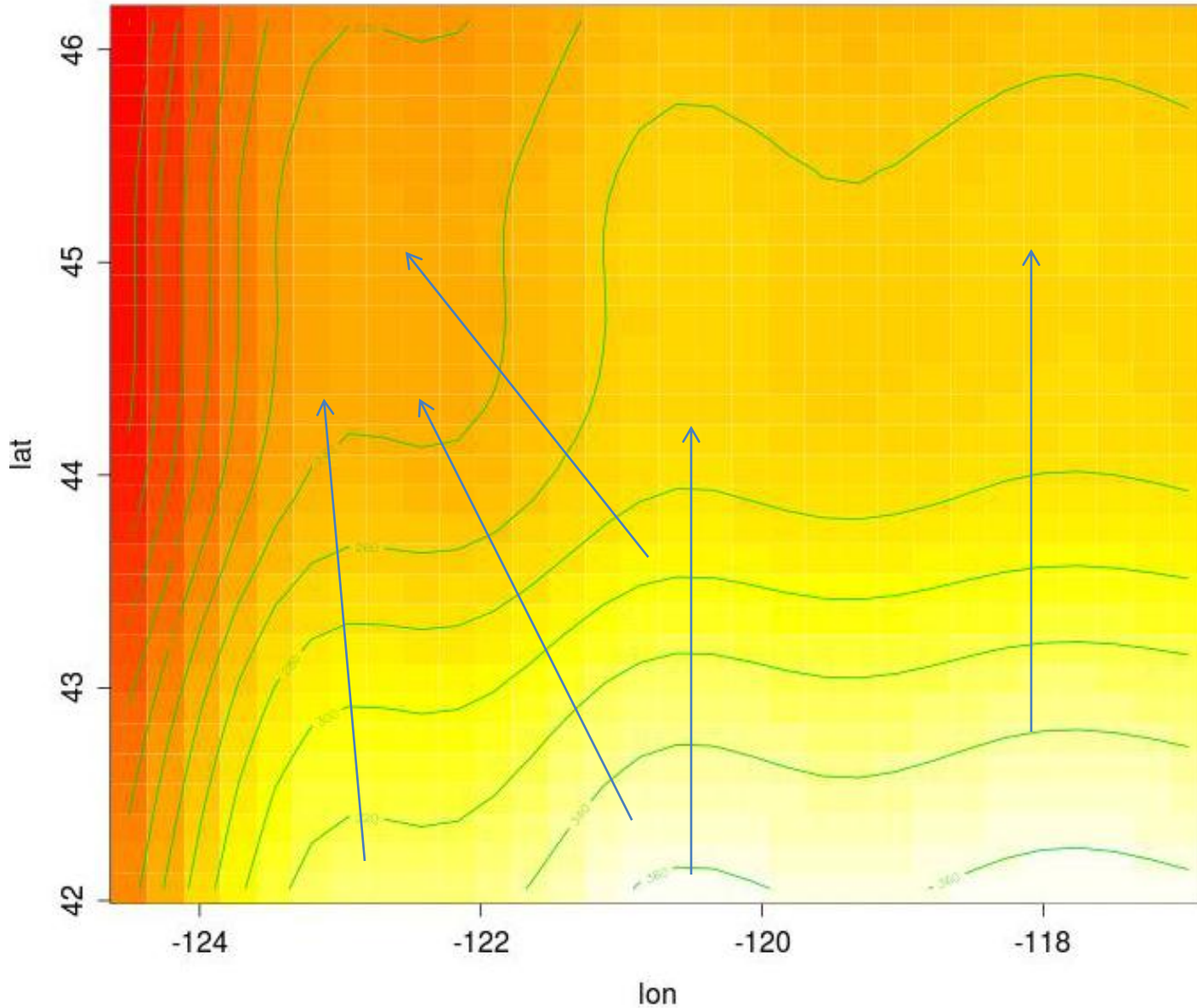


# **GAM INTERACTIONS**

## linear predictor

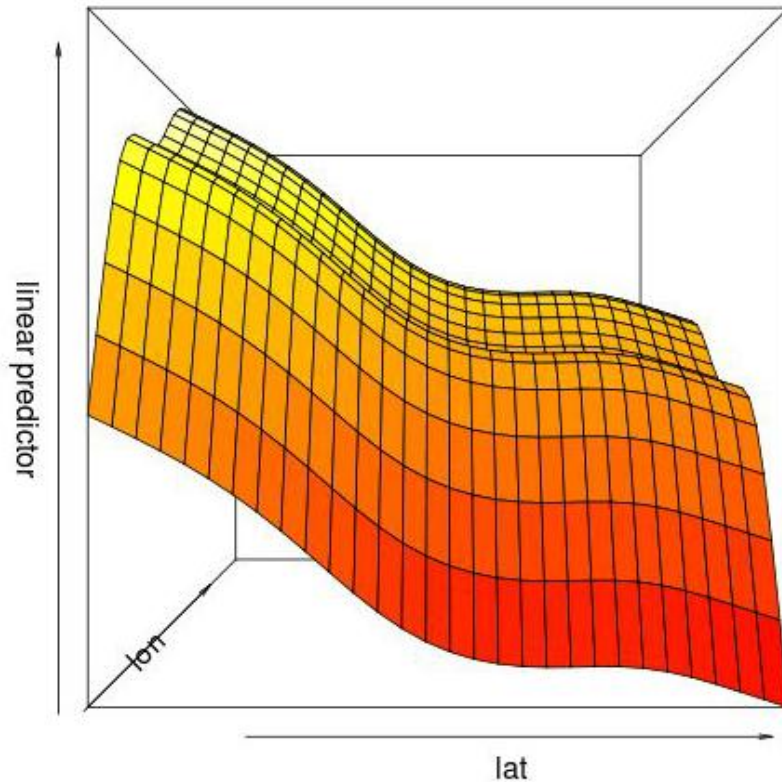


Detecting interaction:  
→  
Interactions are in the diagonal direction?

