The geographical ecology of pond bacteria

August 4, 2015

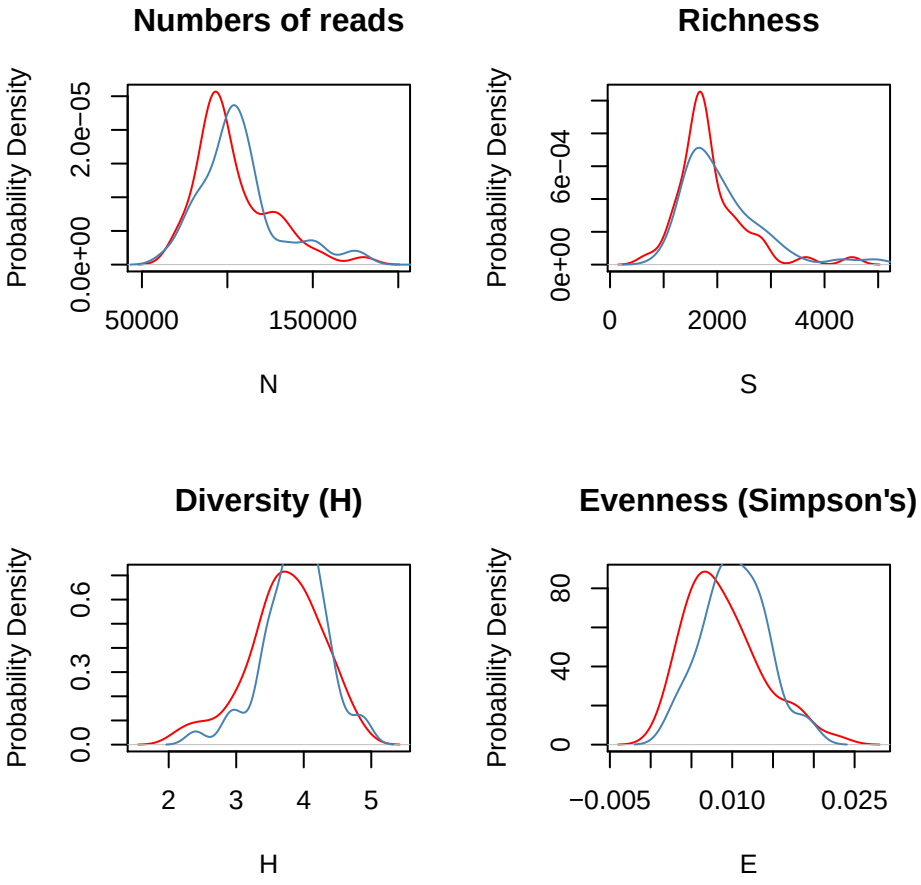
Overview

We asked whether "Active" and "All" differ in primary aspects of alpha-diversity, beta-diversity, and geographical patterns: the taxa-area relationship (TAR), the distance-decay relationship in taxonomic and phylogenetic community similarity.

