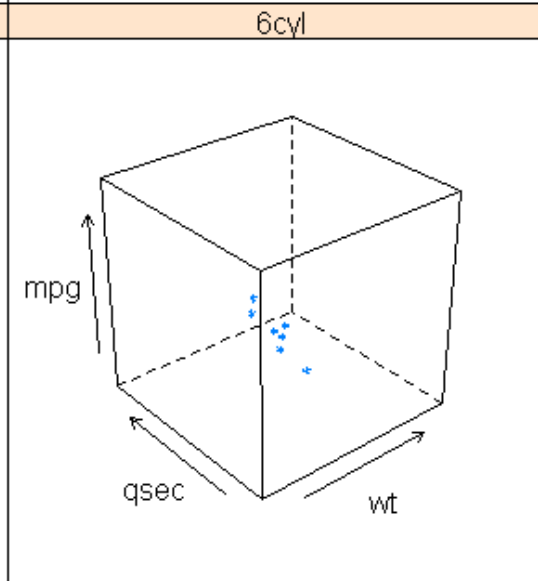
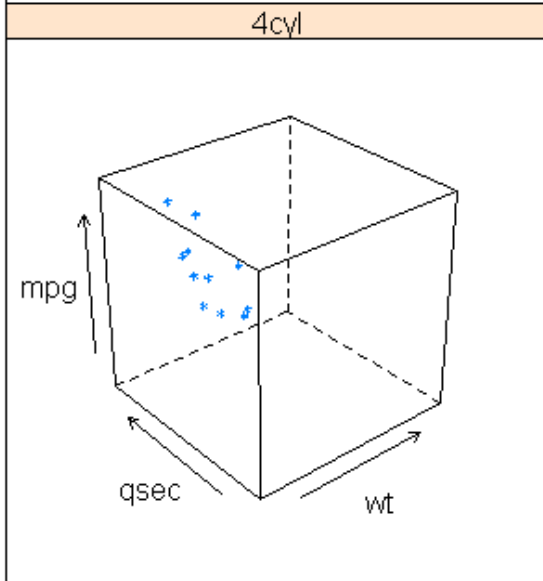
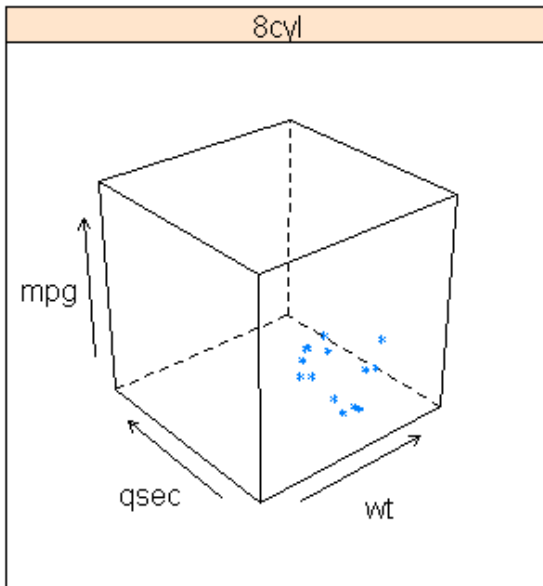


3D Scatterplot by Cylinders

Practical Session on Visualization Tools I Lattice Graphs

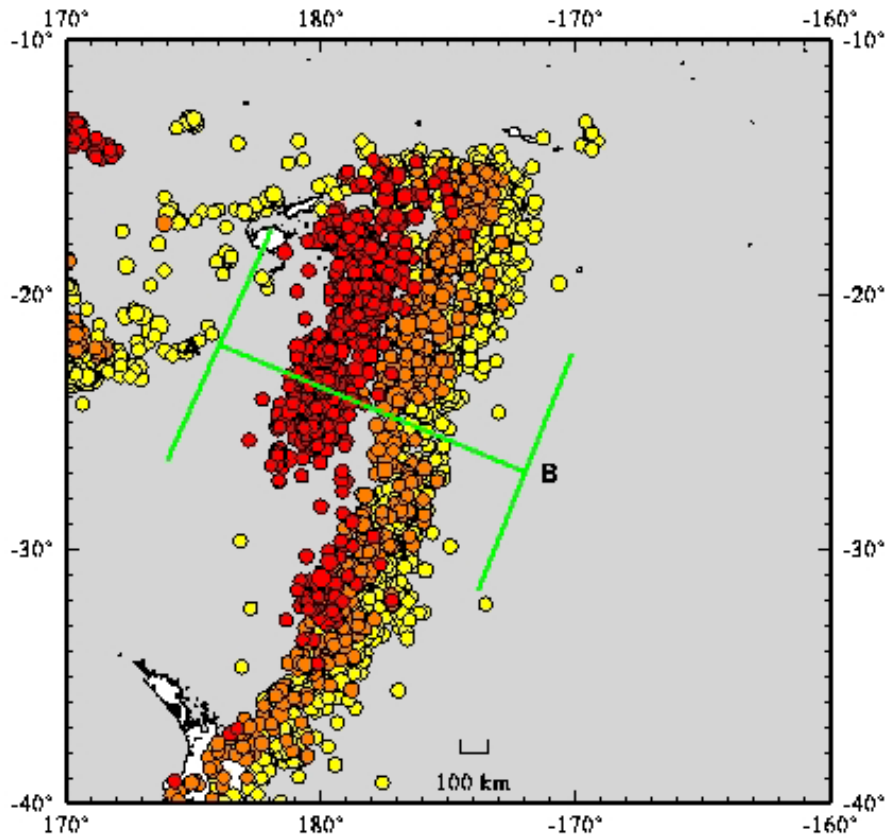


Lattice package by
Deepayan Sarkar

Trellis plots

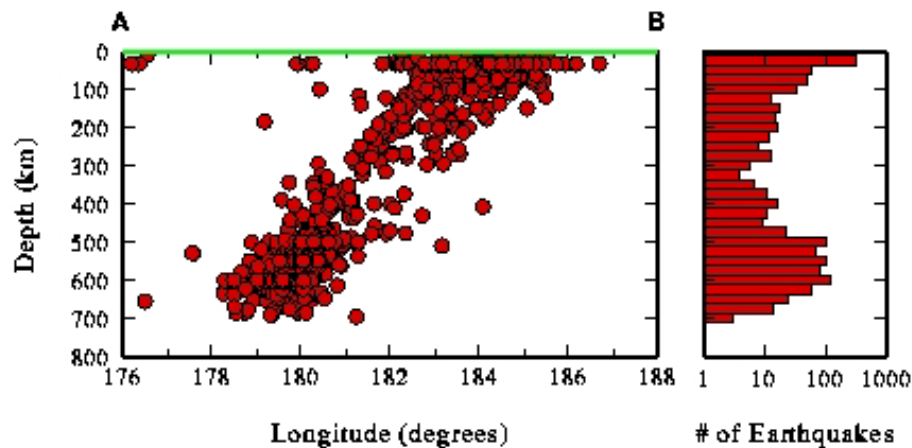
- For better visualizing multivariate data sets
- *Trellis* is used to describe the layout often being rectangular array of plots, like a garden trellis
- Often referred as *Trellis* plots or *Crossplots*
- In R, package *Lattice* was written by Deepayan Sarkar, a reimplementations of Bell Lab's Trellis system
- *Trellis* plots emphasizes on the idea of **conditioning** (on numeric intervals or categorical levels)

Tonga



Tonga Trench Earthquakes

Yellow: 0 — 70 km
 Orange: 71 — 300 km
 Red: 300 — 800 km.



Example made by the
 Geology department at
 Berkeley

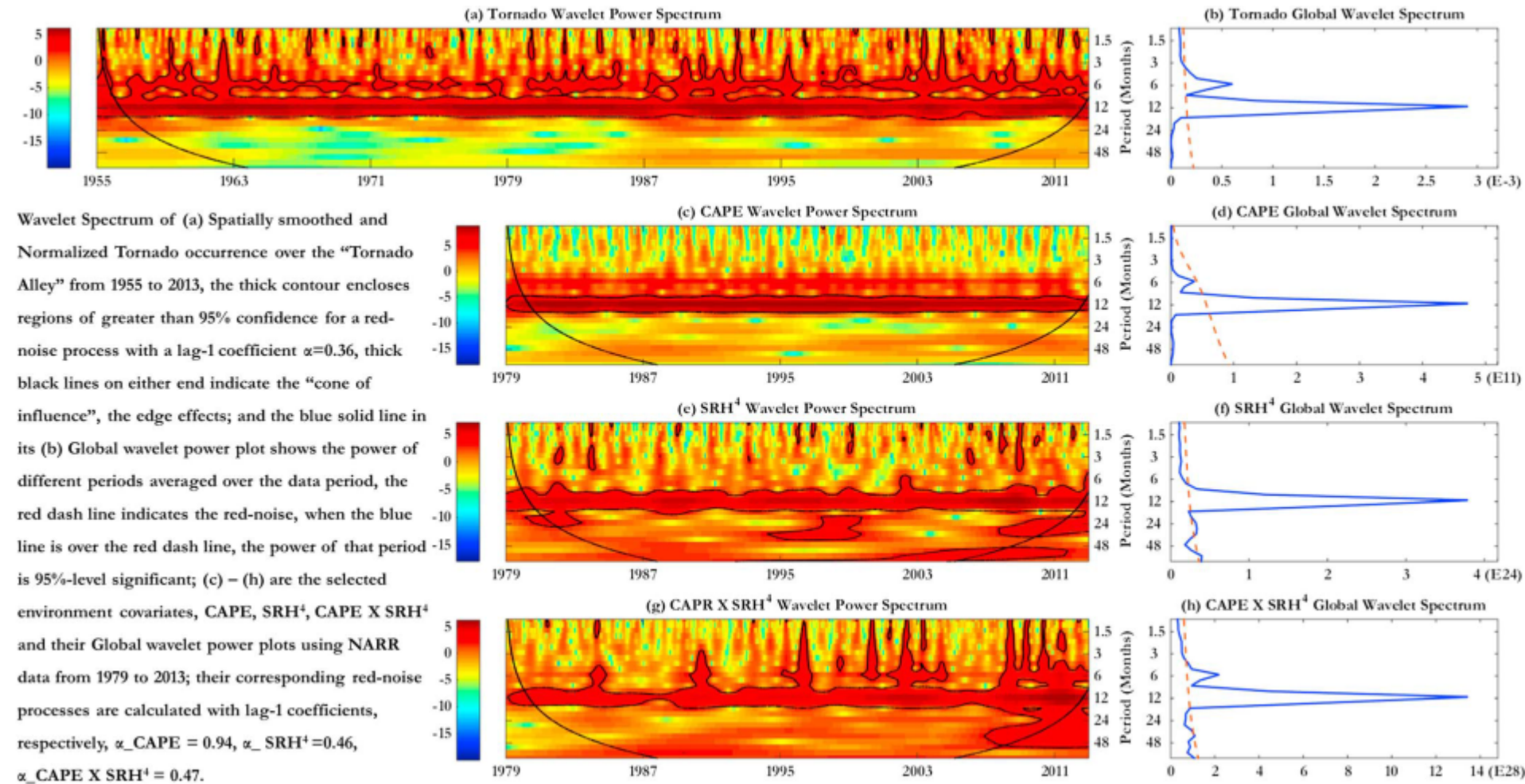
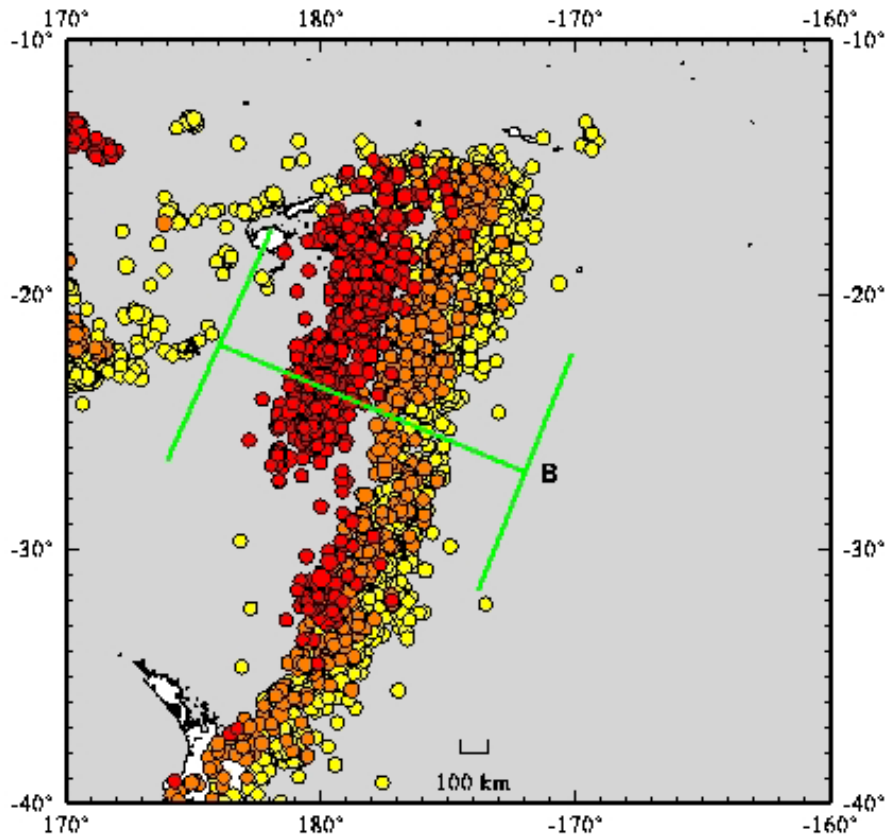


Figure. (a–h) Wavelet spectra of tornado and selected environment covariates and their global wavelet power averaged over data periods.

