Gmail **Carlos Melian <maruca.melian@gmail.com>**

Dynamic Landscape

12 messages

Charles Novaes de Santana <charles.santana@gmail.com> Sat, Dec 16, 2017 at 12:28 AM
To: Gian Marco Palamara <gianmarco.palamara@gmail.com>, Alejandro Rozenfeld <alejandro.rozenfeld@gmail.com>, Carlos Melián - GMAIL <maruca.melian@gmail.com>

Hey guys,

Unless we still don't have the configuration of the simulations we will run for the paper, I launched some simulations with my Julia code, just to have an idea about the time of each simulation. Also to have an idea about the results we will find. I liked the first impression :)

1) I am using the following parameters:

m = 0.3
v = 0.003
J = 10
S = 10
G = 1000

Replicates - 10

frequencies [0.001, 0.00562341325190349, 0.0316227766016838, 0.177827941003892, 1]
r0 [20 values between 0 and 1, in a logarithmic space)

2) I am sending you 5 examples of "Gamma richness in time" averaged across 10 replicates. The frequencies and r0s can be checked in the filename.

3) The mean value across replicates is represented by black dots and the standard deviation is represented by blue bars.

5) These 10 replicates for 1000 generations and J = 10 and S = 10 took 30 minutes to run in my notebook. I did not parallellized it. We can have an idea about what to expect for our real simulations.

Let's keep in touch! I with you guys a good trip and a nice weekend! Thanks for pushing this work forward!! :)

Best,

Charles

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Um axé! :)

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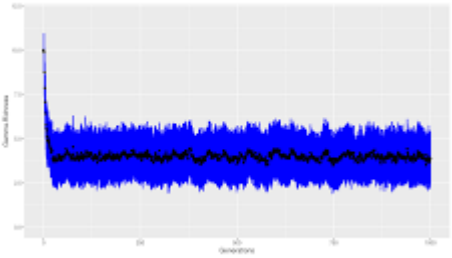
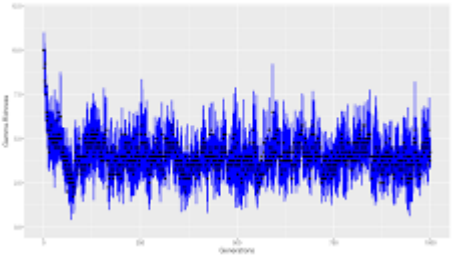
Charles Novaes de Santana, PhD
https://github.com/cndesantana

5 attachments



DynamicFigure_f0.001_r0.png
154K



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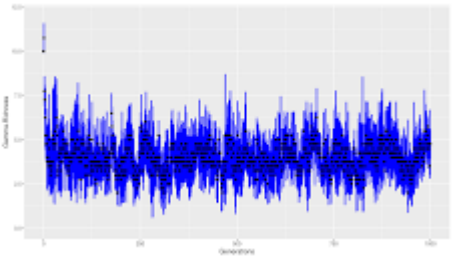
222K



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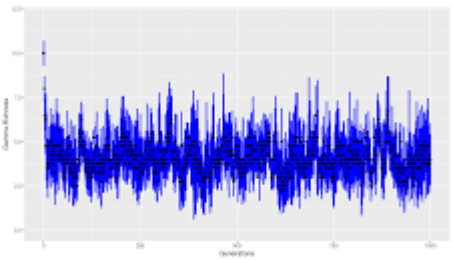
220K



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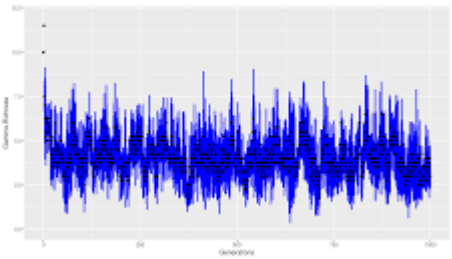
00749586390642525.png
225K



DynamicFigure_f0.00562341325190349_r0.
0908941938542943.png
225K

Gian Marco Palamara <gianmarco.palamara@gmail.com> Sat, Dec 16, 2017 at 1:37 AM
To: Charles Santana <charles.santana@gmail.com>
Cc: Alejandro Rozenfeld <alejandro.rozenfeld@gmail.com>, Carlos Melián - GMAIL <maruca.melian@gmail.com>

