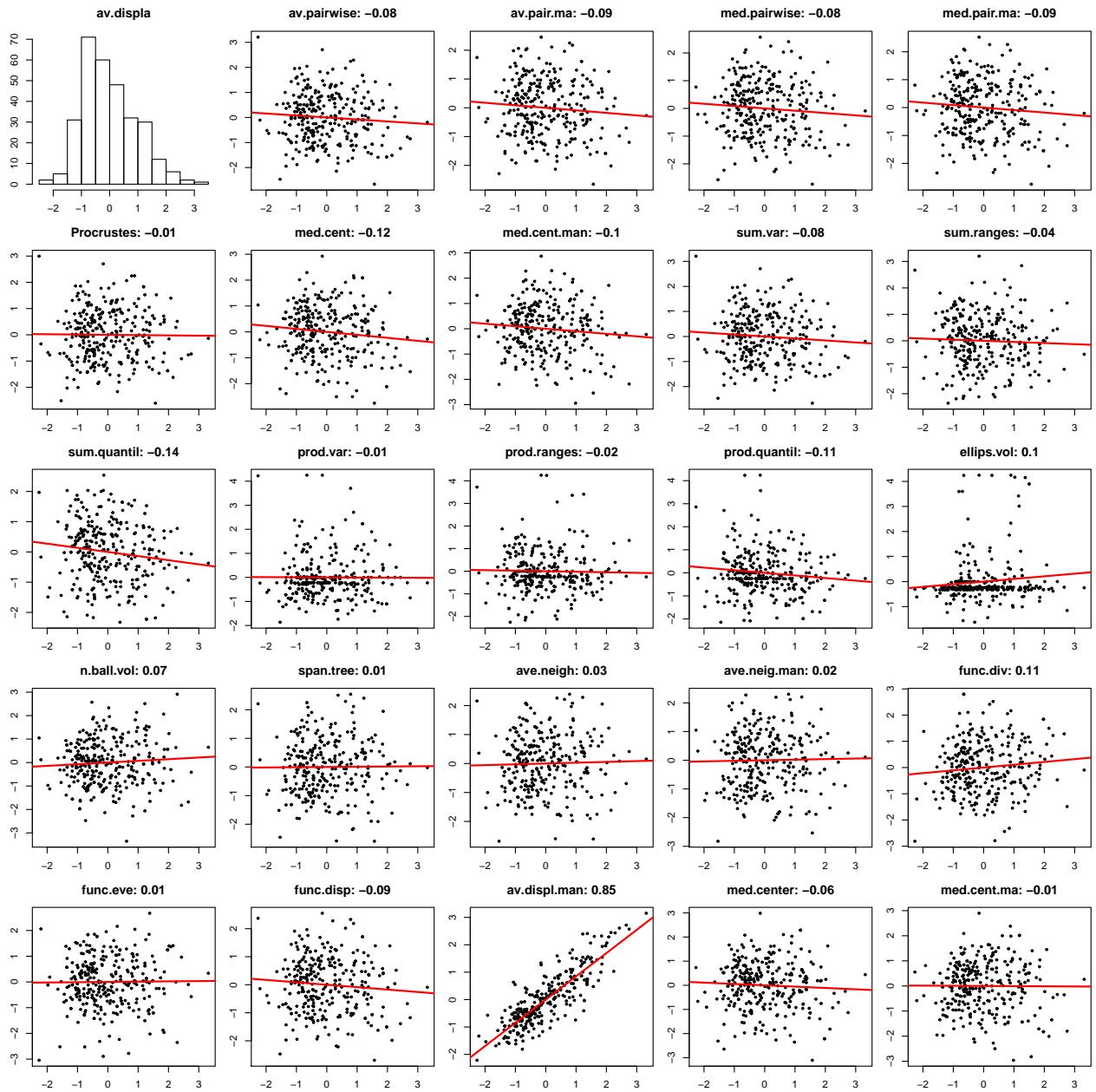
## Function diversity



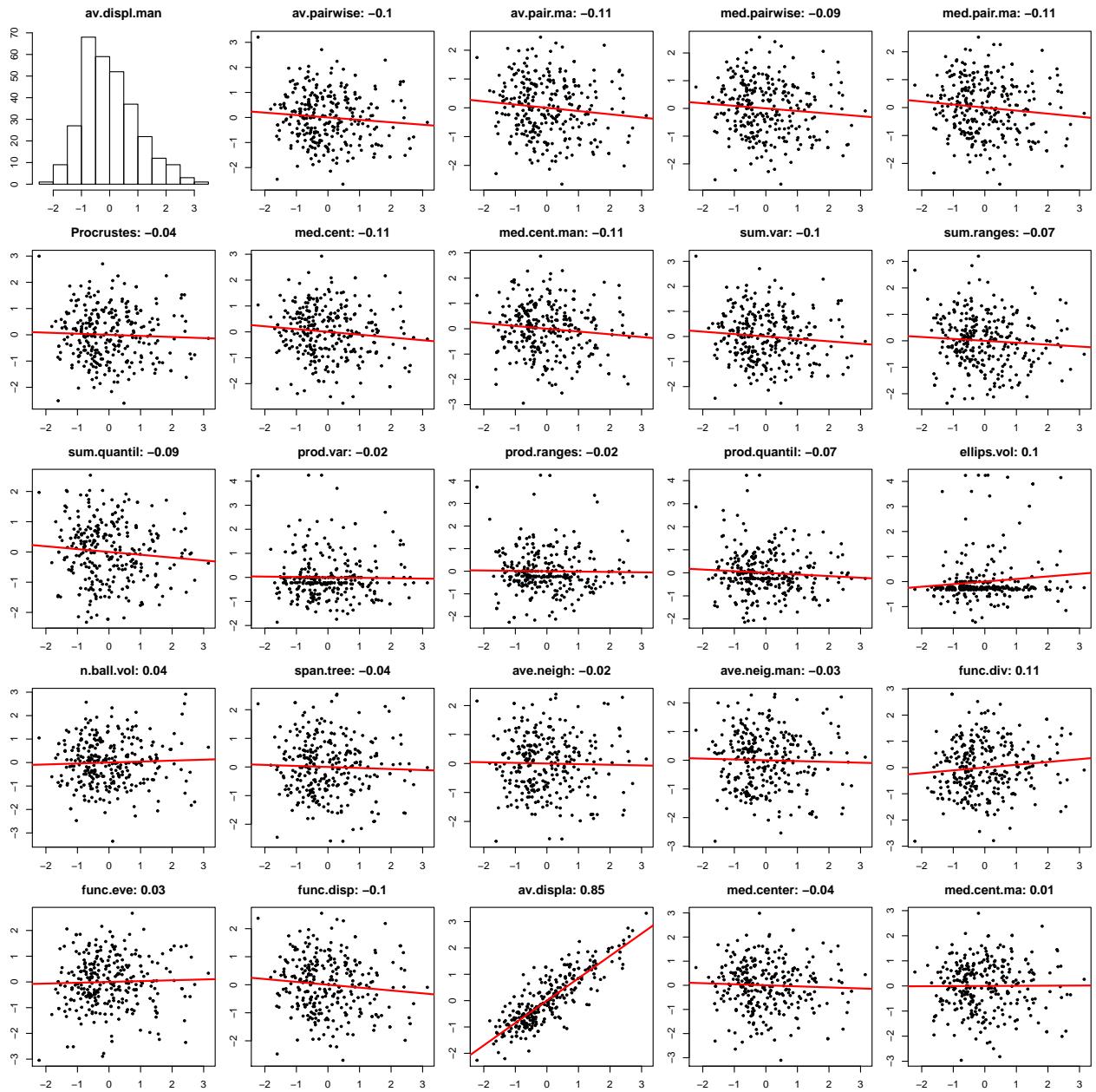
```
## Functional evenness
```



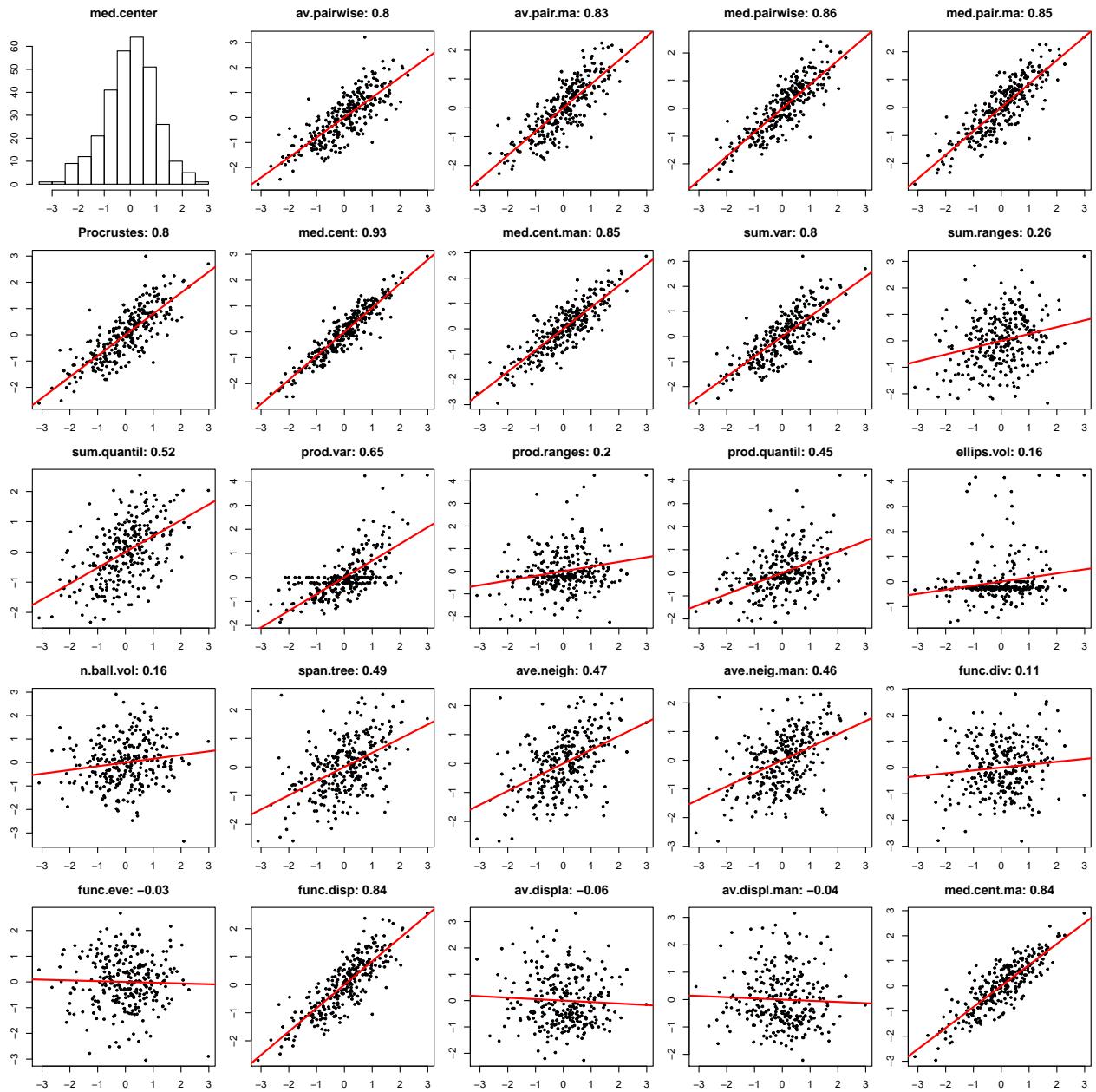
```
## Functional dispersion
```



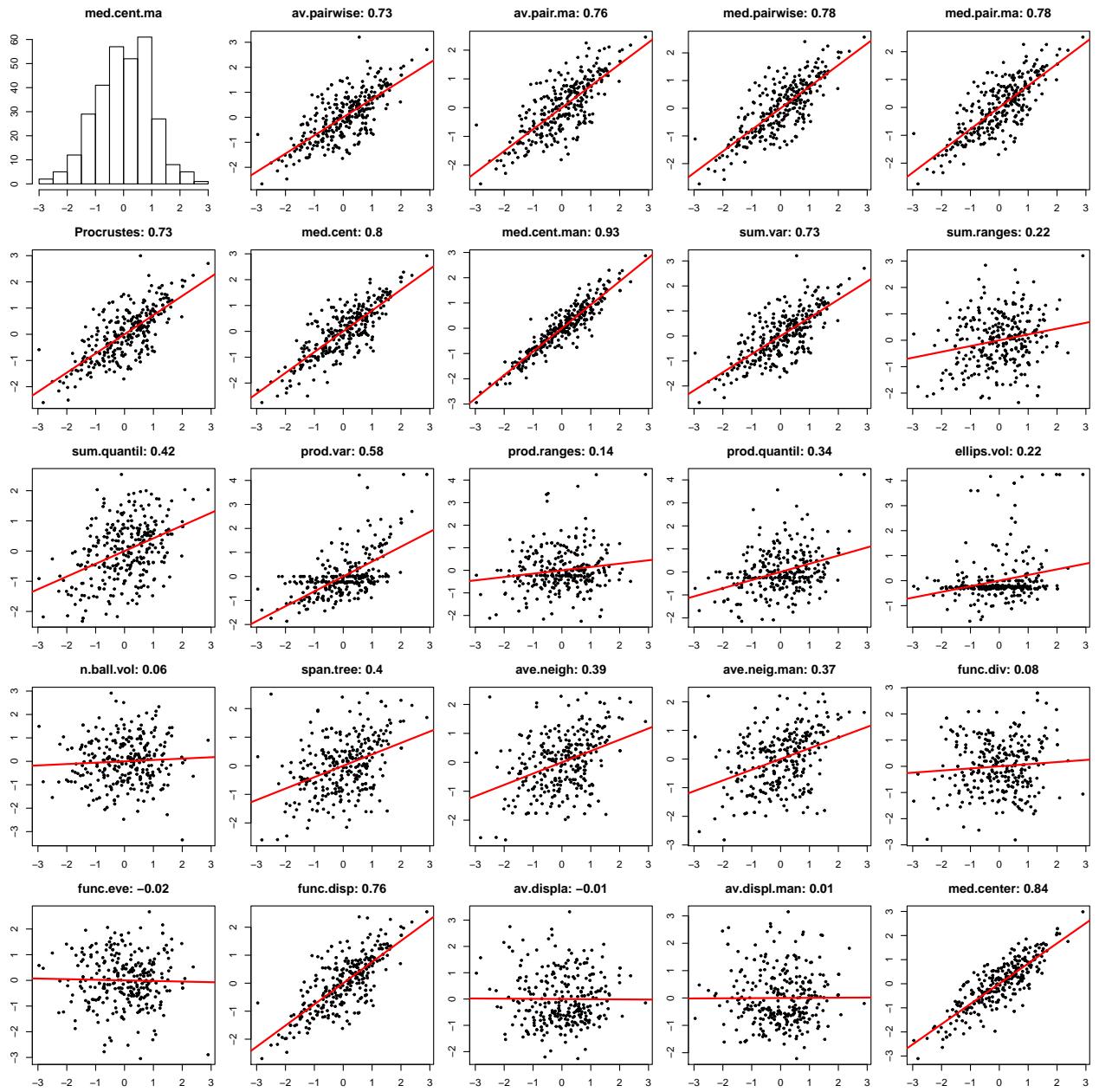
## Average displacement



```
## Average manhattan displacement
```



```
## Median distance from centre
```



```
## Median manhattan distance from centre
```

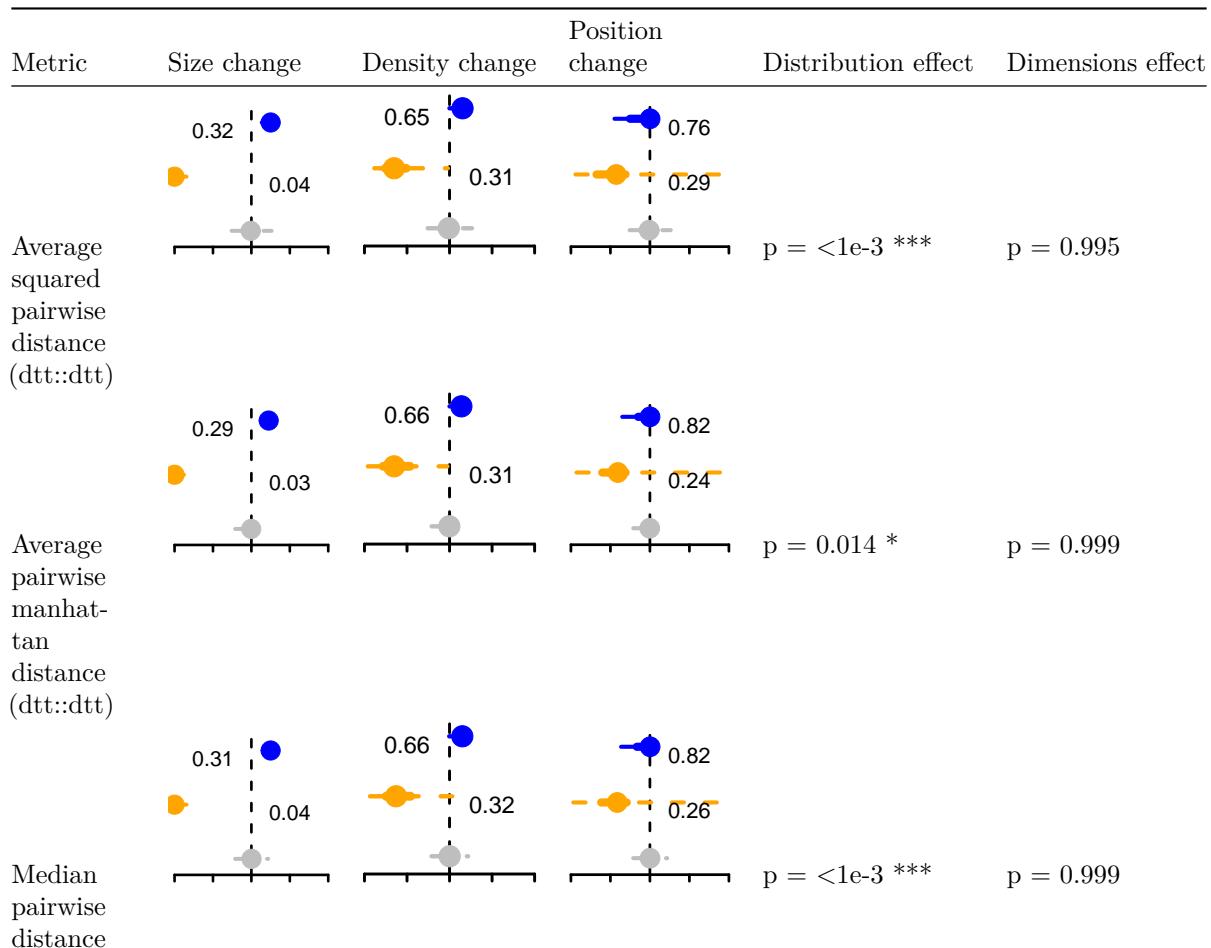
The measurements analysed are the av.pairwise: Average squared pairwise distance (dtt::dtt); av.pair.ma: Average pairwise manhattan distance (dtt::dtt); med.pairwise: Median pairwise distance; med.pair.ma: Median pairwise manhattan distance; Procrustes: Procrustes variances (geomorph::morpho.disparity); med.cent: Median distance from centroid; med.cent.man: Median manhattan distance from centroid; sum.var: Sum of variances; sum.ranges: Sum of ranges; sum.quantil: Sum of quantiles; prod.var: Product of variances; prod.ranges: Product of ranges; prod.quantil: Product of quantiles; ellips.vol: Ellipsoid volume; n.ball.vol: nBall volume; span.tree: Minimum spanning tree average length; ave.neigh: Average minimum neighbours distance; ave.neig.man: Average minimum neighbours manhattan distance; func.div: Function diversity; func.eve: Functional evenness; func.disp: Functional dispersion; av.displa: Average displacement; av.displ.man: Average manhattan displacement; med.center: Median distance from centre; med.cent.ma: Median manhattan distance from centre.