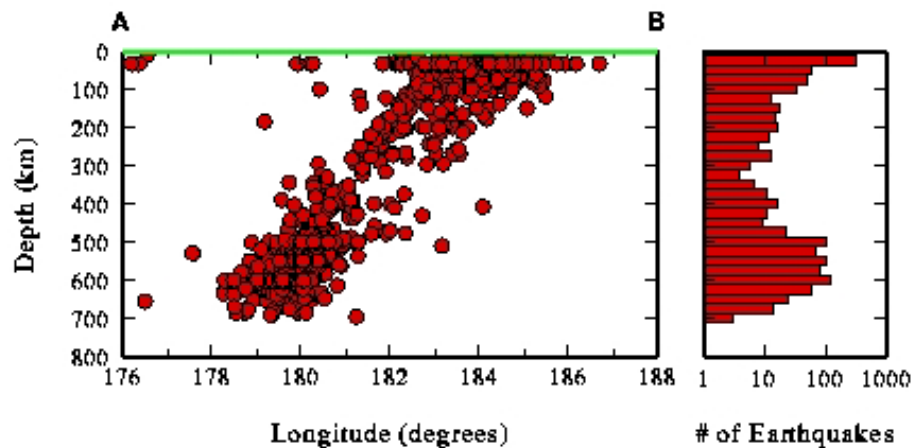
Tonga



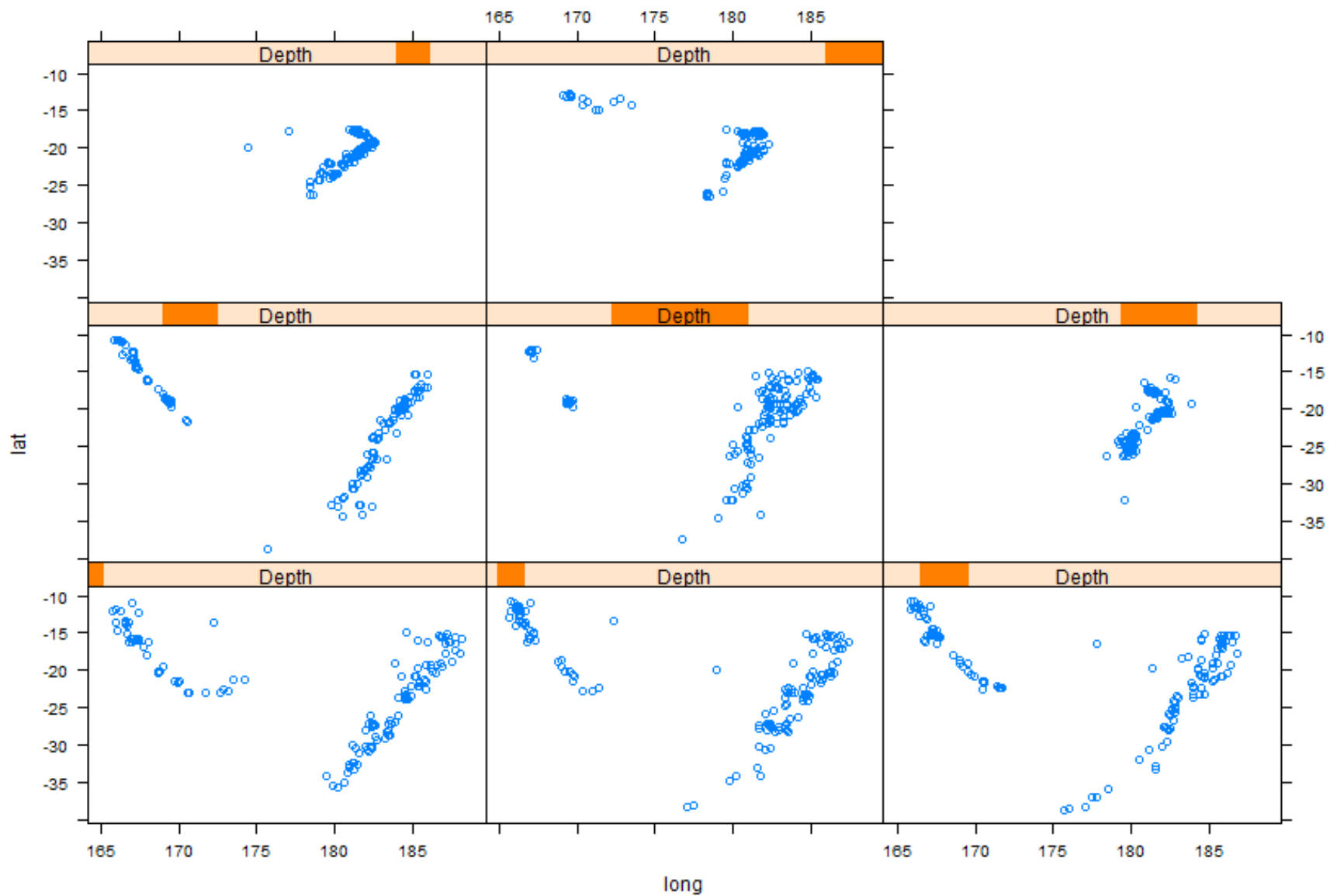
A way to improve?