(Data values screened out)

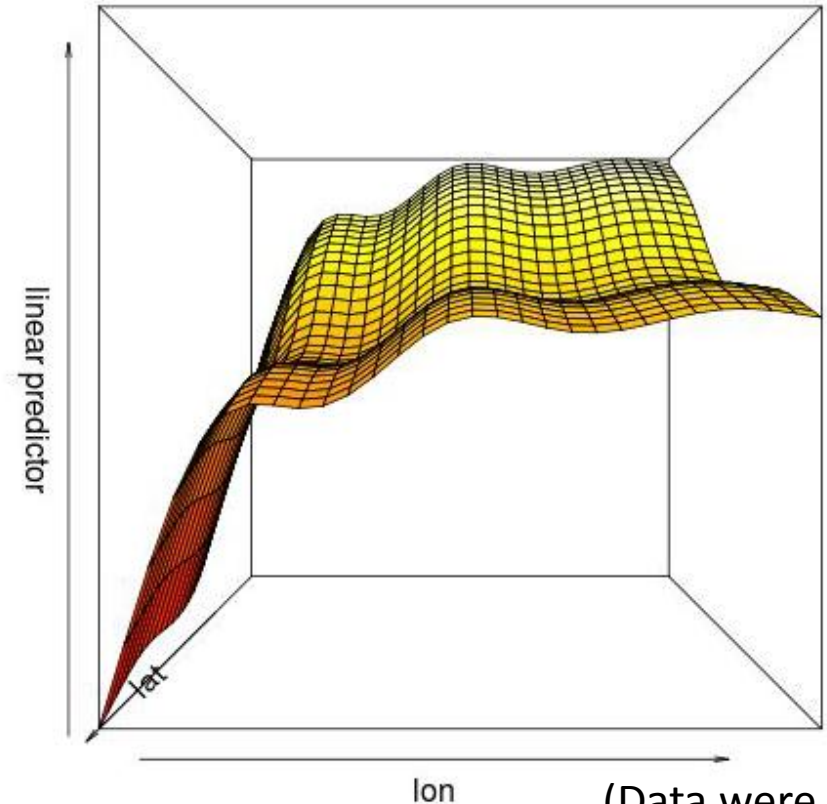
```
vis.gam(GAM_ANUSPLIN1,  
view=c("lon", "lat"), plot.type="contour", color="heat")
```

# LATITUDE AND ELEVATION INTERACTION



```
vis.gam(GAM_ANUSPLIN1,  
view=c("lat", "lon"), theta=0, phi=0)
```

When latitude increases  
tmax decreases: Ok

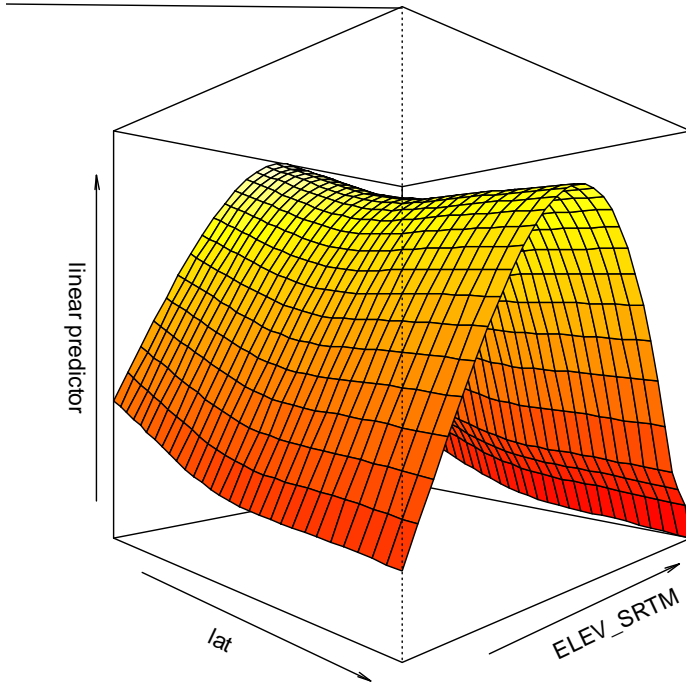


```
vis.gam(GAM_ANUSPLIN1,  
view=c("lat", "lon"), theta=90, phi=0)
```

(Data were  
screened out)

When longitude increases tmax  
increases? This means that when  
going East tmax increases  
(continental effect?)

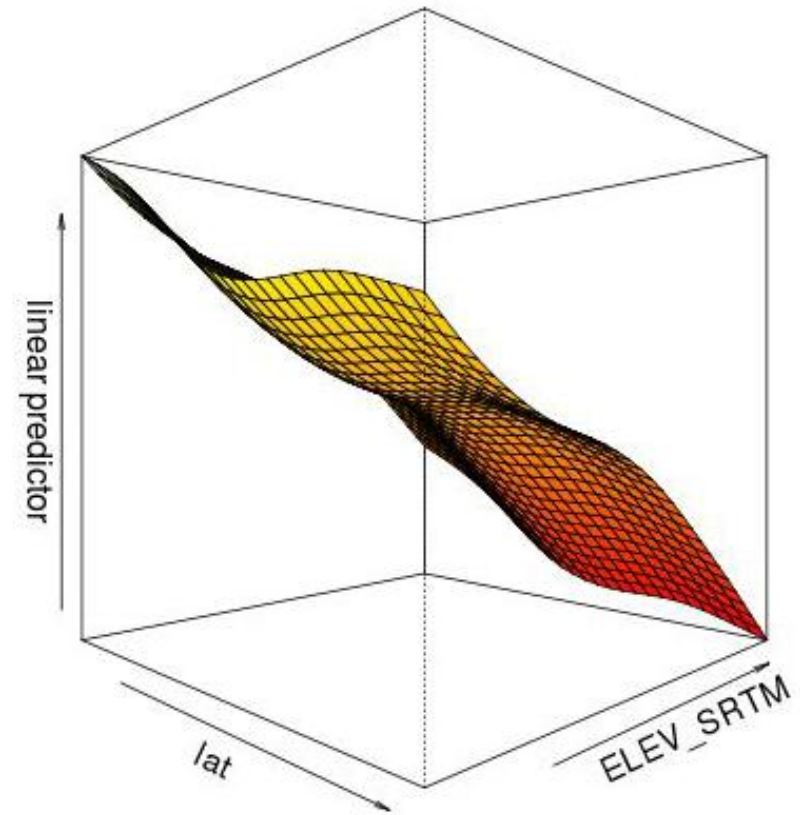
## LATITUDE AND ELEVATION INTERACTION



```
vis.gam(GAM_ANUSPLIN1,  
view=c("lat", "ELEV_SRTM"), plot.type  
="persp", cond=list(x0=42), theta=45,  
phi=0)
```

Before screening:

