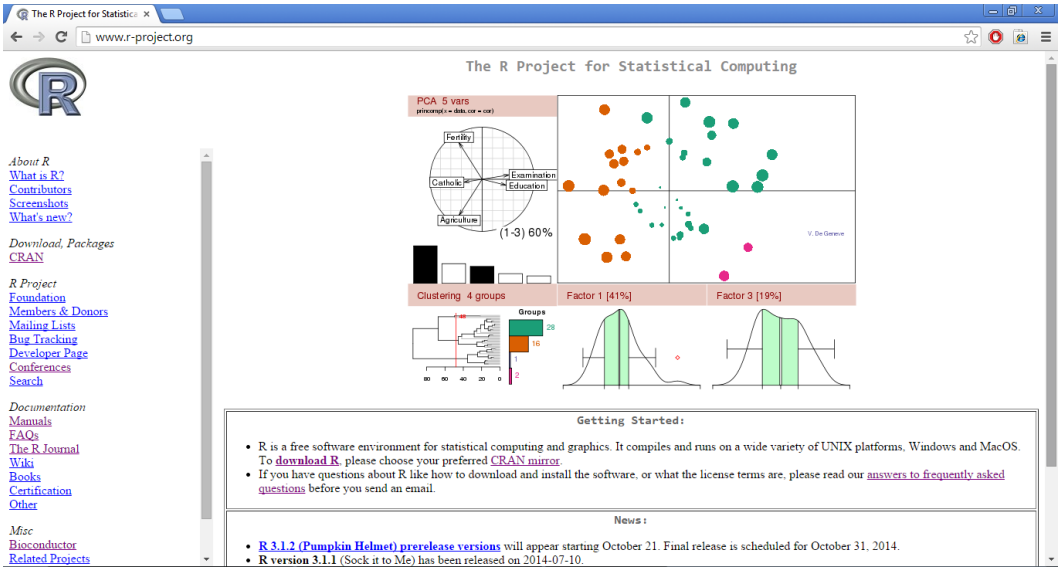
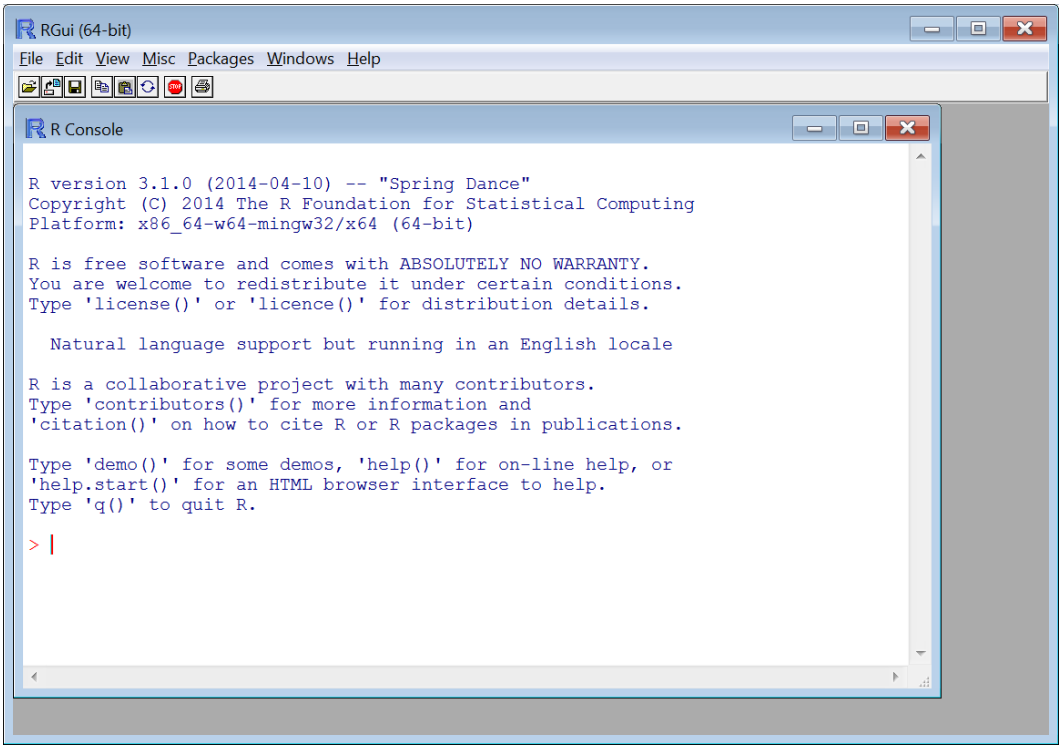
Chapter 1: The R Environment




RGui (64-bit)
File Edit View Misc Packages Windows Help
R Console
R version 3.1.0 (2014-04-10) -- "Spring Dance"
Copyright (C) 2014 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)
R is free software and comes with ABSOLUTELY NO WARRANTY.
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Natural language support but running in an English locale
R is a collaborative project with many contributors.
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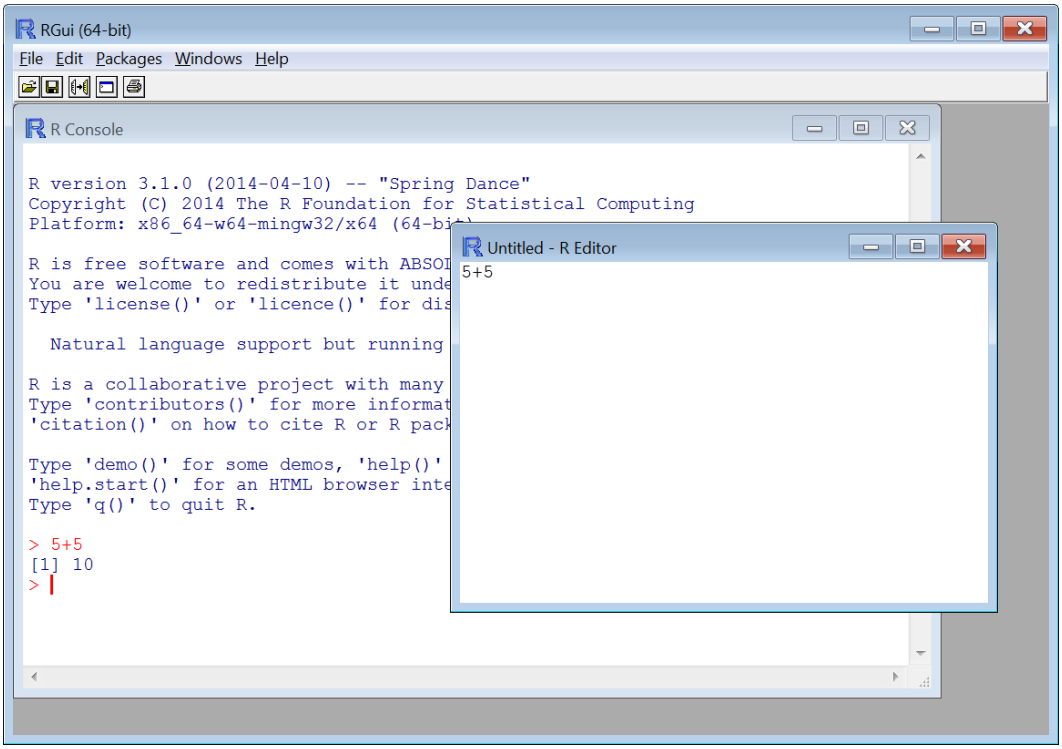
Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.
>


RGui (64-bit)
File Edit Packages Windows Help
R Console
R version 3.1.0 (2014-04-10) -- "Spring Dance"
Copyright (C) 2014 The R Foundation for Statistical Computing
Natural language support but running
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'citation()' on how to cite R or R pack
Type 'demo()' for some demos, 'help()'
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Type 'q()' to quit R.
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>
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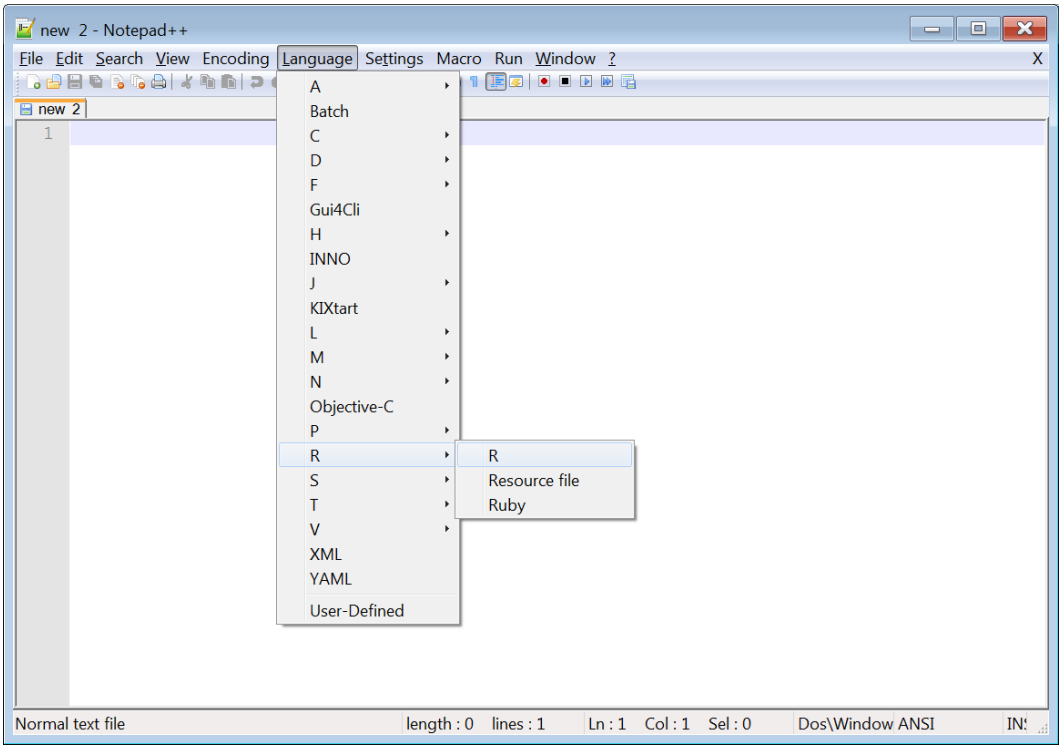
5+5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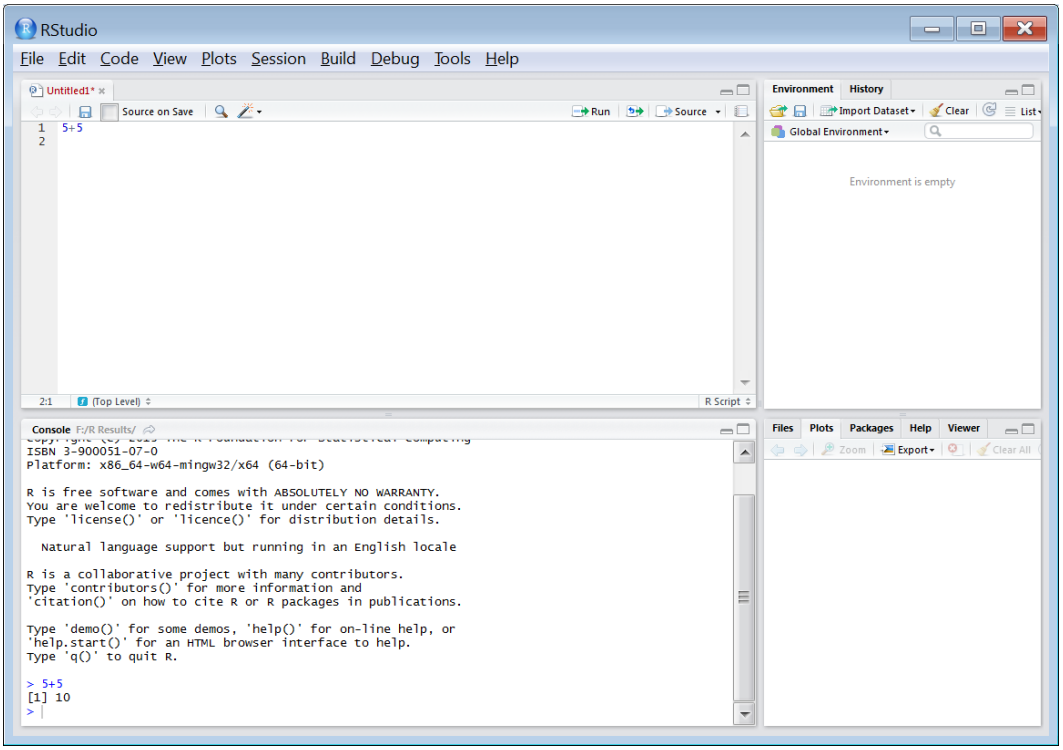
RStudio
File Edit Code View Plots Session Build Debug Tools Help
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1 5+5
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R Script
Environment History
Import Dataset
Clear
List
Global Environment
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Console F:/R Results/
ISBN 3-900051-07-0
Platform: x86_64-w64-mingw32/x64 (64-bit)
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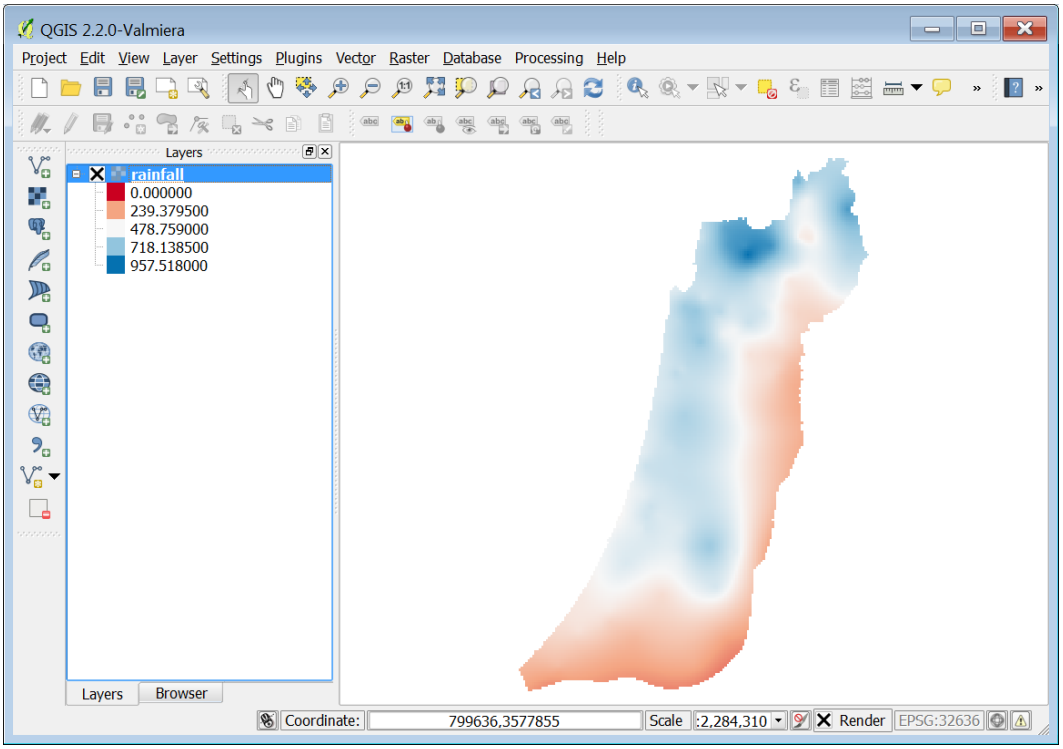
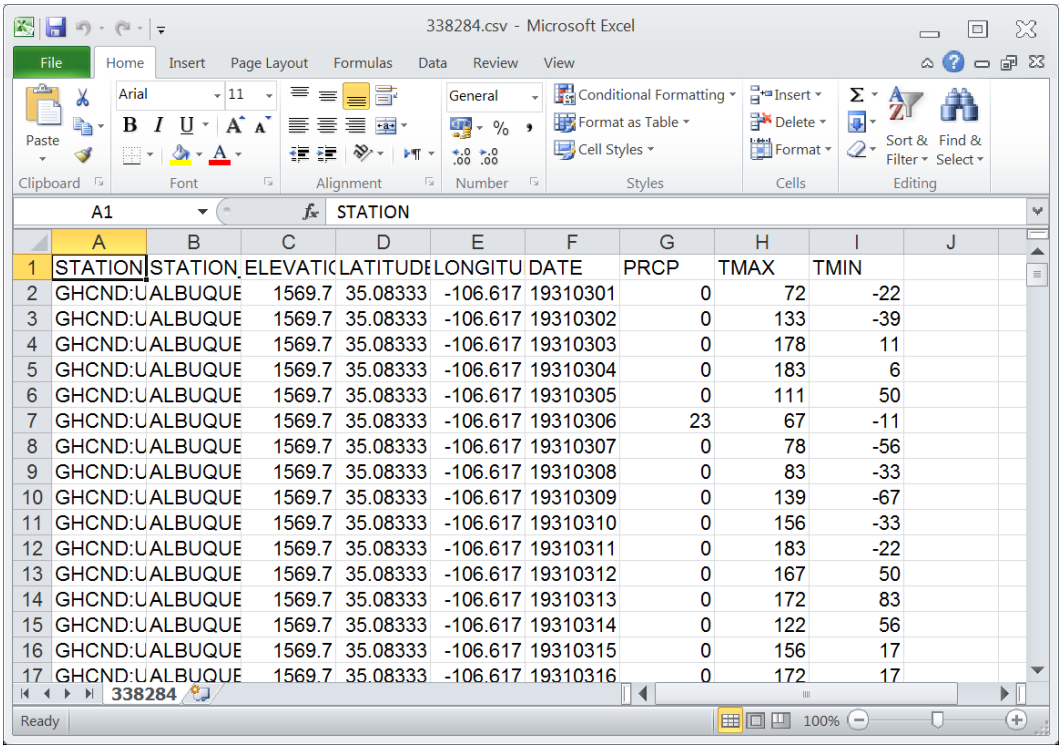
Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.
> 5+5
[1] 10
>
Files Plots Packages Help Viewer
Zoom
Export
Clear All



Chapter 2: Working with Vectors and Time Series



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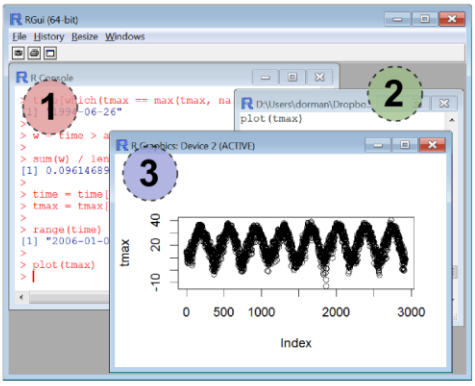
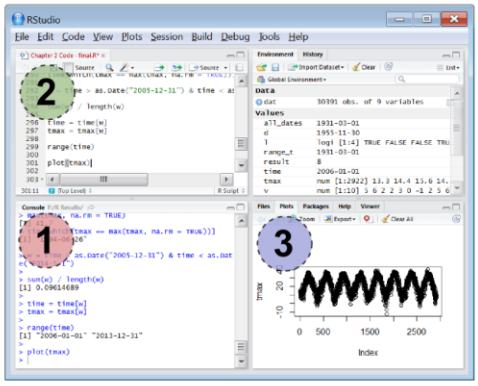
RGui