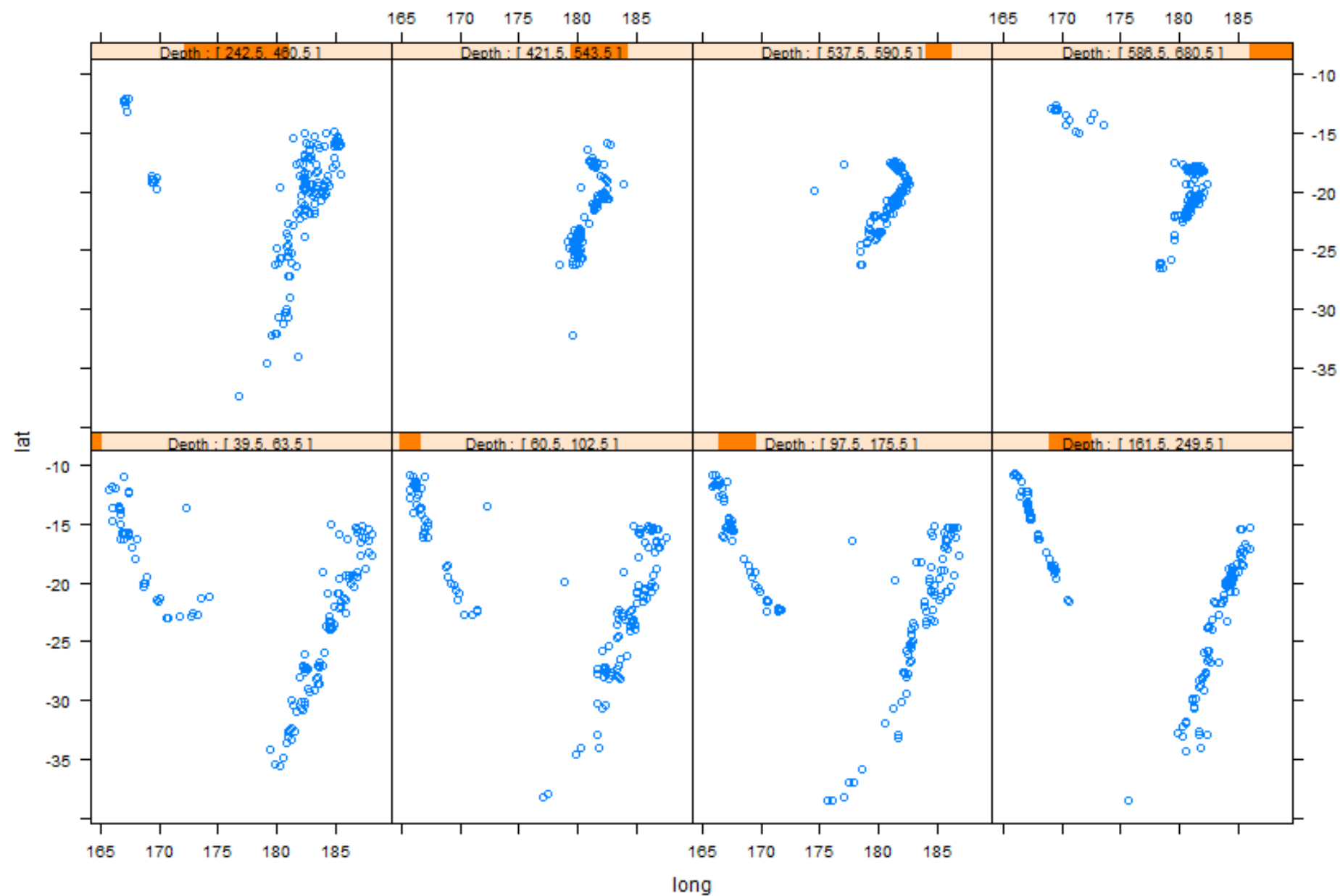
Tonga Trench Earthquakes

Yellow: 0 — 70 km
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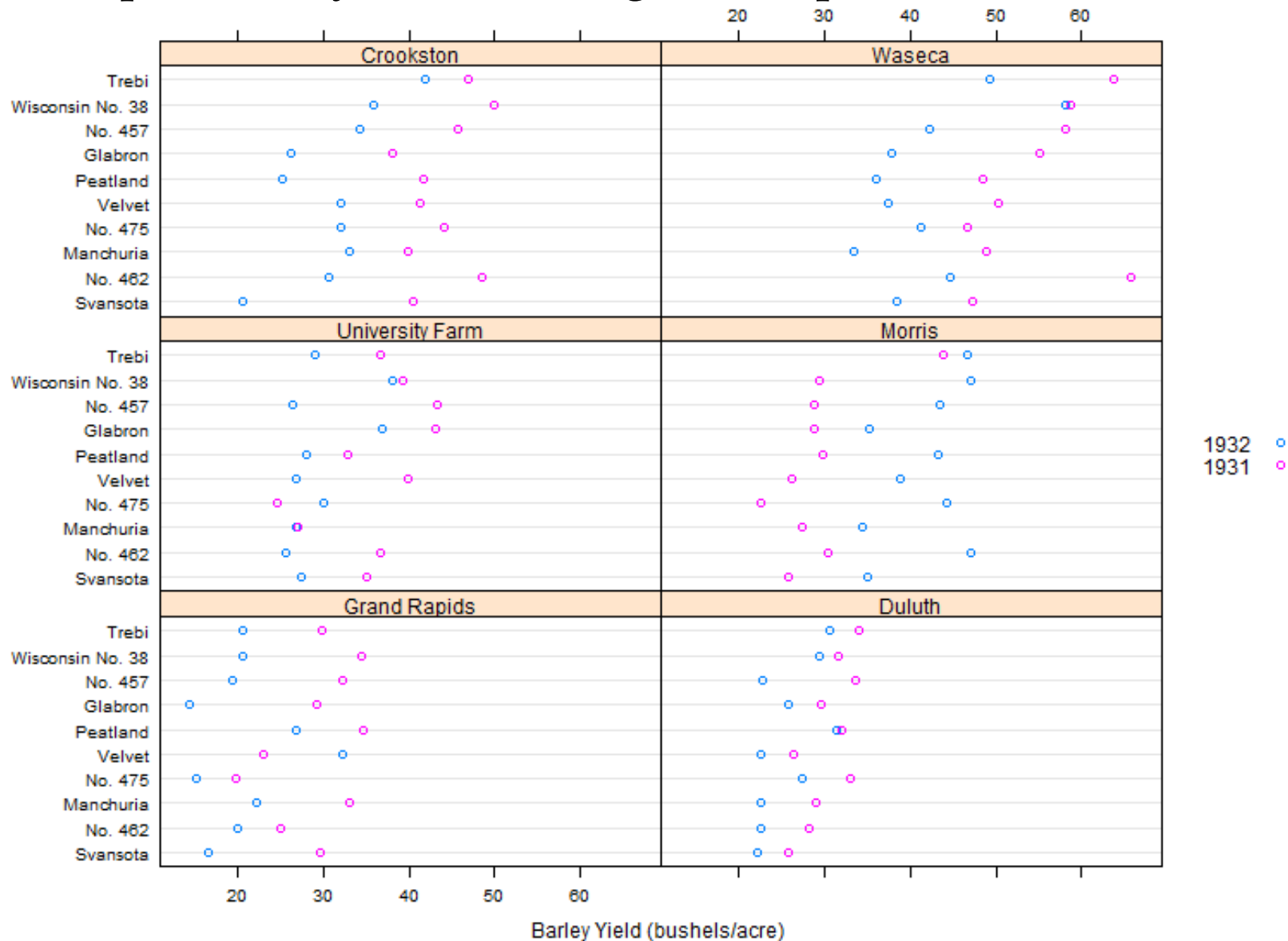


Example made by the
 Geology department at
 Berkeley



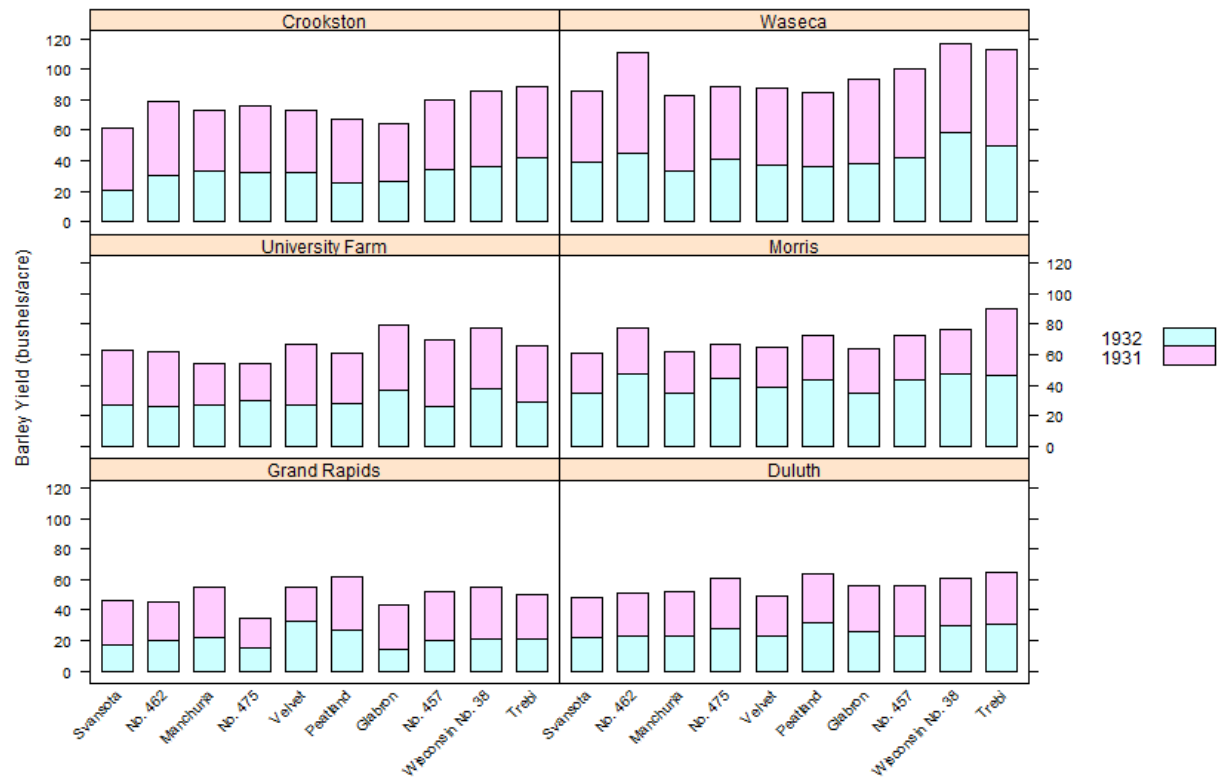


Example: Barley Yields using Trellis plot



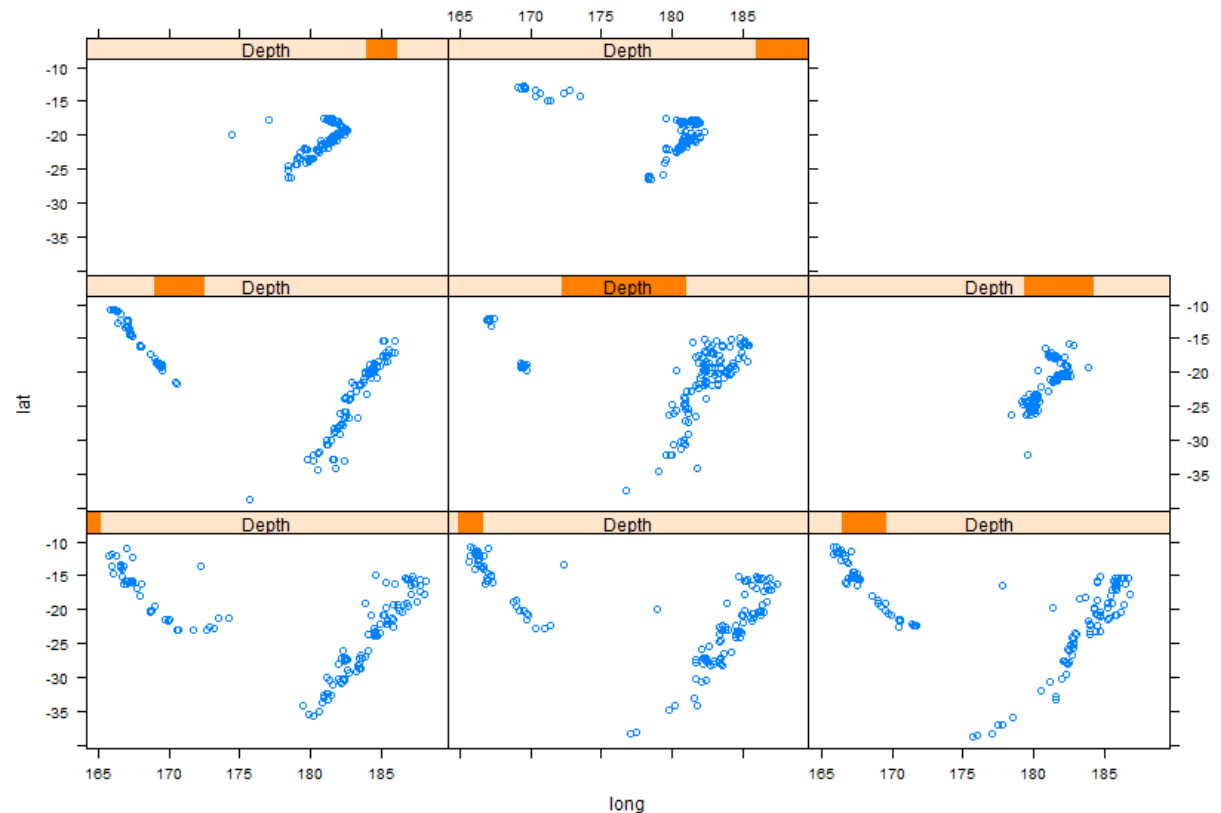
A collection of Trellis plots

- Bar Charts
- Dot Charts
- Box & Whisker Plots
- Histograms
- Density Traces
- QQ Plots
- Scatter Plots



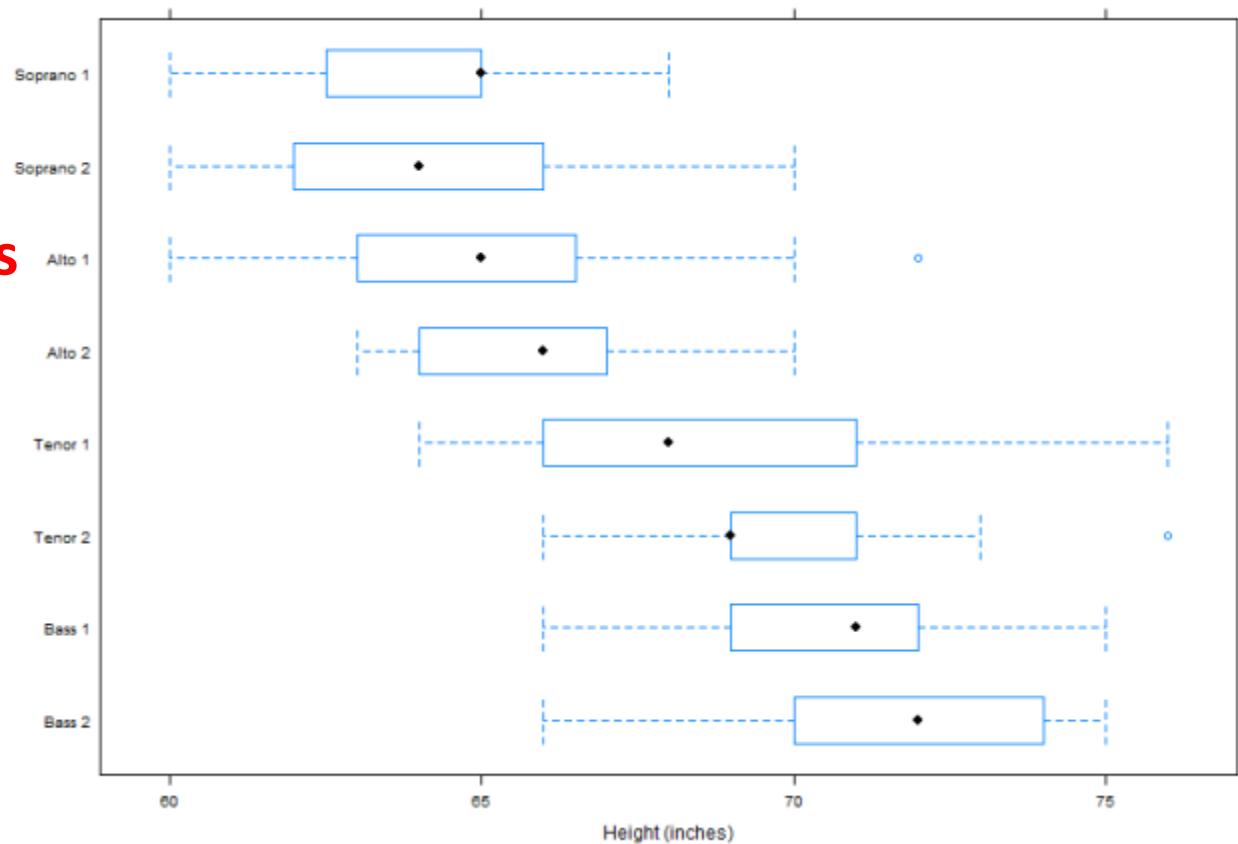
A collection of Trellis plots

- Bar Charts
- **Dot Charts**
- Box & Whisker Plots
- Histograms
- Density Traces
- QQ Plots
- Scatter Plots