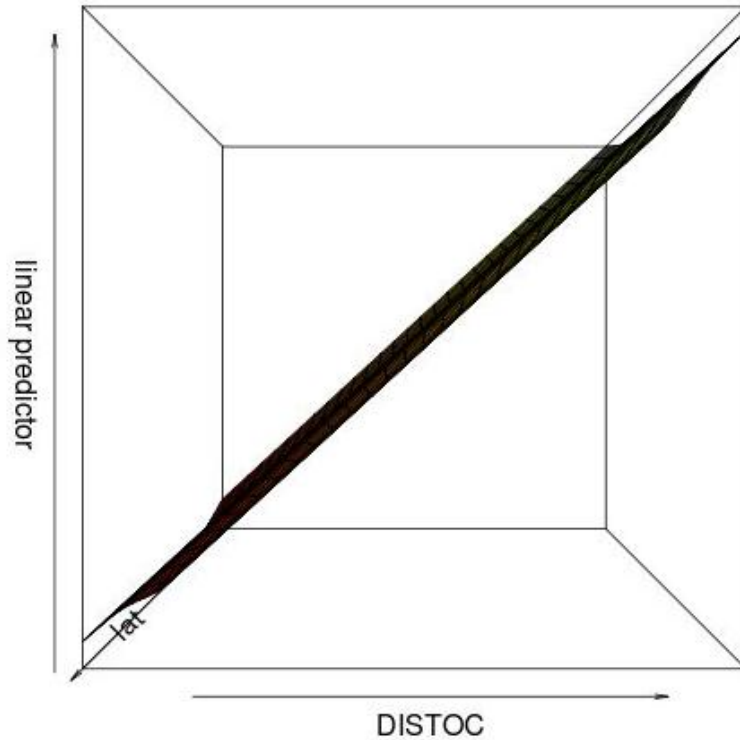
This the graph that alerted me that screening was necessary.



```
vis.gam(GAM_ANUSPLIN1,  
view=c("lat", "ELEV_SRTM"), plot.type  
="persp", cond=list(x0=42), theta=0, p  
hi=0)
```

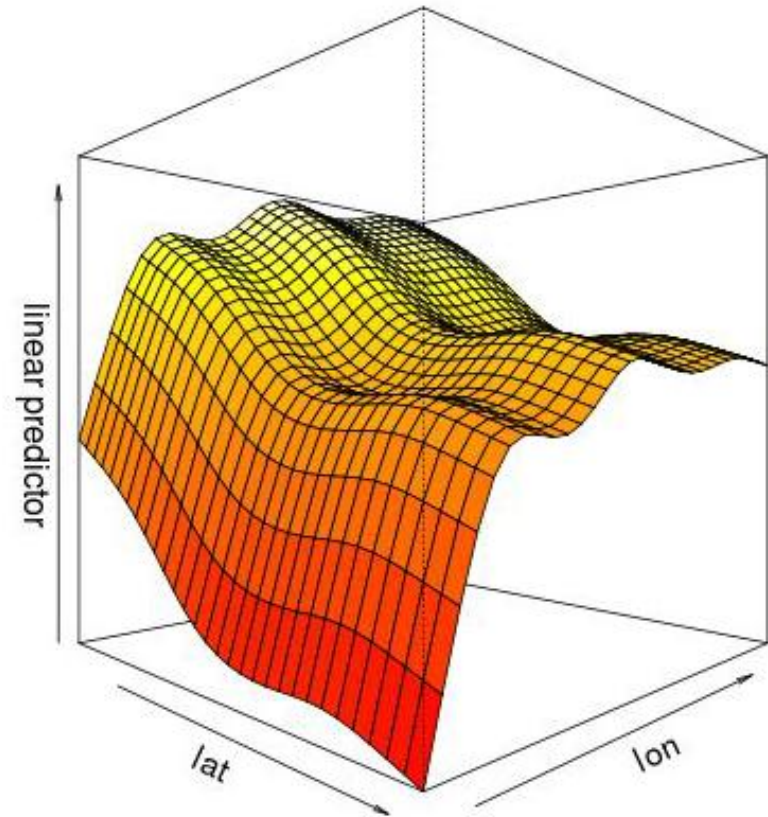
After screening: tmax decreases  
when elevation increases: ok

## DISTANCE TO OCEAN AND LAT-LONG



No interaction?

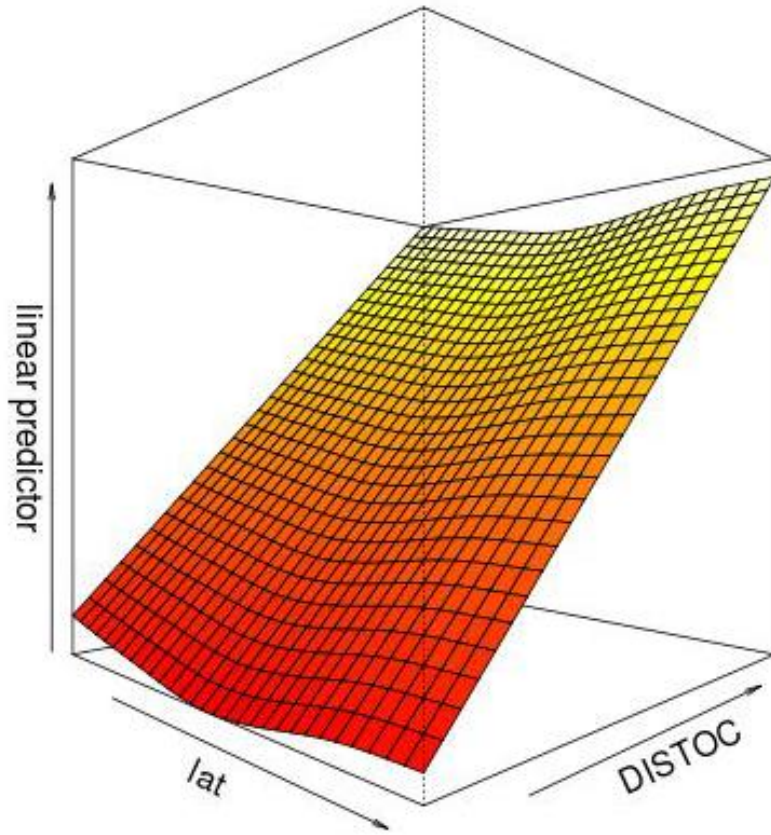
```
vis.gam(GAM_PRISM1,  
view=c("lat", "lon"), theta=90, phi=0)
```