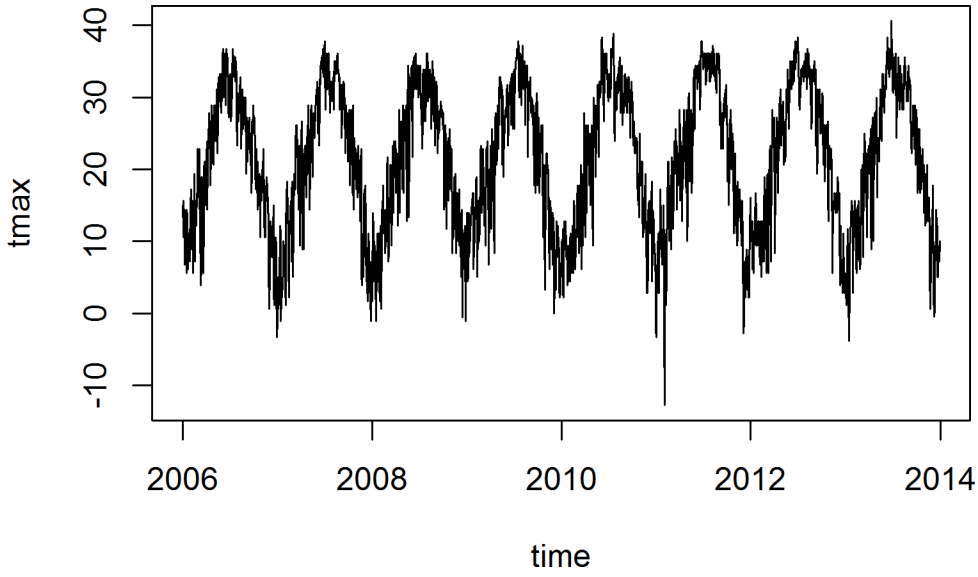
RStudio

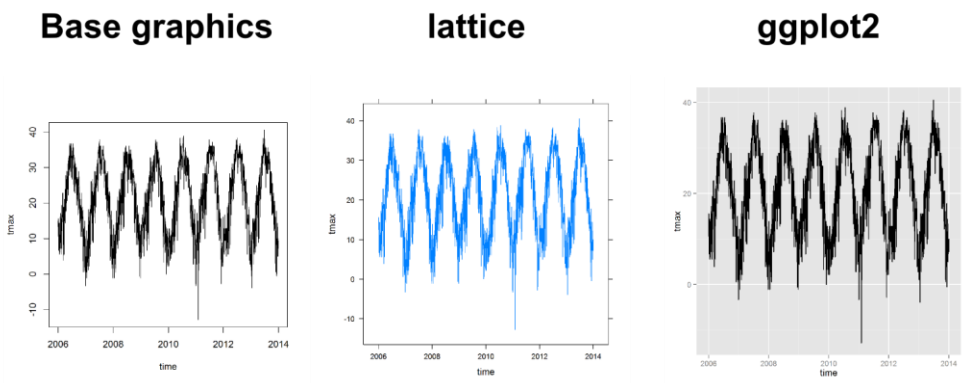


1 **Command line**

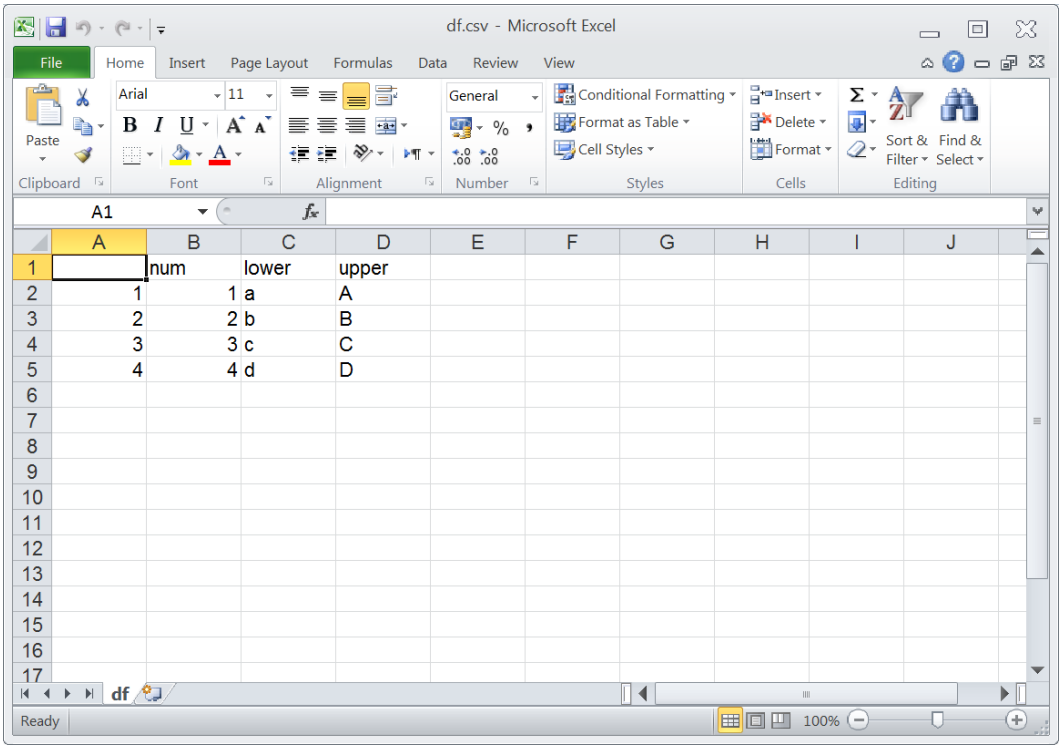
2 **Script editor**

3 **Graphical window**

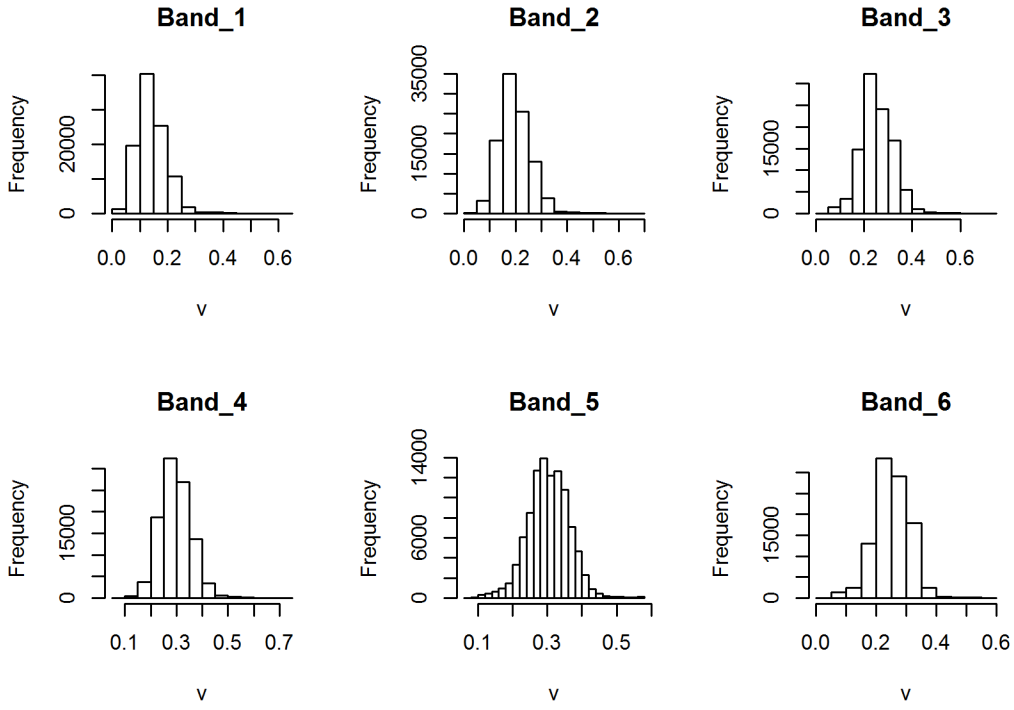




Chapter 3: Working with Tables



Chapter 4: Working with Rasters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0.6
v
Band_2
Frequency
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15000
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0.0
0.2
0.4
0.6
v
Band_3
Frequency
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v
Band_4
Frequency
0
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v
Band_5
Frequency
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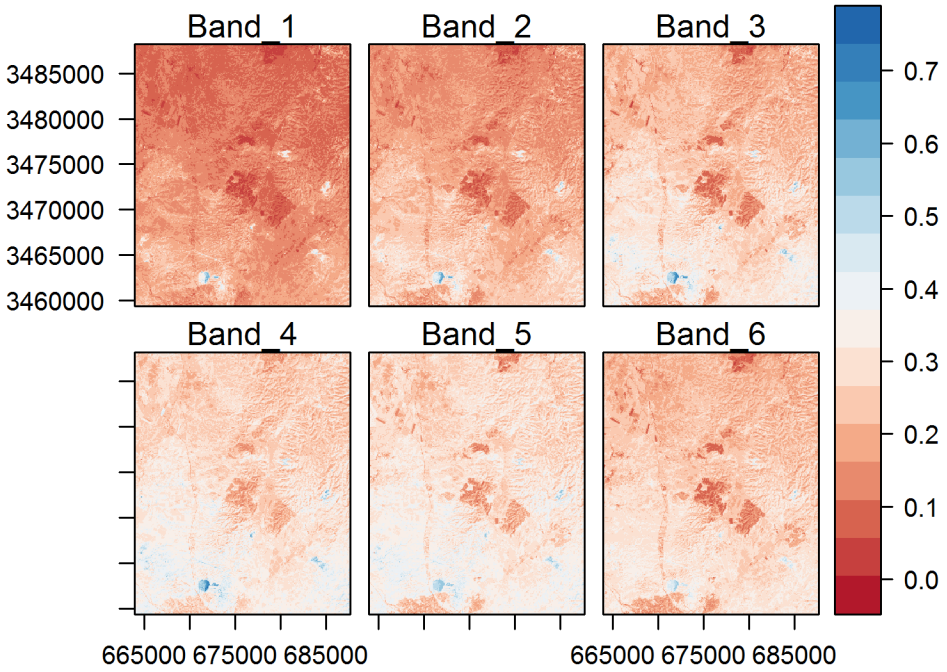
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Band_2
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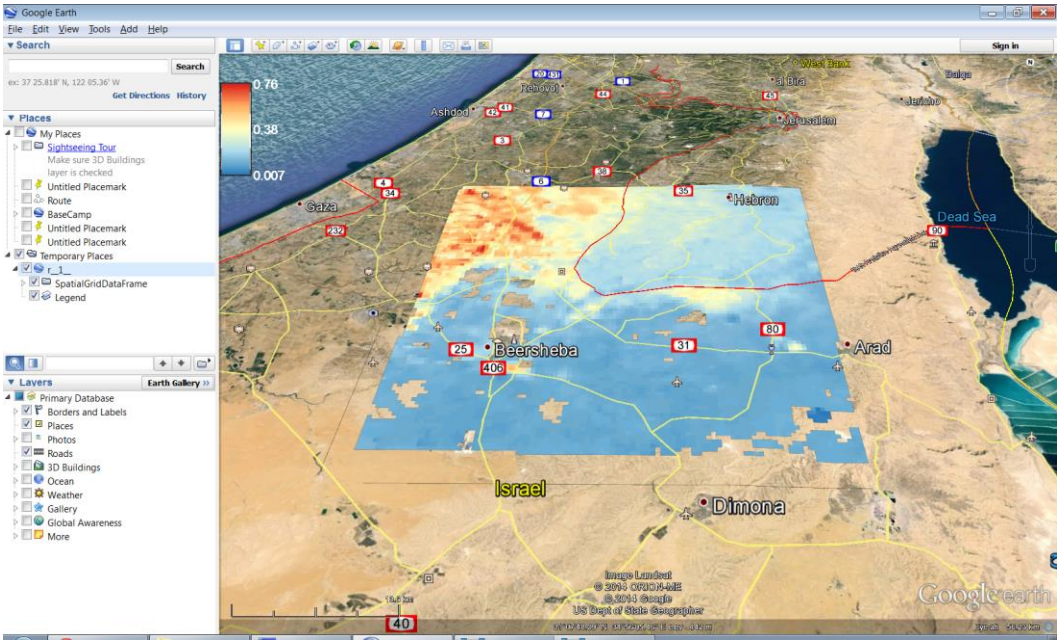
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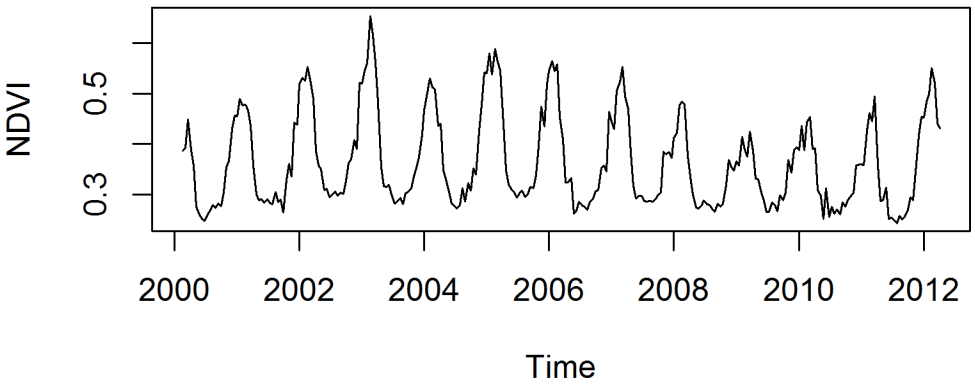
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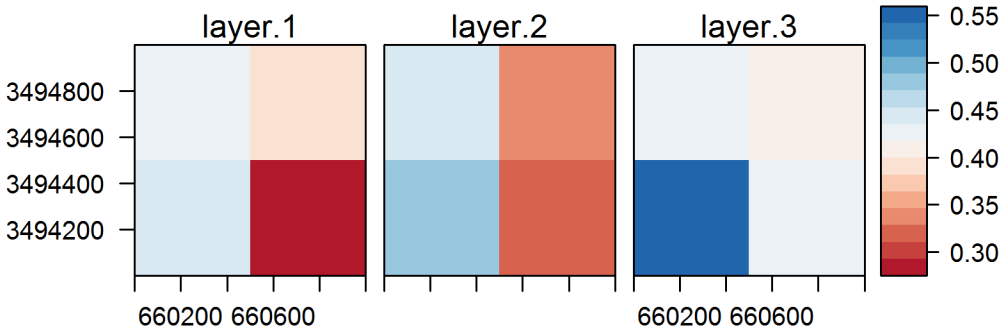
Time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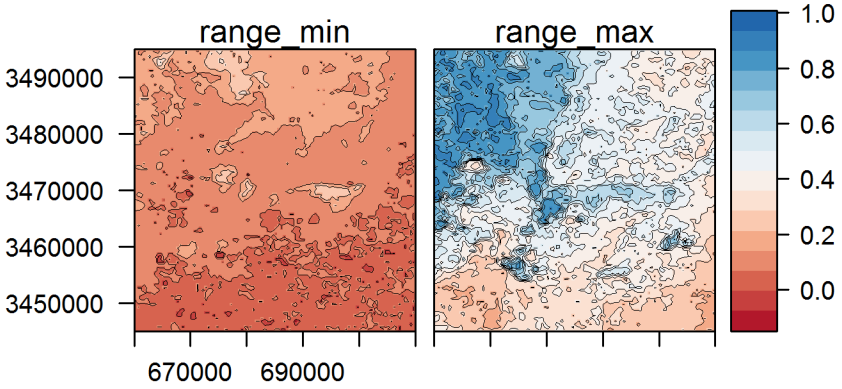
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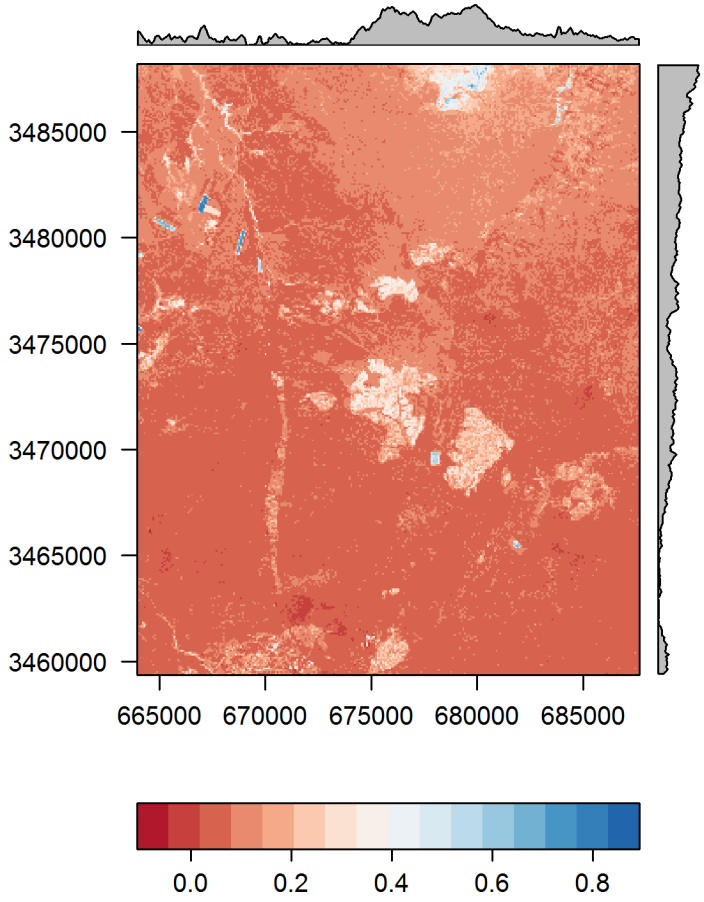
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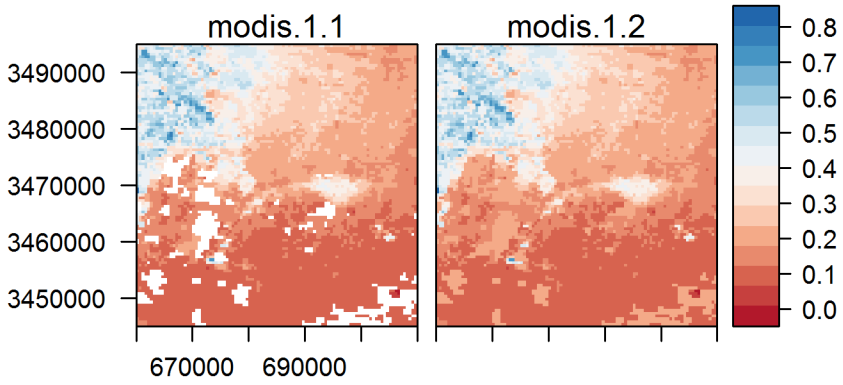
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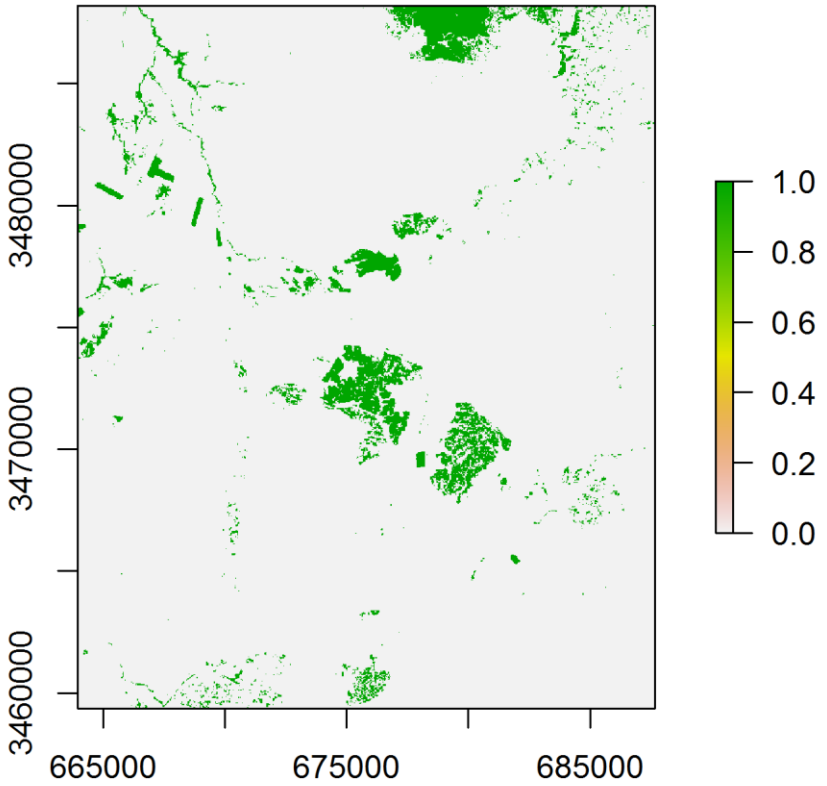
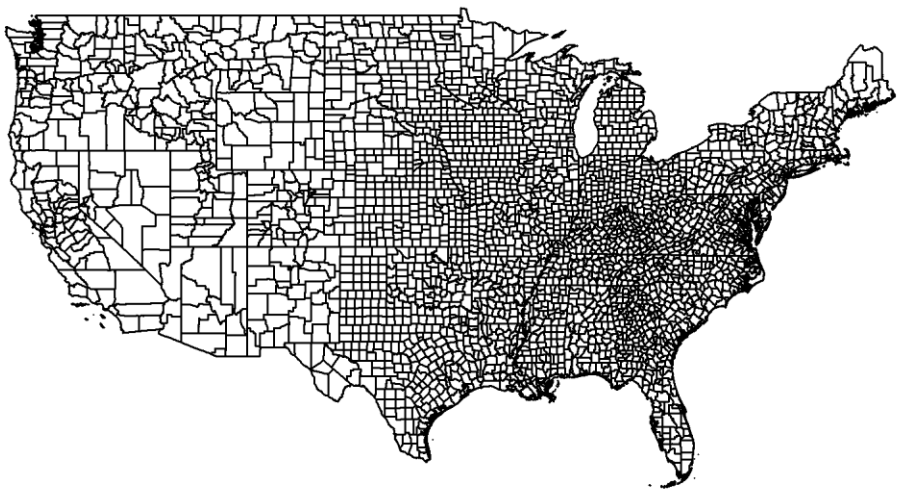
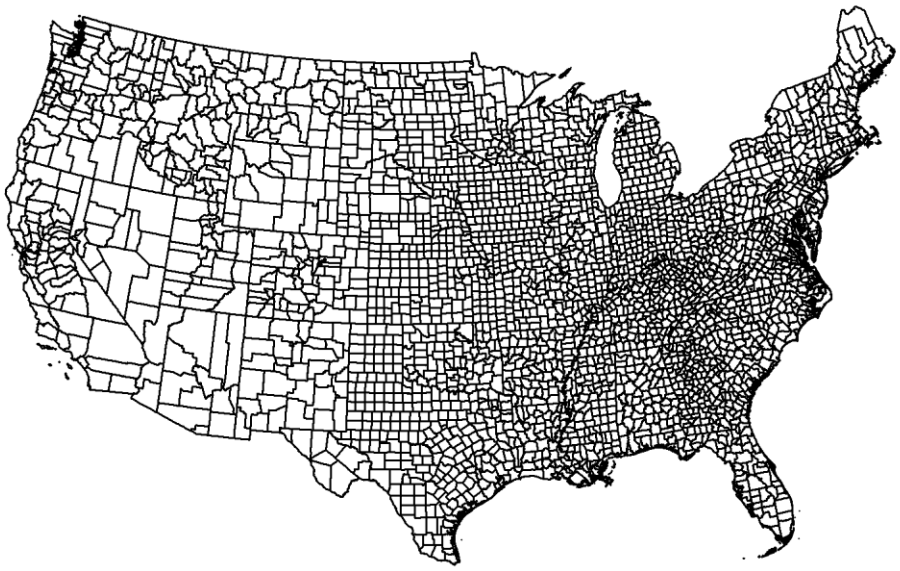
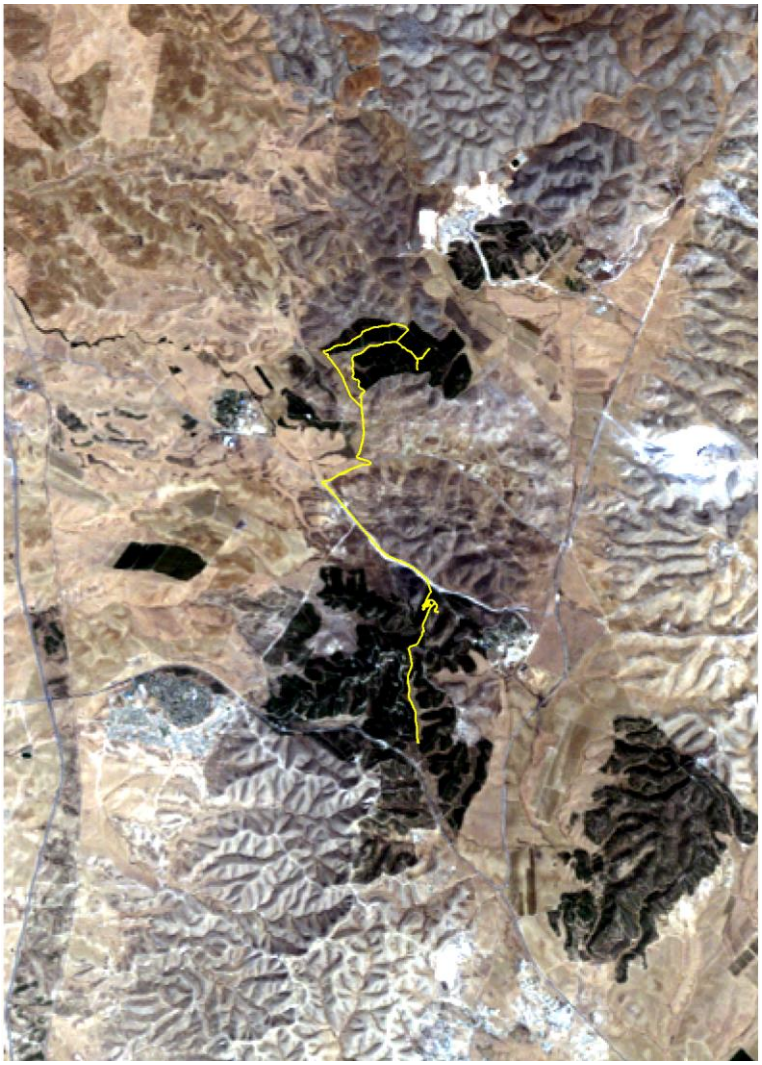
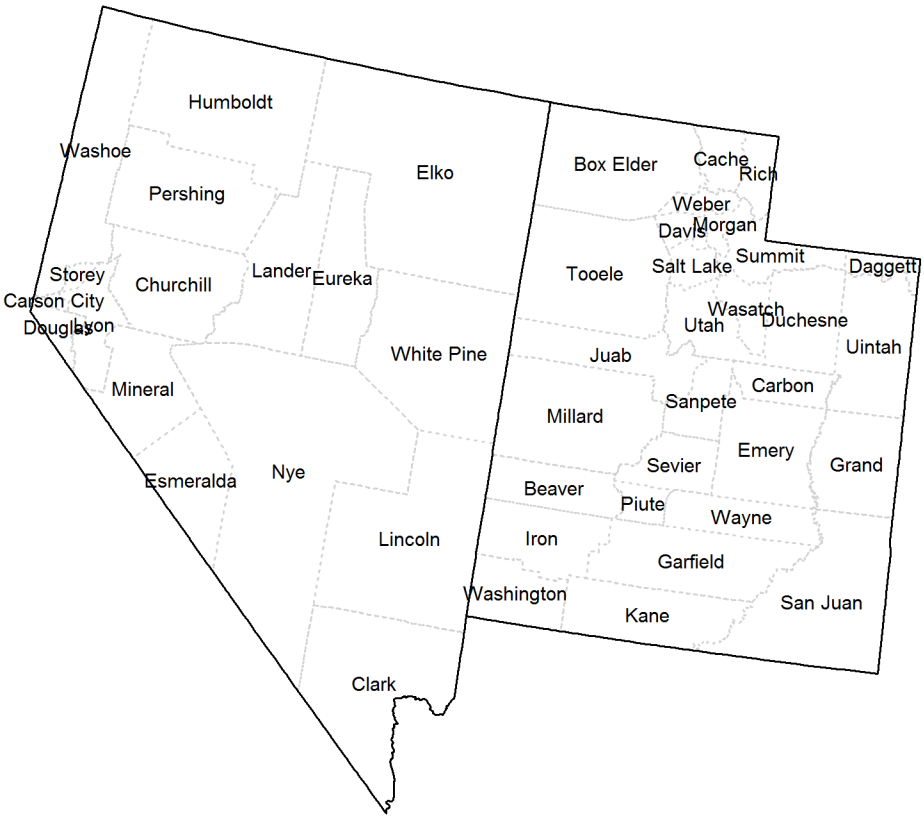