FINDINGS

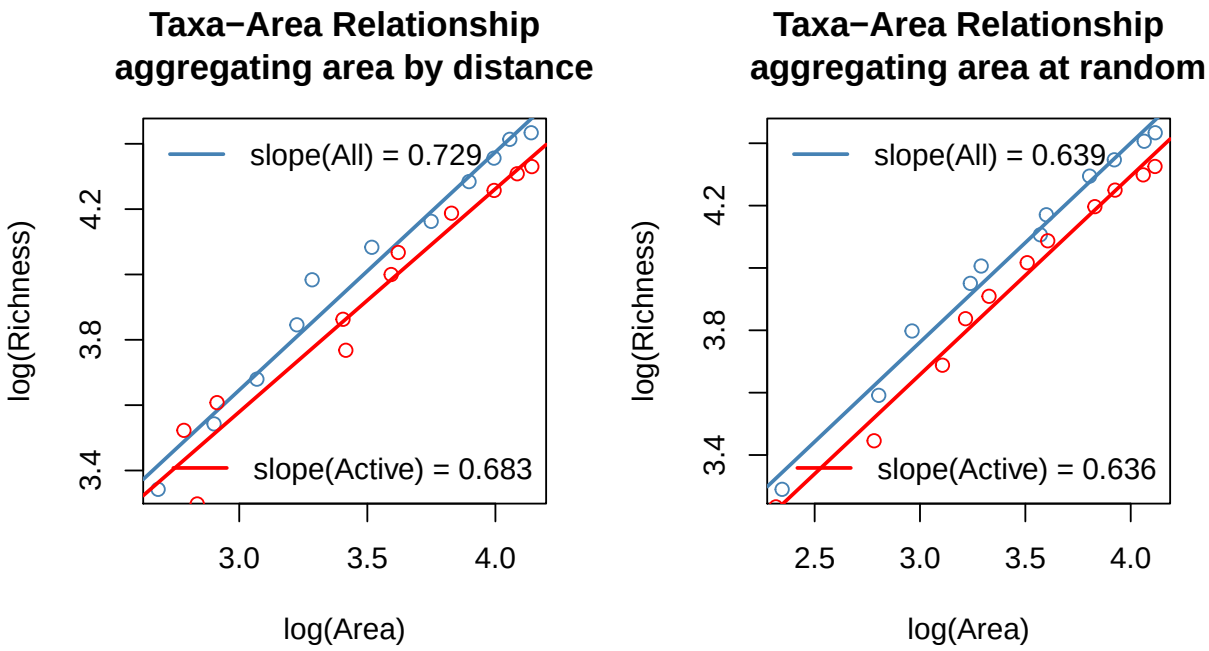
1.) No differences in distributions of observed N, S, Diversity, and Evenness

For each pond, we used the observed taxonomic richness (S), total number of gene reads (N), and number of gene reads per OTU (Ni) to estimate Shannon's diversity index (H), and Simpson's evenness (D/S).