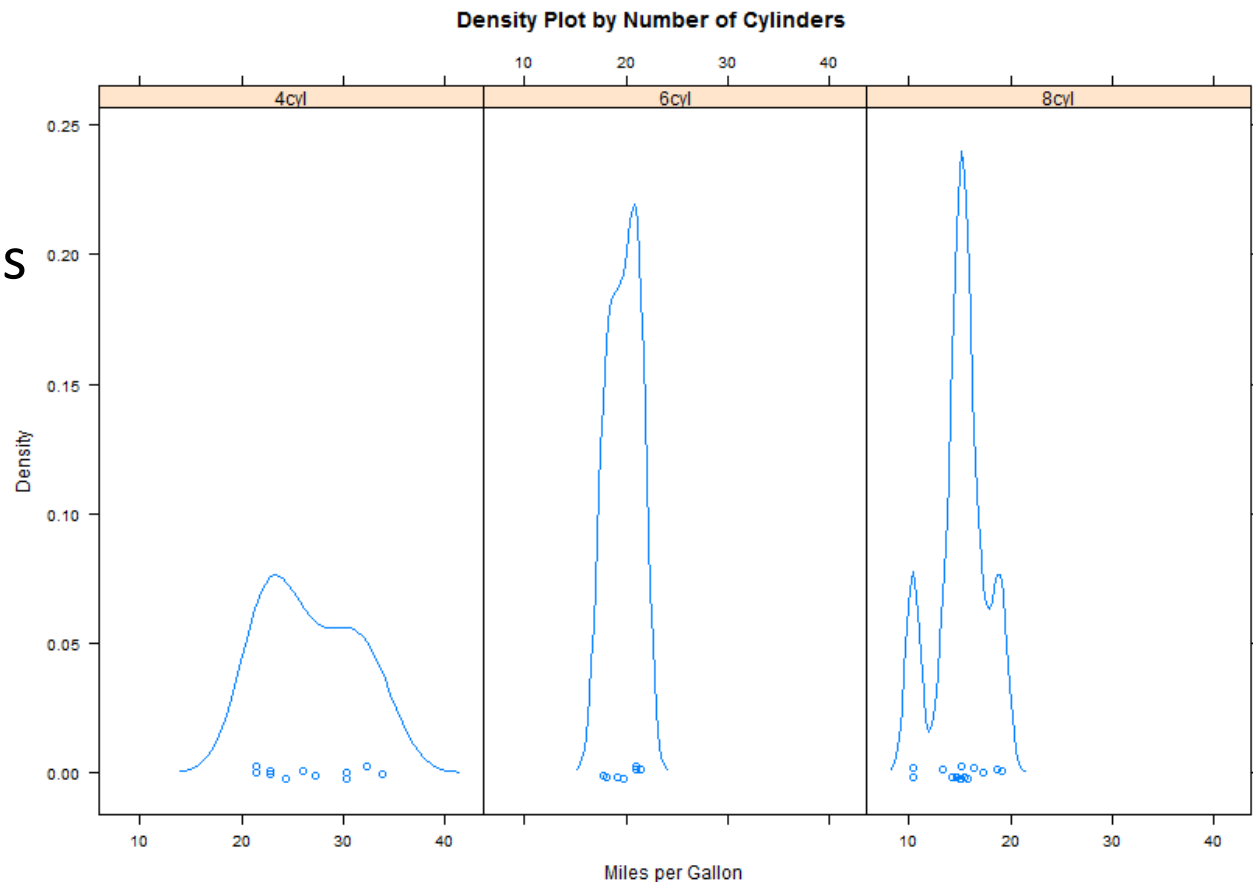
A collection of Trellis plots

- Bar Charts
- Dot Charts
- **Box & Whisker Plots**
- Histograms
- Density Traces
- QQ Plots
- Scatter Plots



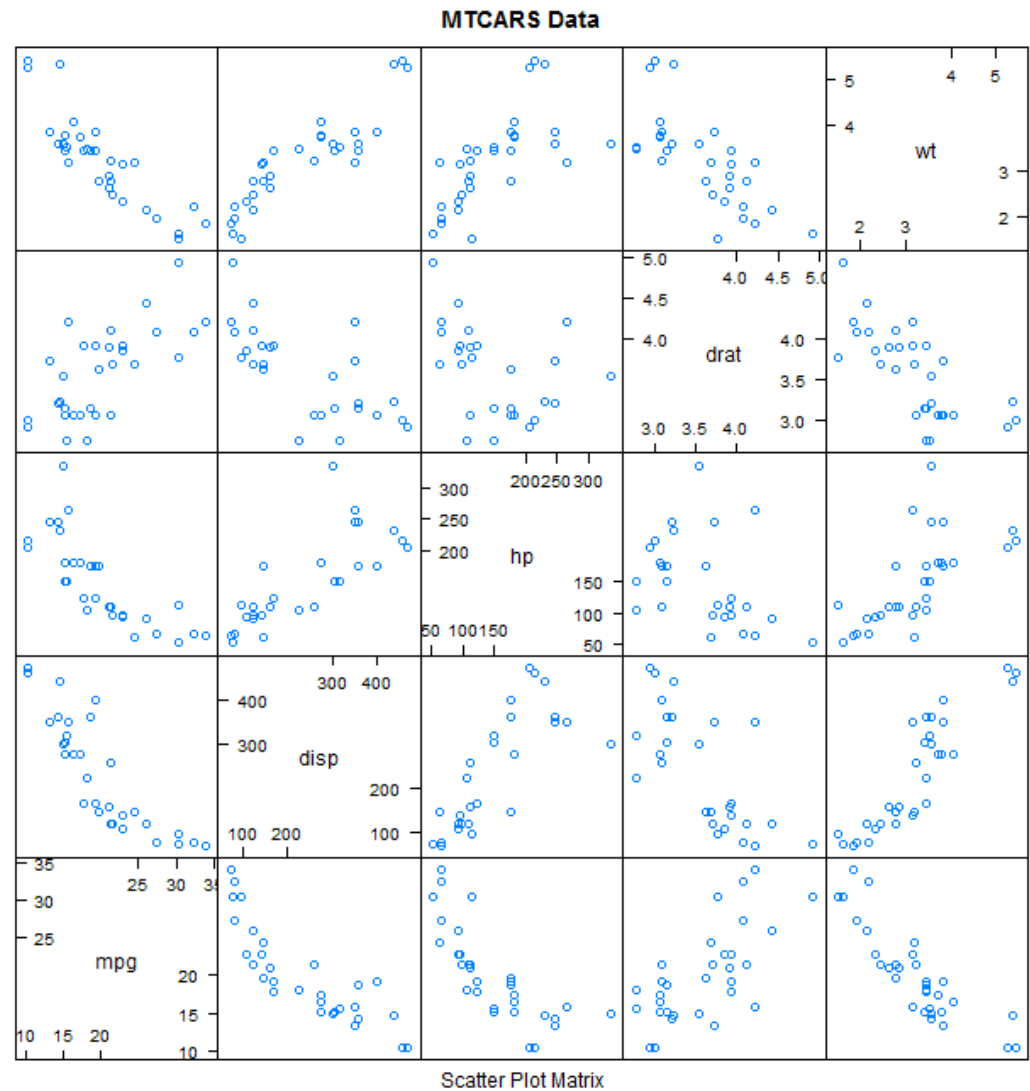
A collection of Trellis plots

- Bar Charts
- Dot Charts
- Box & Whisker Plots
- **Histograms**
- **Density Traces**
- QQ Plots
- Scatter Plots



A collection of Trellis plots

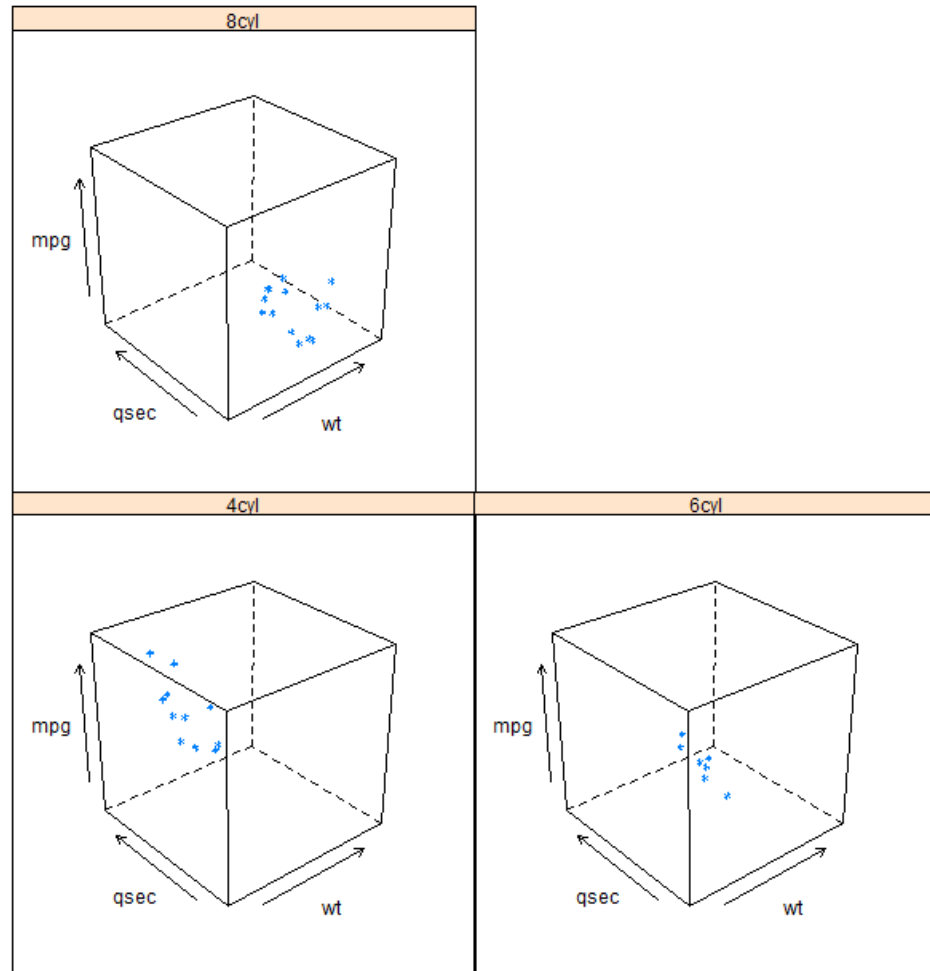
- Bar Charts
- Dot Charts
- Box & Whisker Plots
- Histograms
- Density Traces
- QQ Plots
- **Scatter Plots**



A collection of Trellis plots

- Bar Charts
- Dot Charts
- Box & Whisker Plots
- Histograms
- Density Traces
- QQ Plots
- **Scatter Plots**