Chapter 5: Working with Points, Lines, and Polygons





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Rich
Weber
Morgan
Davis
Summit
Daggett
Storey
Churchill
Lander
Eureka
Tooele
Salt Lake
Carson City
Lyon
Douglas
Wasatch
Utah
Duchesne
Uintah
White Pine
Juab
Mineral
Carbon
Sanpete
Millard
Emery
Sevier
Grand
Esmeralda
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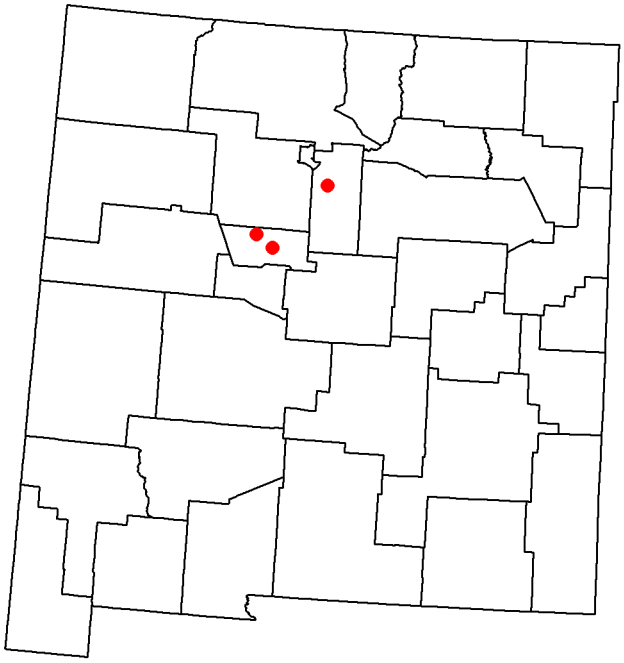
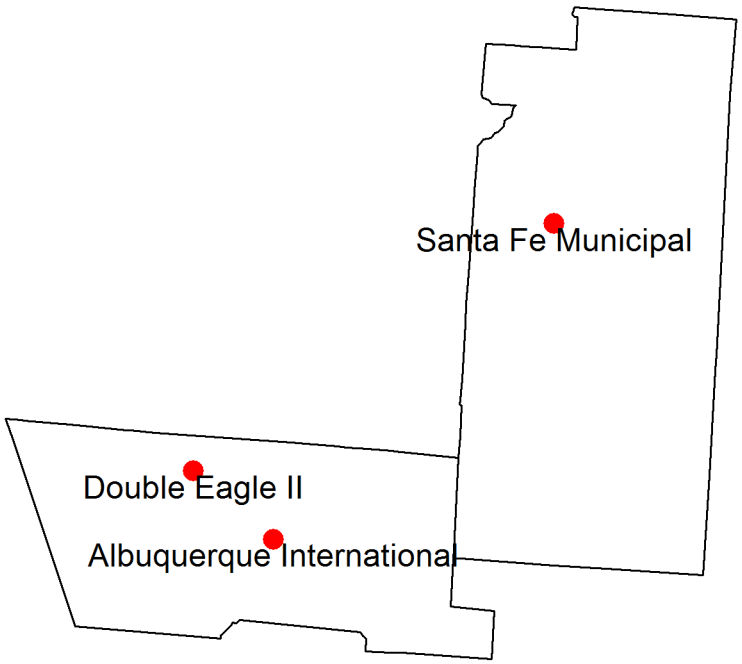
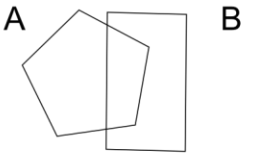
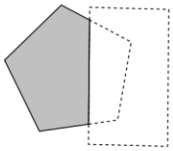
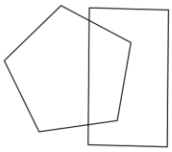
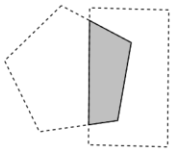
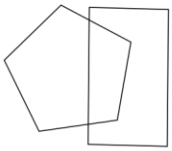
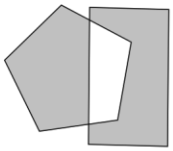
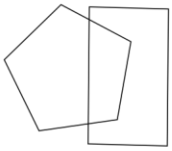
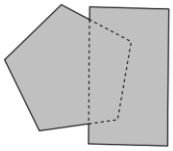
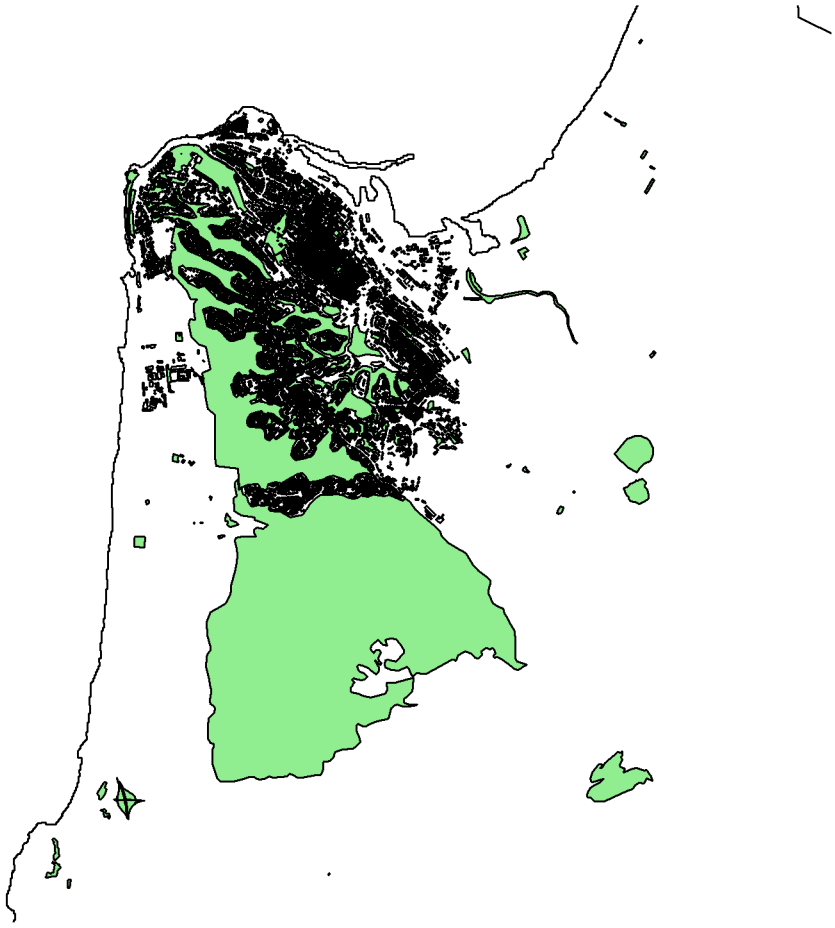
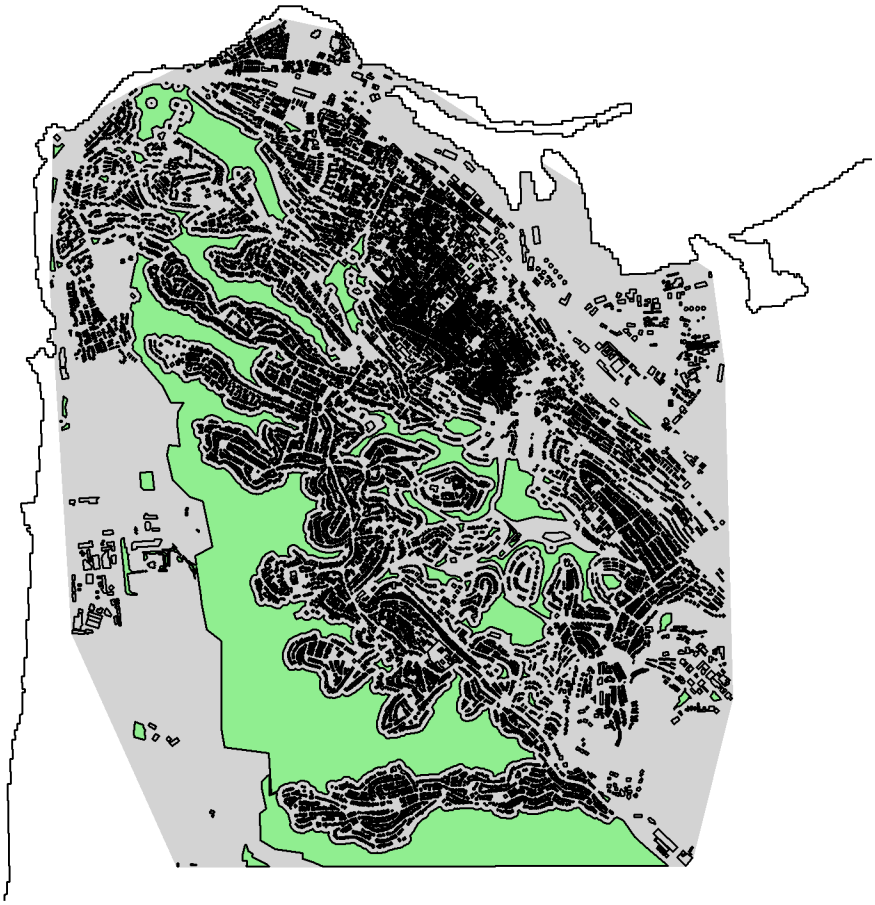
Wayne
Lincoln
Iron
Garfield
Washington
San Juan
Kane
Clark



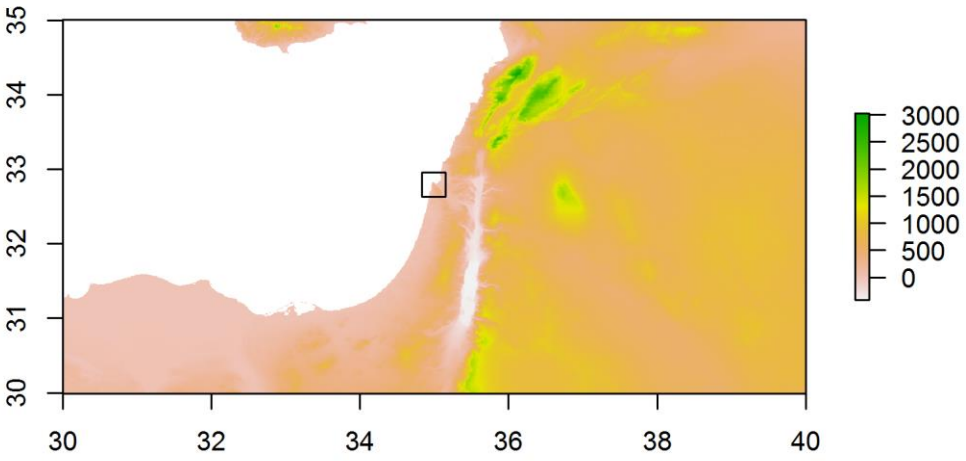

Santa Fe Municipal
Double Eagle II
Albuquerque International

Input geometries	Function call	Output geometry
	gDifference(A,B)	
	gIntersection(A,B)	
	gSymdifference(A,B)	
	gUnion(A,B)	