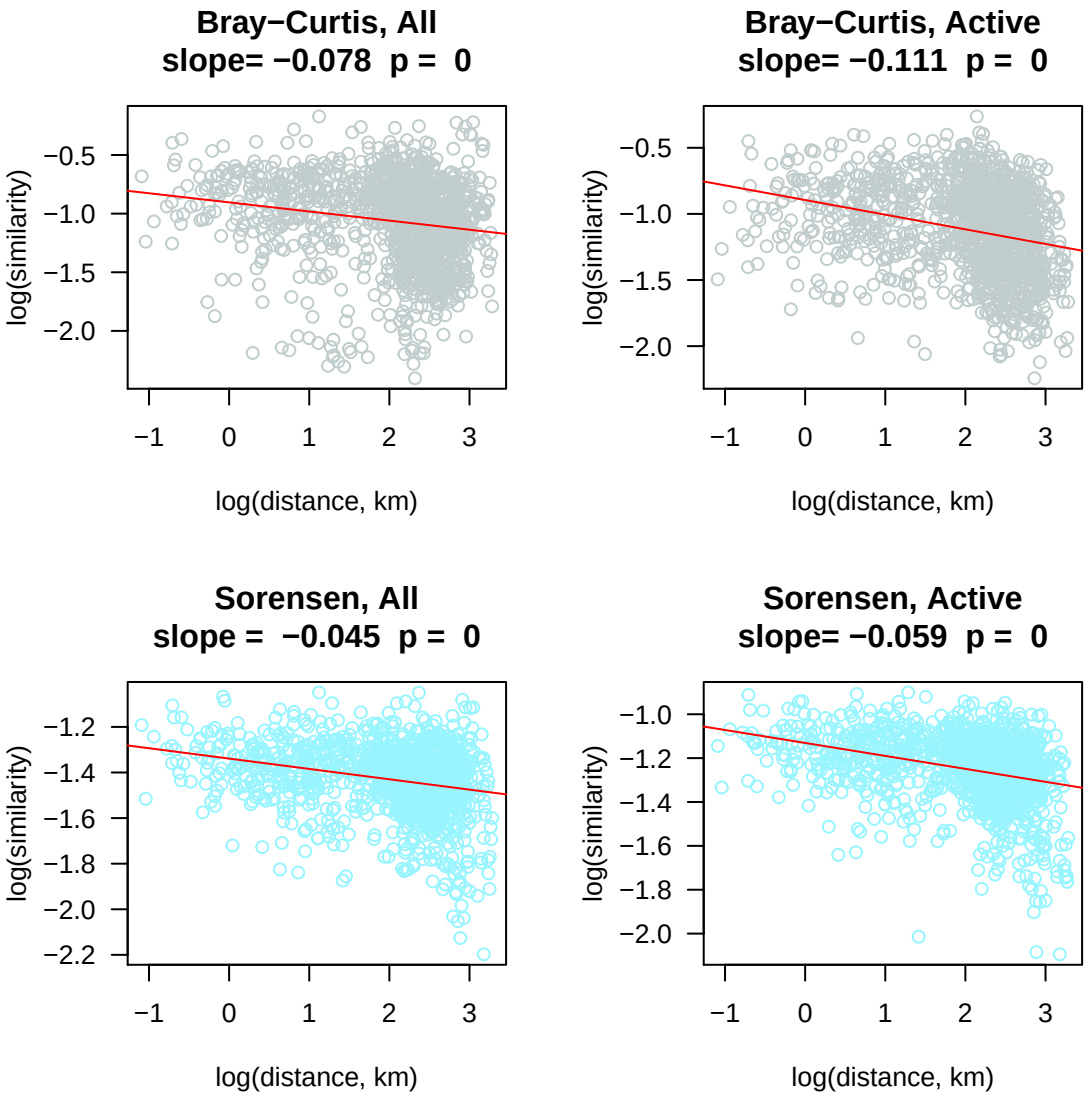


2.) No differences in slopes of taxa-area relationships

The species-area relationshp describes the rate at which species are discovred with increasing area. The SAR one of ecology's oldest and most intensively studied patterns. Arrhenius (1921) first described the general form of the *species-area relationship (SAR)* as a power-law: $S = cA^z$ where S is species richnness and A is area. Arrhenius's formula predicts a rate of increase in richness that is approximately linear in log-log space. That is, $log(S) = c + zlog(A)$, where z is the scaling exponent.



3.) Slight differences in distance-decay relationships



Are the slopes of the DD's different?