3D Scatterplot by Cylinders

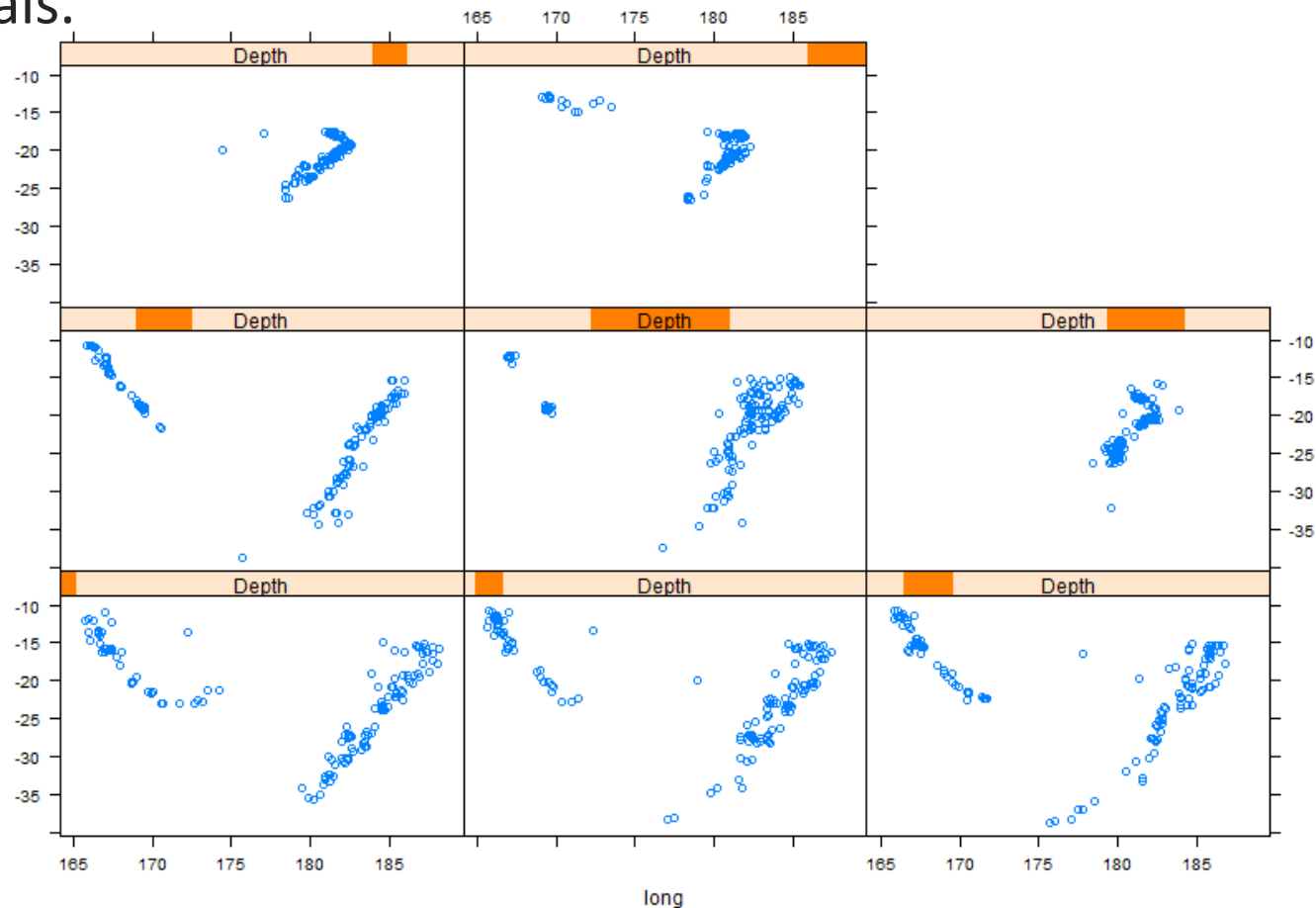


Shingles

The conditioning is described by a shingle, consisting a number of overlapping intervals.

```
depth = quakes  
$depth
```

```
Depth =  
equal.count(depth,  
number=8,  
overlap=.1)
```

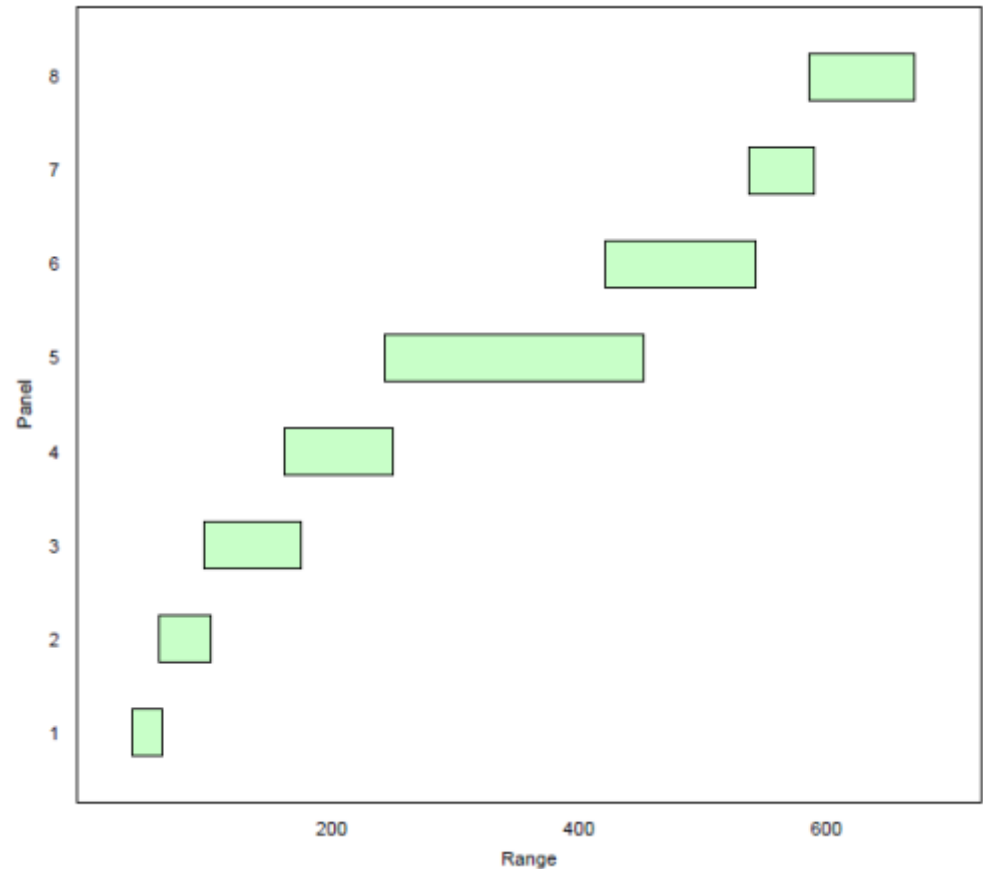


Shingles

A shingle contains the original values with the attached information.

```
> range(Depth)
[1] 40 680
> range(depth)
[1] 40 680

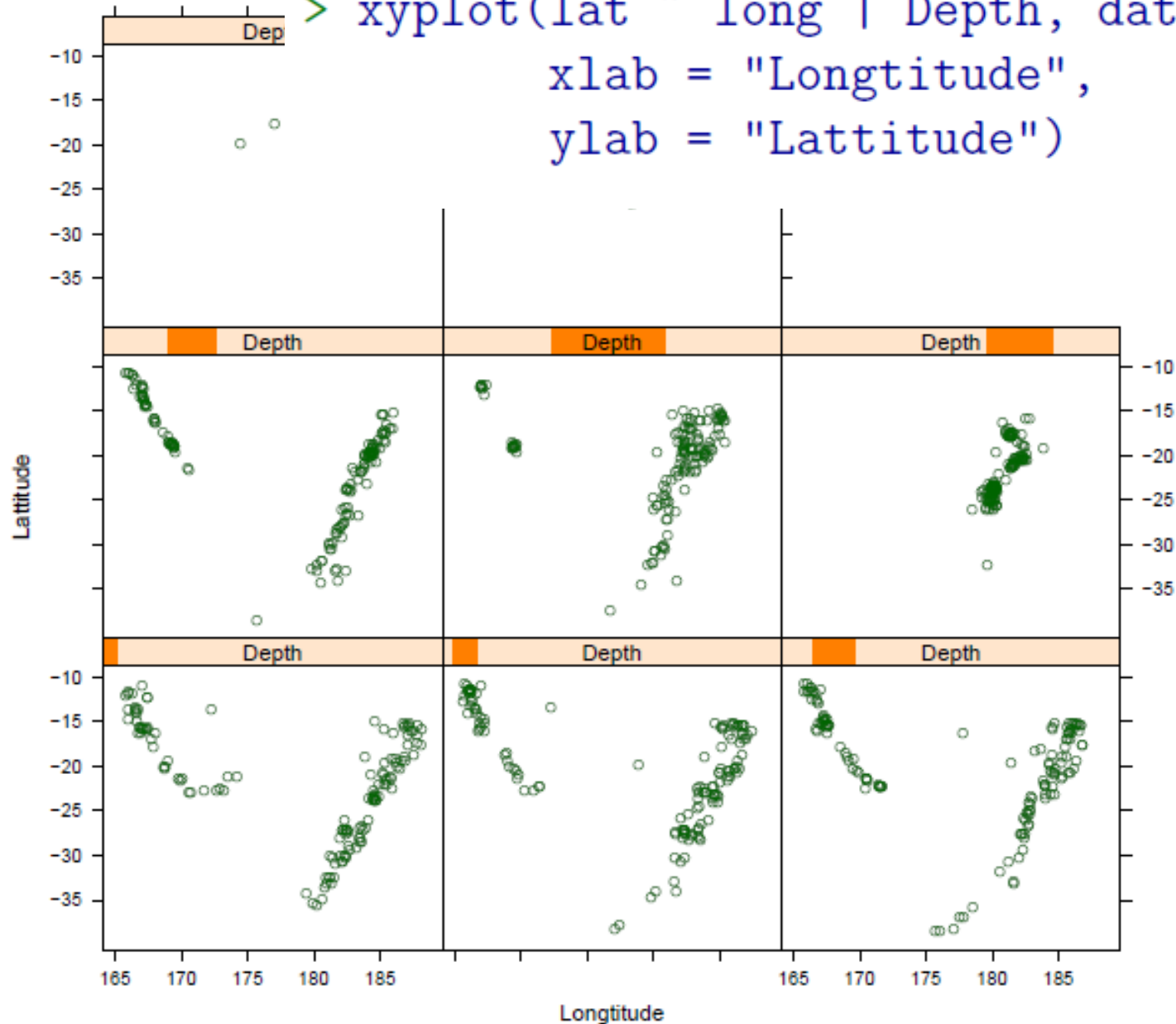
> plot(Depth)
```



Display the “*Earthquakes*” using `xyplot()`

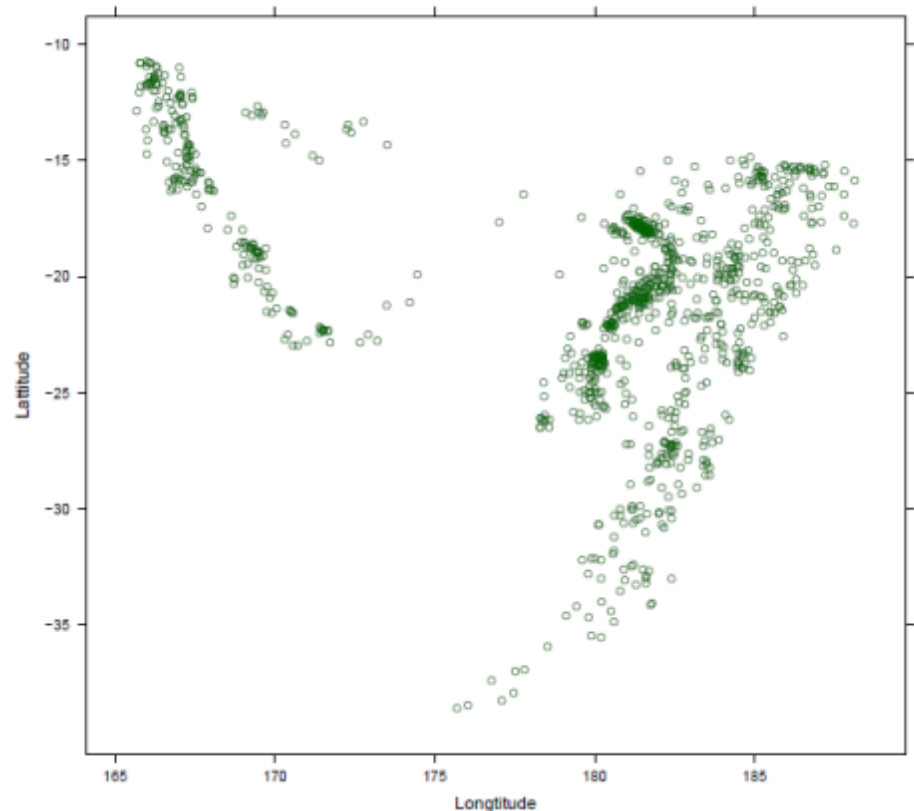
```
> Depth = equal.count(quakes$depth,  
                        number = 8,  
                        overlap = .1)  
> xyplot(lat ~ long | Depth, data = quakes,  
          xlab = "Longitude",  
          ylab = "Latitude")
```

```
> xyplot(lat ~ long | Depth, data = quakes,  
          xlab = "Longitude",  
          ylab = "Latitude")
```



xyplot() can do unconditional plots too

```
> xyplot(lat ~ long, data = quakes,  
         xlab = "Longitude",  
         ylab = "Latitude")
```