Chapter 6: Modifying Rasters and Analyzing Raster Time Series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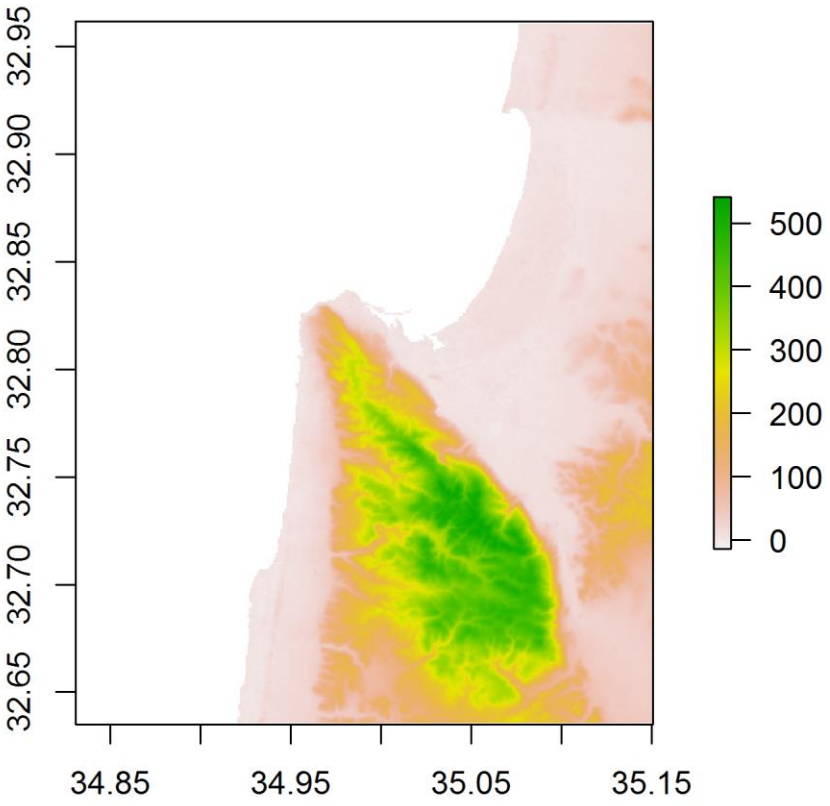
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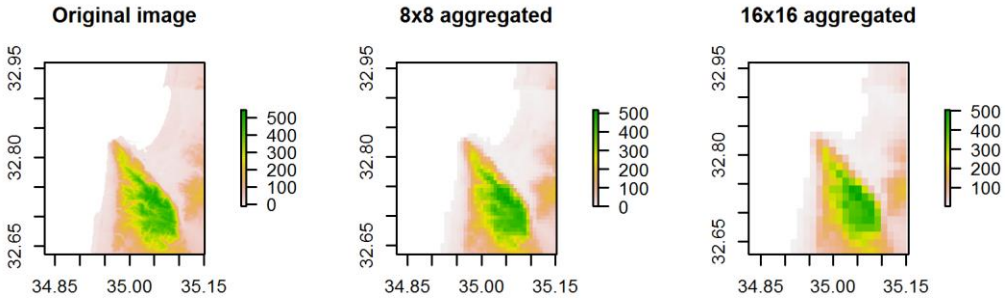
Original image
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16x16 aggregated
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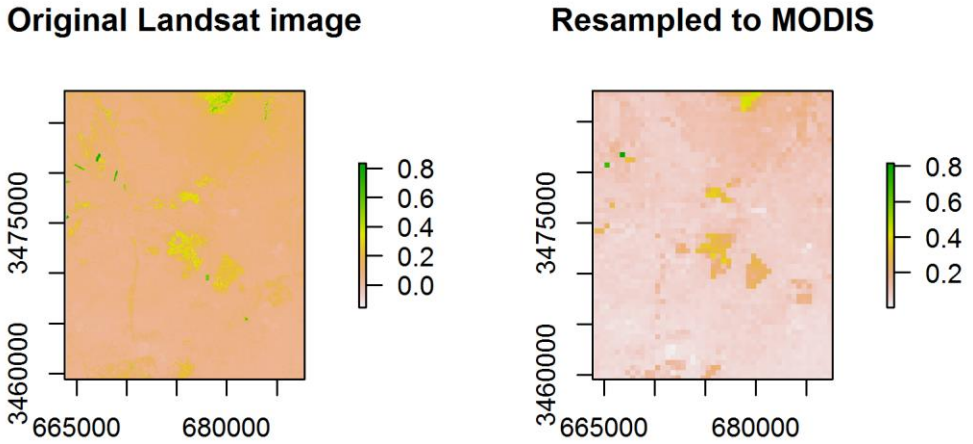
Original Landsat image
Resampled to MODIS
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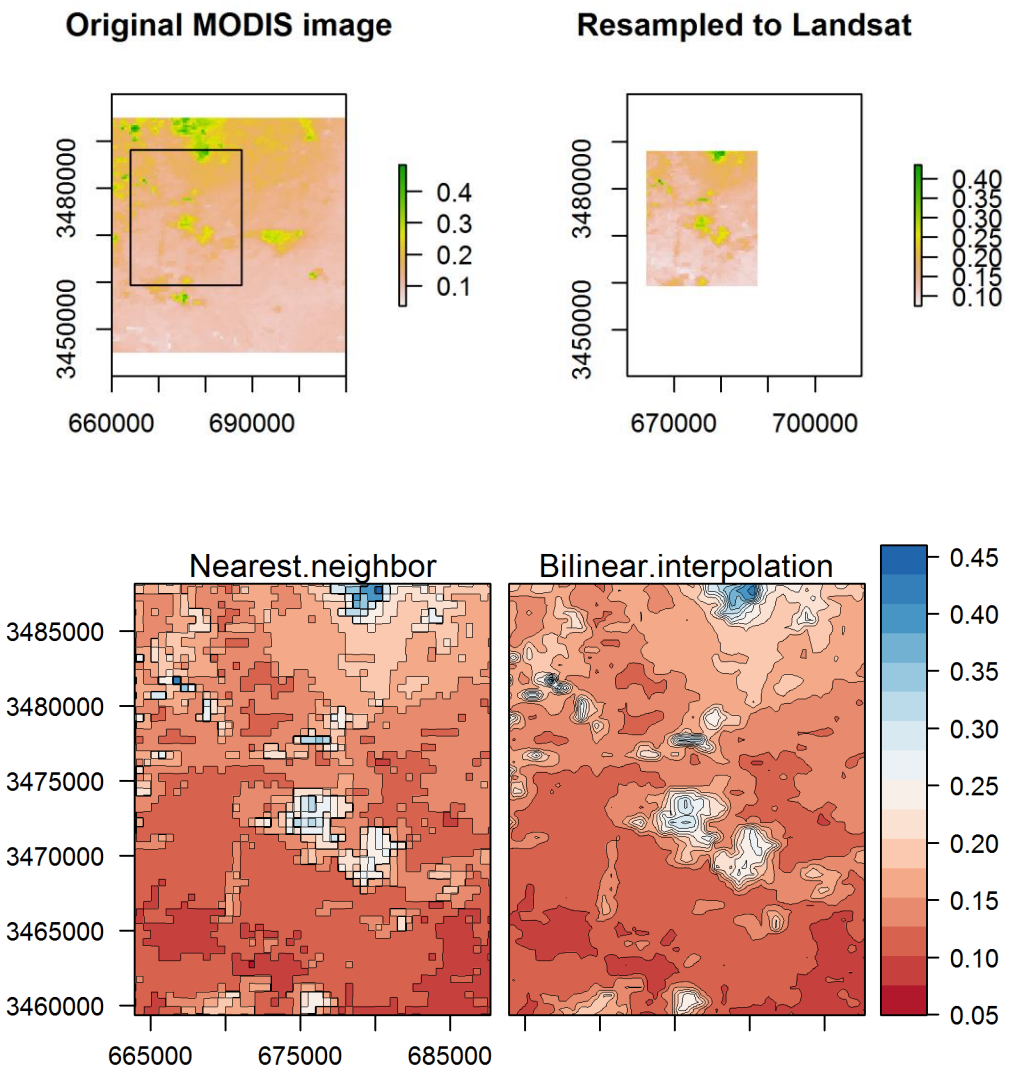
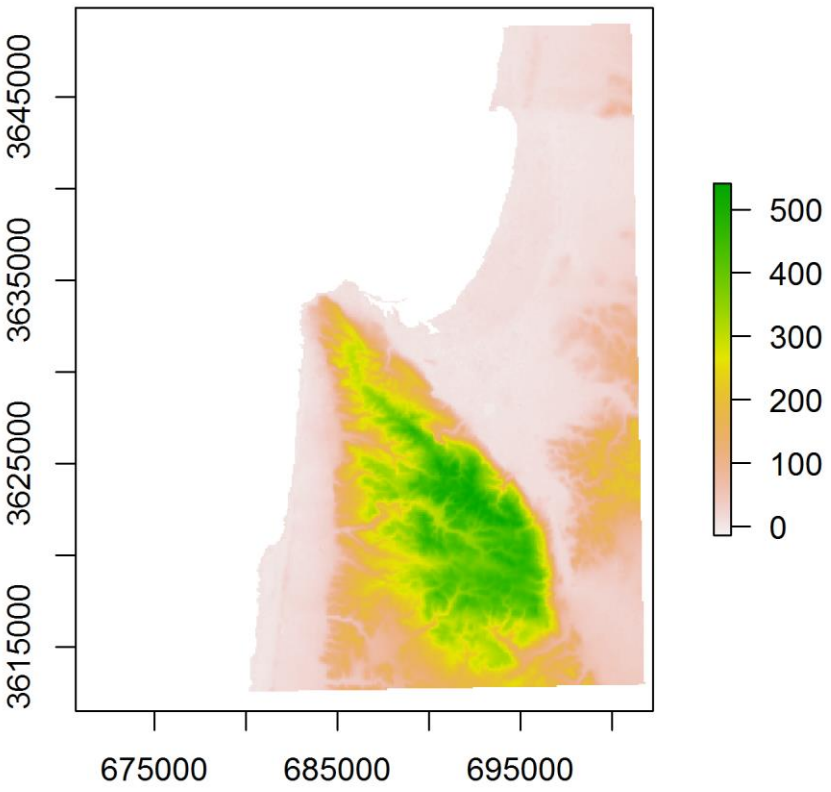
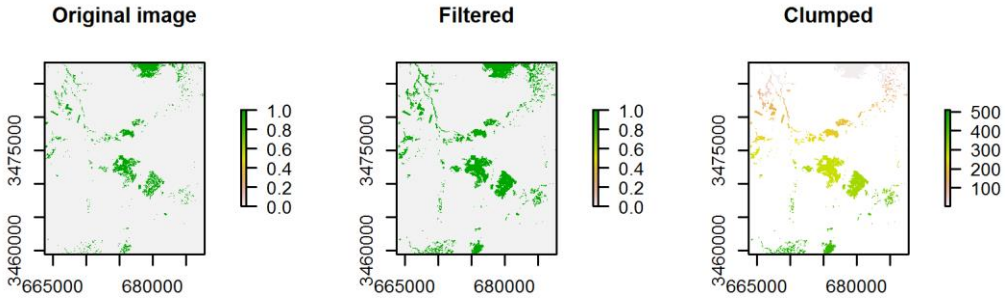
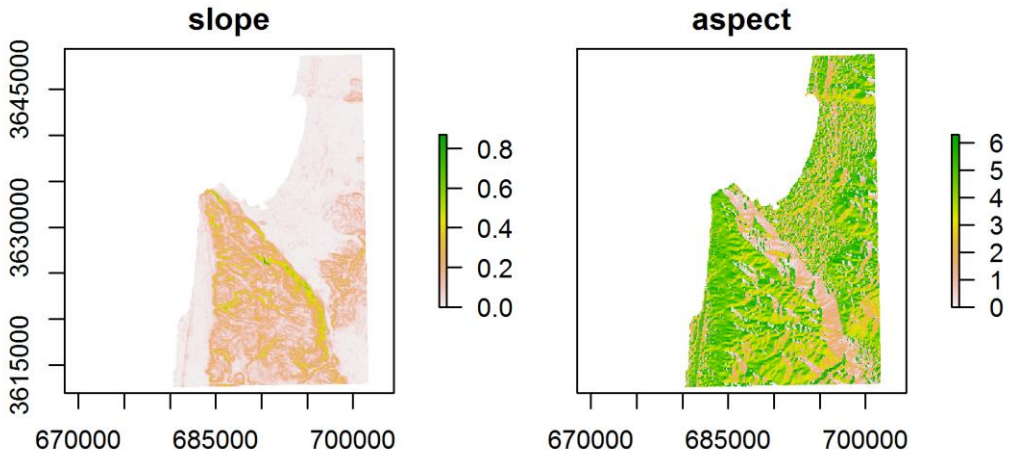
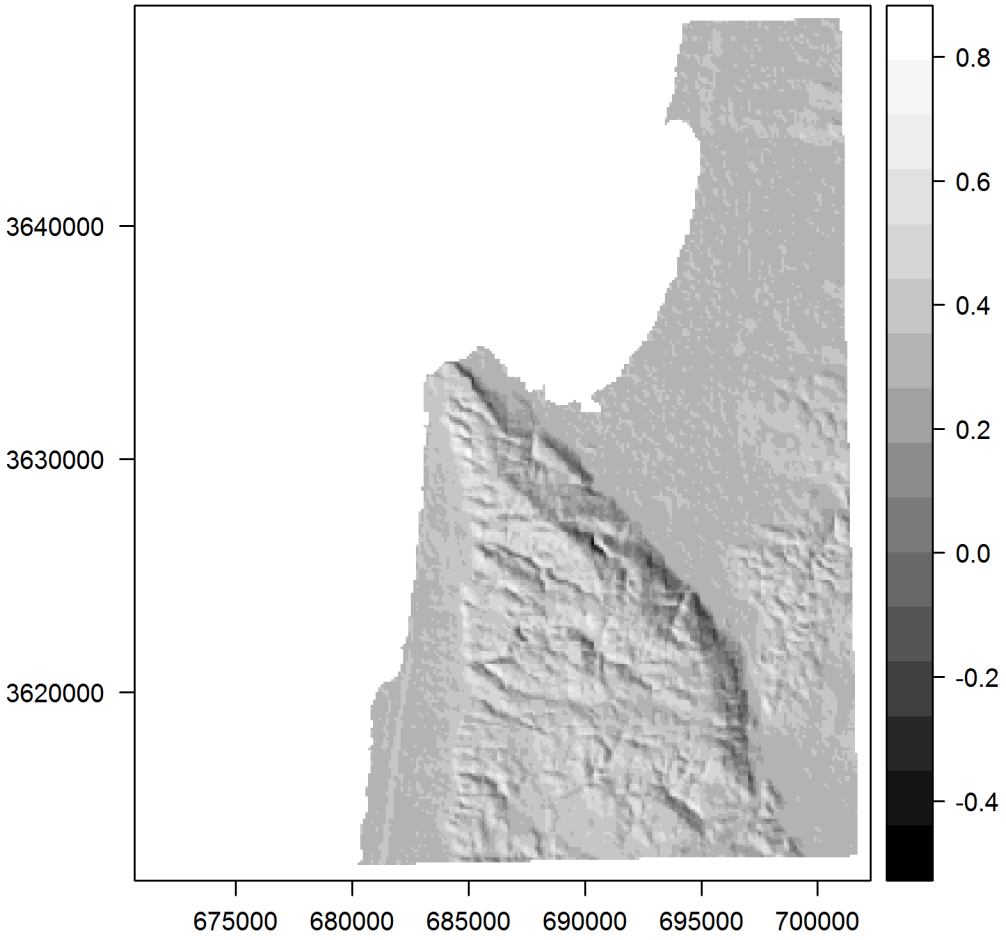
0.8
0.6
0.4
0.2
0.0

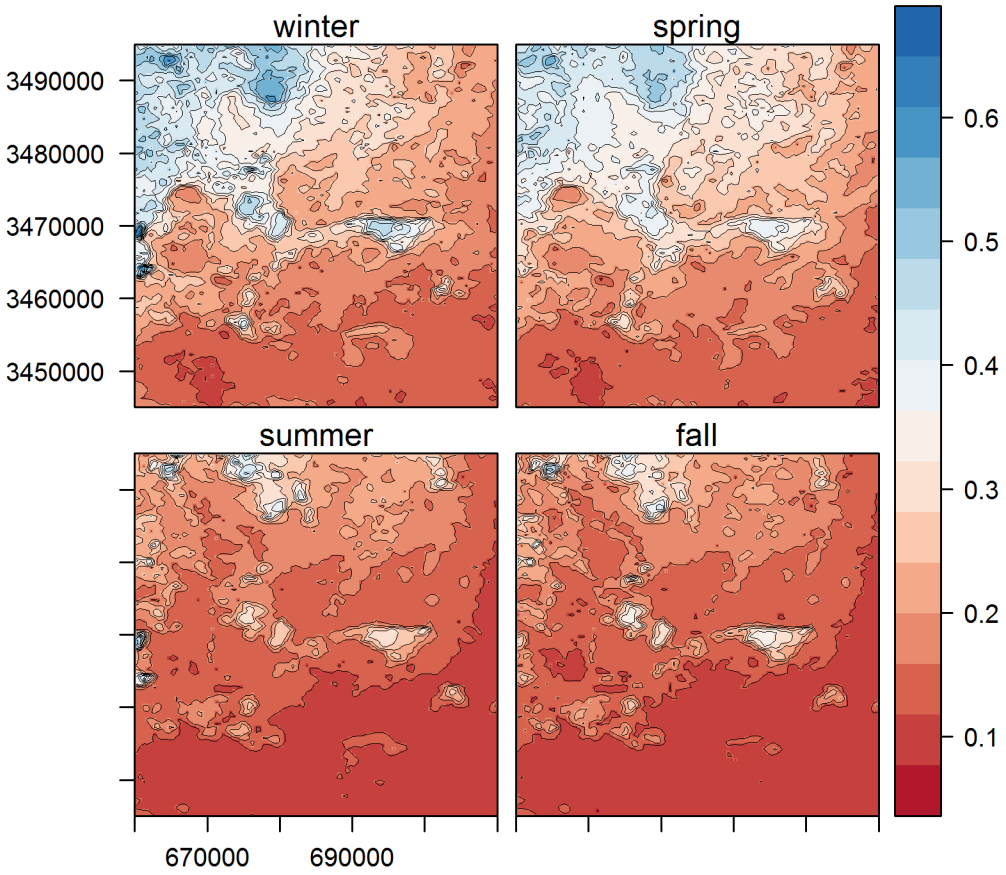

Original MODIS image
Resampled to Landsat
3480000
3450000
660000
690000
0.4
0.3
0.2
0.1
3480000
3450000
670000
700000
0.40
0.35
0.30
0.25
0.20
0.15
0.10
Nearest.neighbor
Bilinear.interpolation
3485000
3480000
3475000
3470000
3465000
3460000
665000
675000
685000
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05

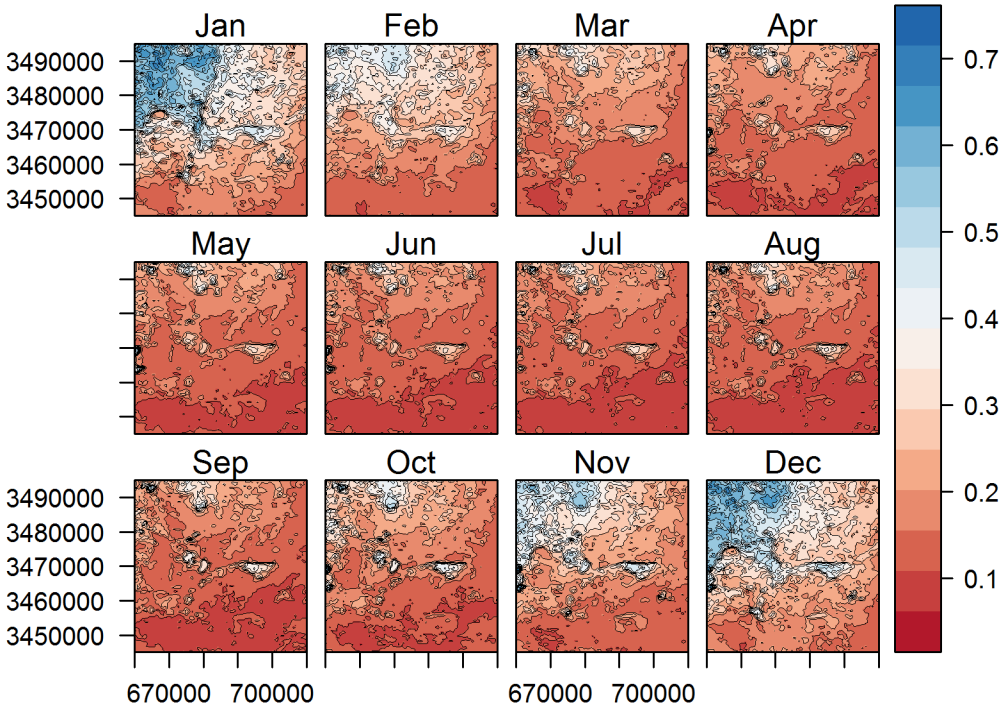

3645000
3635000
3625000
3615000
675000
685000
695000
500
400
300
200
100
0


Original image
Filtered
Clumped
3475000
3460000
665000
680000
1.0
0.8
0.6
0.4
0.2
0.0
500
400
300
200
100