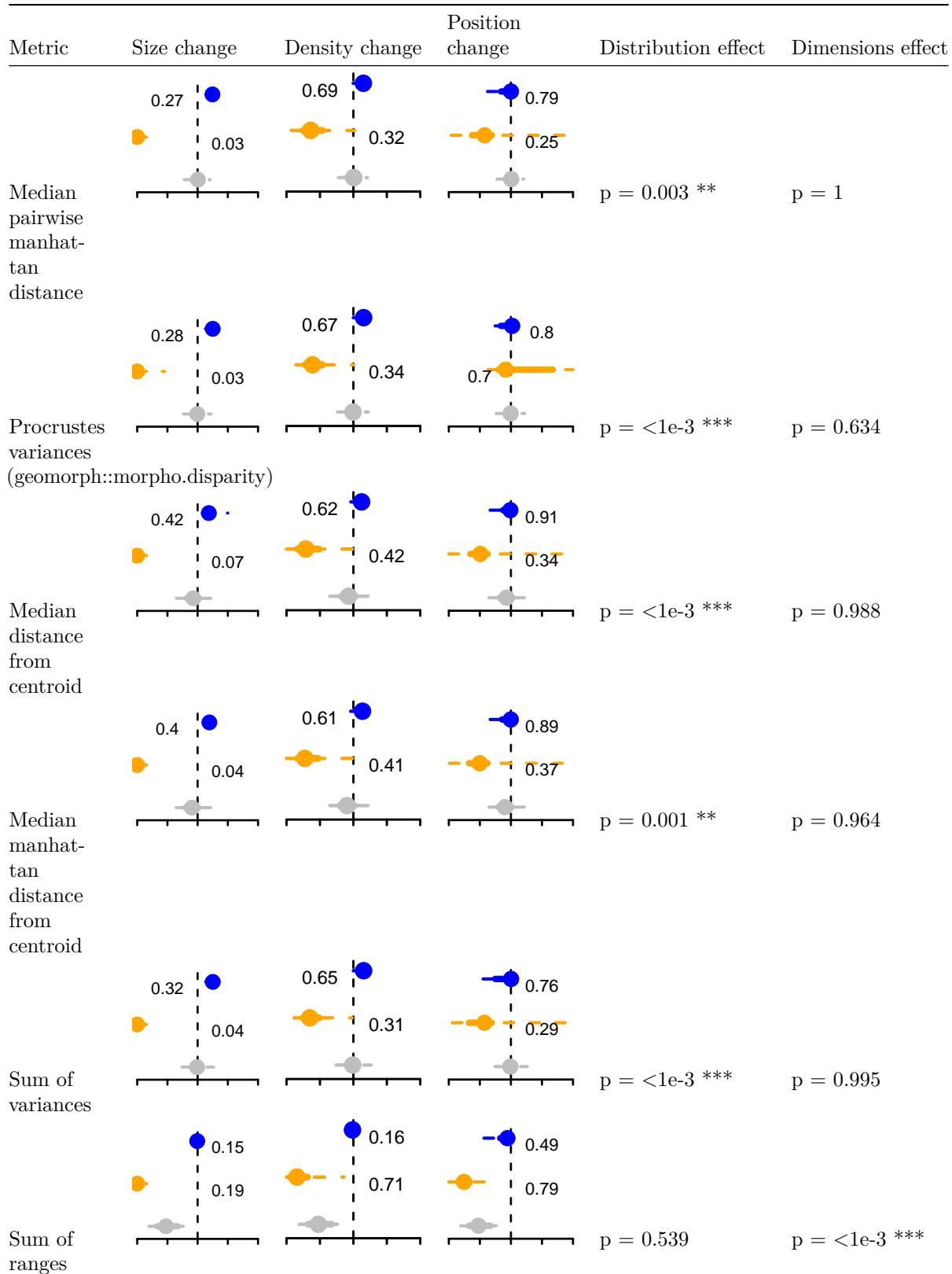
## Space shifting all measures

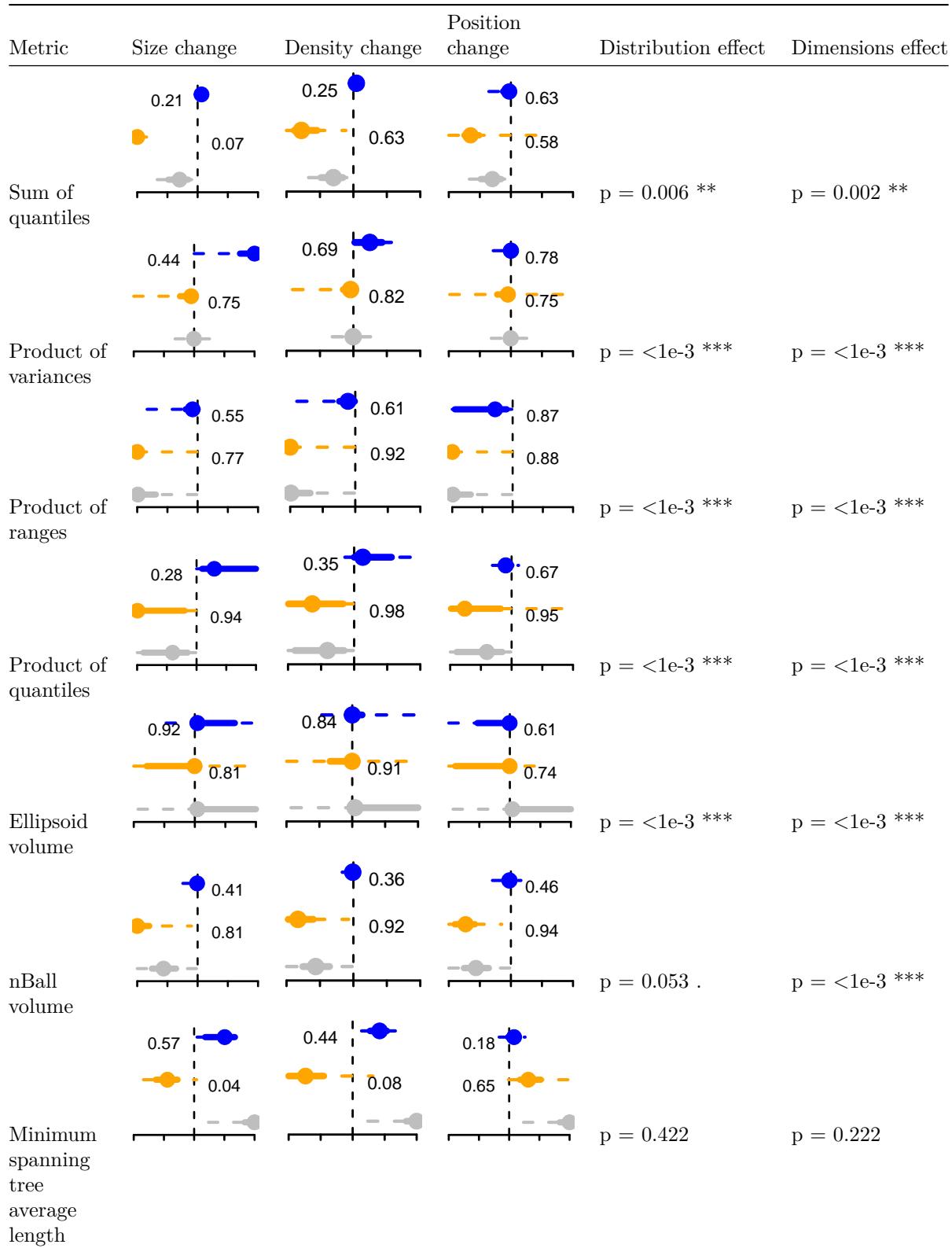
```
## The metrics names (shortened vector)
name <- all_metrics_names

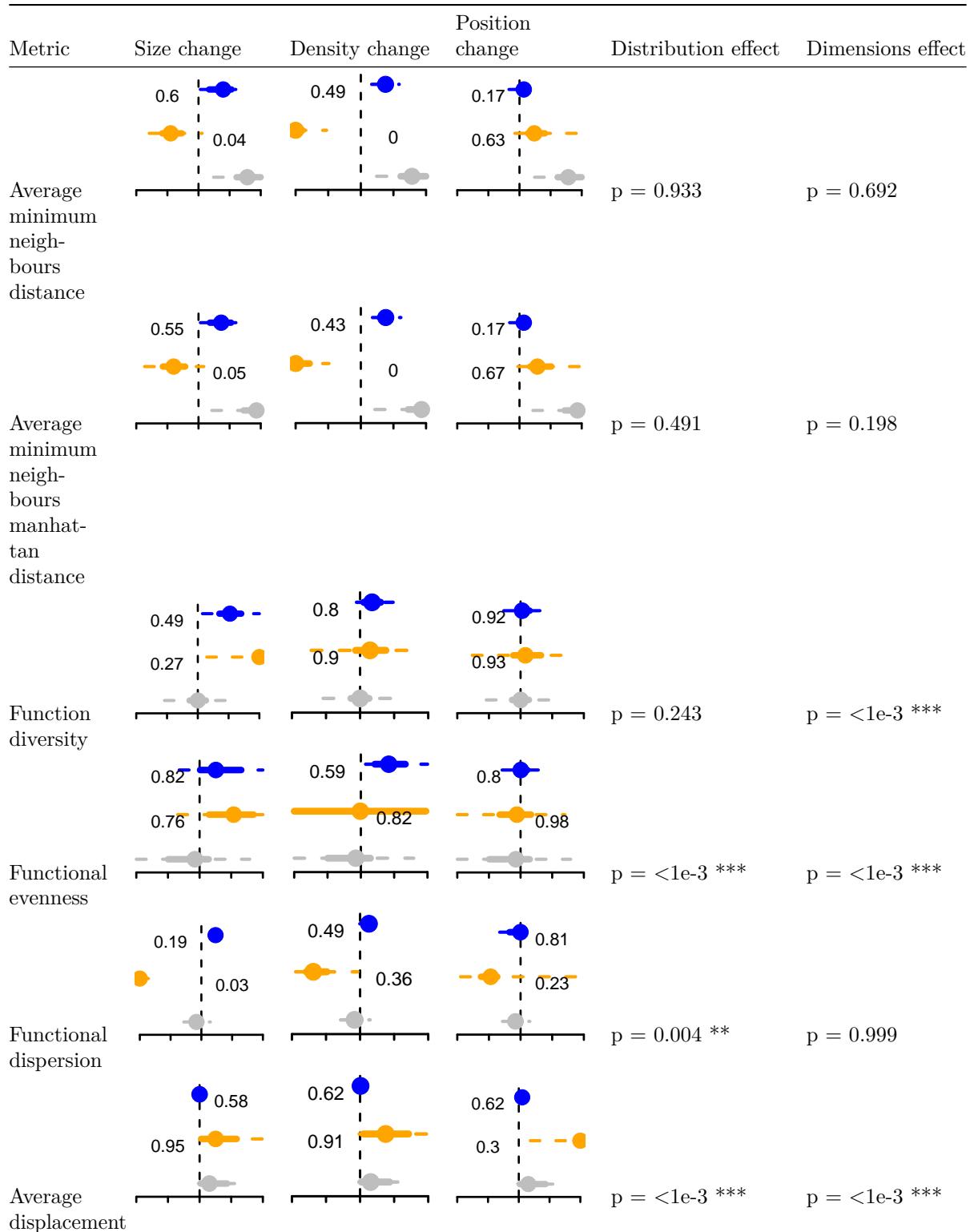
## Making a list of parameters for each mini plot
plot.param <- list(scaler = 3,
                     bg.col = "black",
                     col = c("grey", "orange", "blue"),
                     quantiles = c(95, 50),
                     cent.tend = median,
                     pch = 19,
                     metric.max = length(all_metrics),
                     cex = 2)
```

