How residence time constrains diversity

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INTRODUCTION

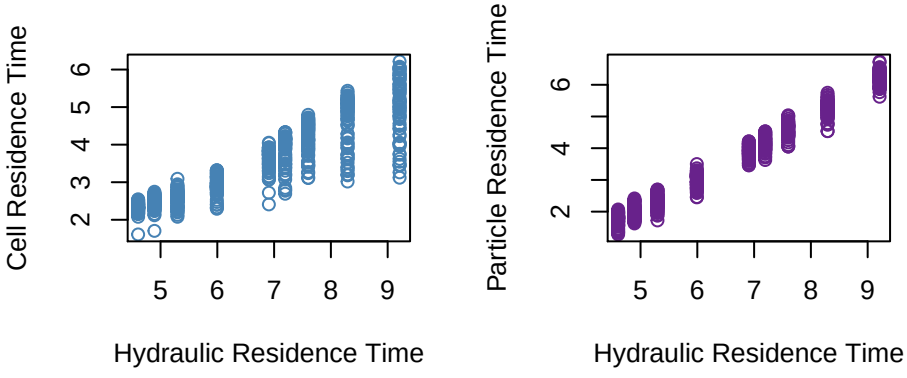
Here, we explore the influence of mean cell residence time, hydraulic residence time, and particle residence time on abundance, local (α) diversity, physiology, and resource availability and diversity.

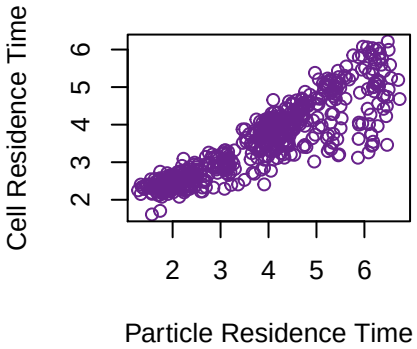
These simulations

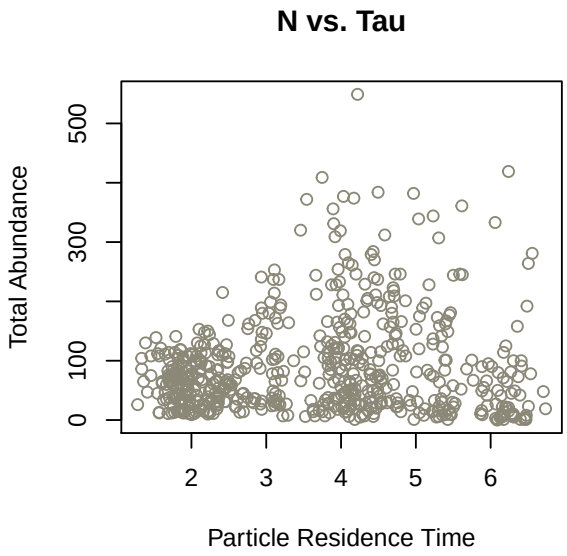
Load Data

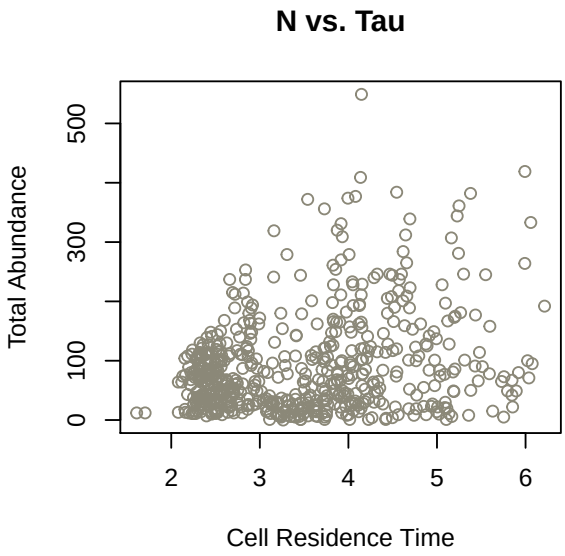
```
sim.data <- read.csv("~/GitHub/hydrobide/results/simulated_data/2015June/June7/SimData.csv")
```