Trellis plot with multiple categorical variables

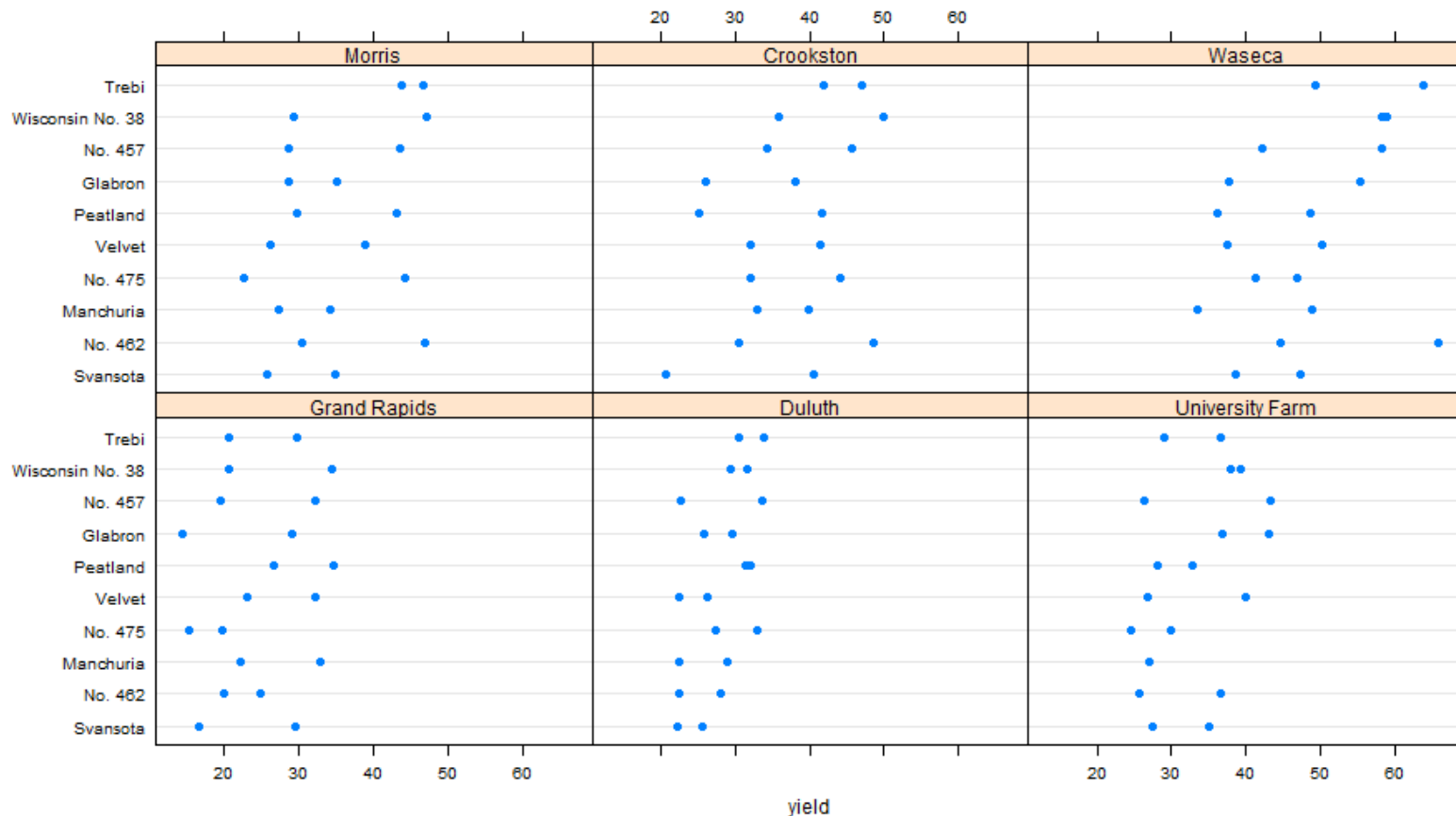
Example: The Barley Yield at University Farm, St. Paul, MN

`data(barley)` available in R

- `dotchart` is used to make trellis plot with multiple categorical and numeric variables
- Some variables of the barley data
 1. Barley yield (`yield`) – numeric
 2. Seed strain (`variety`) – categorical
 3. Growing site (`site`) – categorical
 4. Year (`year`) – although numeric, but only 1931, 1932, can be treated as categorical

Step-by-step I

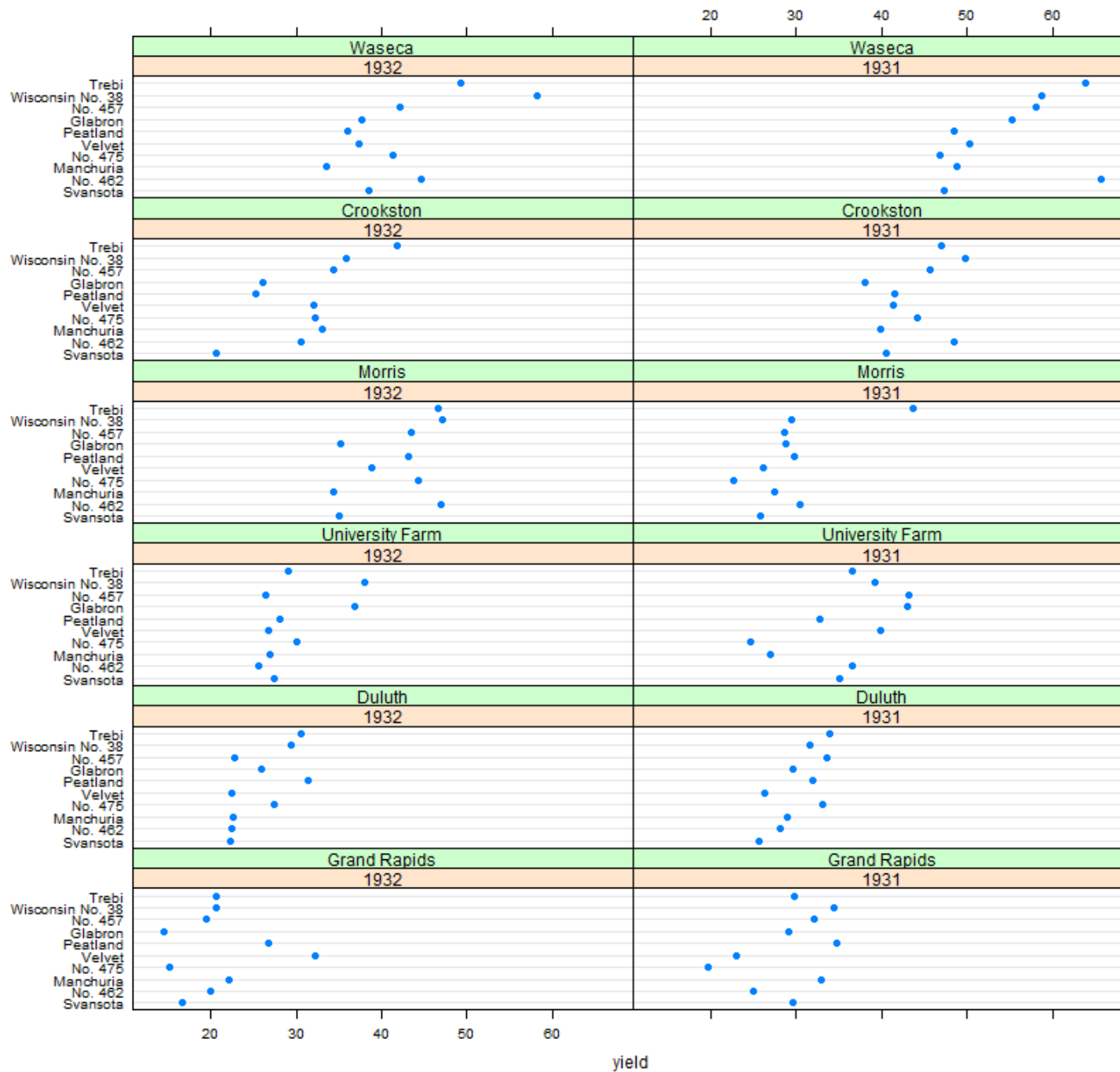
```
dotplot(variety ~ yield | site, data = barley)
```



Step-by-step II

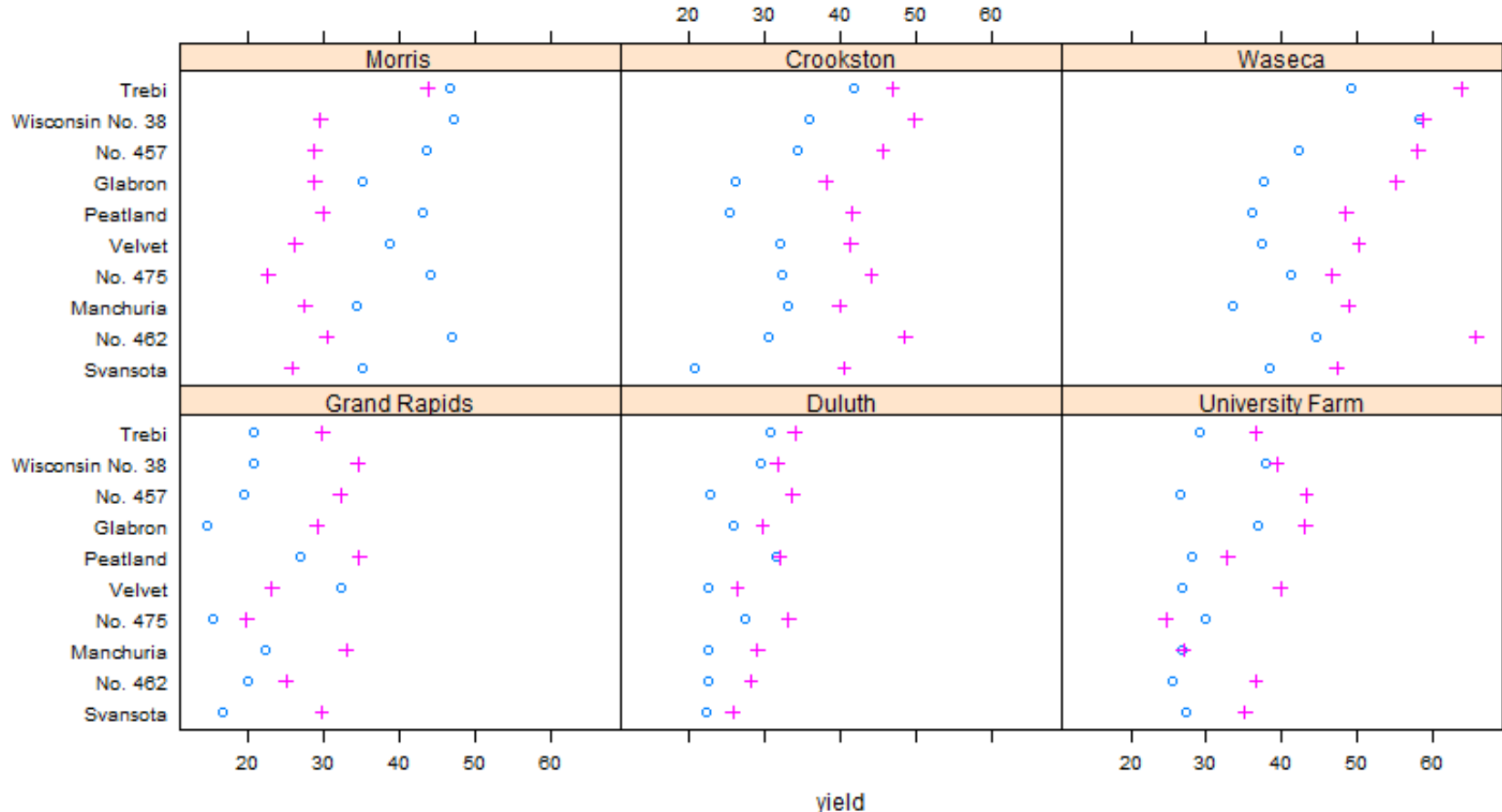
```
dotplot(variety ~ yield | site * year, data = barley)
```