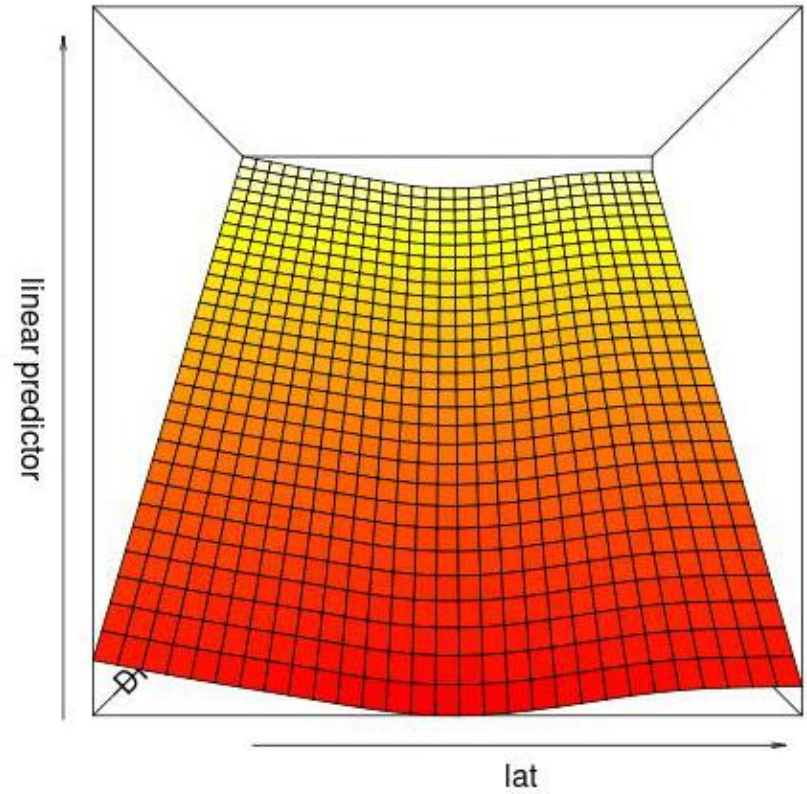
(Data values  
screened out)

```
vis.gam(GAM_ANUSPLIN1,  
view=c("lat", "lon"), plot.type="persp", theta=45,  
phi=0)
```

# LATITUDE AND DISTANCE TO OCEAN INTERACTION



`vis.gam(GAM_PRISM1, view=c("lat", "DISTOC"), theta=45, phi=0)`

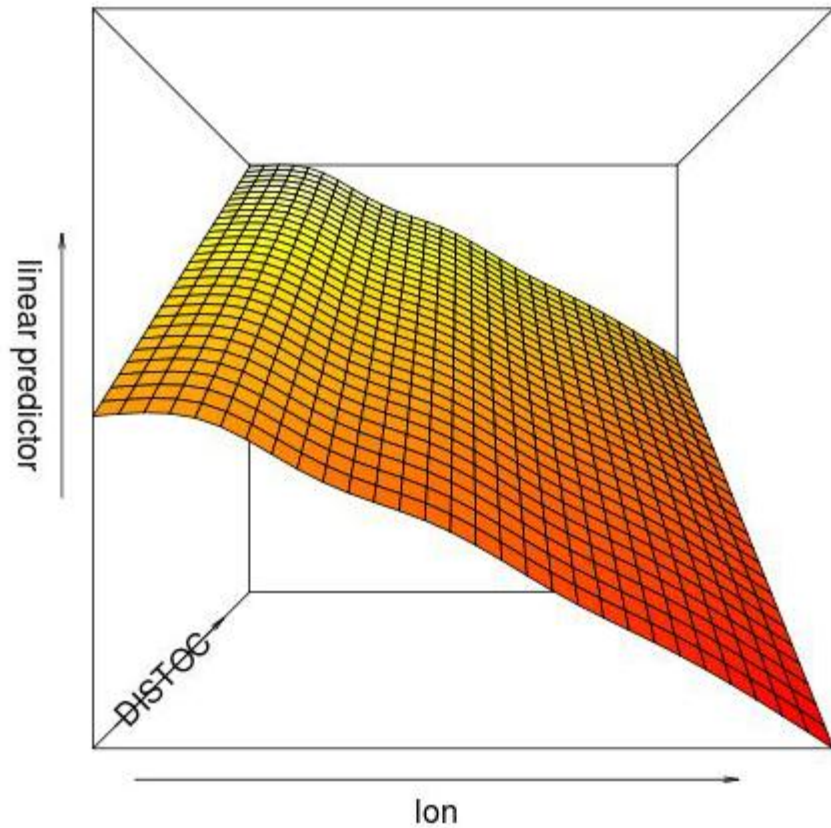


`vis.gam(GAM_PRISM1, view=c("lat", "DISTOC"), theta=0, phi=0)`

The effect of latitude is stronger away from the sea?

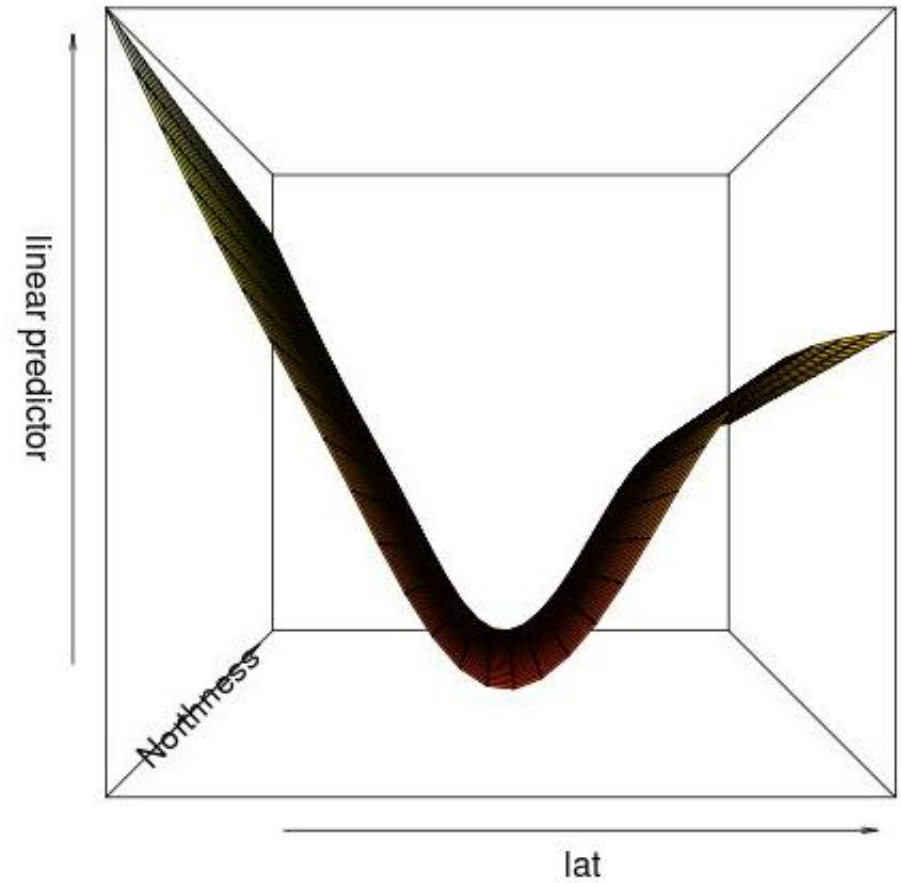
(Data values screened out)