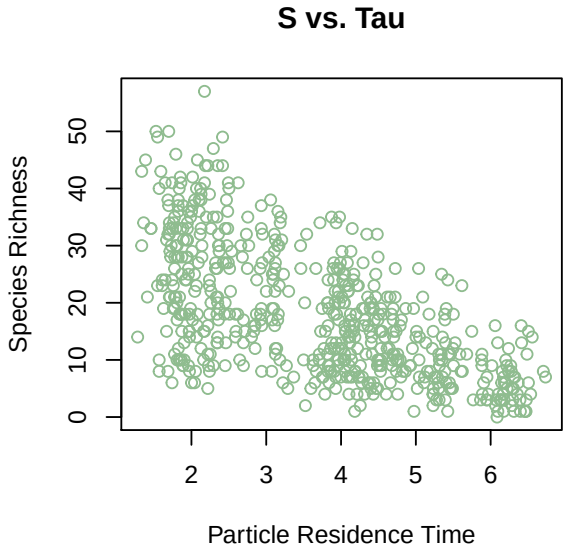
Univariate relationships

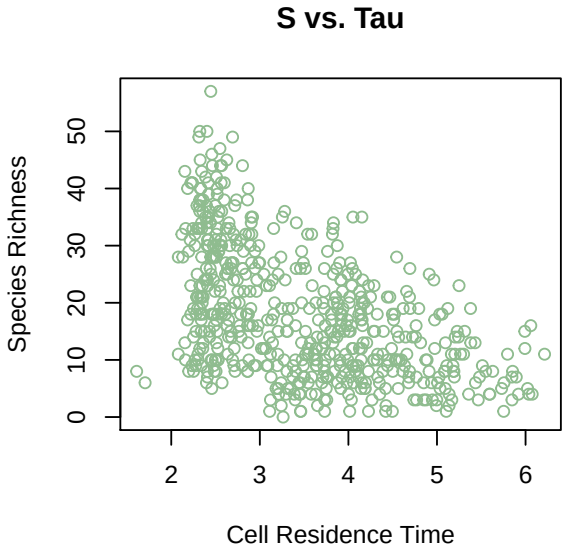


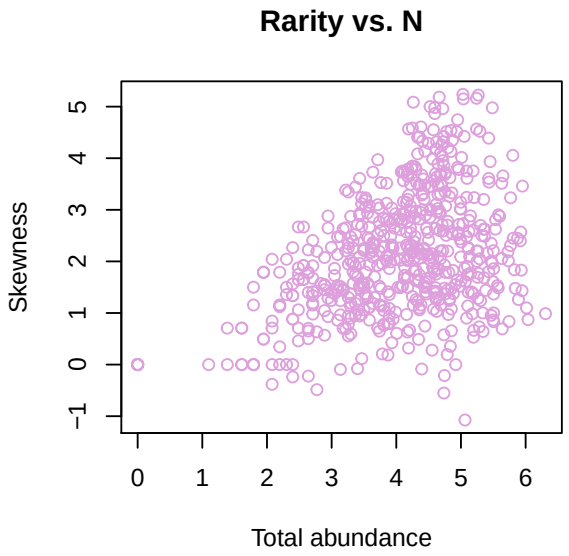


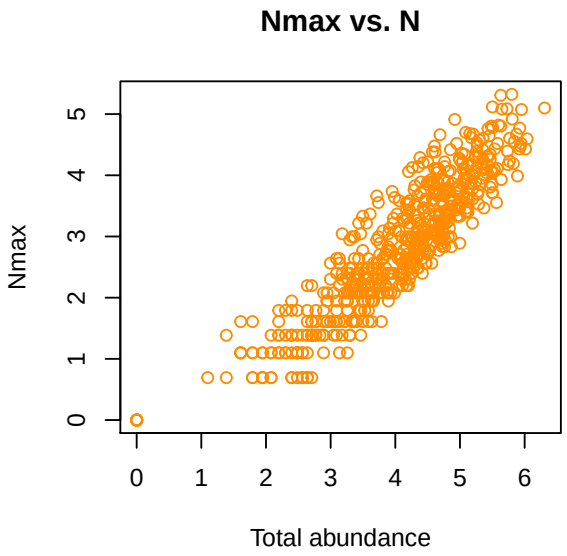

N vs. Tau
Total Abundance
0
100
300
500
2
3
4
5
6
Particle Residence Time

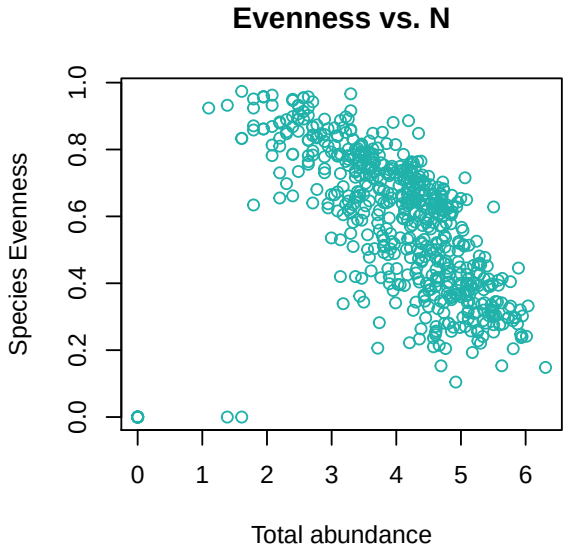

N vs. Tau
Total Abundance
0
100
300
500
2
3
4
5
6
Cell Residence Time

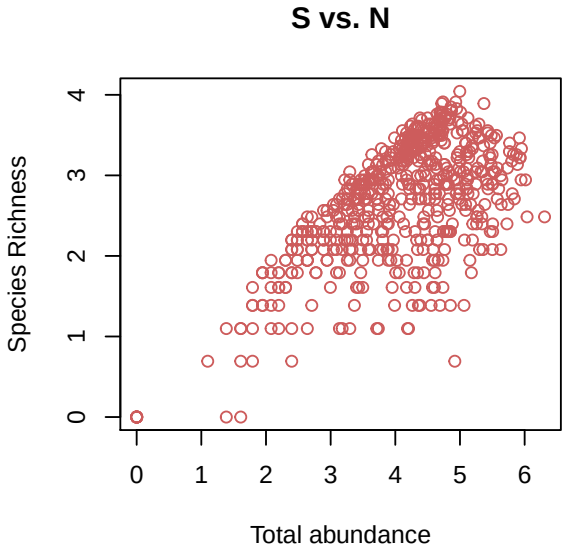

S vs. Tau
Species Richness
0
10
20
30
40
50
2
3
4
5
6
Particle Residence Time

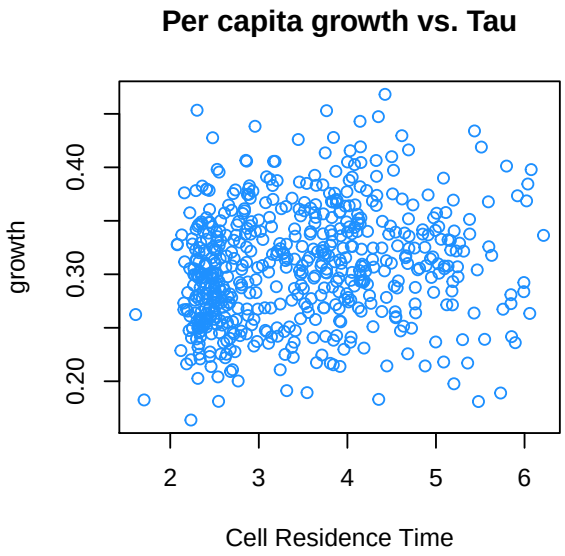