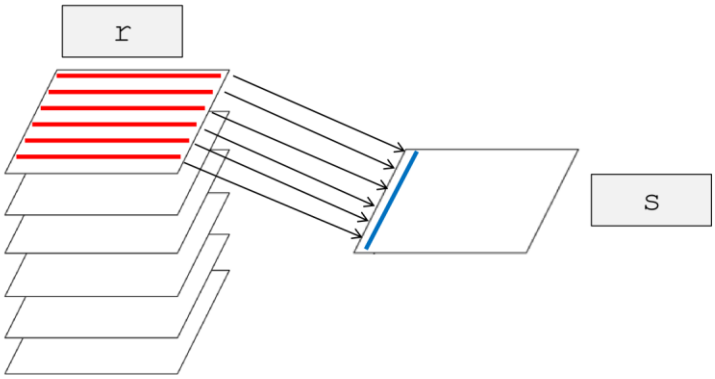

slope
3645000
3630000
3615000
670000
685000
700000
0.8
0.6
0.4
0.2
0.0
aspect
670000
685000
700000
6
5
4
3
2
1
0


3640000
3630000
3620000
675000
680000
685000
690000
695000
700000
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4

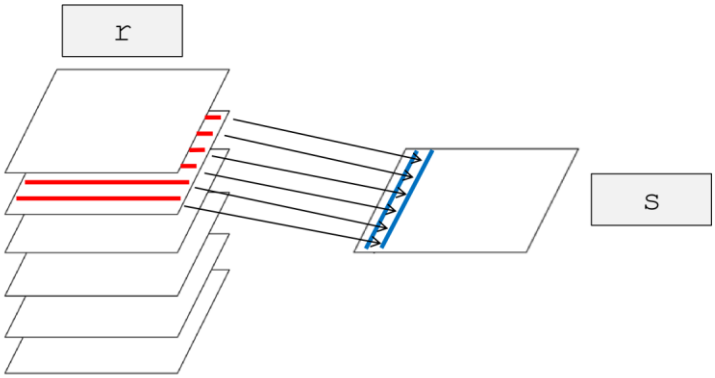

winter
spring
summer
fall
3490000
3480000
3470000
3460000
3450000
670000
690000
0.6
0.5
0.4
0.3
0.2
0.1


Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
3490000
3480000
3470000
3460000
3450000
670000
700000
0.7
0.6
0.5
0.4
0.3
0.2
0.1

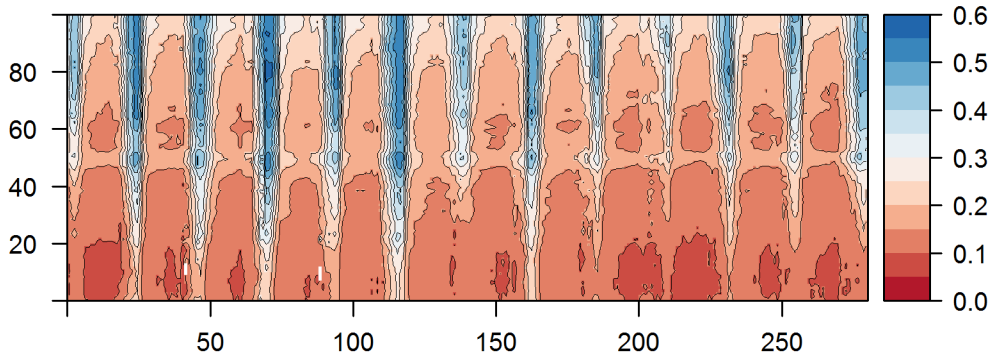
Layer 1



Layer 2

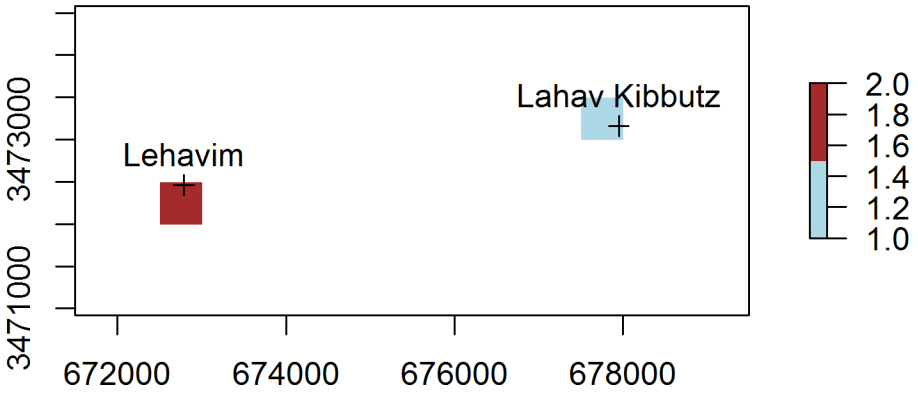


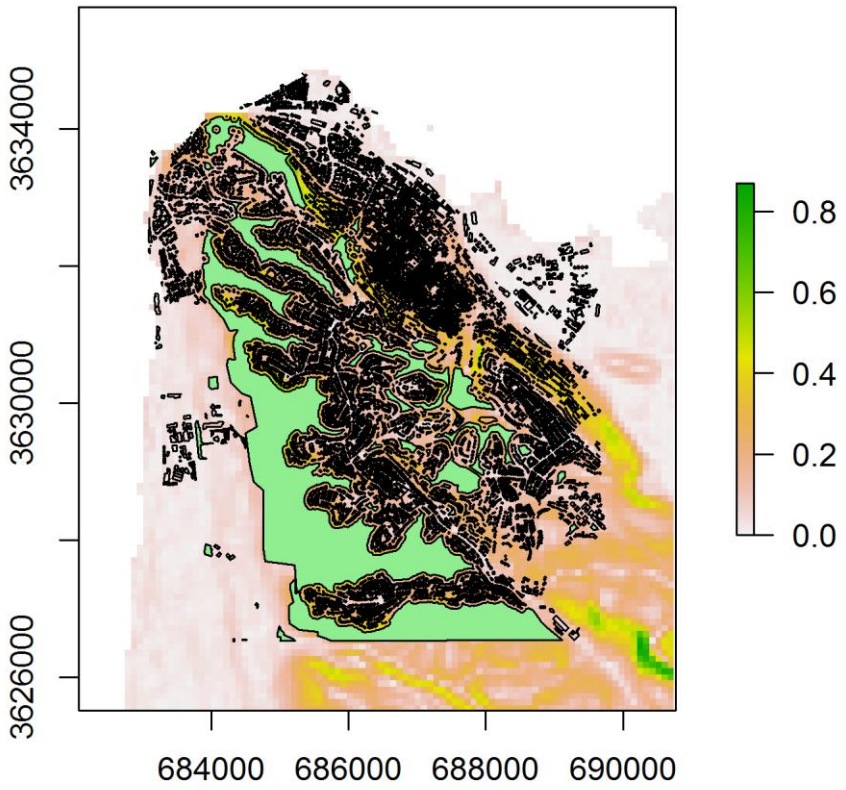
And so on up to layer 280...

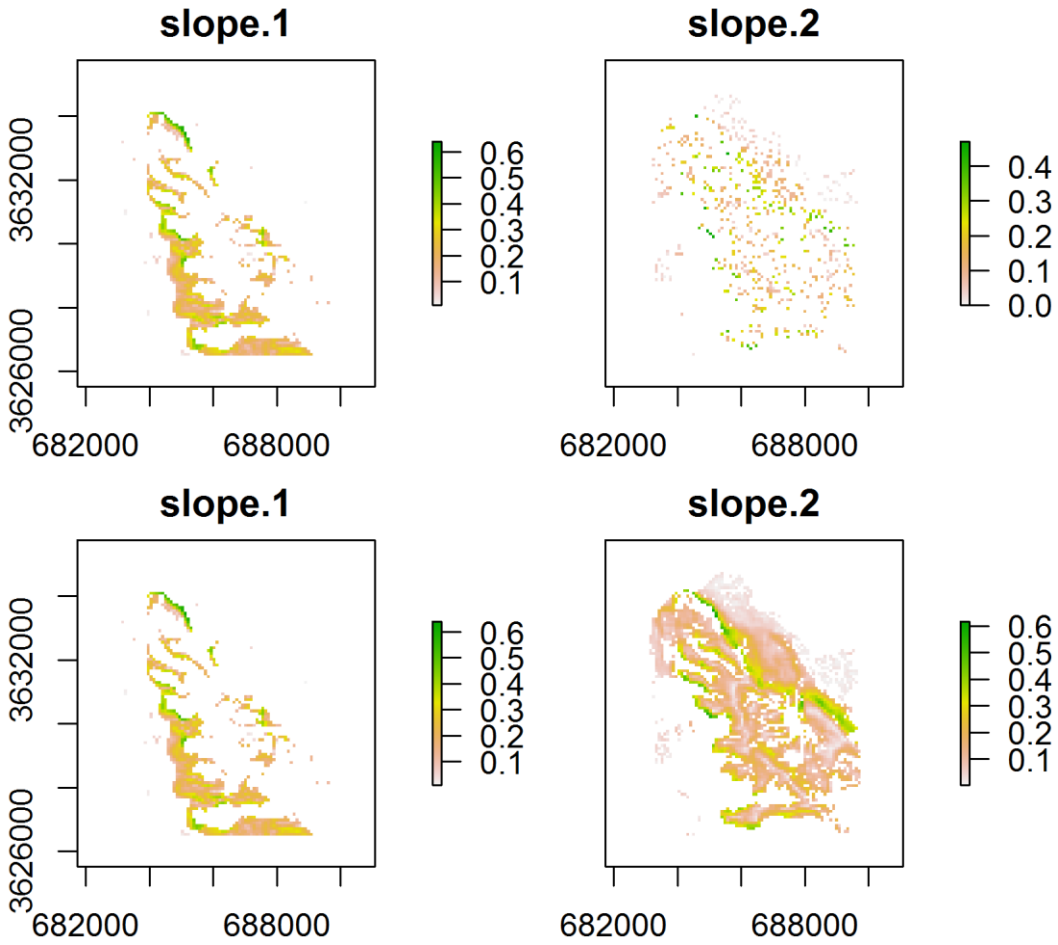


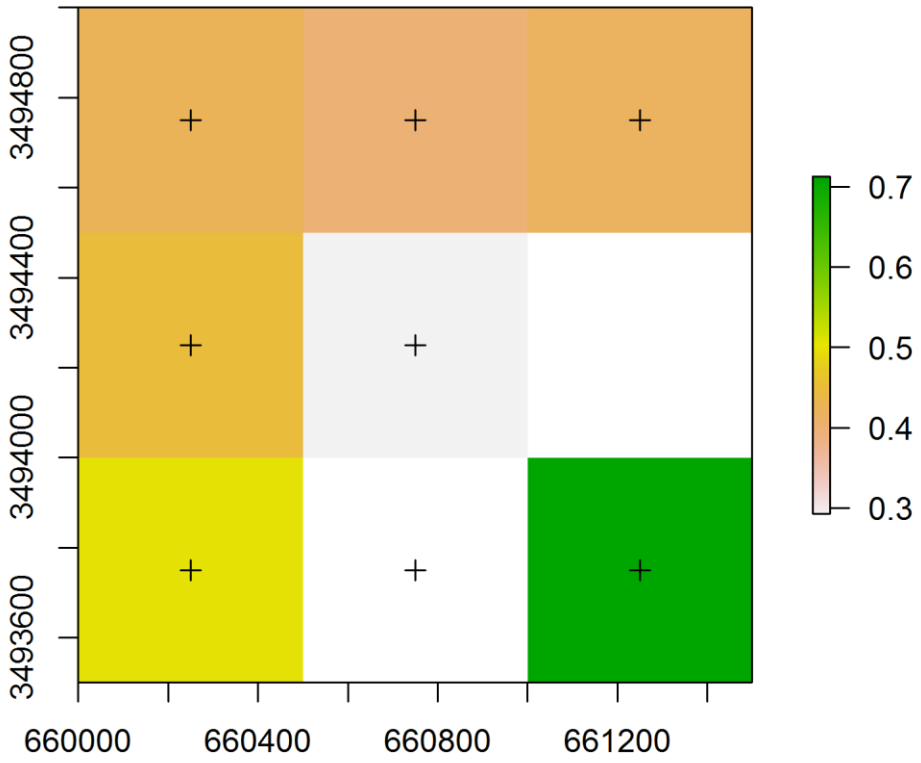
Chapter 7: Combining Vector and Raster Datasets

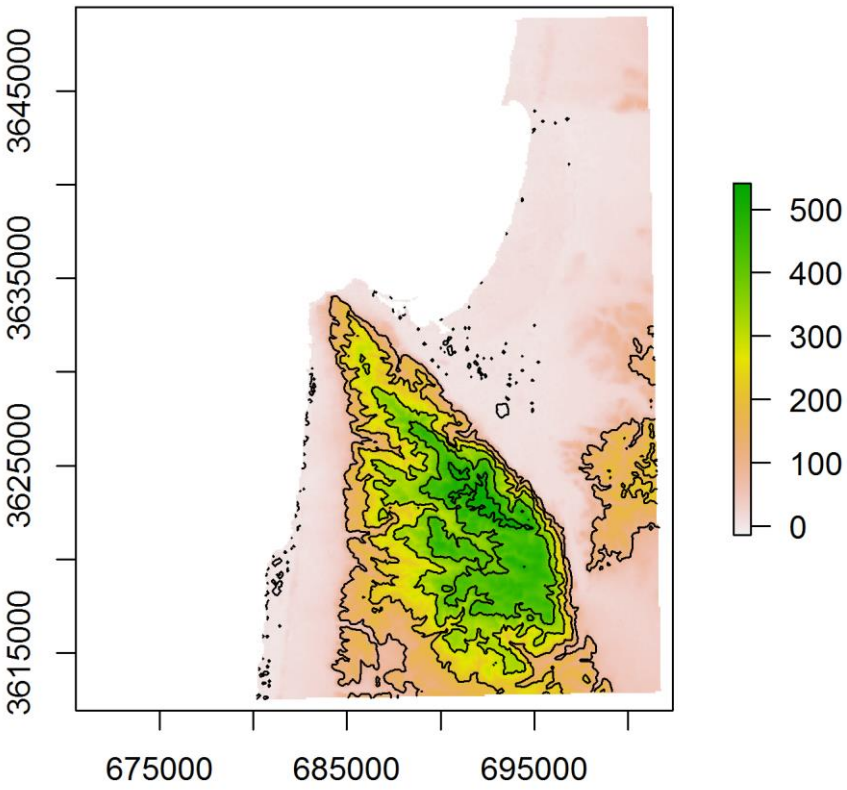

Lahav Kibbutz
Lehavim

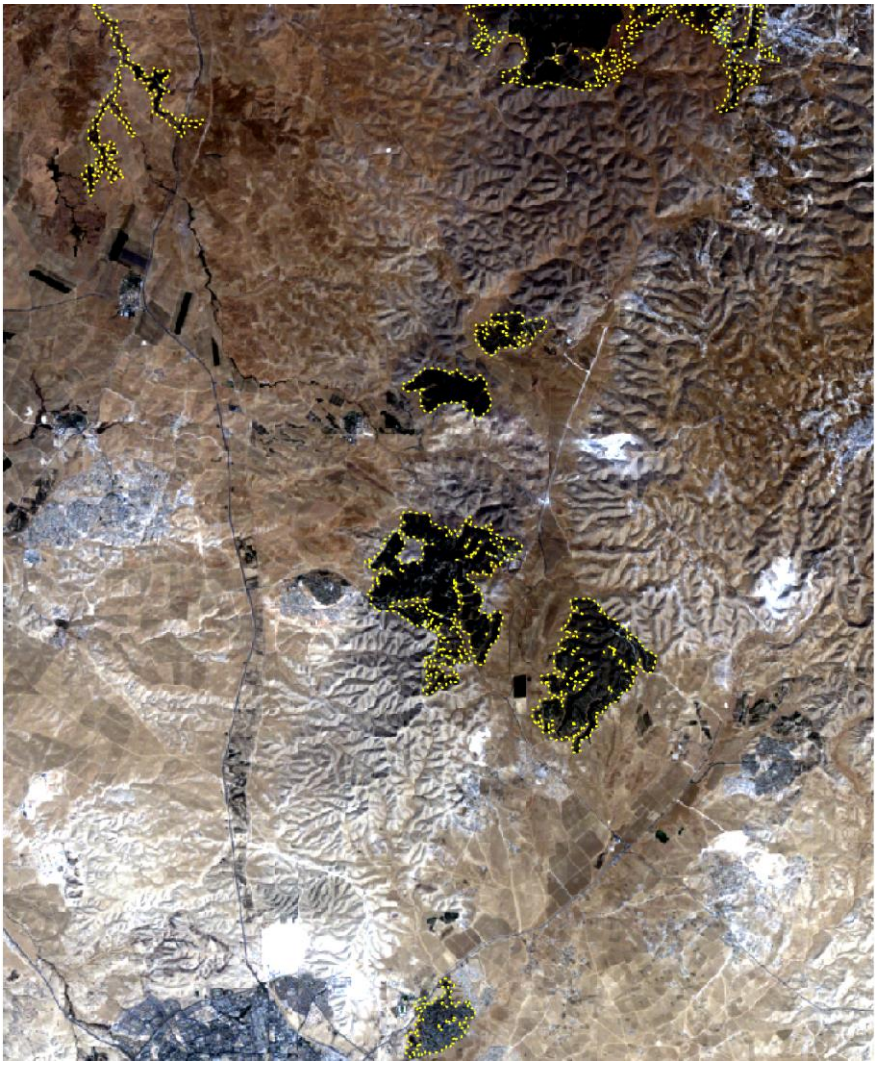

Lahav Kibbutz
Lehavim
3473000
3471000
672000
674000
676000
678000
2.0
1.8
1.6
1.4
1.2
1.0

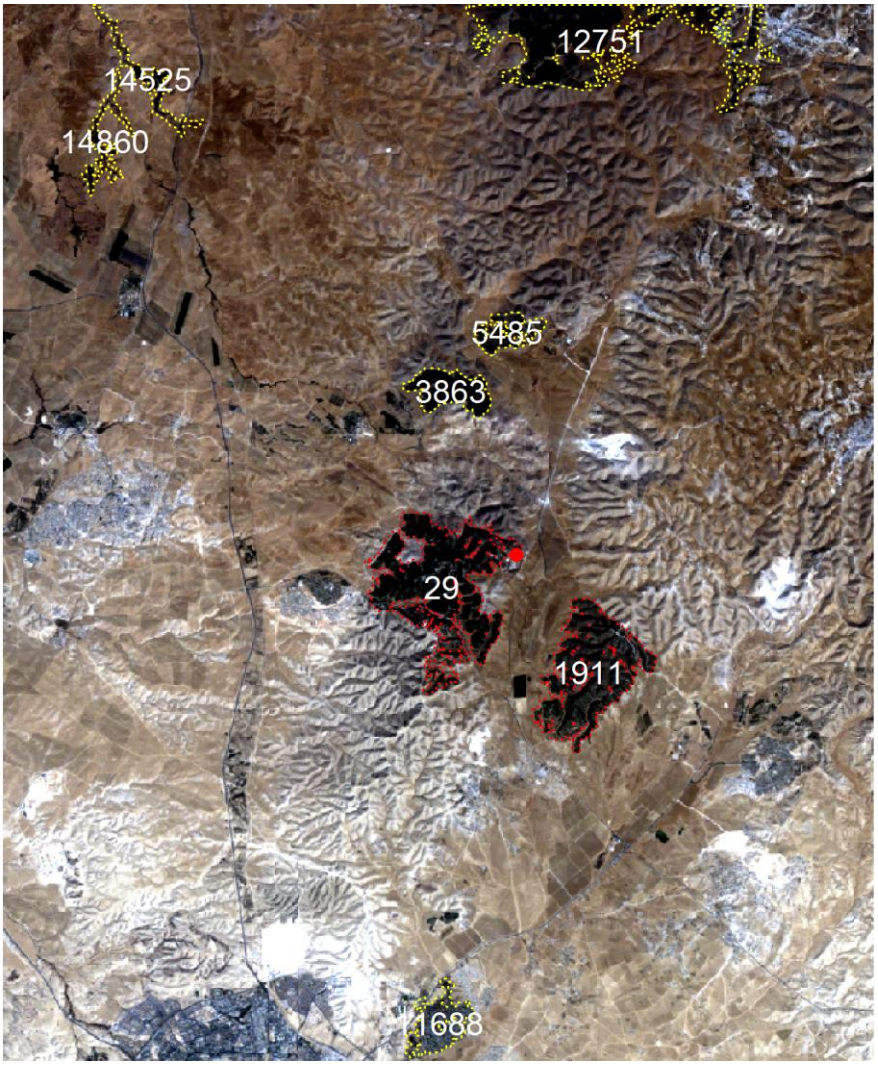

3634000
3630000
3626000
684000
686000
688000
690000
0.8
0.6
0.4
0.2
0.0

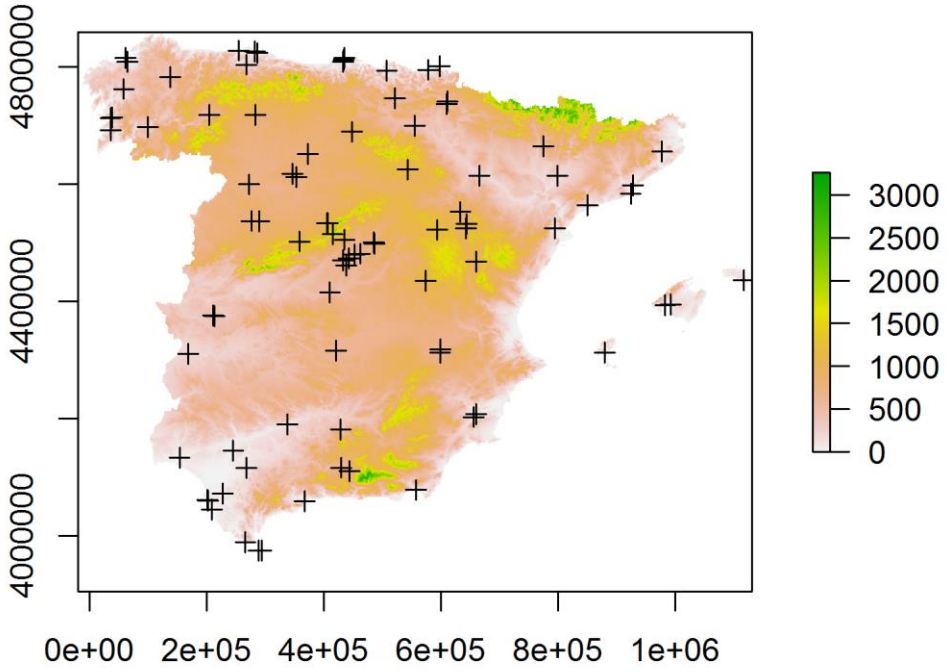

slope.1
slope.2
slope.1
slope.2
3632000
3626000
682000
688000
0.6
0.5
0.4
0.3
0.2
0.1
0.0