# LATITUDE AND DISTANCE TO OCEAN INTERACTION



`vis.gam(GAM_PRISM1, view=c("lon", "DISTOC"), theta=0, phi=0)`

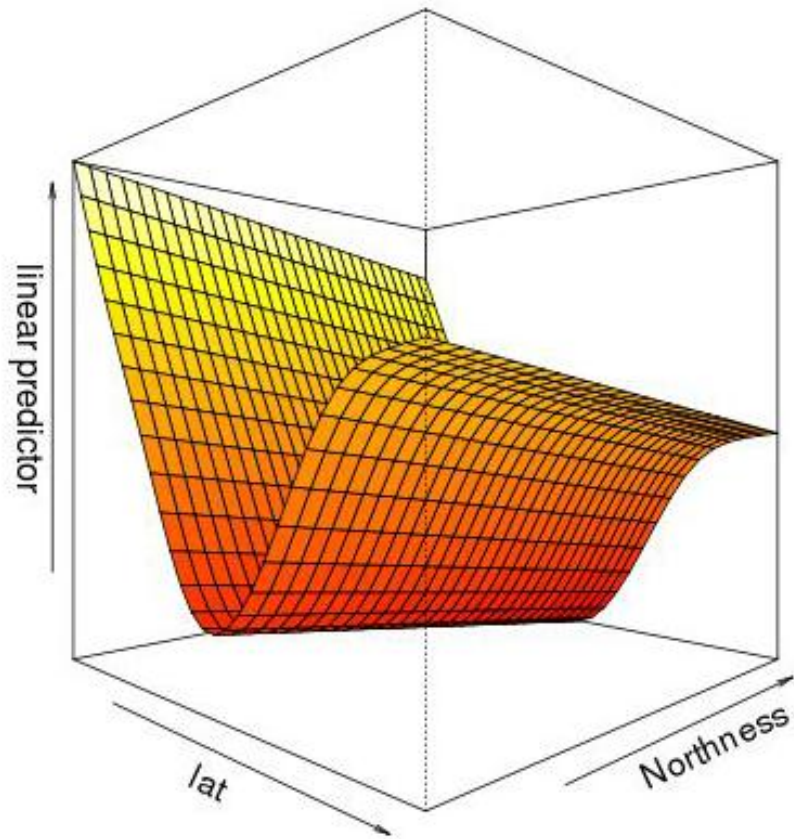
(Data values  
screened out)



`vis.gam(GAM_PRISM1, view=c("lat", "Northness"), theta=0, phi=0)`

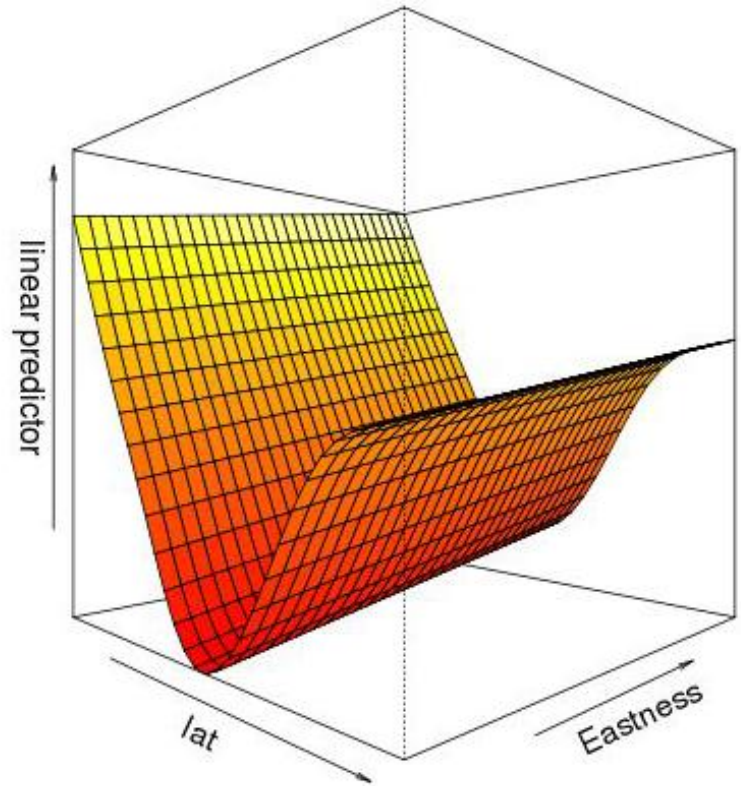
This plot is somewhat surprising...I am unsure of its interpretation.

## LATITUDE AND ASPECT INTERACTIONS



```
vis.gam(GAM_PRISM1,  
view=c("lat", "Northness"), theta=45, phi=0)
```

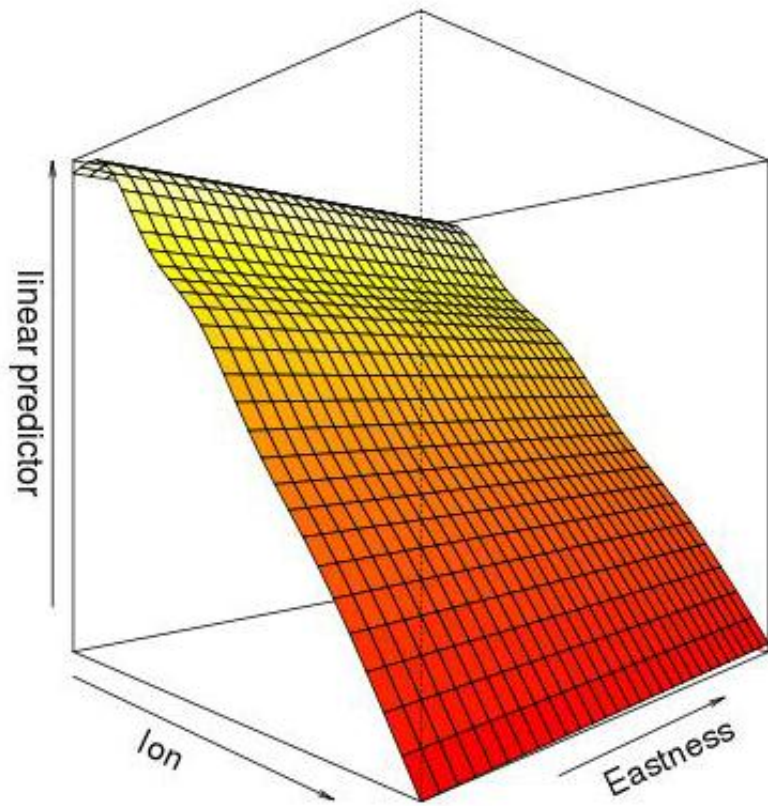
(Data values  
screened out)