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## [1] "Bray-Curtis: Difference in slope = -0.033 ; p = 0.015"
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## [1] "Sorensen: Difference in slope = -0.014 ; p = 0.02"
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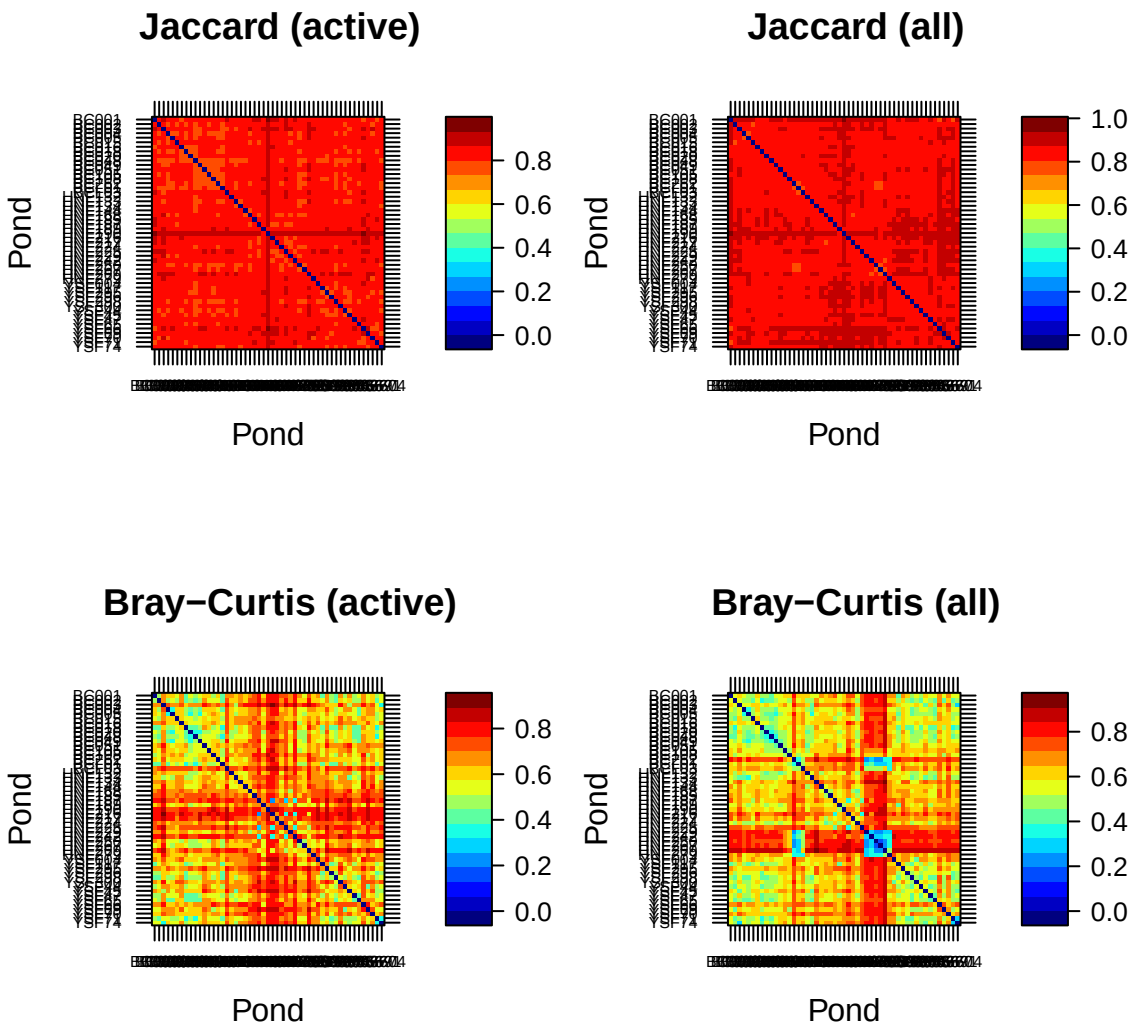