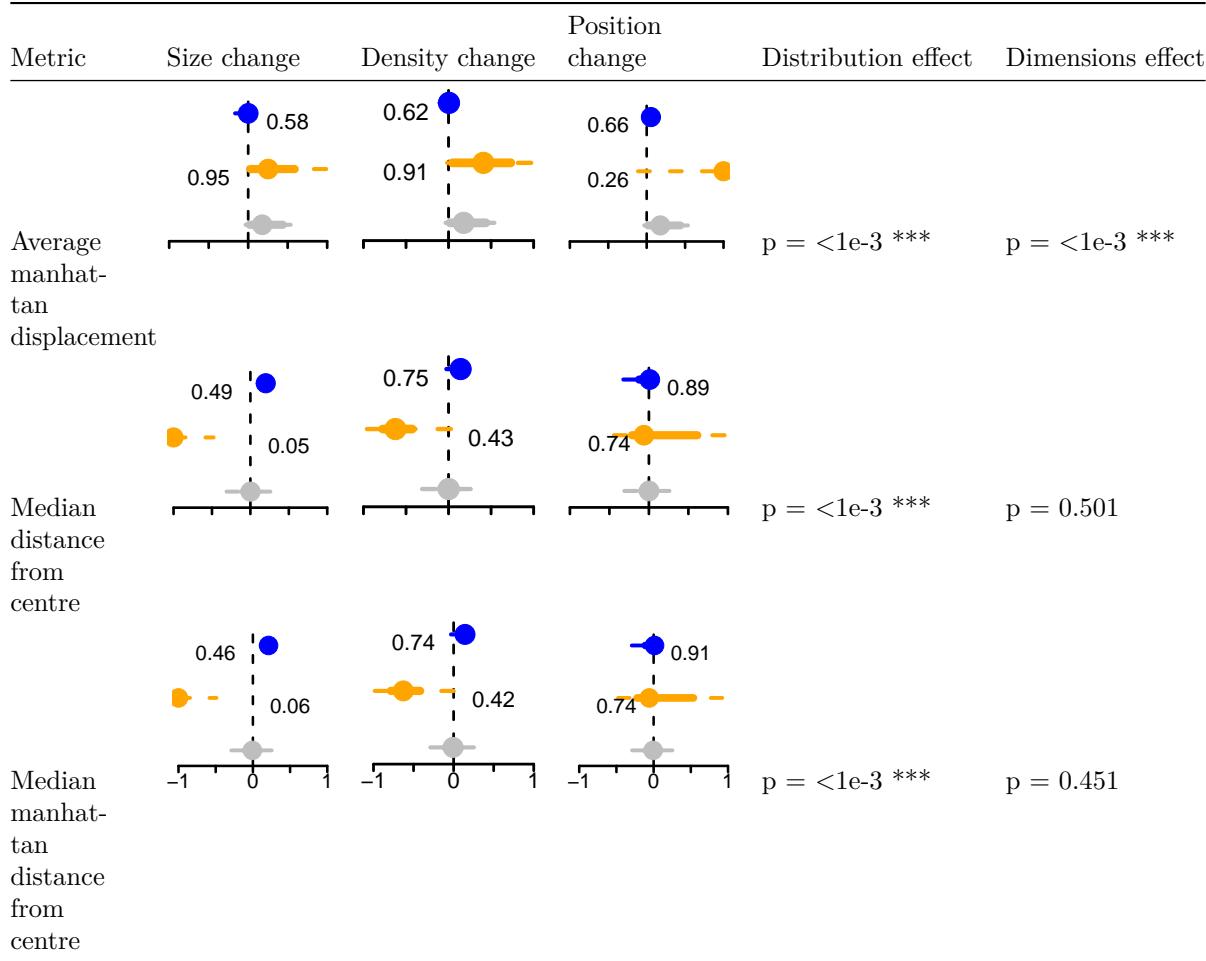
### All measures results 20% removal



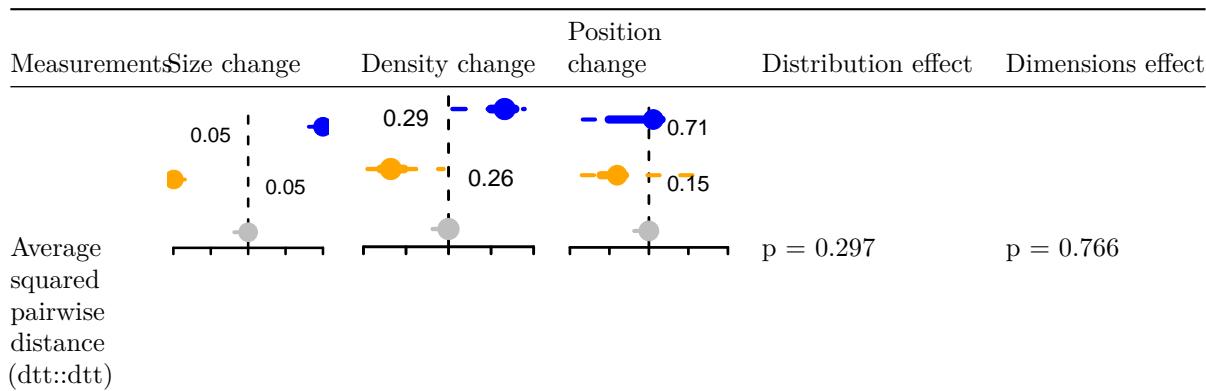


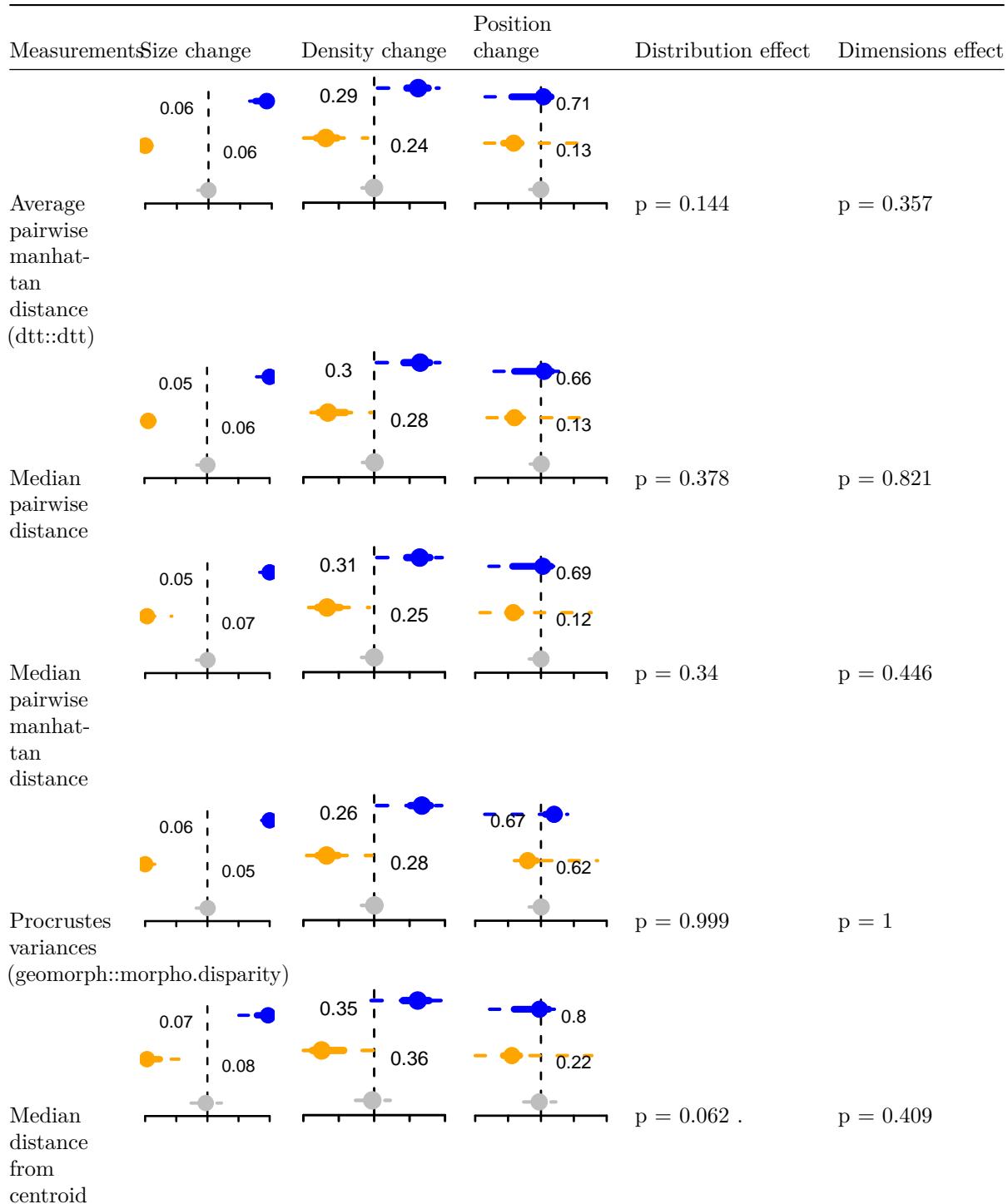


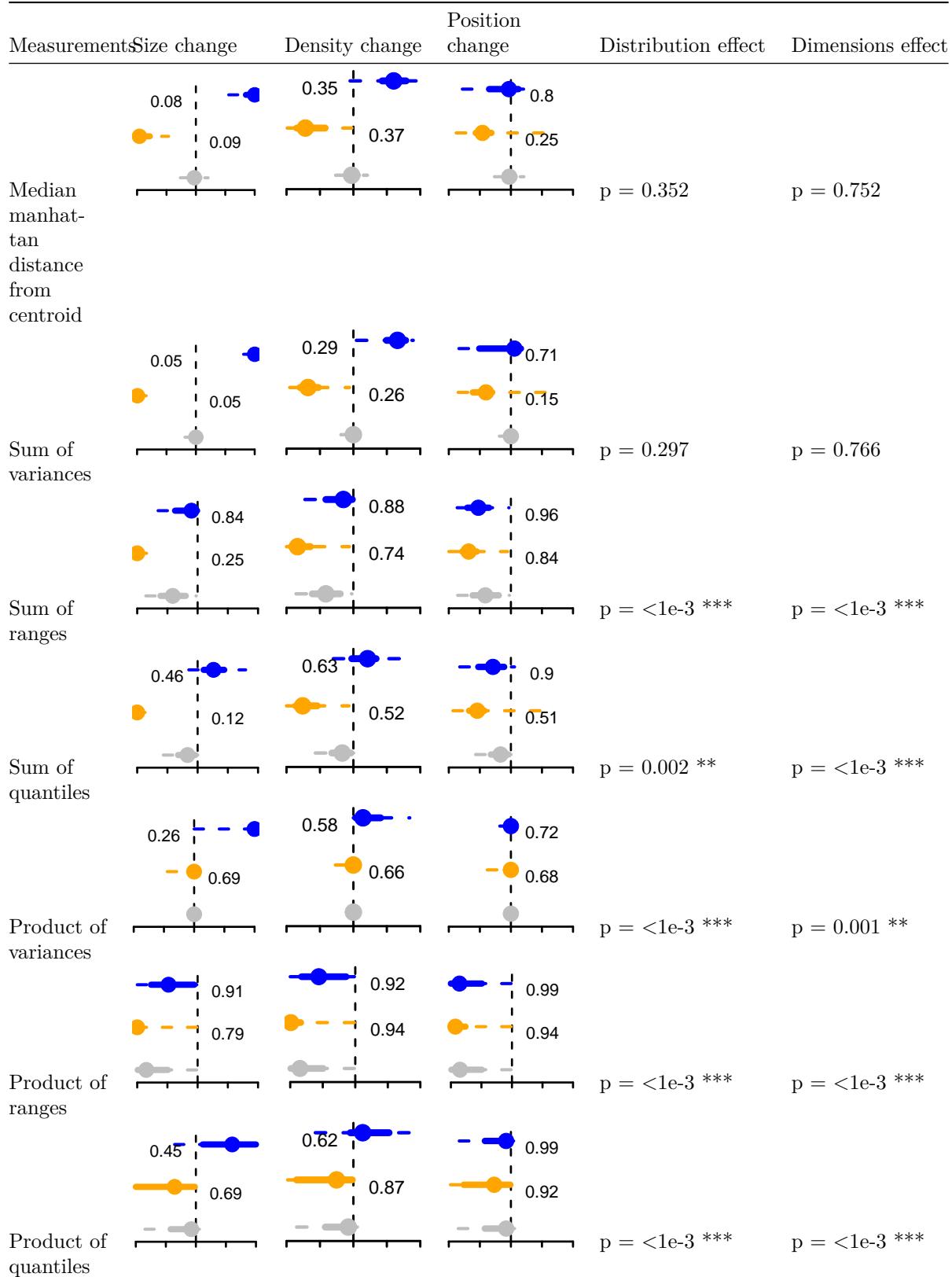