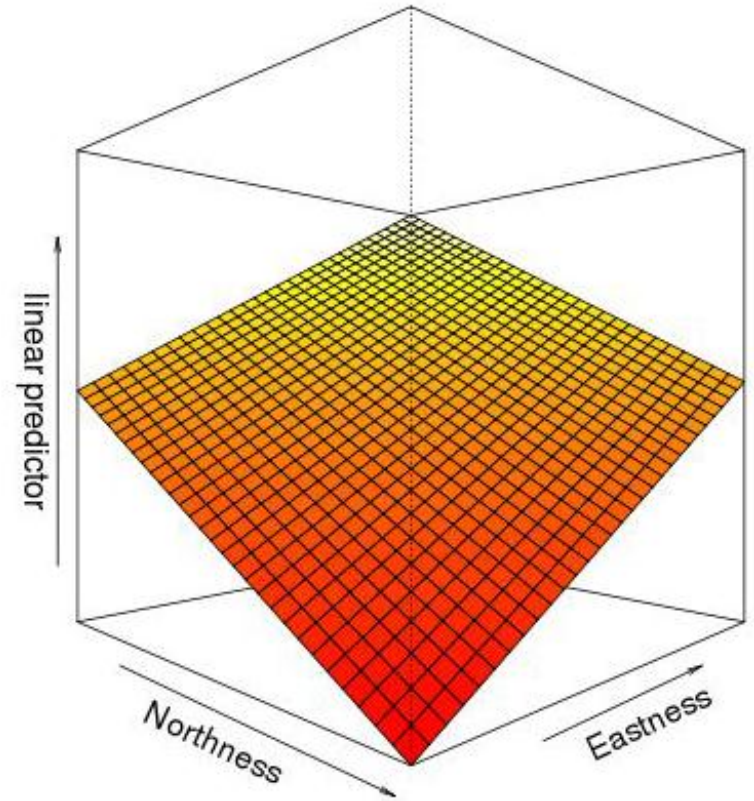
```
vis.gam(GAM_PRISM1,  
view=c("lat", "Eastness"), theta=45, phi=0)
```

These plots are somewhat surprising...I  
am unsure of their interpretations.





```
vis.gam(GAM_PRISM1,
view=c("lon","Eastness"),theta=45,phi=0)
```



```
vis.gam(GAM_PRISM1,
view=c("Northness","Eastness"),theta=45,phi=0)
```

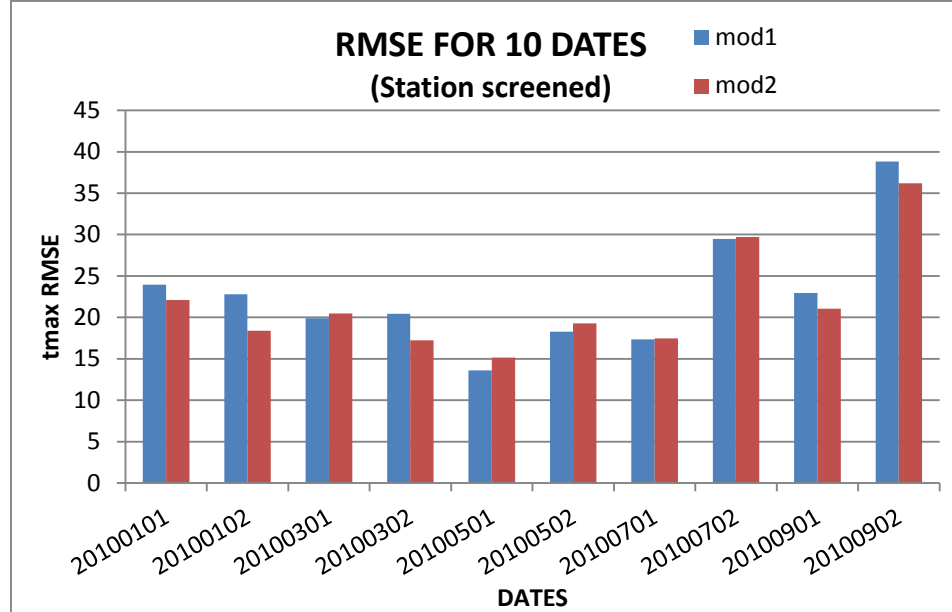
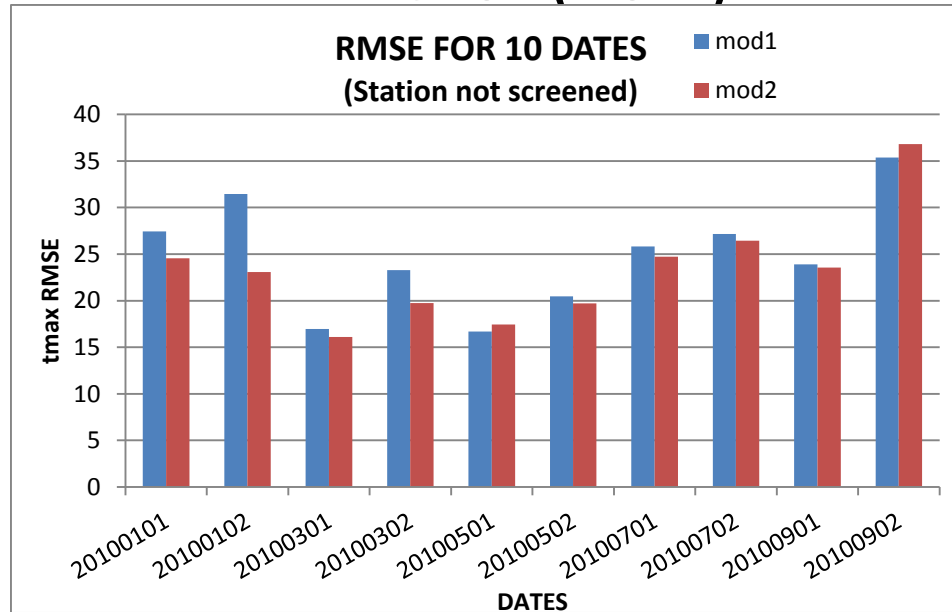
# NEW GAM MODELS WITH INTERACTIVE TERMS

####Regression part 2: GAM models

```
mod1<-gam(tmax~ s(lat) + s(lon) + s(ELEV_SRTM), data=data_s)
mod2<- gam(tmax~ s(lat,lon) + s(ELEV_SRTM), data=data_s)
mod3<-gam(tmax~ s(lat) + s(lon) + s(ELEV_SRTM) + s(Northness)+ s(Eastness) + s(DISTOC), data=data_s)
mod4<-gam(tmax~ s(lat) + s(lon) + s(ELEV_SRTM) + s(Northness_w)+ s(Eastness_w) + s(DISTOC),
data=data_s)
mod5<- gam(tmax~ s(lat) + s(lon) + s(ELEV_SRTM) + s(Northness,Eastness) + s(DISTOC), data=data_s)
mod6<- gam(tmax~ s(lat,lon) + s(ELEV_SRTM) + s(Northness,Eastness) + s(DISTOC), data=data_s)
```

The R-code was modified to include interactive terms and as output: RMSE,GCV, AIC values.