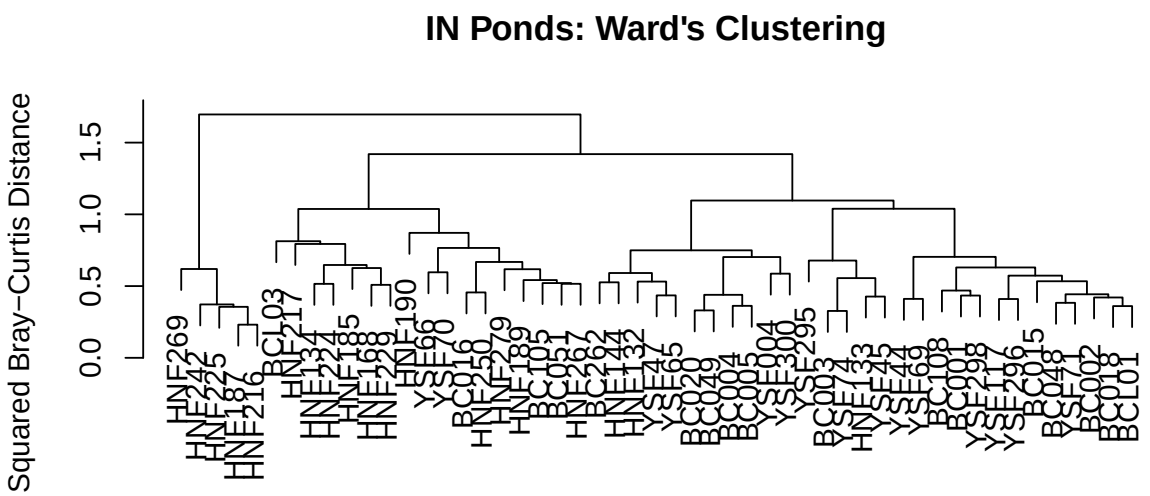
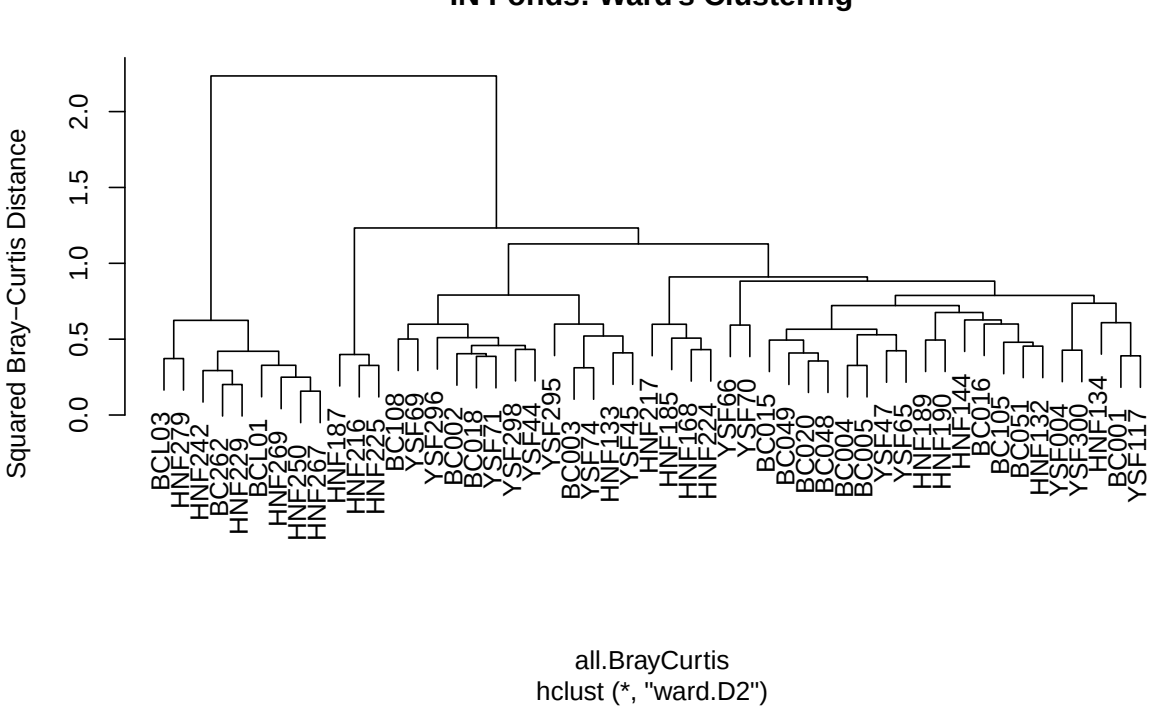
4.) Little difference in community distance matrices between Active and All when using presence-absence; generally low similarity. Substantial differences between Active and All based on Bray-Curtis.