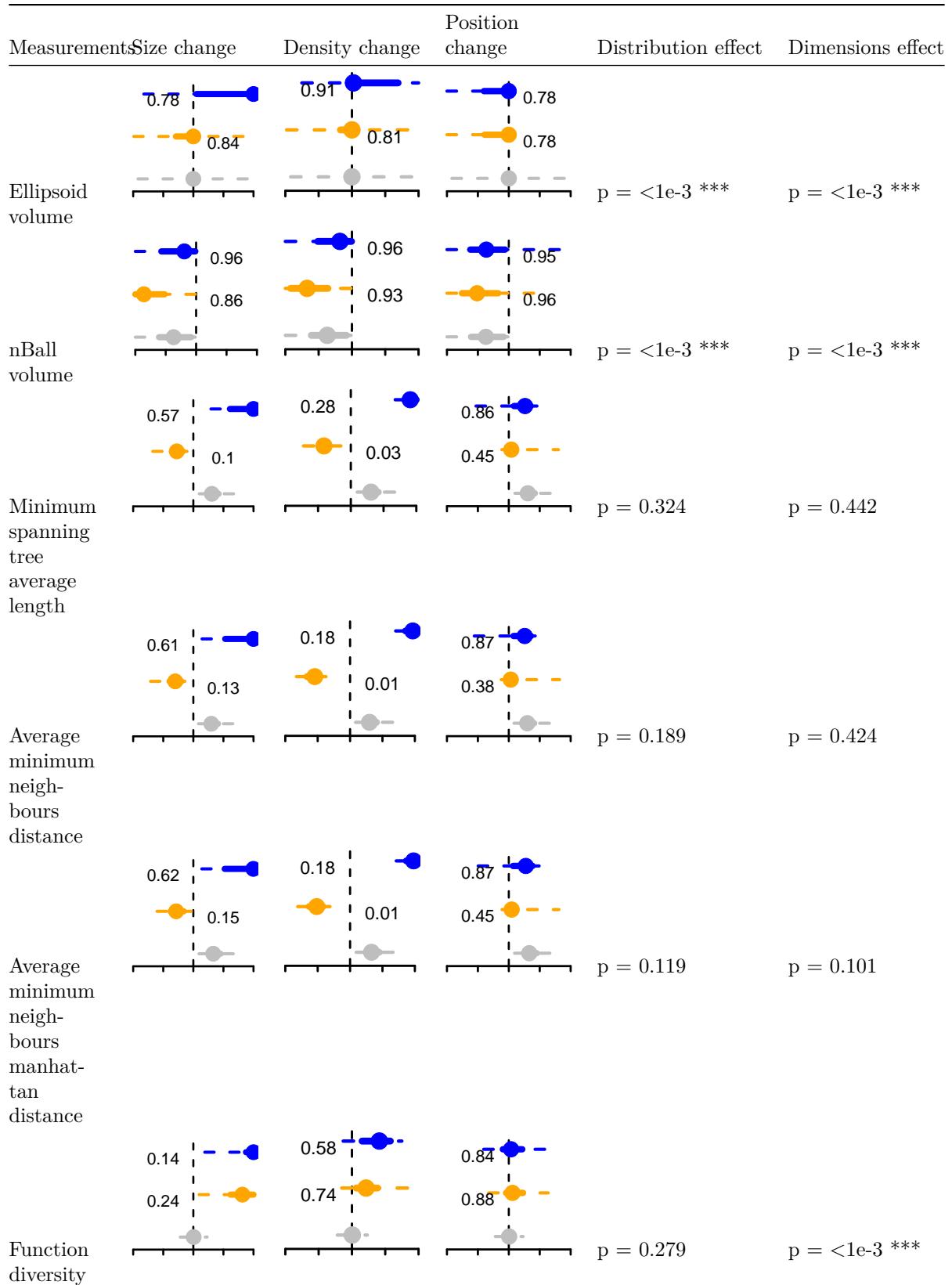


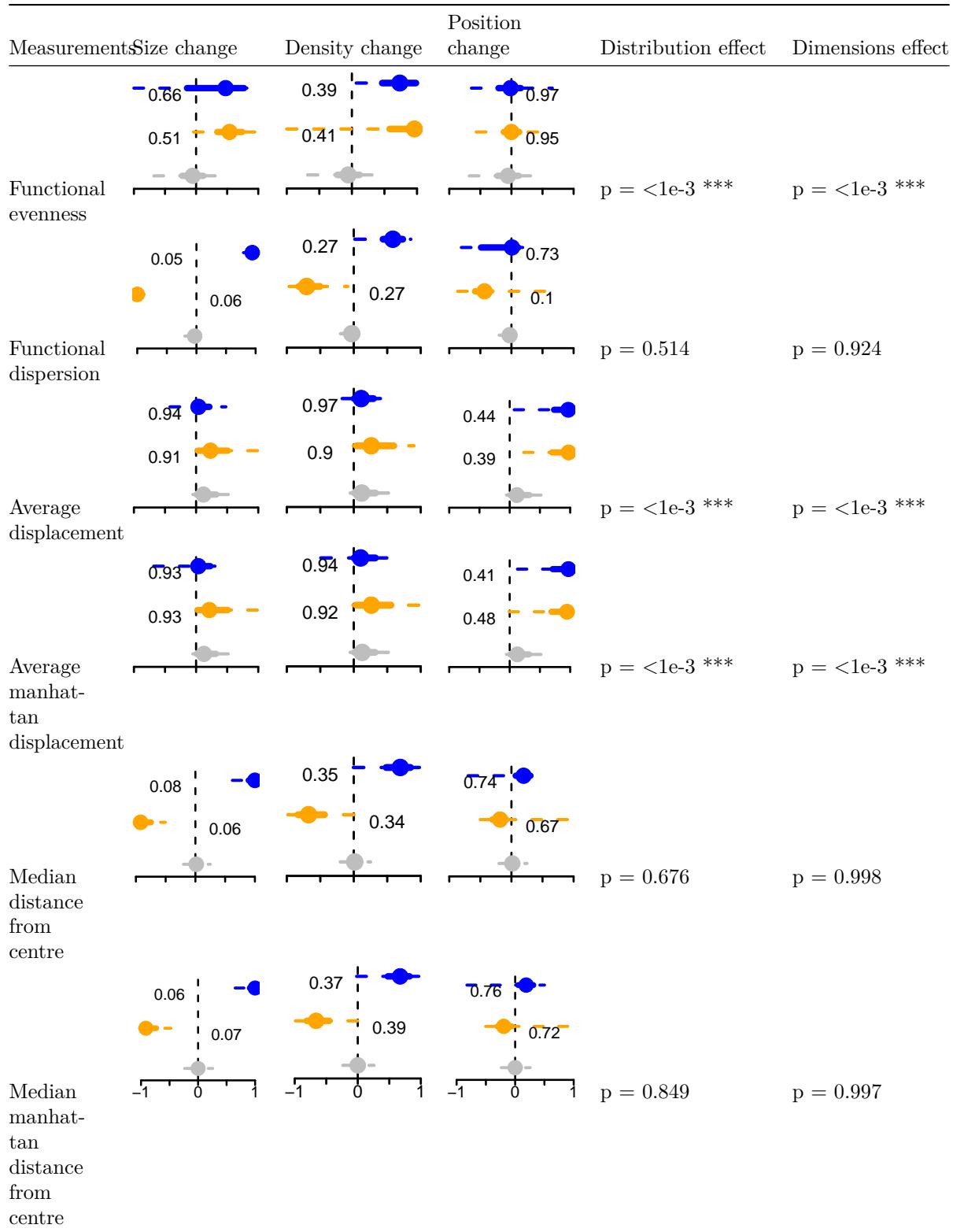
#### All measures results 50% removal



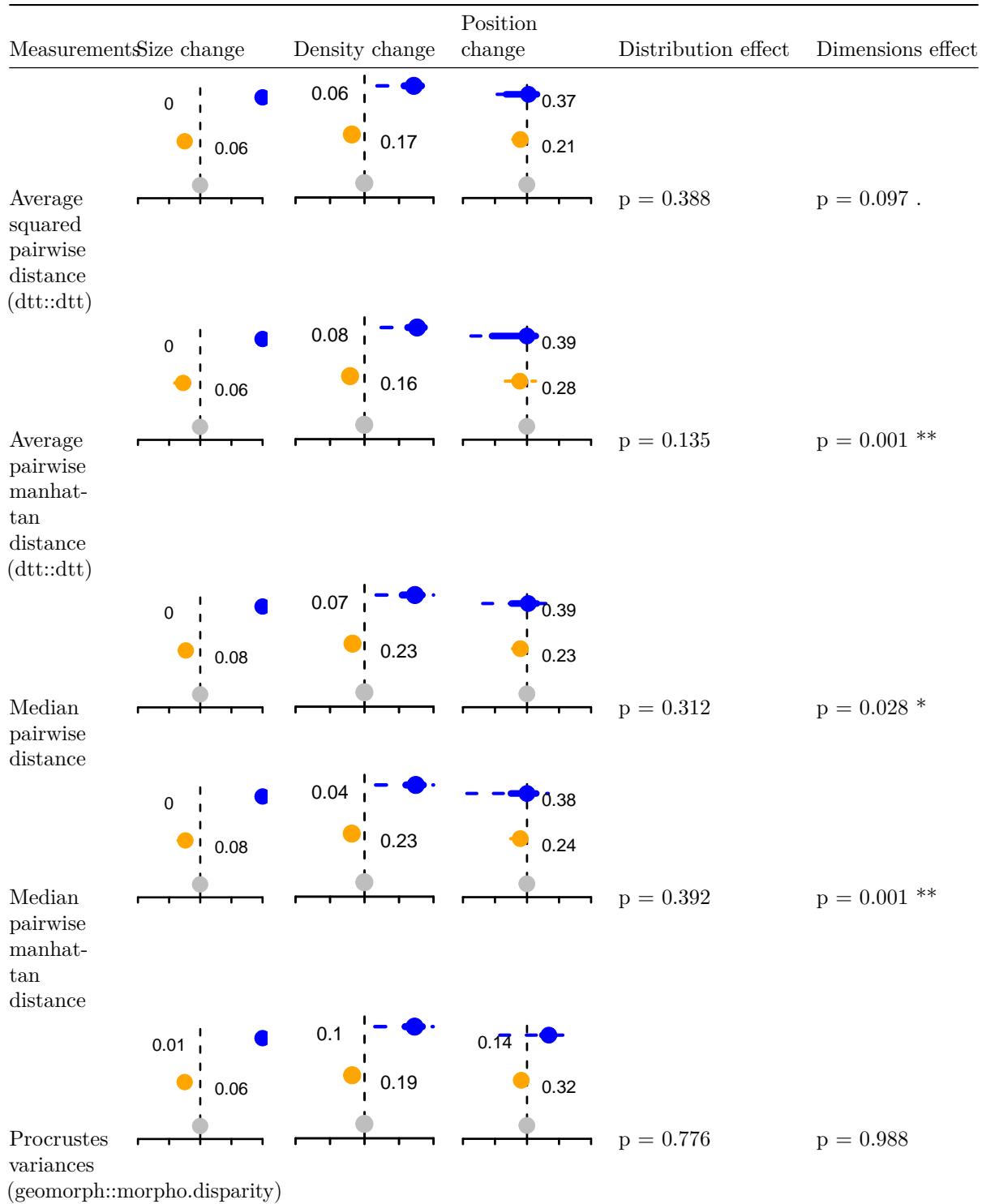


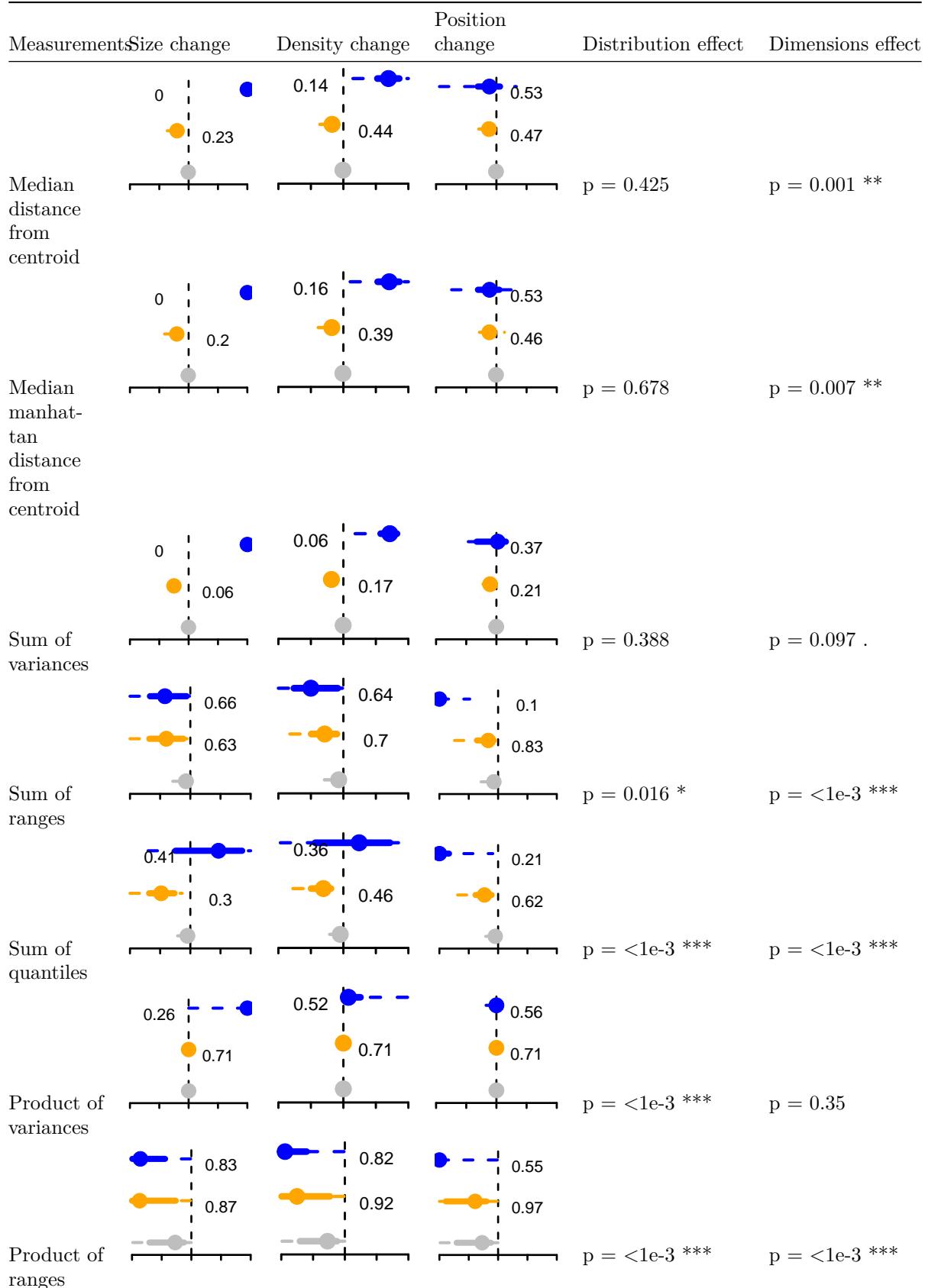