Now conditional on both site and year



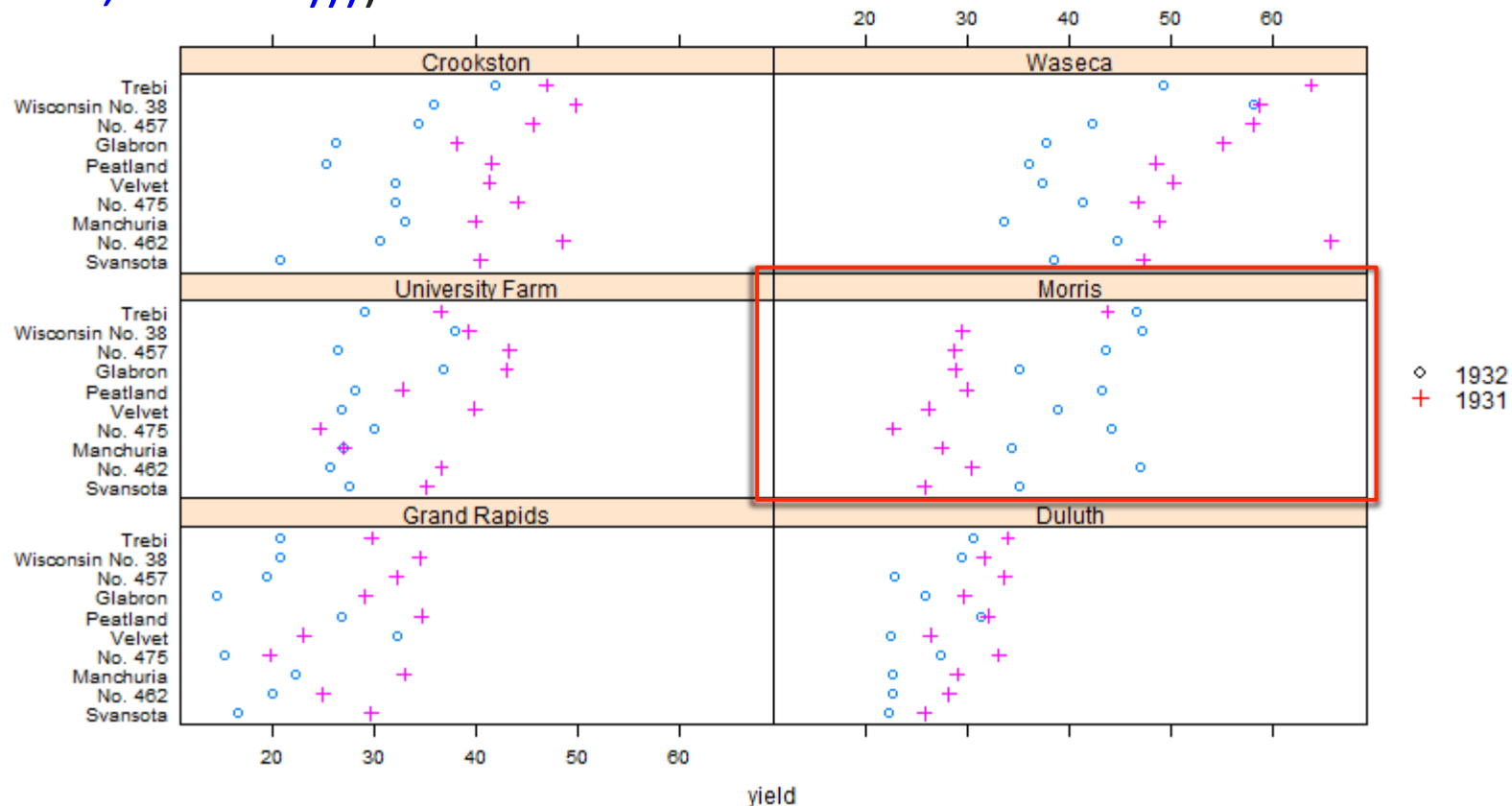
Step-by-step III


```
dotplot(variety ~ yield | site, data = barley, panel  
=panel.superpose, group = year, pch = c(1, 3))
```



Legend for different years, and some details

```
dotplot(variety ~ yield | site, data = barley, panel =  
panel.superpose, group = year, pch = c(1, 3), key = list(space =  
"right", transparent = TRUE, points = list(pch = c(1, 3), col = 1:2), text  
= list(c("1932", "1931"))))
```





Two ways to do the same plot, the main difference is how to specify “key=“

option 1

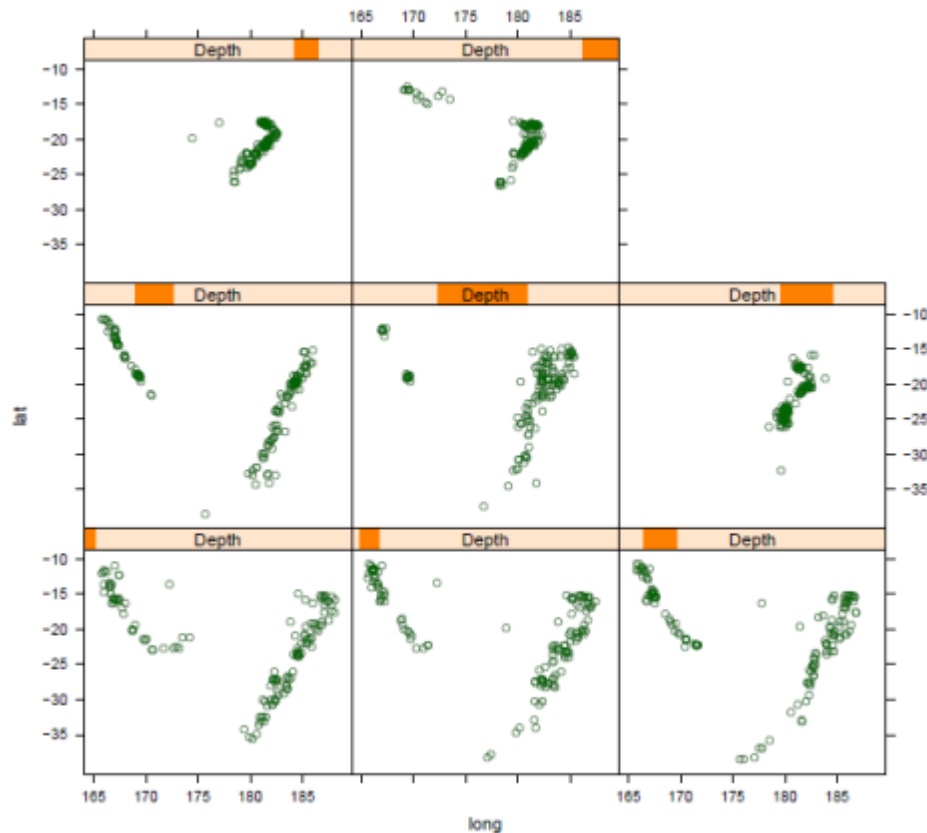
```
dotplot(variety ~ yield | site, data = barley, panel =  
panel.superpose, group = year, pch = c(1, 3), key = list(space =  
"right", transparent = TRUE, points = list(pch = c(1, 3), col =  
1:2), text = list(c("1932", "1931"))))
```

option 2

```
dotplot(variety ~ yield | site, data = barley, groups = year, key =  
simpleKey(levels(barley$year), space = "right"), xlab = "Barley  
Yield (bushels/acre) ", aspect=0.5, layout = c(2,3), ylab=NULL)
```

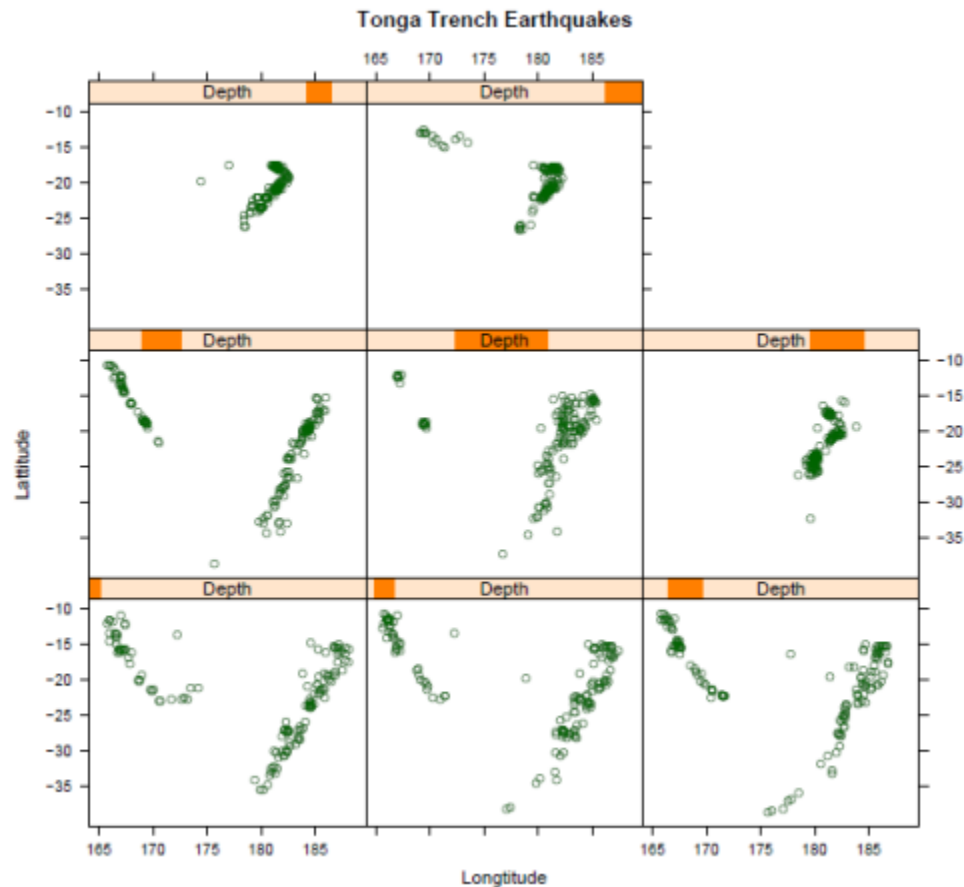
Color Scheme

```
trellis.par.set(theme = col.whitebg())  
xyplot(lat ~ long | Depth, data = quakes)
```