S vs. Tau
Species Richness
0
10
20
30
40
50
2
3
4
5
6
Cell Residence Time

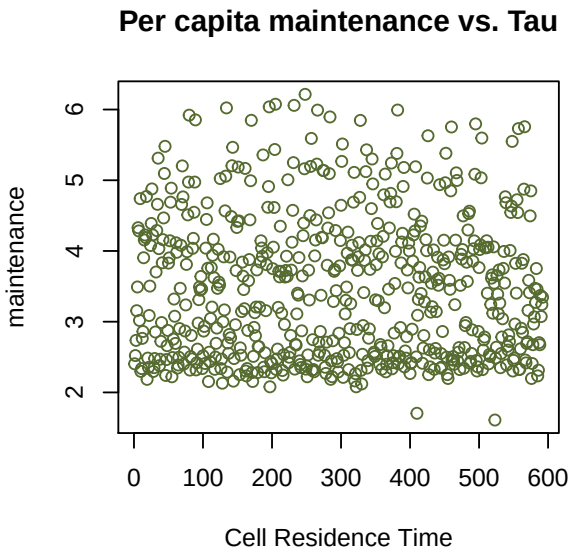

Rarity vs. N
Skewness
−1
0
1
2
3
4
5
0
1
2
3
4
5
6
Total abundance

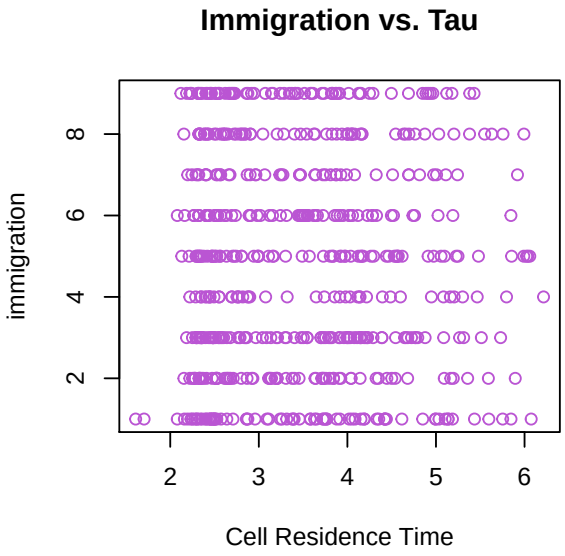

Nmax vs. N
Nmax
0
1
2
3
4
5
0
1
2
3
4
5
6
Total abundance

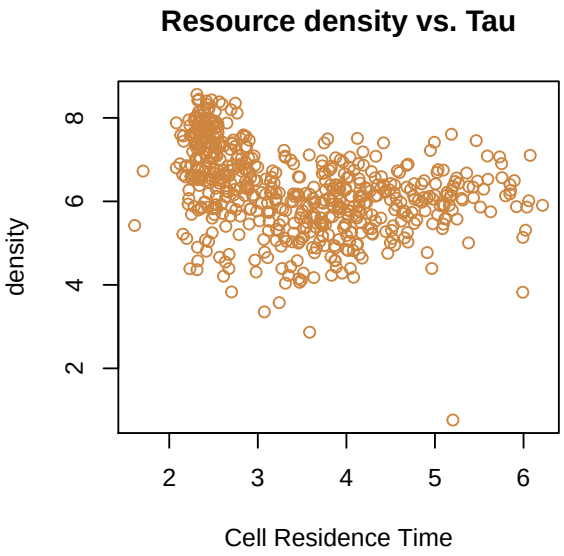

Evenness vs. N
Species Evenness
0.0
0.2
0.4
0.6
0.8
1.0
0
1
2
3
4
5
6
Total abundance

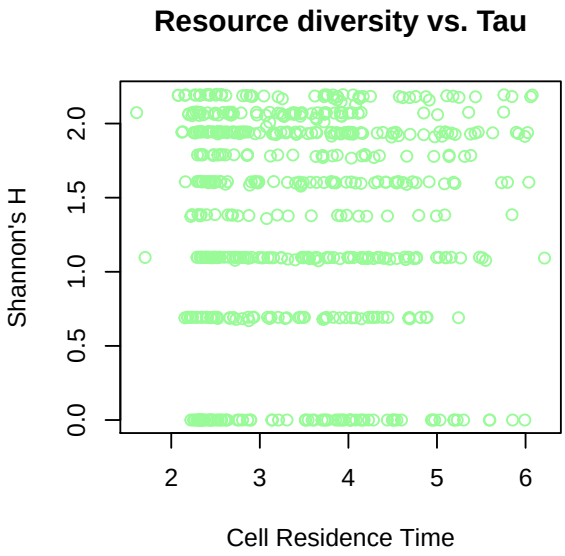

S vs. N
Species Richness
0
1
2
3
4
0
1
2
3
4
5
6
Total abundance