# RMSE FOR GAM FOR MODELS WITH INTERACTION (MOD1 ) AND WITHOUT INTERACTION (MOD2)



Blue: no interactive term  
Red: interactive term

Not  
screened

s(lat) + s(lon) + s  
(ELEV\_SRTM)

With mod2  
S(lat,lon), see  
previous slide for  
specification.

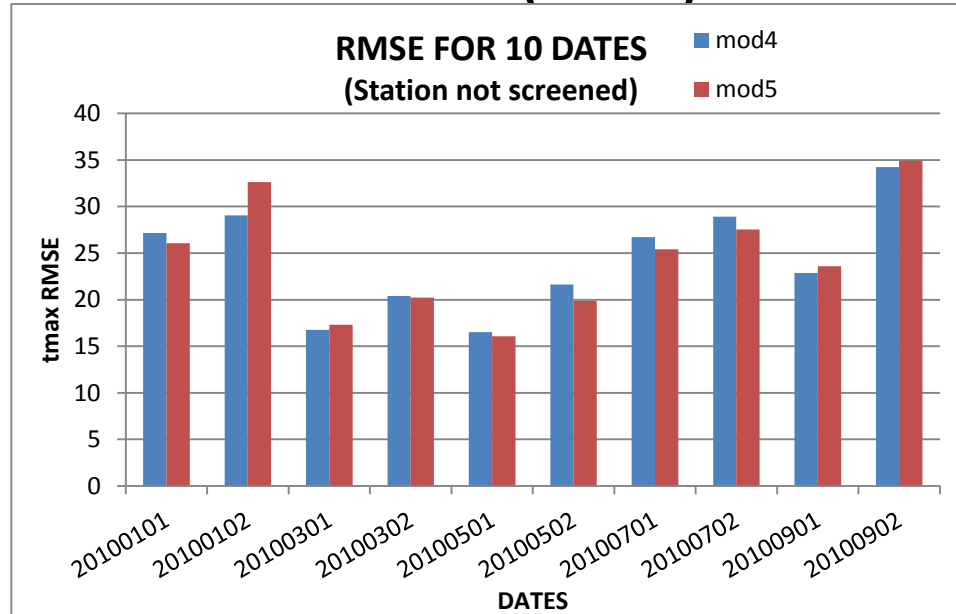
screened

`mod1<-gam(tmax~ s(lat) + s(lon) + s(ELEV_SRTM), data=data_s)`

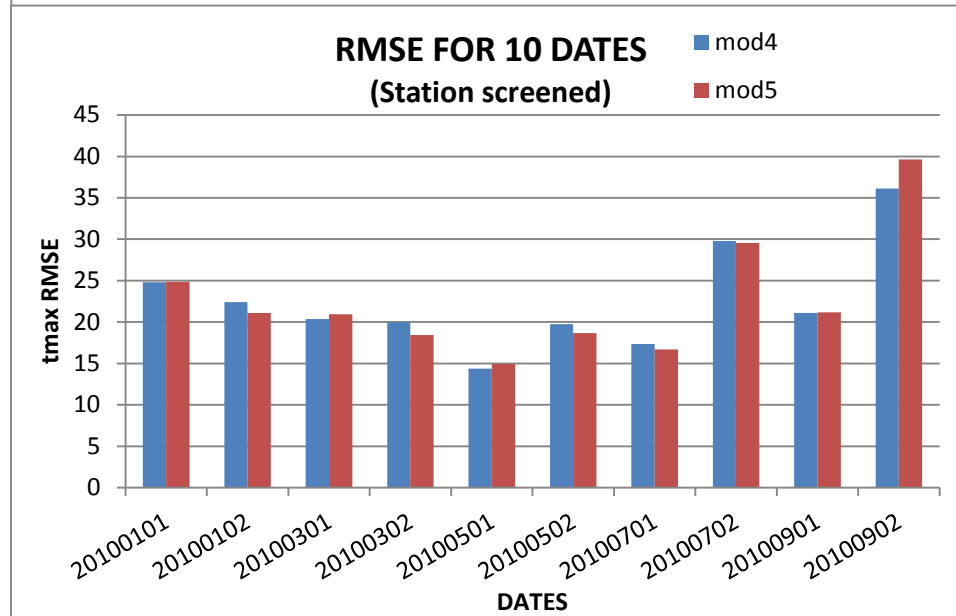
`mod2<- gam(tmax~ s(lat,lon) + s(ELEV_SRTM), data=data_s)`