IN Ponds: Ward's Clustering
Squared Bray−Curtis Distance
0.0
0.5
1.0
1.5
active.BrayCurtis
hclust (*, "ward.D2")


IN Ponds: Ward's Clustering
Squared Bray−Curtis Distance
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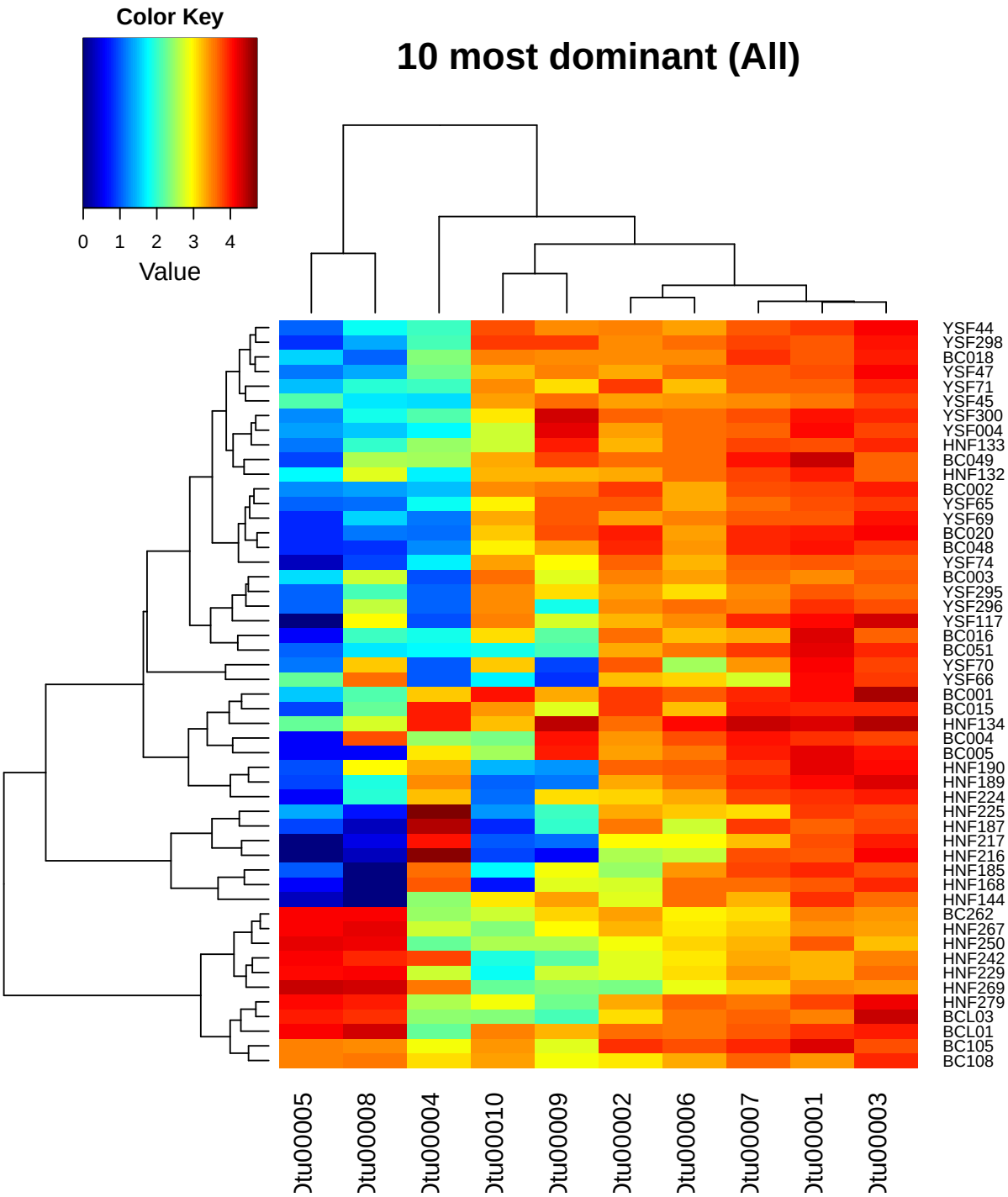
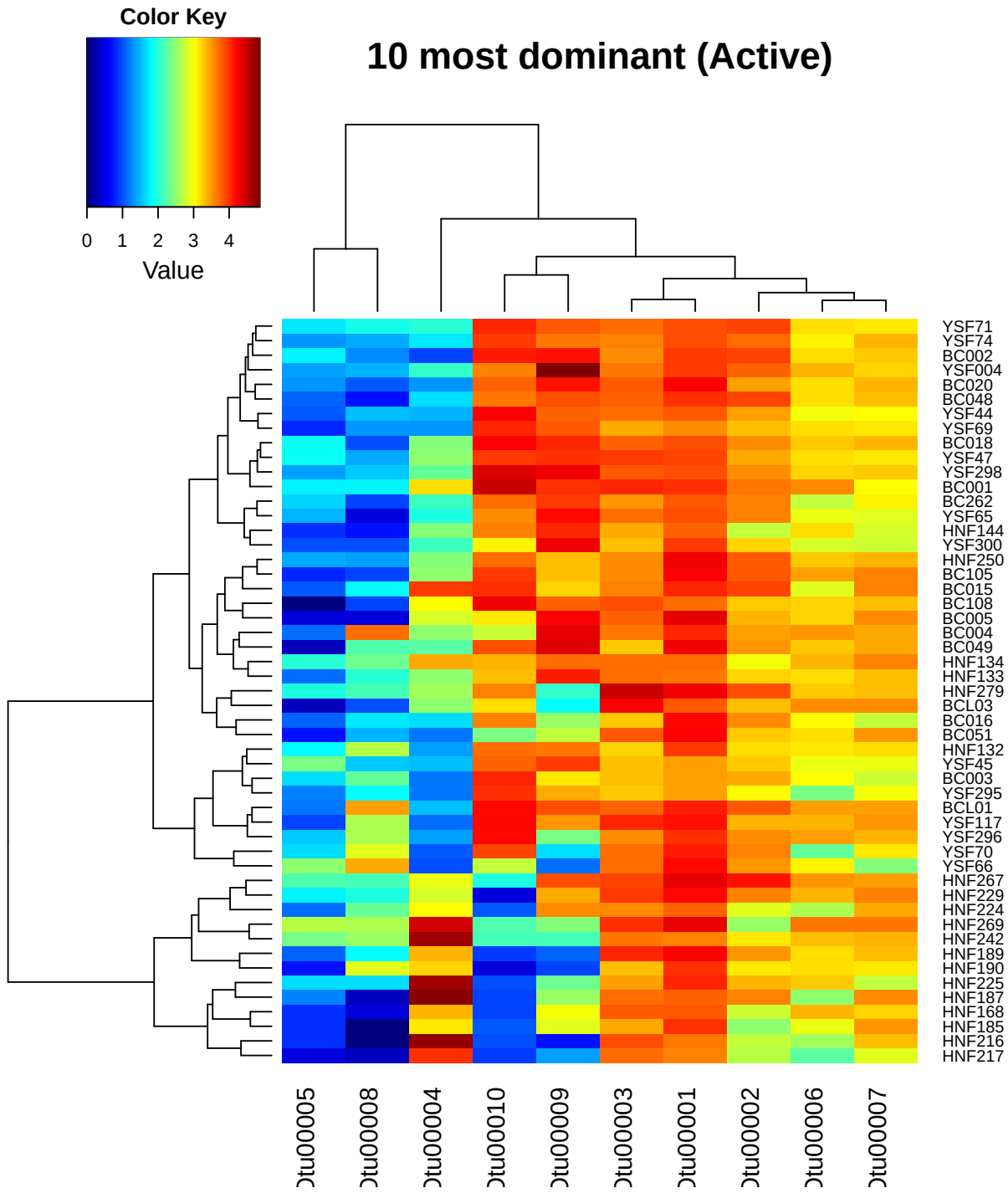
0.5
1.0
1.5
2.0
all.BrayCurtis
hclust (*, "ward.D2")