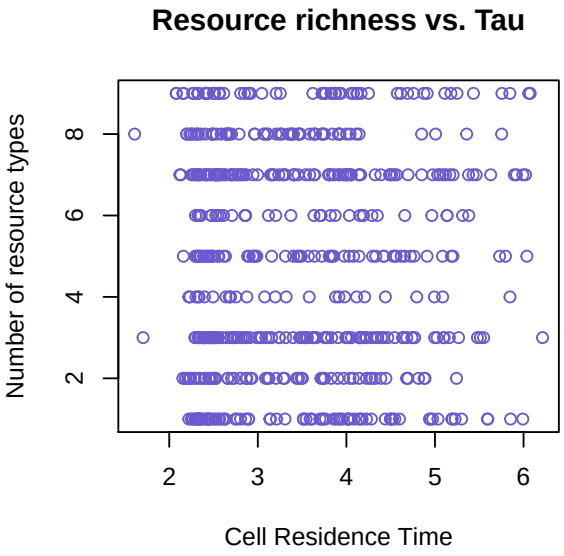

Per capita growth vs. Tau
growth
0.20
0.30
0.40
2
3
4
5
6
Cell Residence Time


Per capita maintenance vs. Tau
maintenance
2
3
4
5
6
0
100
200
300
400
500
600
Cell Residence Time


Immigration vs. Tau
immigration
2
4
6
8
2
3
4
5
6
Cell Residence Time


Resource density vs. Tau
density
2
4
6
8
2
3
4
5
6
Cell Residence Time


Resource diversity vs. Tau
Shannon's H
0.0
0.5
1.0
1.5
2.0
2
3
4
5
6
Cell Residence Time


Resource richness vs. Tau
Number of resource types
2
4
6
8
2
3
4
5
6
Cell Residence Time