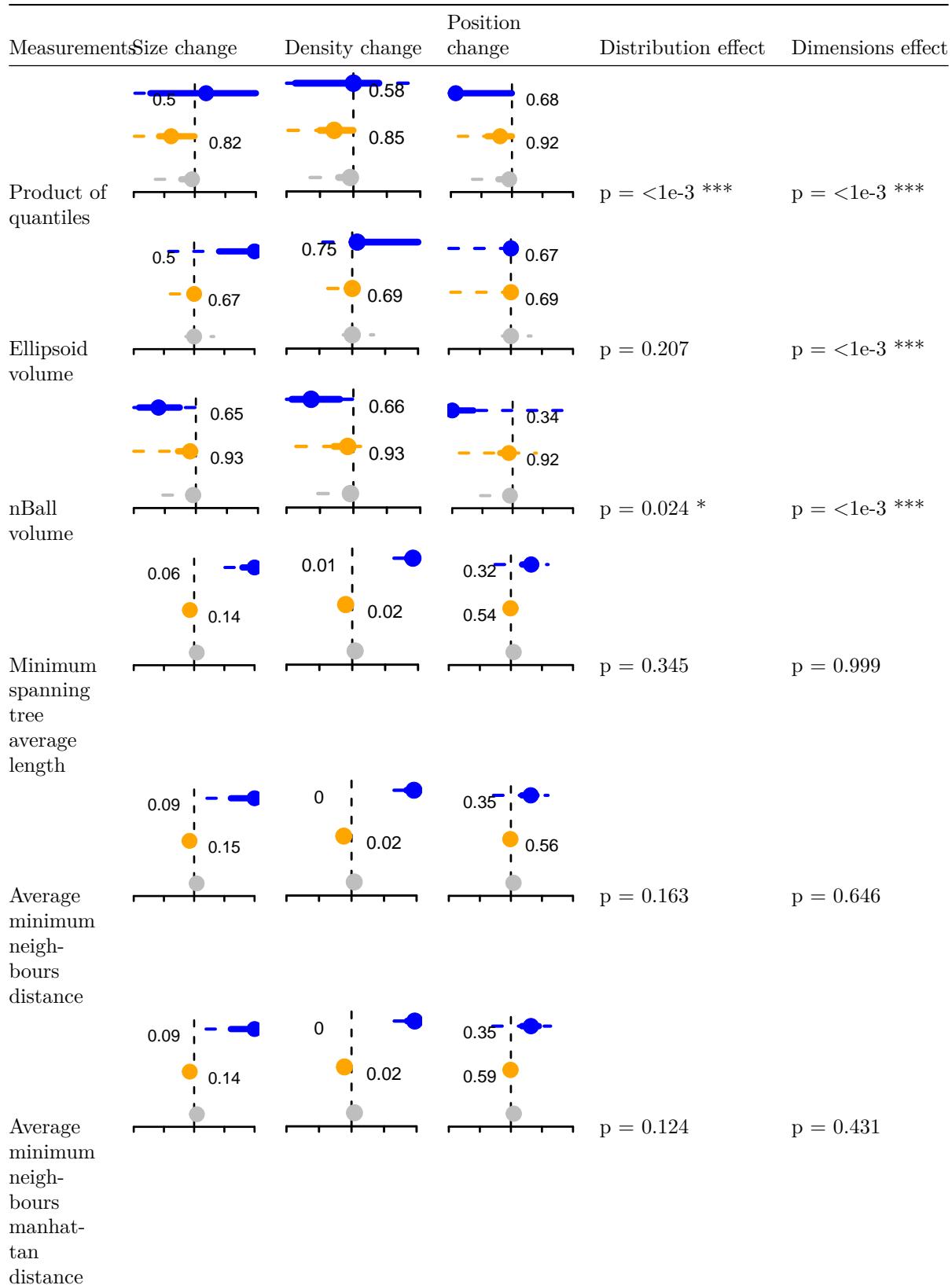


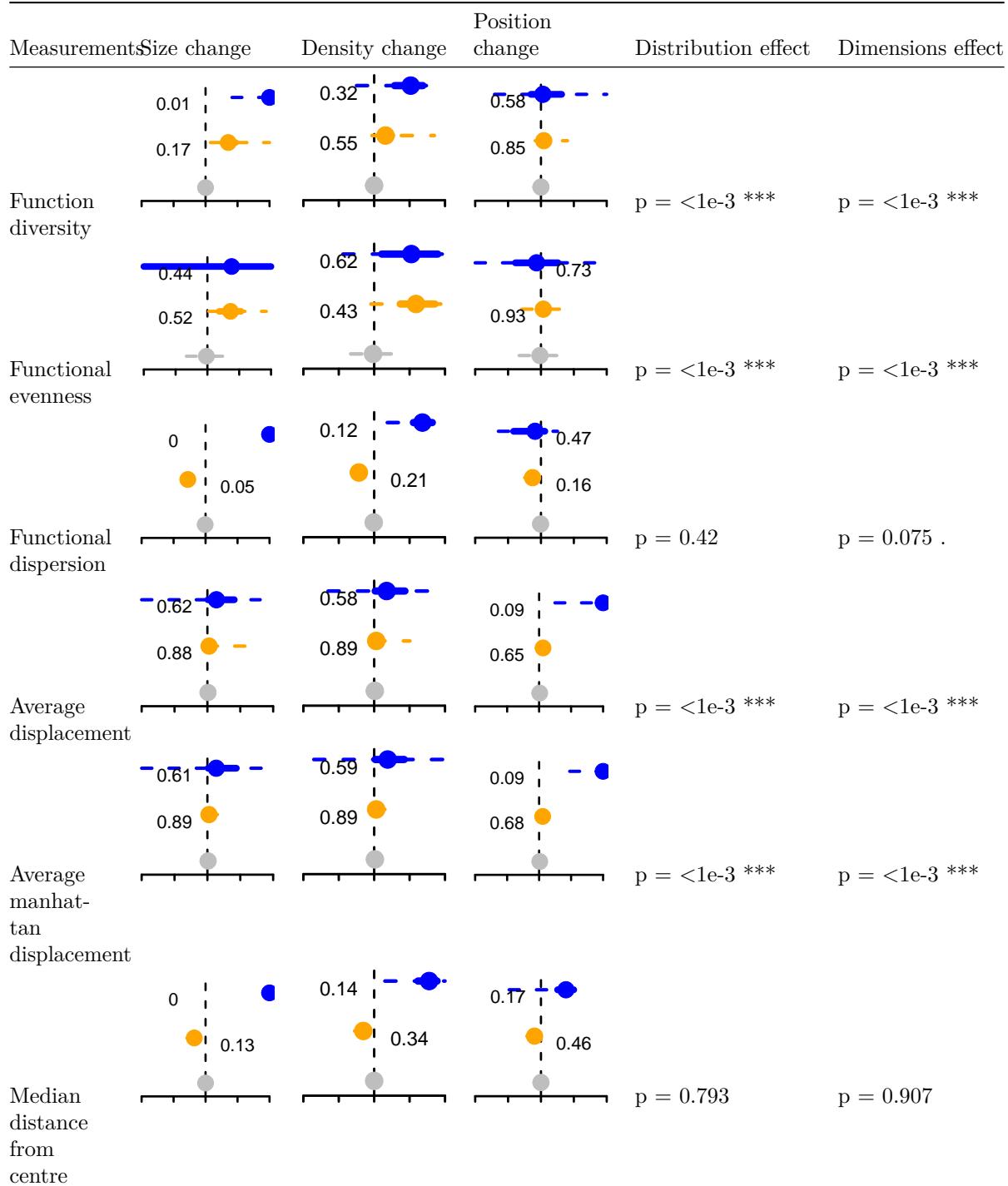


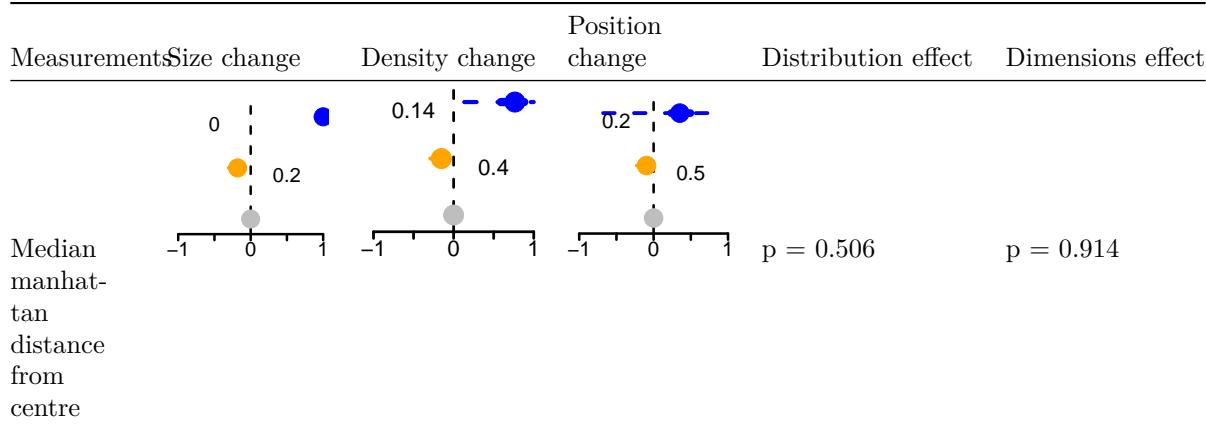
All measures results 80% removal



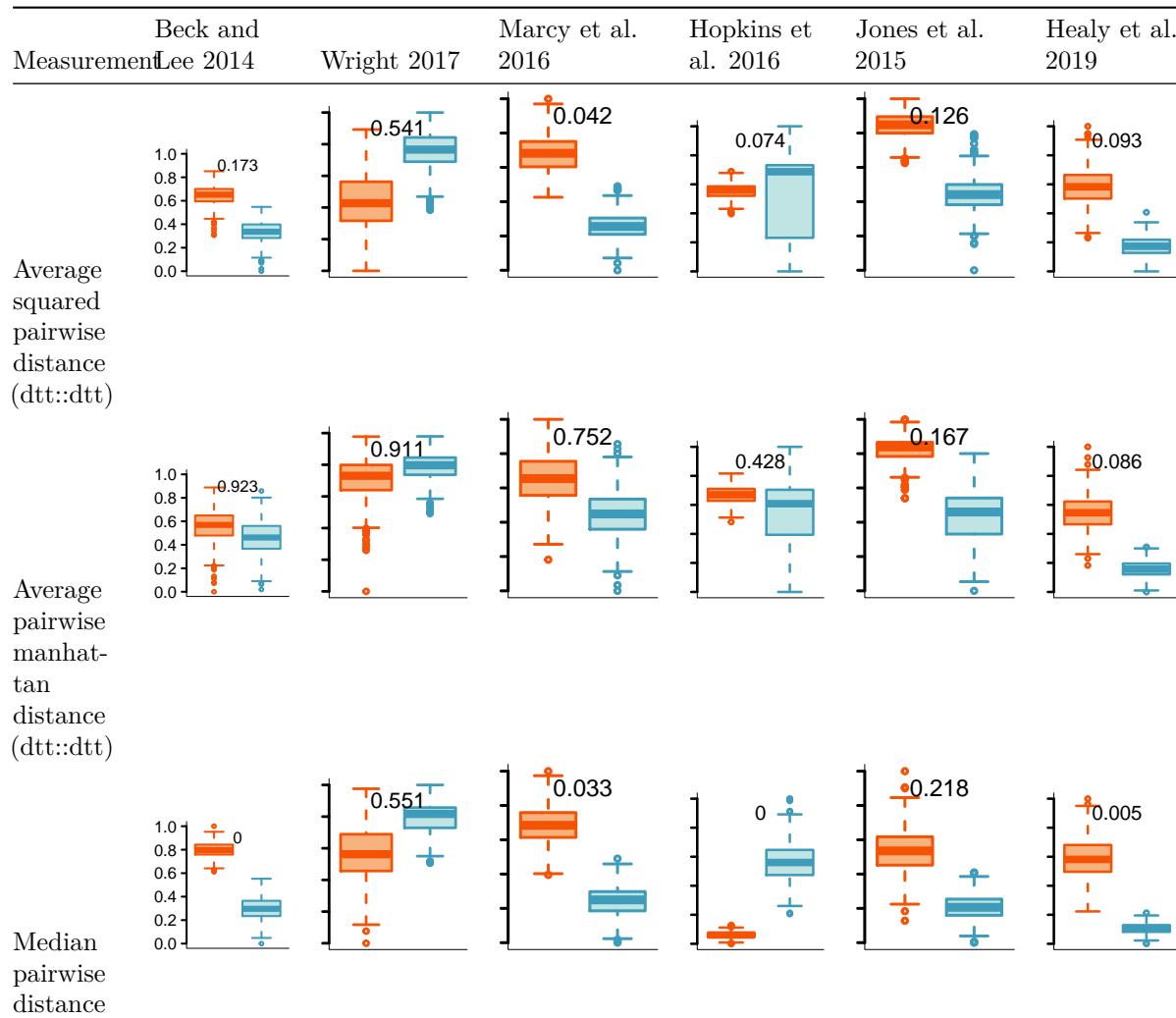