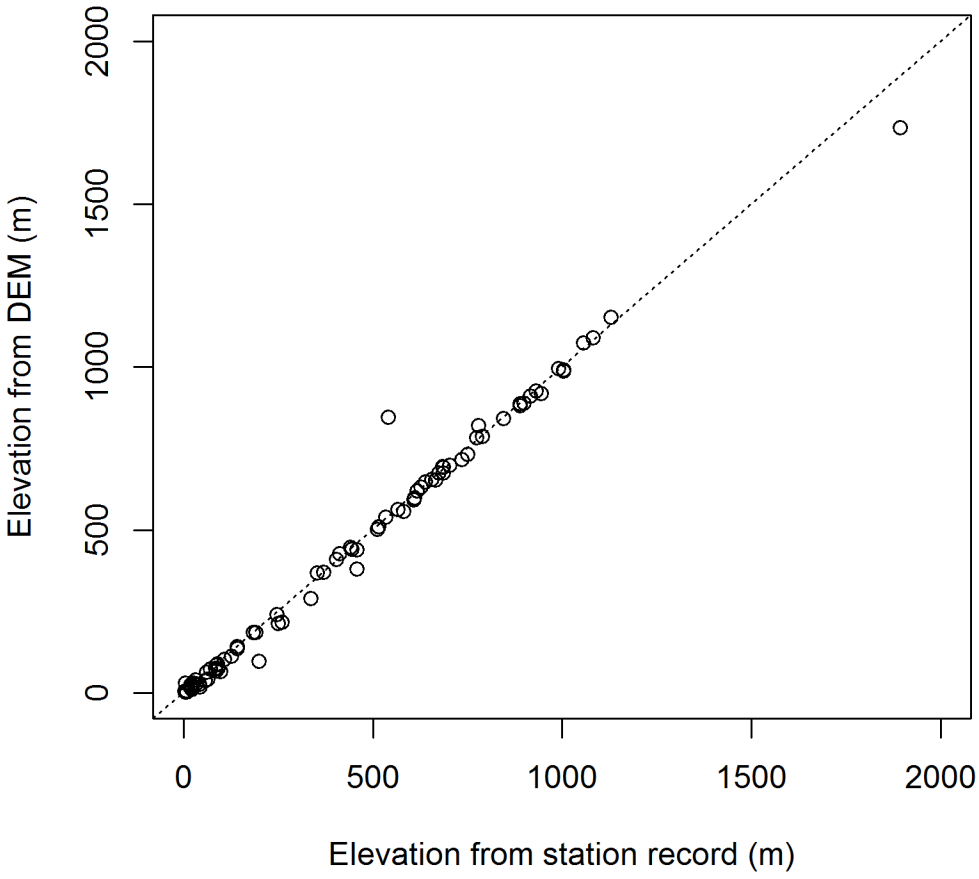

3494800
3494400
3494000
3493600
660000
660400
660800
661200
0.7
0.6
0.5
0.4
0.3


3645000
3635000
3625000
3615000
675000
685000
695000
500
400
300
200
100
0

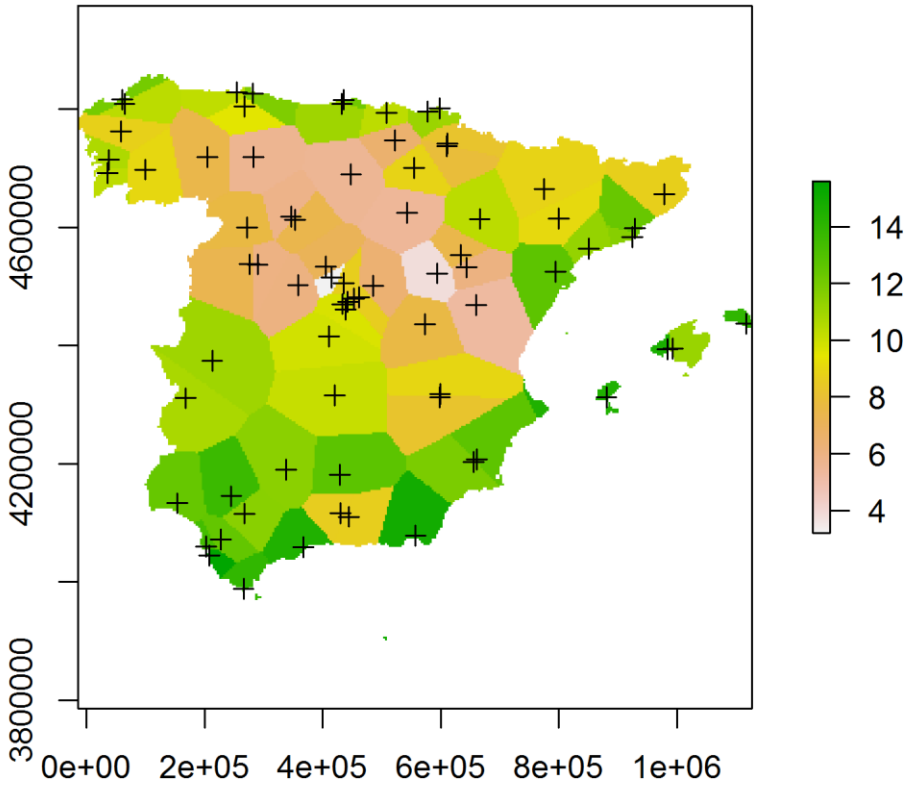


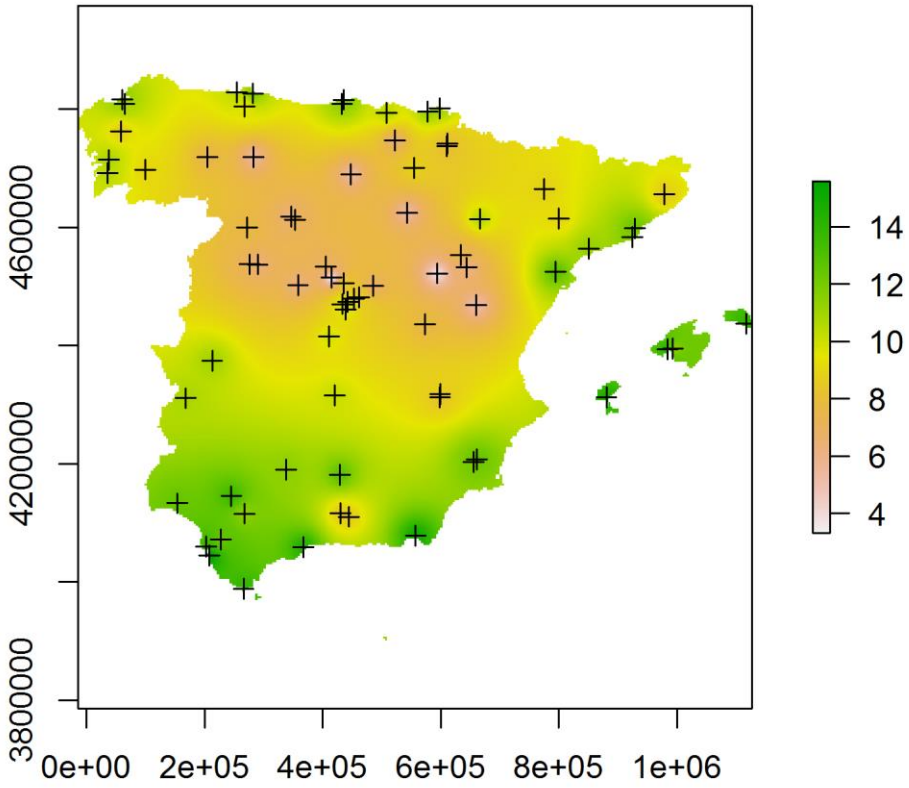

12751
14525
14860
5485
3863
29
1911
1688

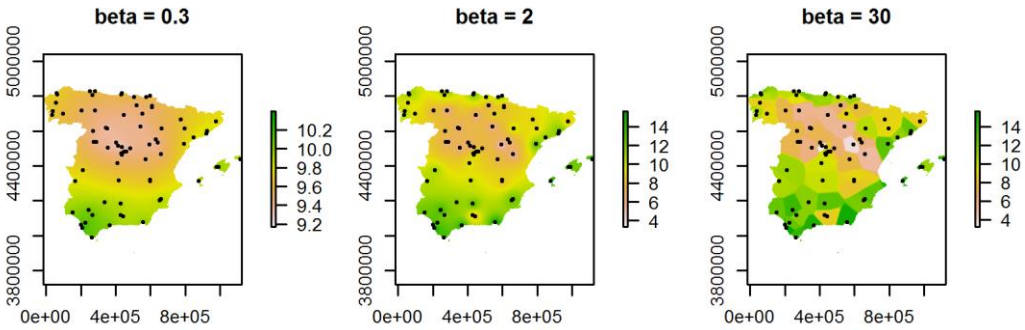

4800000
4400000
4000000
0e+00
2e+05
4e+05
6e+05
8e+05
1e+06
3000
2500
2000
1500
1000
500
0

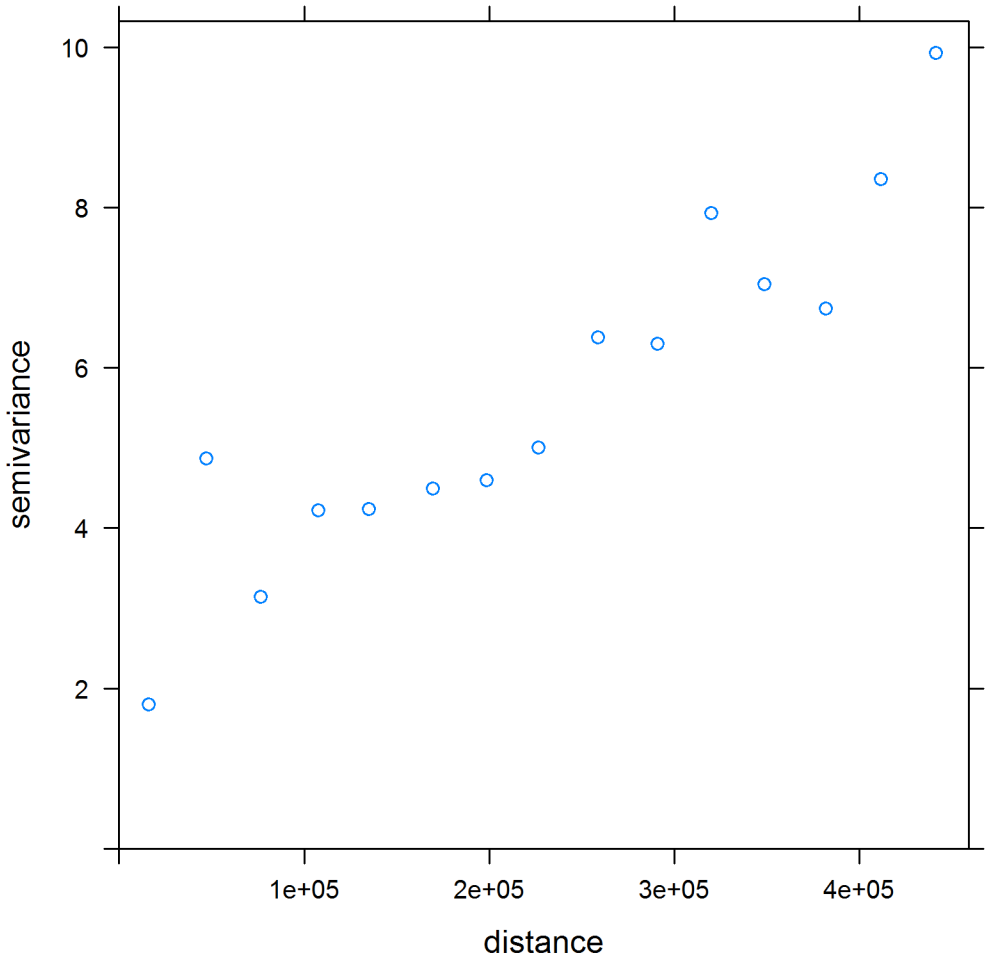


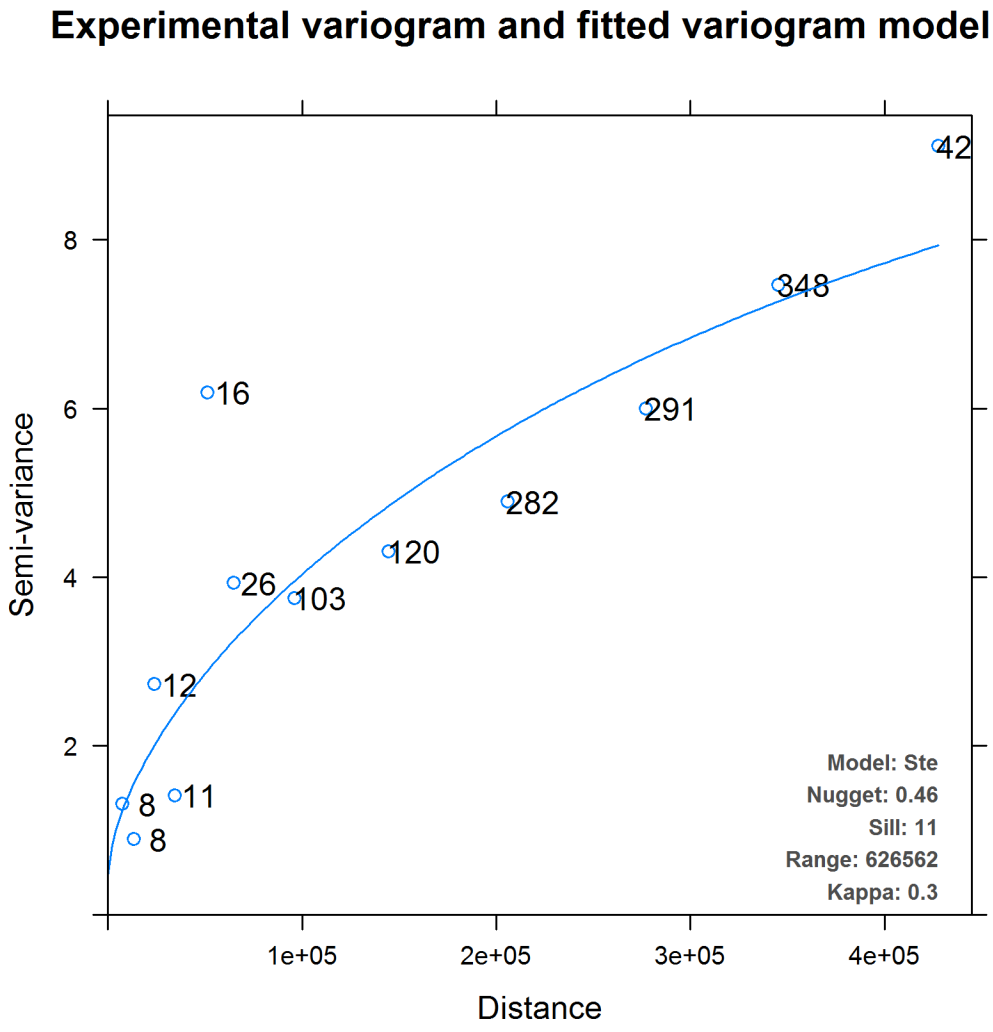
Chapter 8: Spatial Interpolation of Point Data