Title, Axis annotation

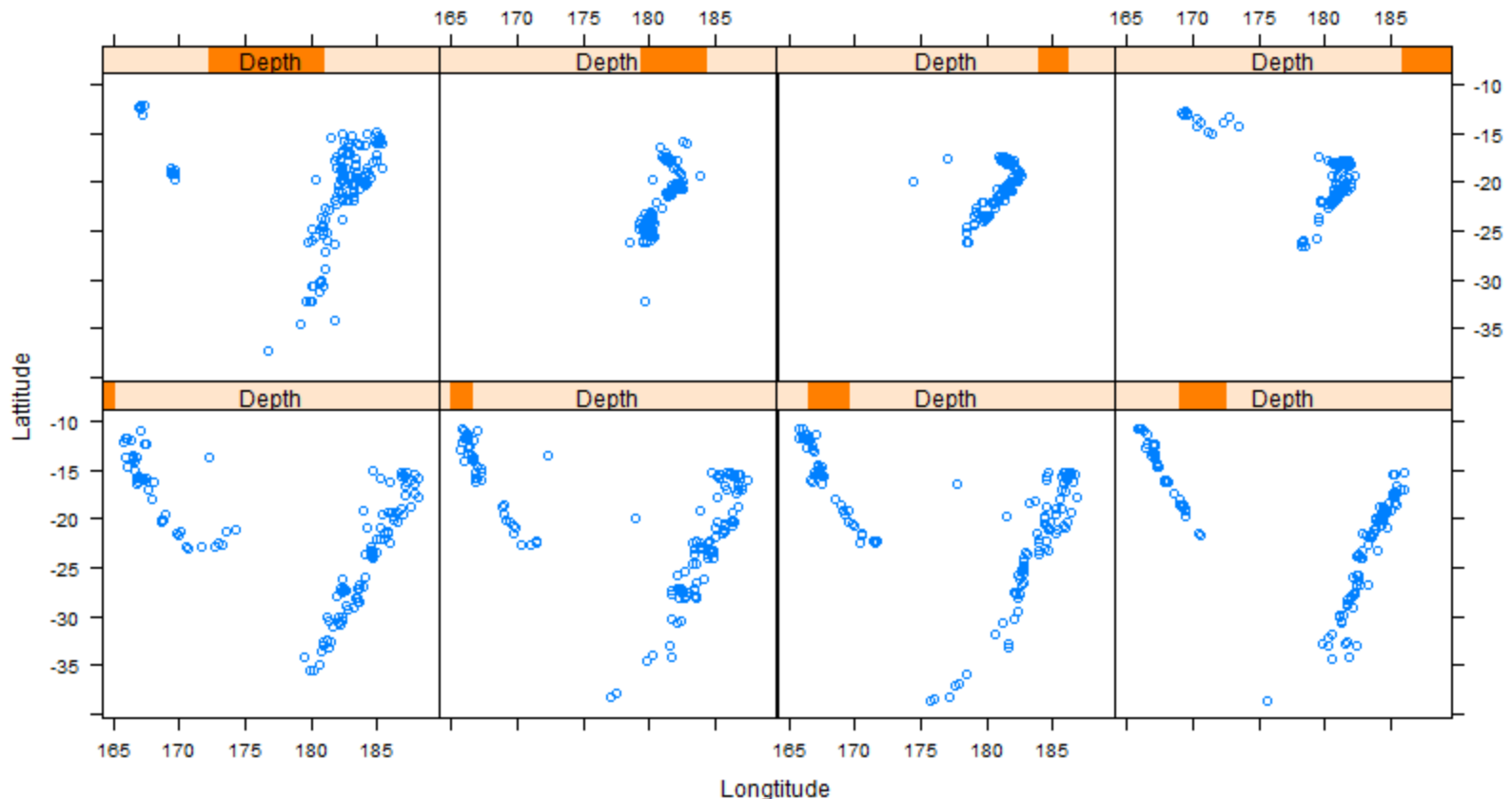
`xyplot(lat ~ long | Depth, data = quakes, main = "Tonga Trench Earthquakes", xlab = "Longitude", ylab = "Latitude")`



Change Layout

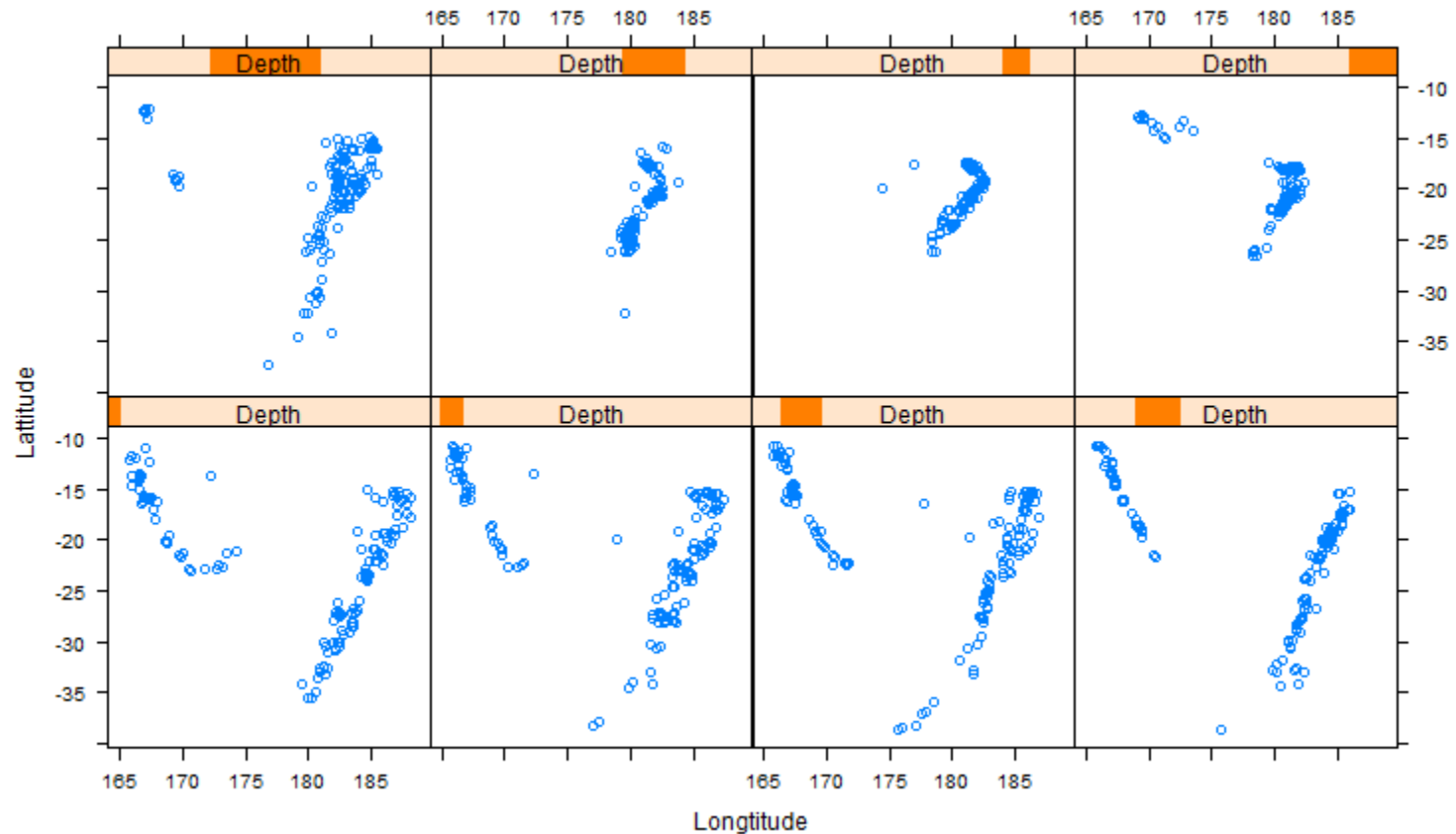
E.g. Rearrange the earthquake plot with 4 columns, 2 rows, 1 page layout: ...`layout = c(4, 2, 1)`...

```
xyplot(lat ~ long | Depth, data = quakes, layout = c(4, 2, 1), xlab = "Longitude", ylab = "Latitude")
```



Aspect Ratio

`xyplot(lat ~ long | Depth, data = quakes, aspect = 1, layout = c(4, 2, 1), xlab = "Longitude", ylab = "Latitude")`





Some example data for you to explore with Trellis

OrchardSprays

quakes

ethanol

iris

singer

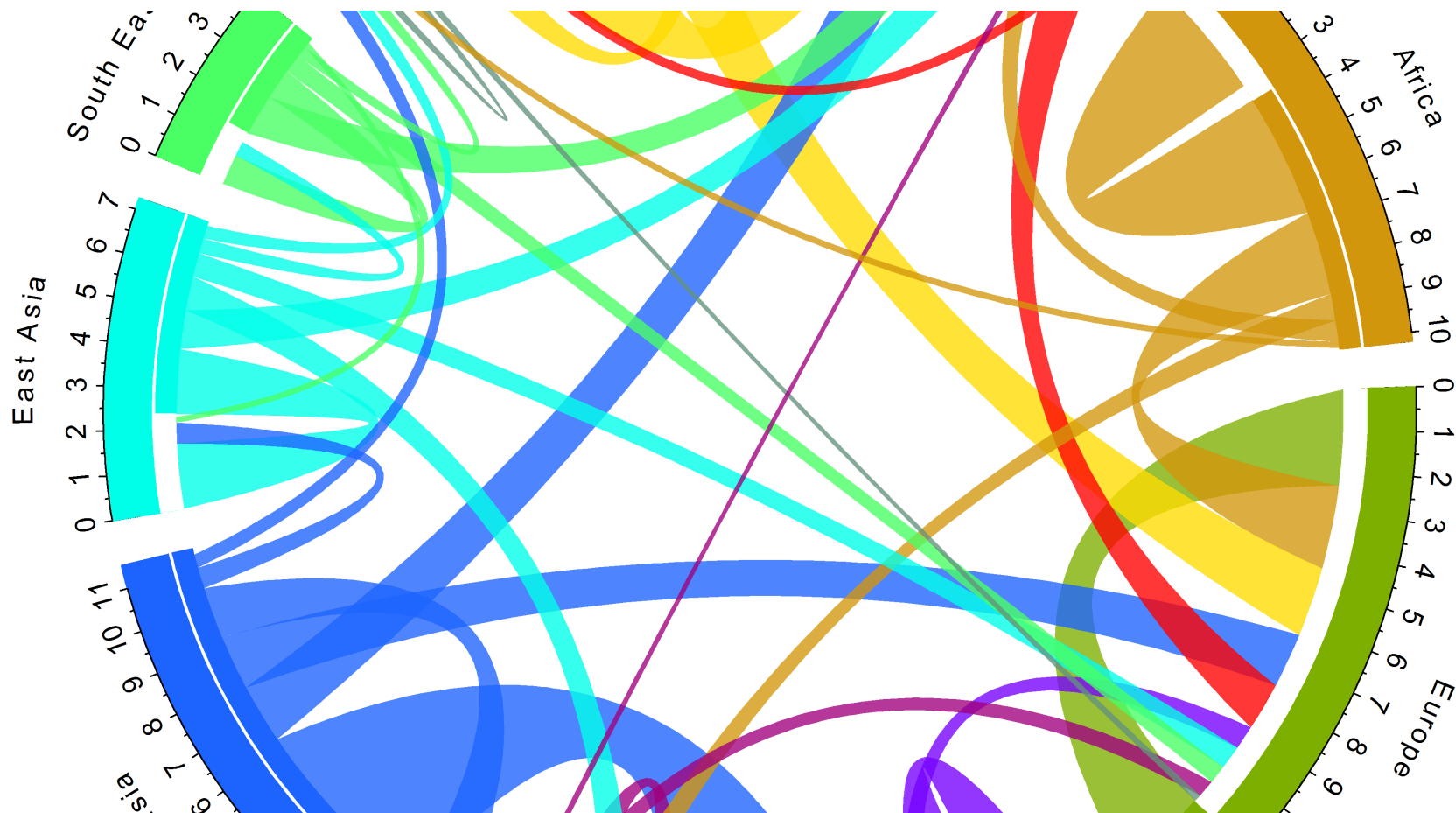
barley

states

grid

mtcars

VADeaths



Visualization II Circular plot

R package **circlize**