Color Key
0 1 2 3 4
Value
10 most dominant (All)
YSF44
YSF298
BC018
YSF47
YSF71
YSF45
YSF300
YSF004
HNF133
BC049
HNF132
BC002
YSF65
YSF69
BC020
BC048
YSF74
BC003
YSF295
YSF296
YSF117
BC016
BC051
YSF70
YSF66
BC001
BC015
HNF134
BC004
BC005
HNF190
HNF189
HNF224
HNF225
HNF187
HNF217
HNF216
HNF185
HNF168
HNF144
BC262
HNF267
HNF250
HNF242
HNF229
HNF269
HNF279
BCL03
BCL01
BC105
BC108
Otu00005
Otu00008
Otu00004
Otu00010
Otu00009
Otu00002
Otu00006
Otu00007
Otu00001
Otu00003


Color Key
0 1 2 3 4
Value
10 most dominant (Active)
YSF71
YSF74
BC002
YSF004
BC020
BC048
YSF44
YSF69
BC018
YSF47
YSF298
BC001
BC262
YSF65
HNF144
YSF300
HNF250
BC105
BC015
BC108
BC005
BC004
BC049
HNF134
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HNF279
BCL03
BC016
BC051
HNF132
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BC003
YSF295
BCL01
YSF117
YSF296
YSF70
YSF66
HNF267
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HNF224
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HNF242
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HNF225
HNF187
HNF168
HNF185
HNF216
HNF217
Otu00005
Otu00008
Otu00004
Otu00010
Otu00009
Otu00003
Otu00001
Otu00002
Otu00006
Otu00007