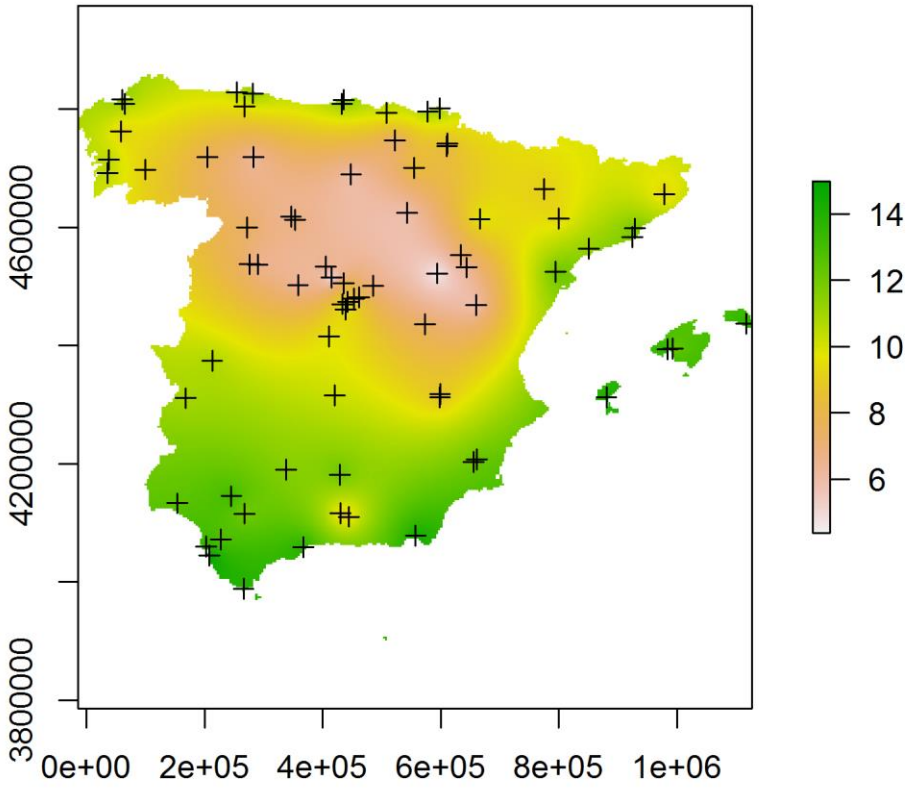

4600000
4200000
3800000
0e+00
2e+05
4e+05
6e+05
8e+05
1e+06
14
12
10
8
6
4

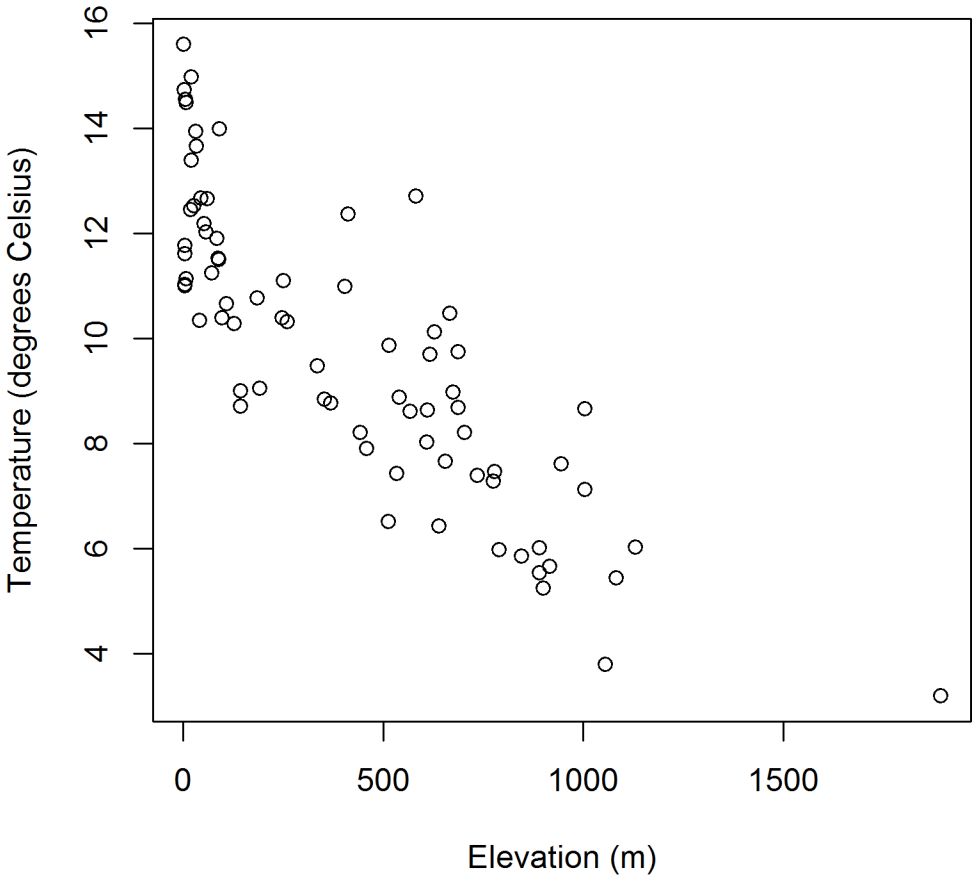

4600000
4200000
3800000
0e+00
2e+05
4e+05
6e+05
8e+05
1e+06
14
12
10
8
6
4

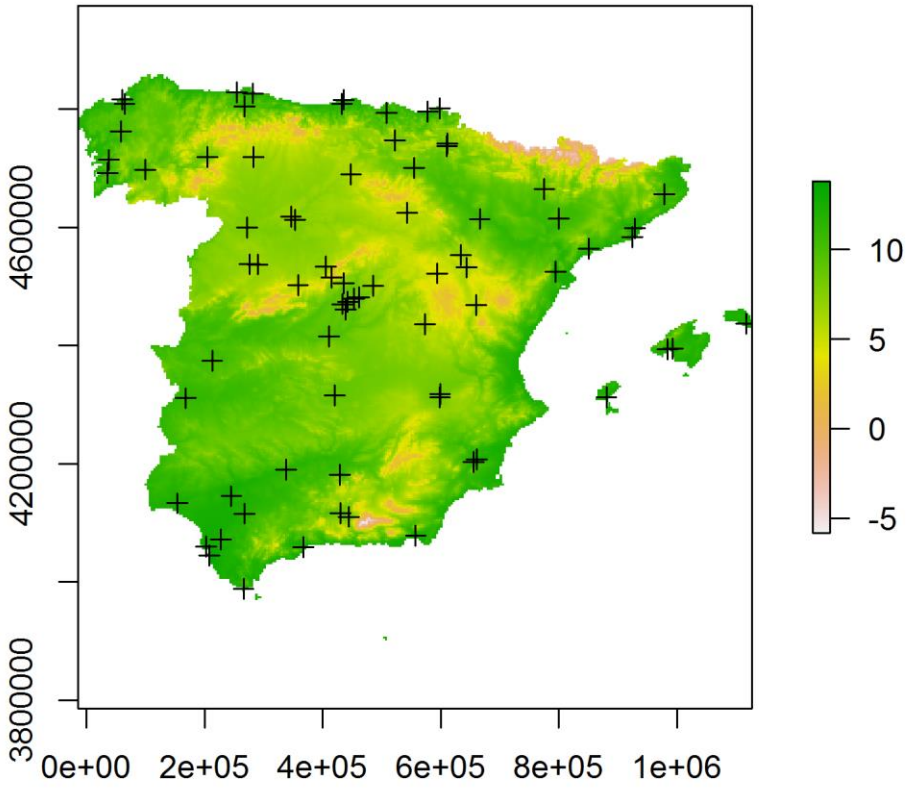

beta = 0.3
5000000
4400000
3800000
0e+00
4e+05
8e+05
10.2
10.0
9.8
9.6
9.4
9.2
beta = 2
5000000
4400000
3800000
0e+00
4e+05
8e+05
14
12
10
8
6
4
beta = 30
5000000
4400000
3800000
0e+00
4e+05
8e+05
14
12
10
8
6
4

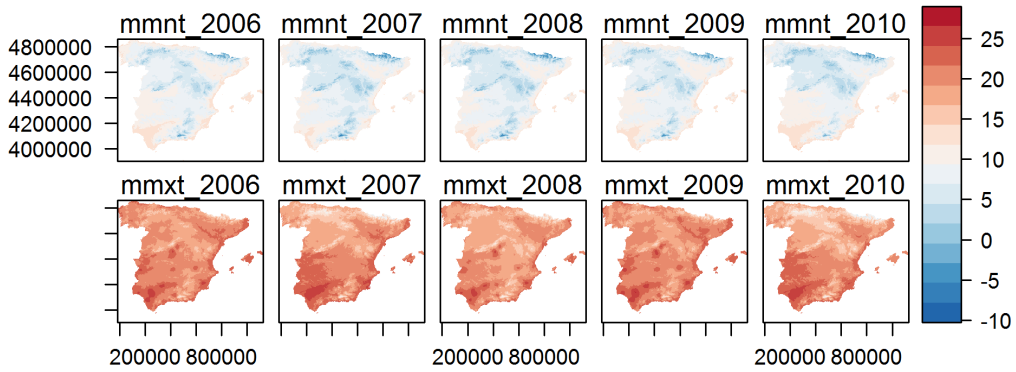

semivariance
10
8
6
4
2
1e+05
2e+05
3e+05
4e+05
distance

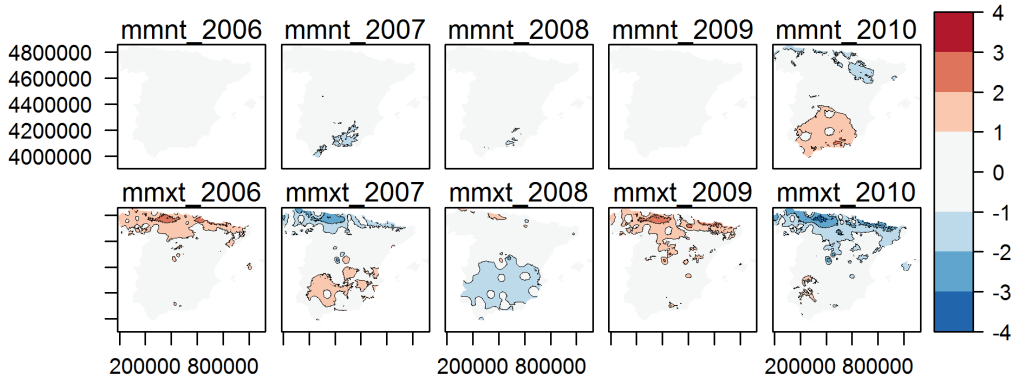

Experimental variogram and fitted variogram model
Semi-variance
Distance
2
4
6
8
1e+05
2e+05
3e+05
4e+05
42
348
16
291
282
120
26
103
12
11
8
8
Model: Ste
Nugget: 0.46
Sill: 11
Range: 626562
Kappa: 0.3


4600000
4200000
3800000
0e+00
2e+05
4e+05
6e+05
8e+05
1e+06
14
12
10
8
6

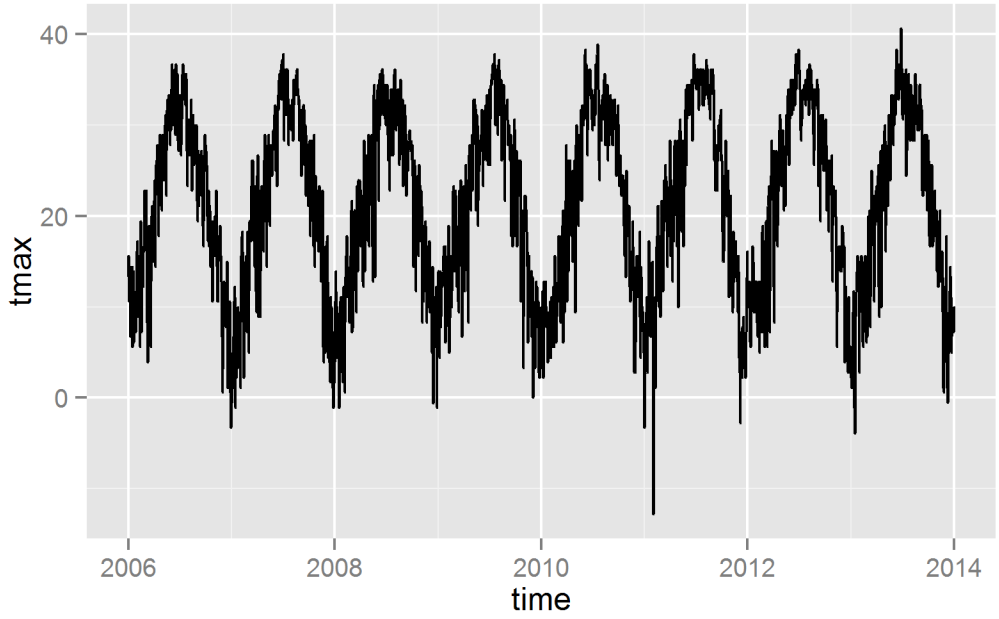

Temperature (degrees Celsius)
4
6
8
10
12
14
16
0
500
1000
1500
Elevation (m)

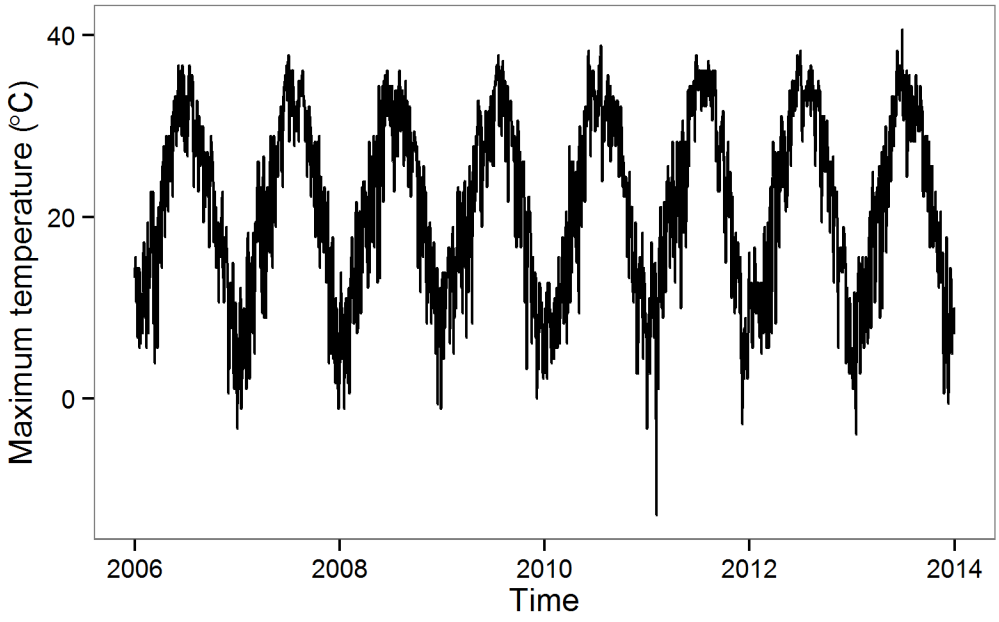

4600000
4200000
3800000
0e+00
2e+05
4e+05
6e+05
8e+05
1e+06
10
5
0
-5

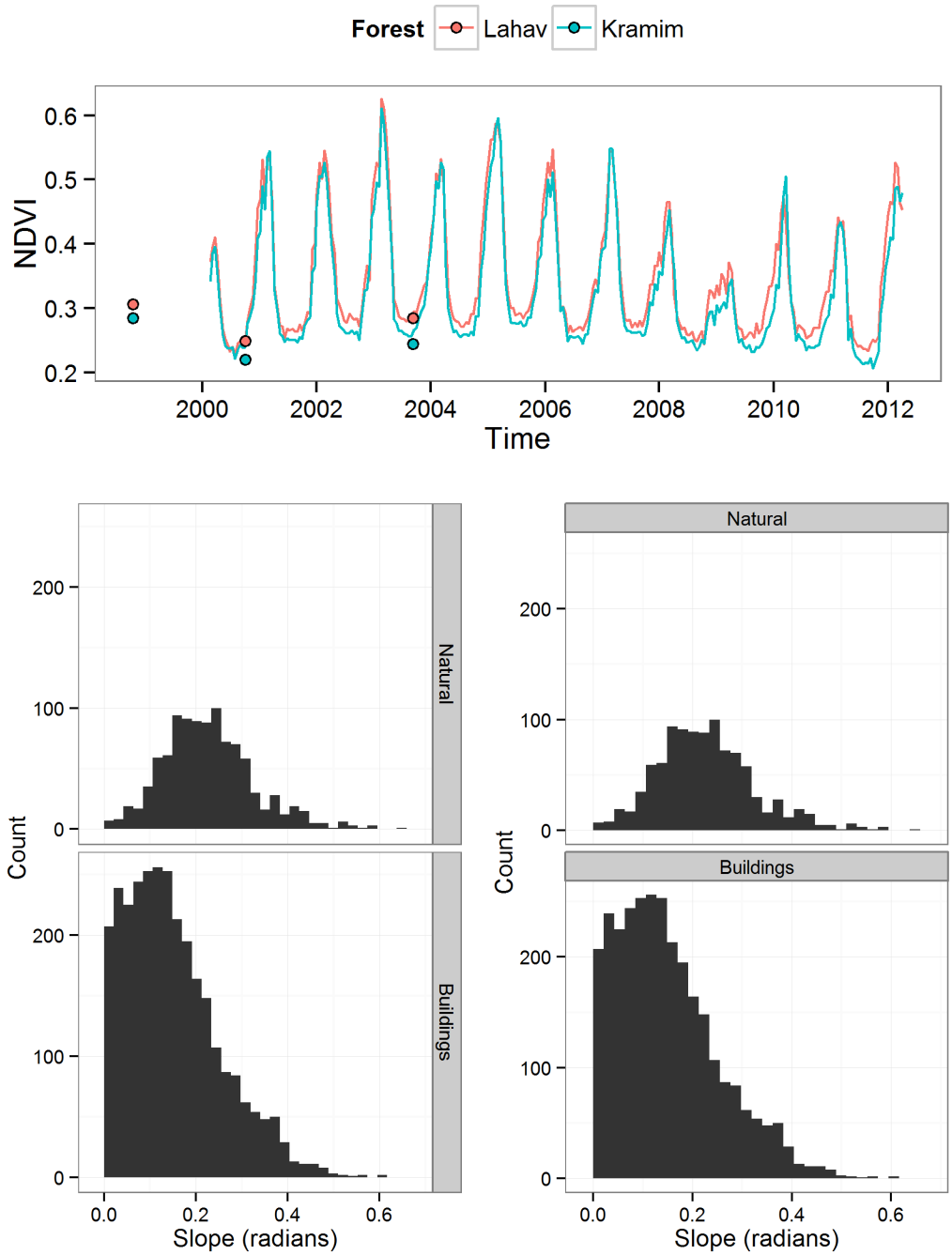


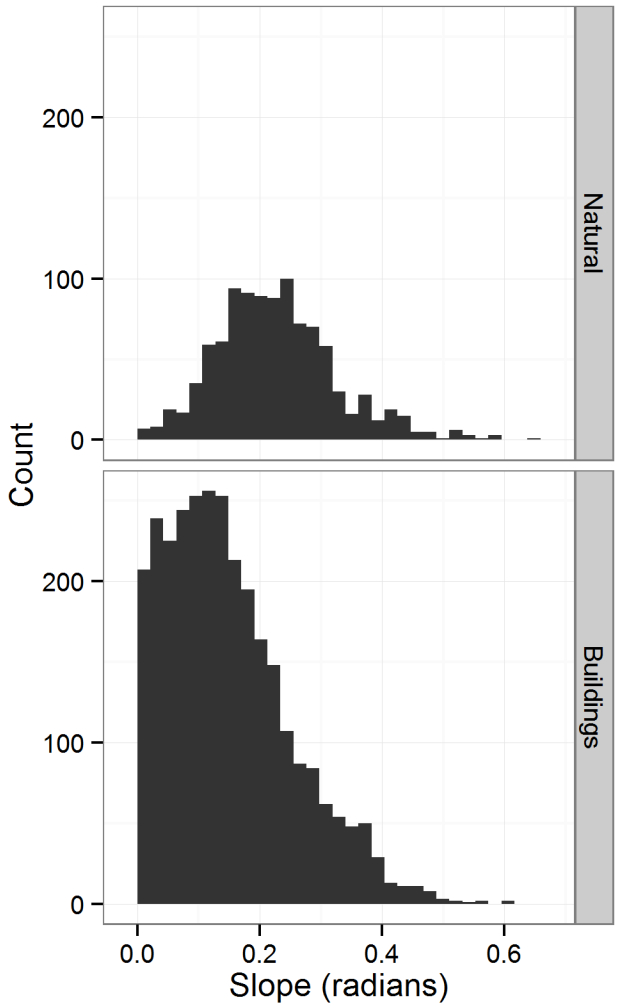


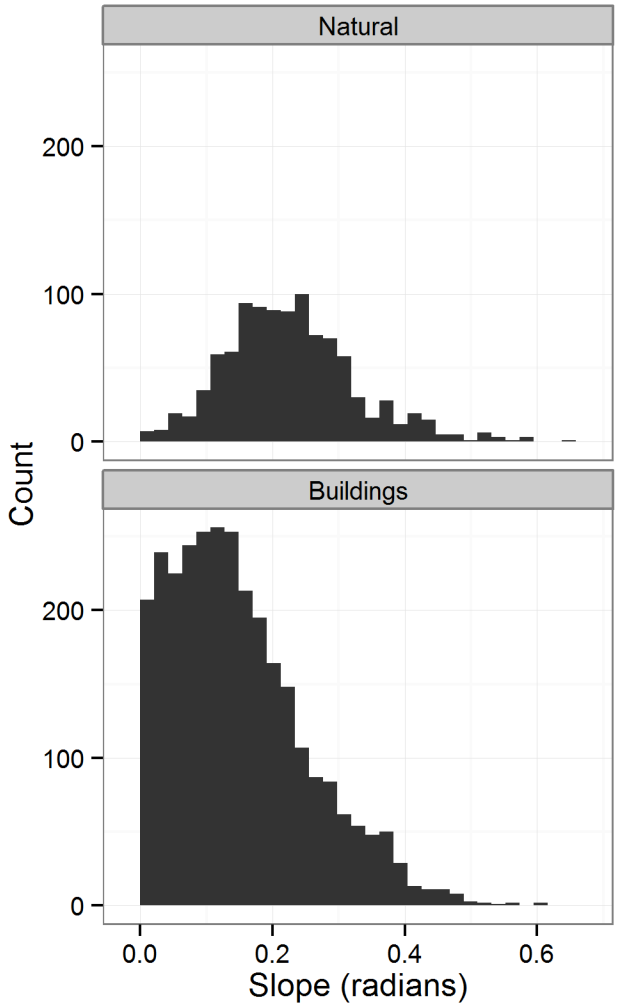
Chapter 9: Advanced Visualization of Spatial Data