# RMSE FOR GAM FOR MODELS WITH INTERACTION (MOD4 ) AND WITHOUT INTERACTION (MOD5)

Not screened



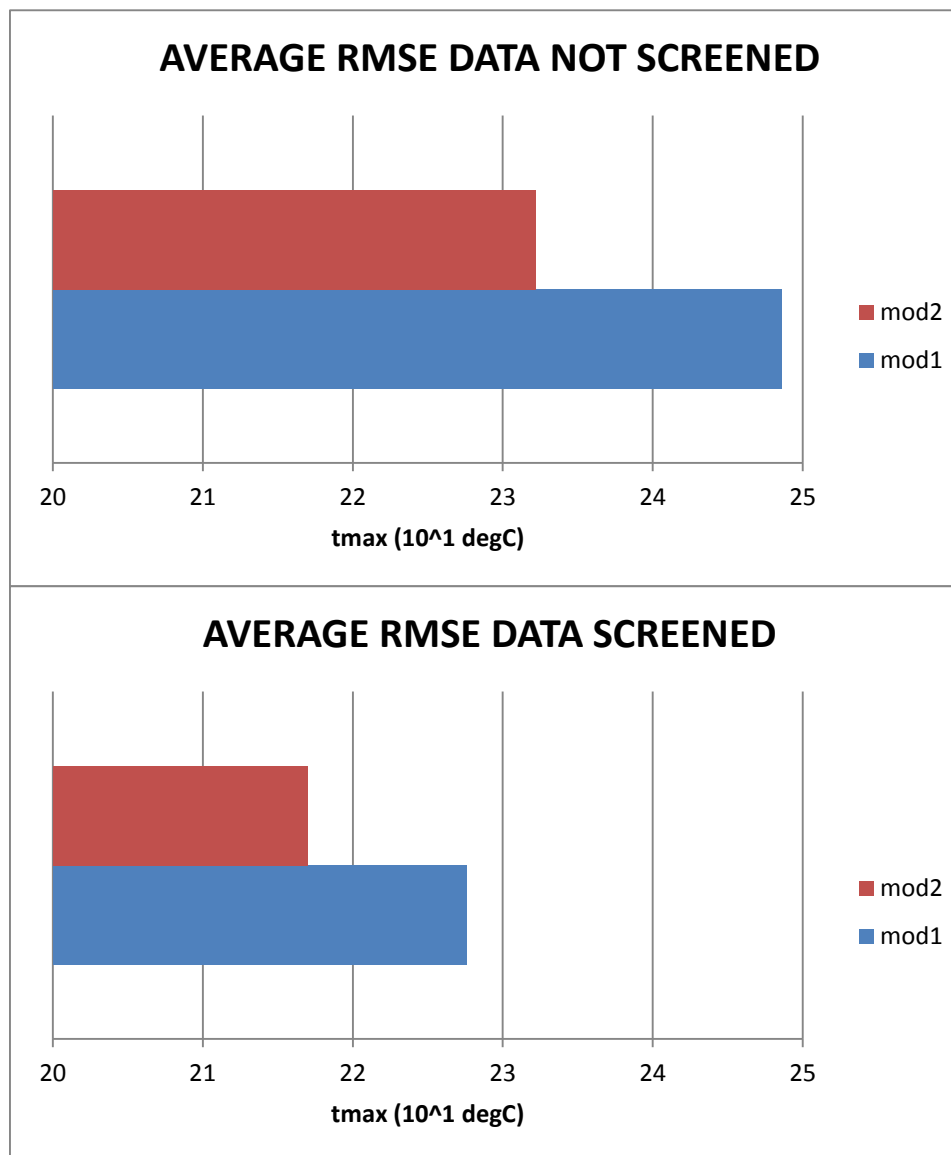
screened



Dates are on the x-axis.

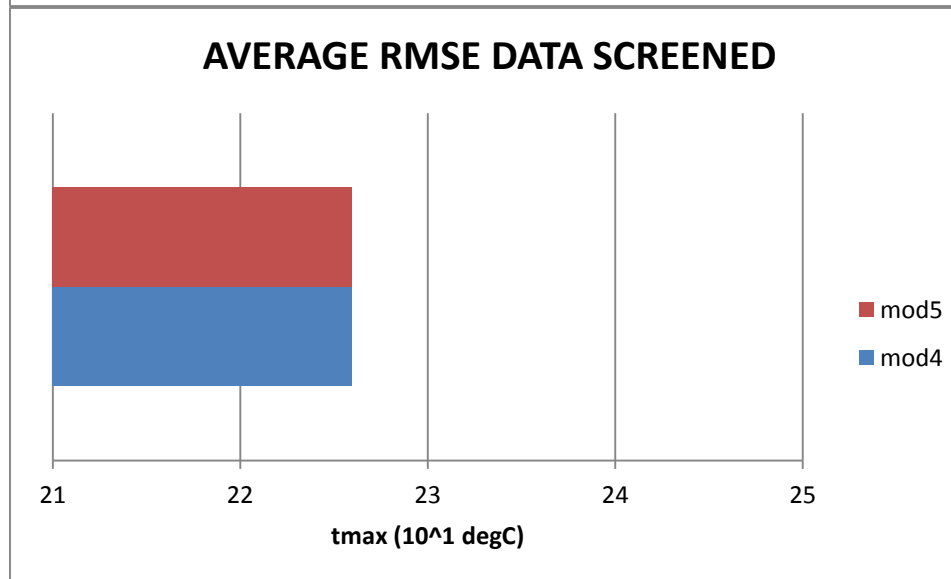
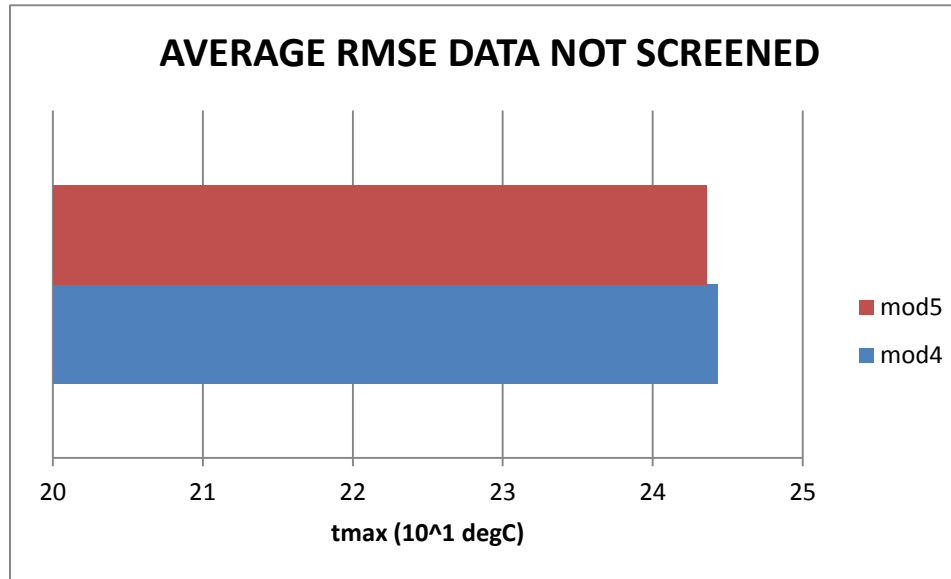
```
mod4<-gam(tmax~ s(lat) + s(lon) + s(ELEV_SRTM) + s(Northness_w)+ s(Eastness_w) + s(DISTOC),
mod5<- gam(tmax~ s(lat) + s(lon) + s(ELEV_SRTM) + s(Northness,Eastness) + s(DISTOC)
```

# RMSE FOR GAM FOR MODELS WITH INTERACTION (MOD1 ) AND WITHOUT INTERACTION (MOD2)



There is slight improvement when using interactive term.

# RMSE FOR GAM FOR MODELS WITH INTERACTION (MOD1 ) AND WITHOUT INTERACTION (MOD2)



There is no improvement when using interactive term in screen data for mod4.