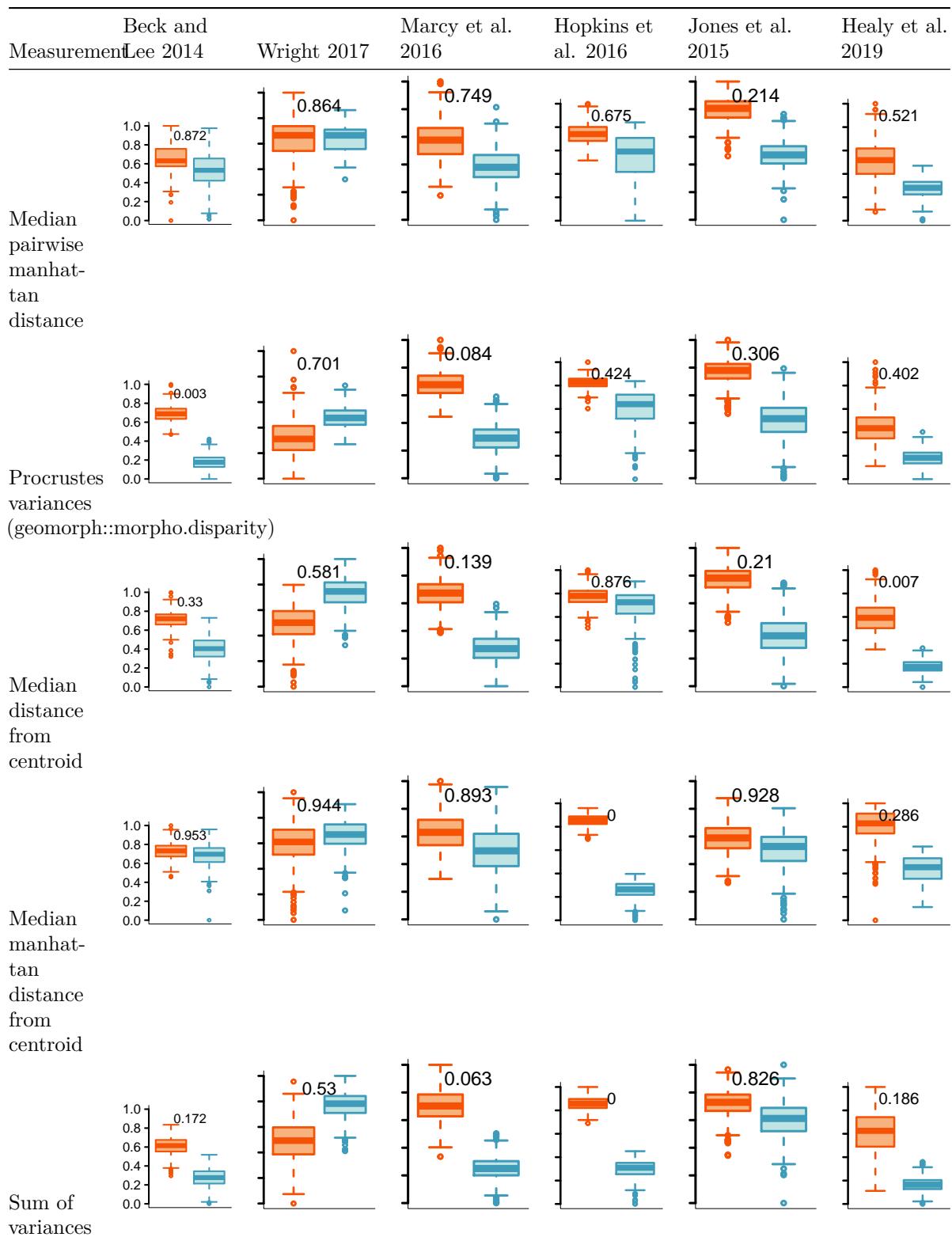


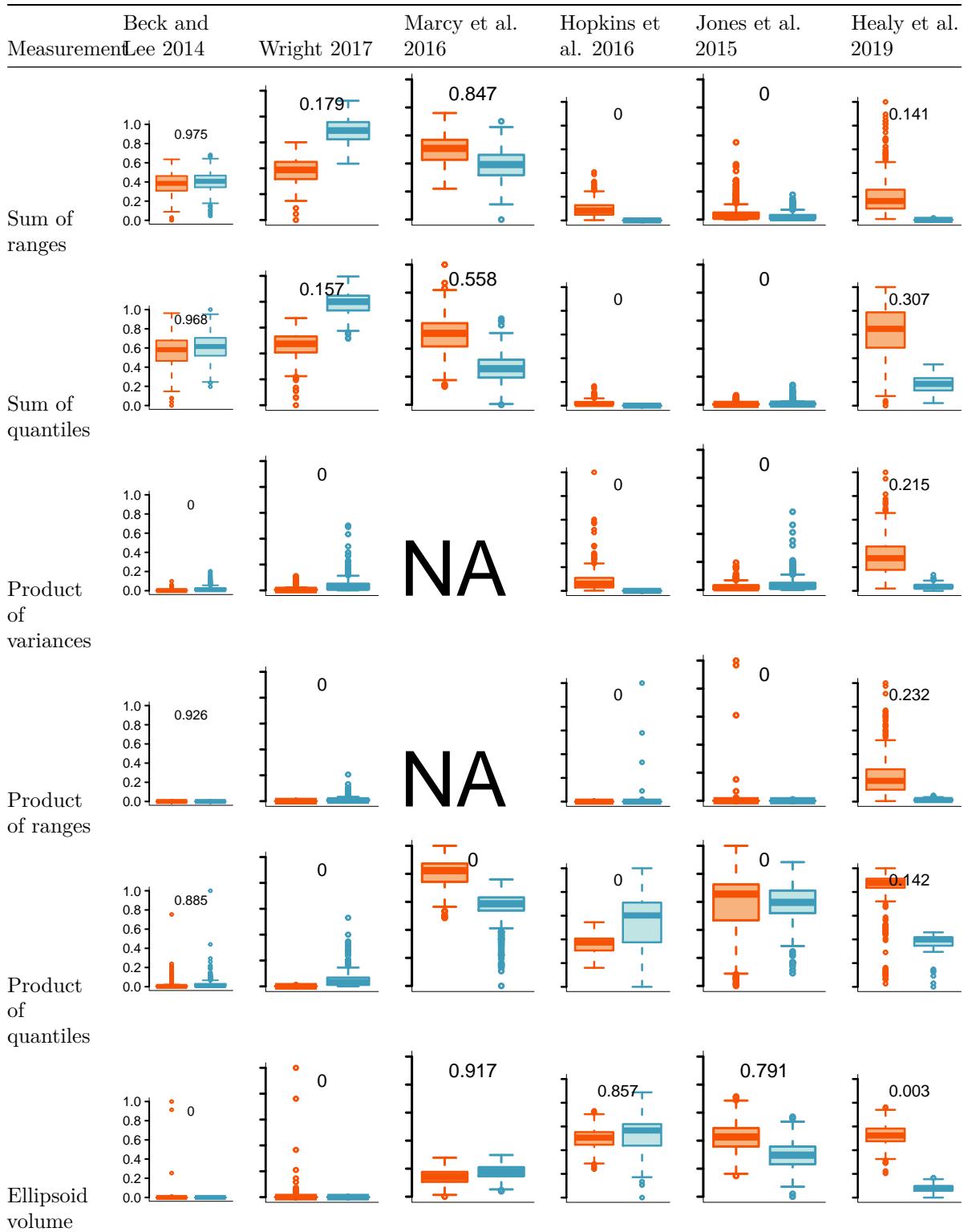


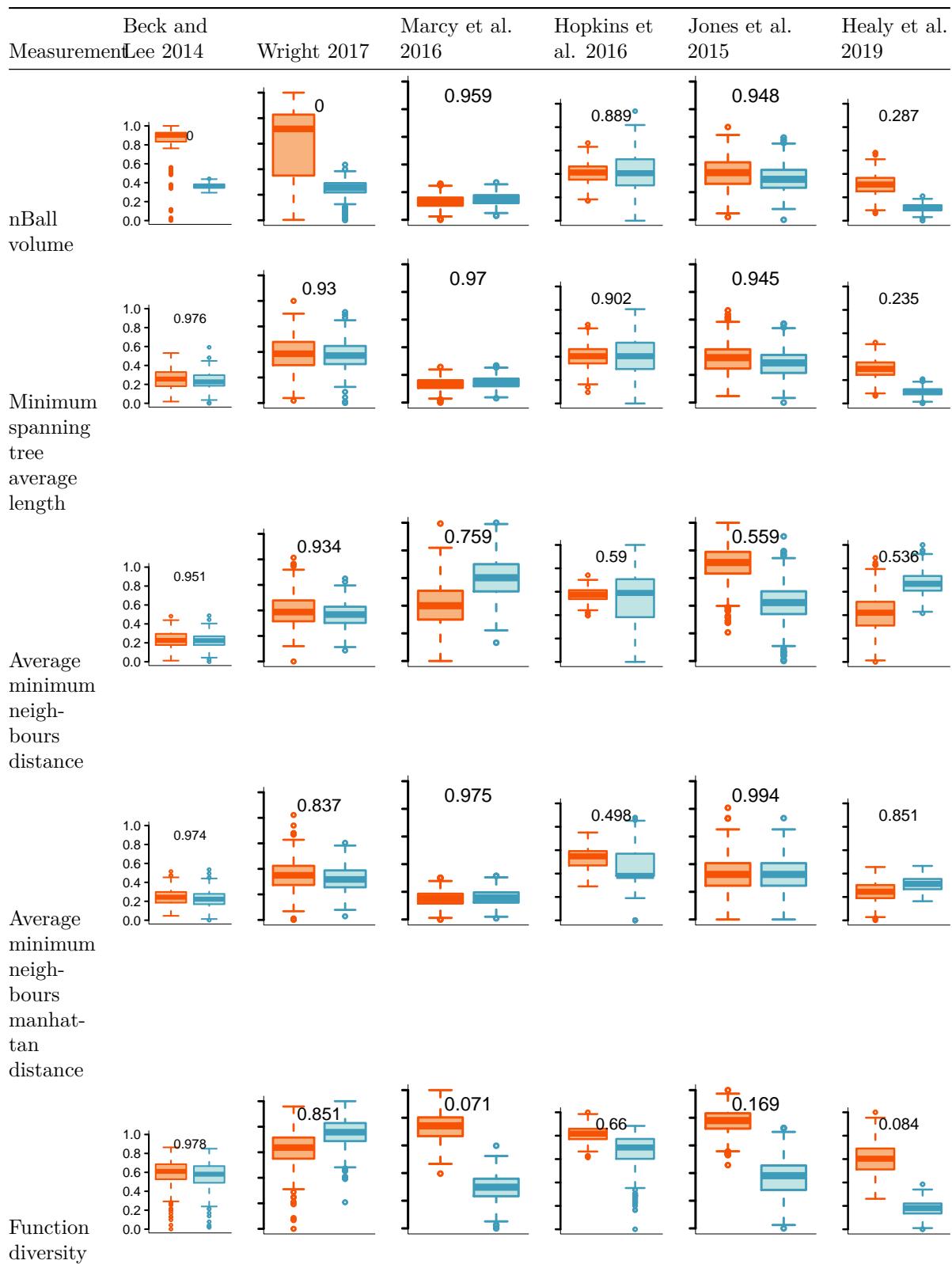


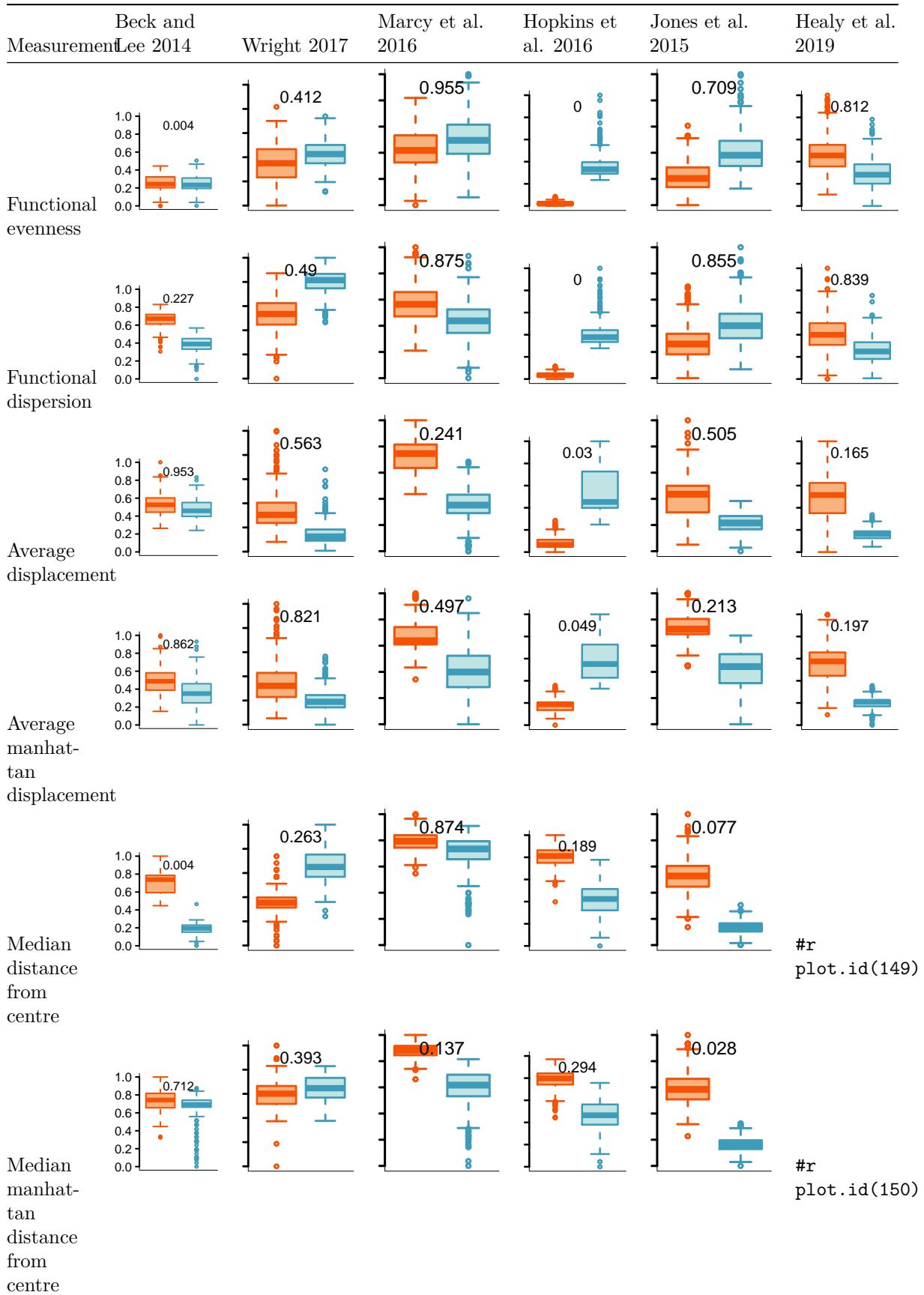
## Empirical results (all measurements)











Beck and Measuremen	Lee 2014	Marcy et al. Wright 2017	2016	Hopkins et al. 2016	Jones et al. 2015	Healy et al. 2019
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