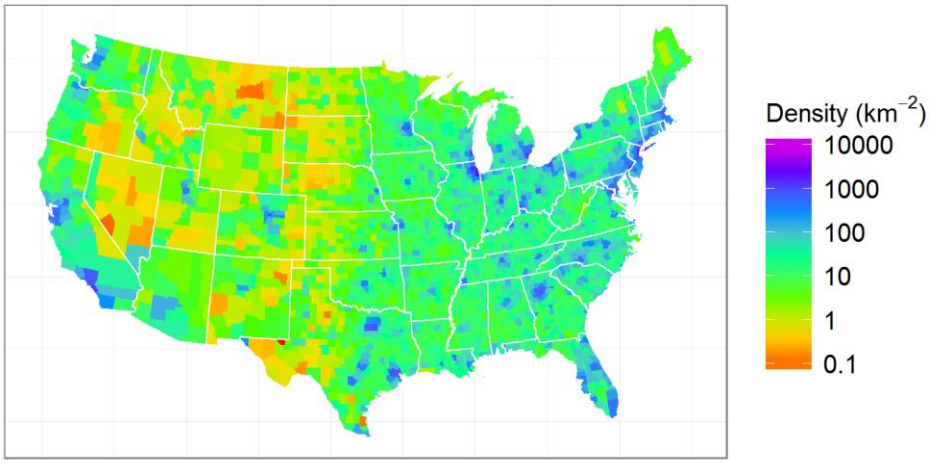

40
20
0
tmax
2006
2008
2010
2012
2014
time

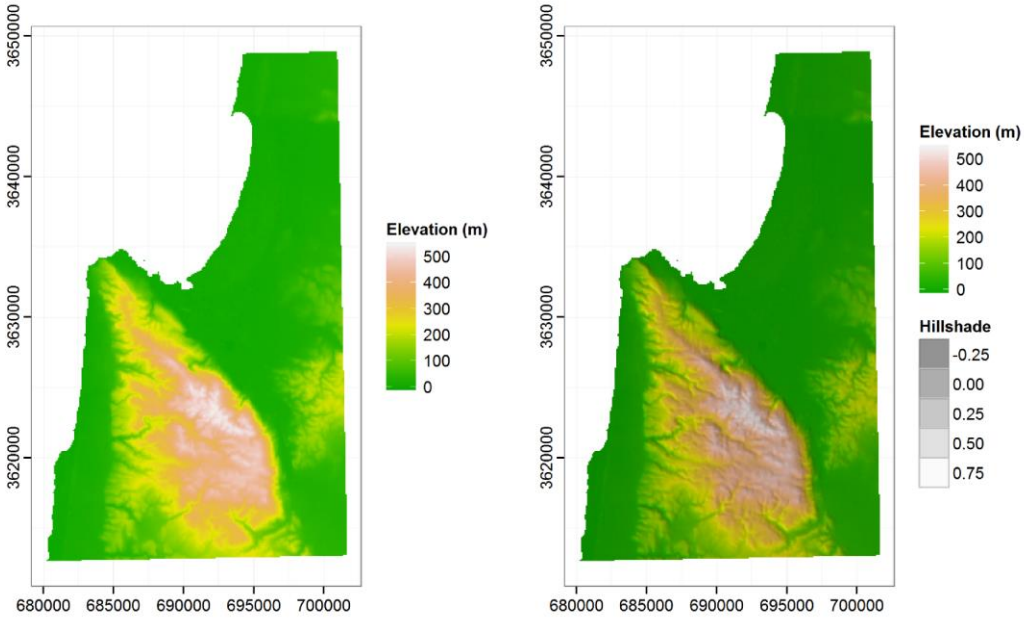

40
20
0
Maximum temperature (°C)
2006
2008
2010
2012
2014
Time

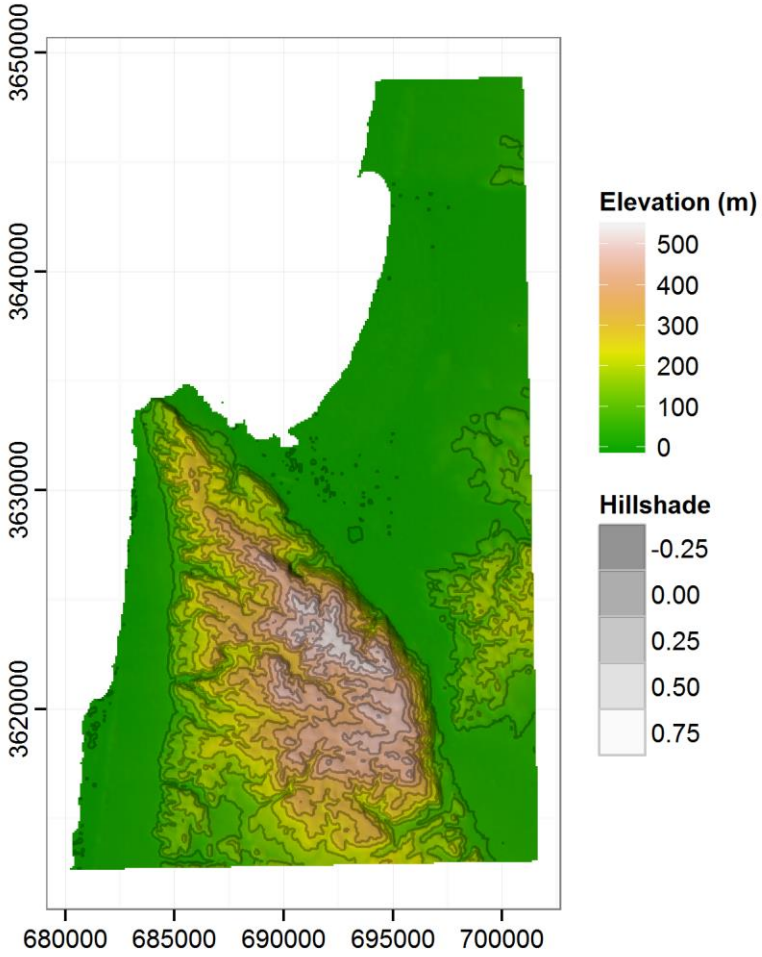

Forest
Lahav
Kramim
NDVI
0.6
0.5
0.4
0.3
0.2
2000
2002
2004
2006
2008
2010
2012
Time
Natural
Buildings
Count
200
100
0
0.0
0.2
0.4
0.6
Slope (radians)

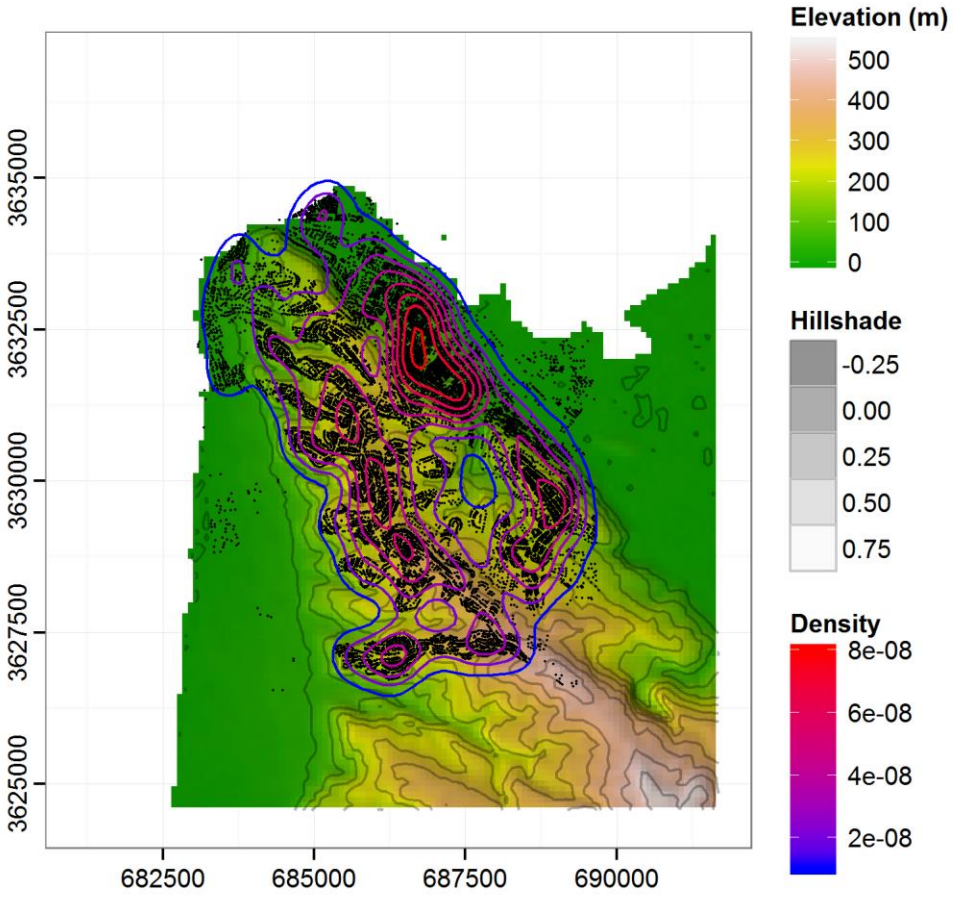

Natural
Buildings
Count
200
100
0
200
100
0
0.0
0.2
0.4
0.6
Slope (radians)

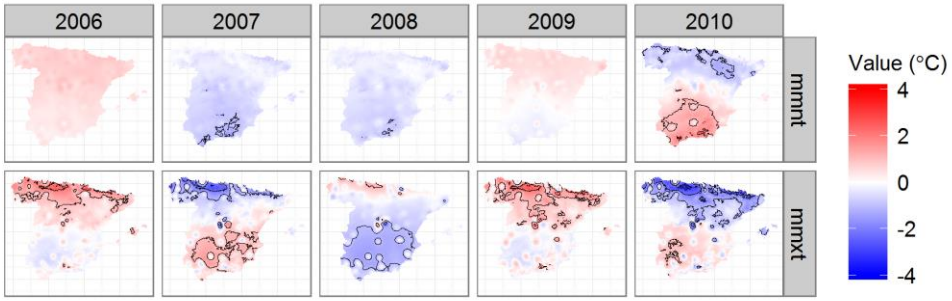

Natural
Buildings
Count
200
100
0
200
100
0
0.0
0.2
0.4
0.6
Slope (radians)

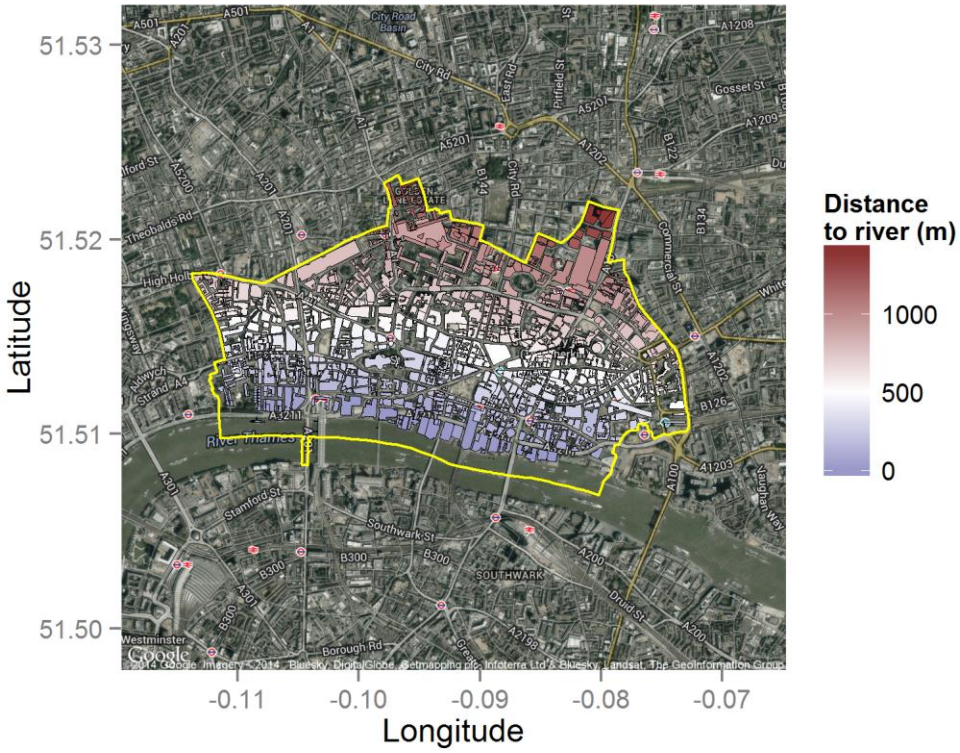

Density (km^{-2})
10000
1000
100
10
1
0.1

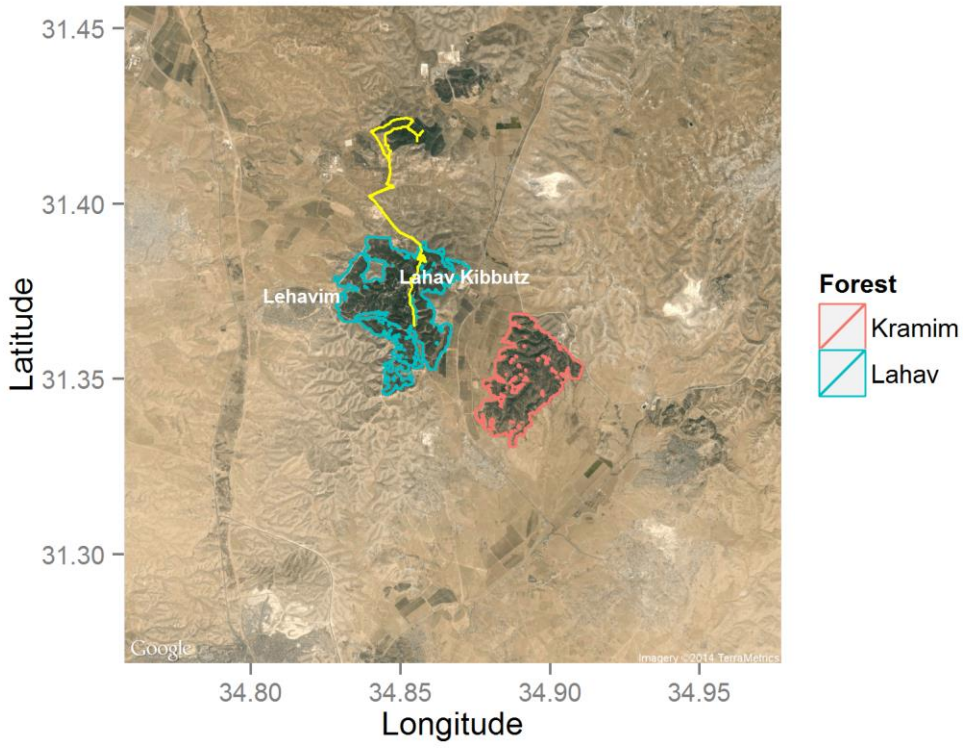

3650000
3640000
3630000
3620000
680000
685000
690000
695000
700000
Elevation (m)
500
400
300
200
100
0
Hillshade
-0.25
0.00
0.25
0.50
0.75

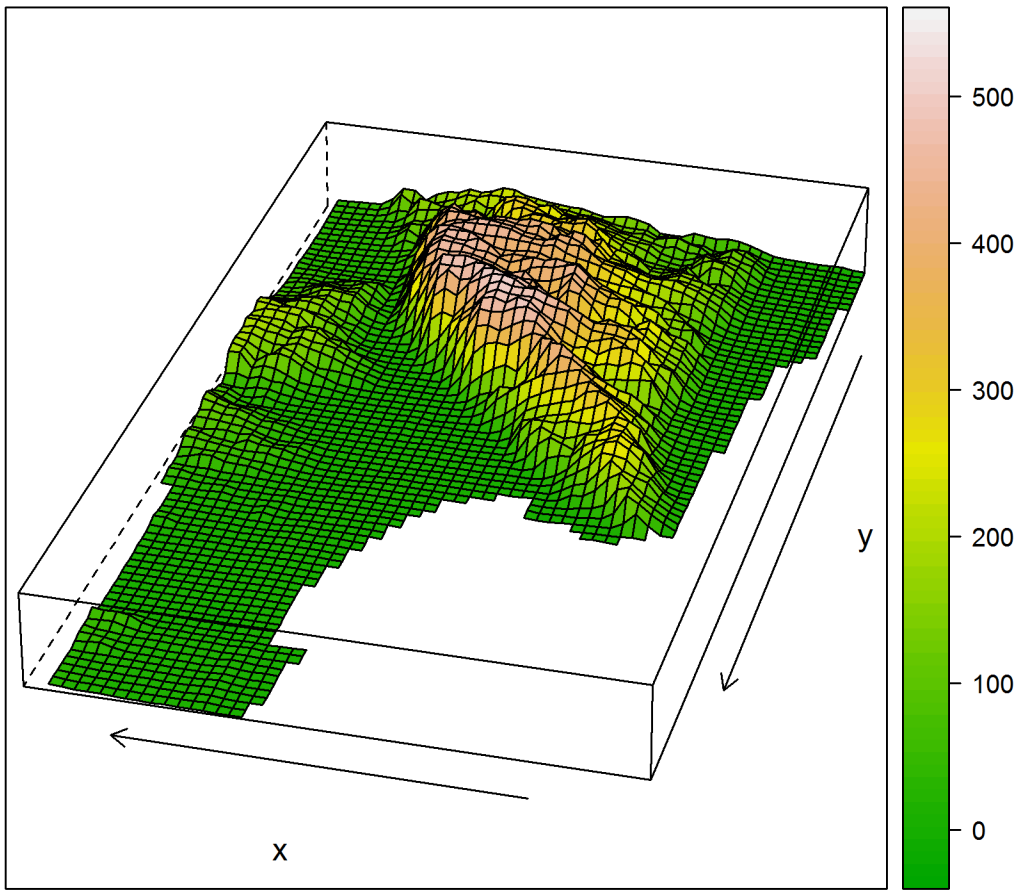

3650000
3640000
3630000
3620000
680000
685000
690000
695000
700000
Elevation (m)
500
400
300
200
100
0
Hillshade
-0.25
0.00
0.25
0.50
0.75

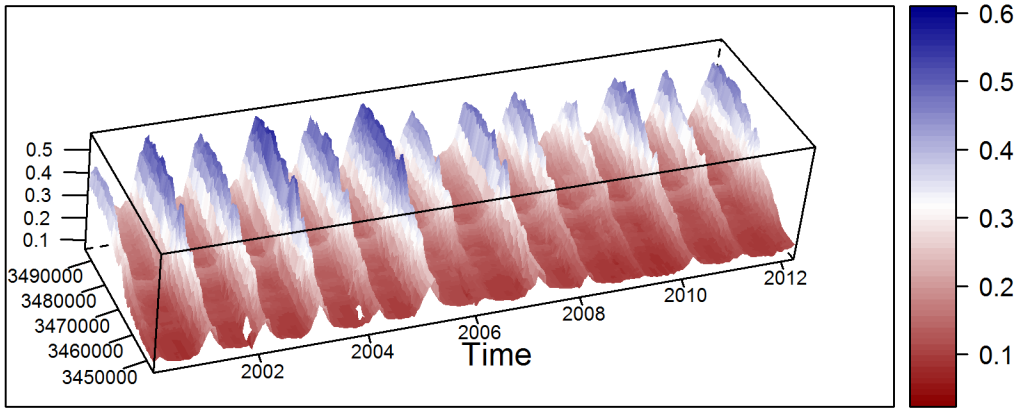

Elevation (m)
500
400
300
200
100
0
Hillshade
-0.25
0.00
0.25
0.50
0.75
Density
8e-08
6e-08
4e-08
2e-08
3635000
3632500
3630000
3627500
3625000
682500
685000
687500
690000


2006
2007
2008
2009
2010
mmnt
mmxt
Value (°C)
4
2
0
-2
-4


51.53
51.52
51.51
51.50
Latitude
-0.11
-0.10
-0.09
-0.08
-0.07
Longitude
Distance to river (m)
1000
500
0


31.45
31.40
31.35
31.30
Latitude
Lehavim
Lahav Kibbutz
Google
Imagery ©2014 TerraMetrics
34.80
34.85
34.90
34.95
Longitude
Forest
Kramim
Lahav


500
400
300
200
100
0
y
x


0.5
0.4
0.3
0.2
0.1
3490000
3480000
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3460000
3450000
2002
2004
2006
2008
2010
2012
Time
0.6
0.5
0.4
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0.2
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