Awesome, thanks!
Will get back to you from Switzerland ;)
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Gian Marco Palamara <gianmarco.palamara@gmail.com> Mon, Dec 18, 2017 at 4:09 PM

To: Charles Santana <charles.santana@gmail.com>
Cc: Alejandro Rozenfeld <alejandro.rozenfeld@gmail.com>, Carlos Melián - GMAIL <maruca.melian@gmail.com>

Dear Charles,

thanks for sending this. I had a great time in Bahia and am now back in KB full of inspiration to finish this work. Hope you are doing great too!

I have a couple of questions:

1 Can you confirm that what you call r0 is the critical radius normalised across the size of the landscape? Just to double check again the "translation" between your codes and our codes, when we have r(t) = A*(1 + sin(2Pi*omega*t))/2 to describe the connectivity threshold in our codes, you should have r0=A/2L, where L is the size of the landscape edge and f = 2*omega, as you have a factor Pi instead of 2Pi in the argument of the sinus function.

2 you write "r0 [20 values between 0 and 1, in a logarithmic space)" and I assume the five plots refer to the five frequencies you proposed, so where are the 20 values of r0 used?
The first plot "DynamicFigure_f0.001_r0.png" has only the value of f in its filename and no value for r0, while the other 4 have a value for f and a value for r0 in their filename.
Interestingly the first plot shows much less fluctuations around steady state when compared to the other four.

Could you please comment a bit more on which scenarios these plots refer to?

As we discussed in Feira last time, Carlos and I are preparing the simulations to send to the cluster during Xmas break and will need to synchronise with you in order double check our results with yours.

That's all for the moment,
more soon ...
Ciao
GM

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Gian Marco Palamara

Theoretical Ecologist

Charles Novaes de Santana <charles.santana@gmail.com> Mon, Dec 18, 2017 at 8:29 PM
To: Gian Marco Palamara <gianmarco.palamara@gmail.com>
Cc: Alejandro Rozenfeld <alejandro.rozenfeld@gmail.com>, Carlos Melián - GMAIL <maruca.melian@gmail.com>

Hi GM,

Good to know everything is good in CH and you are inspired to keep working on DynaLands. I am also very motivated to keep working on it :)

Regarding your comments:

1)

GM: 1 Can you confirm that what you call r0 is the critical radius normalised across the size of the landscape?
Just to double check again the "translation" between your codes and our codes, when we have r(t) = A*(1 + sin(2Pi*omega*t))/2 to describe the connectivity threshold in our codes, you should have r0=A/2L,

where L is the size of the landscape edge and f = 2*omega, as you have a factor Pi instead of 2Pi in the argument of the sinus function.

The r0 I used in these last simulations is the same critical radius I have used before. I just ran a test simulation while I was waiting for your message with the details for the real simulations (the values of A and w, and the values of r0 and f). Now that you sent me the confirmation of the translation I will change my code accordingly :)

r0=A/2L
f = 2*omega

2)
GM: 2 you write "r0 [20 values between 0 and 1, in a logarithmic space)" and I assume the five plots refer to the five frequencies you proposed, so where are the 20 values of r0 used?
The first plot "DynamicFigure_f0.001_r0.png" has only the value of f in its filename and no value for r0, while the other 4 have a value for f and a value for r0 in their filename.
Interestingly the first plot shows much less fluctuations around steady state when compared to the other four.

Sorry, in this case the first '0' is part of the radius itself. I am using just 'r' as a prefix in the filename, my bad. So the file "DynamicFigure_f0.001_r0.png" represents a static landscape simulation (r0 = A/2 = 0).

So the other 4 files I sent represent simulations for 2 values of frequencies and 2 values of r0:

freq	r0
0.001	0.0074
0.0056	0.090

I understand that I did not explore the different frequencies enough to see different behaviour in richness. The frequencies are at the same order of magnitude.

I just wanted to be sure that I was able to launch simulations for many replicates and get the results in a way we could compare with the results we get from Matlab code. And, of course, I wanted to know how long those simulations would take in my personal machine (30 minutes for 10 realizations).

Just let me know the configuration of the simulation as soon as you have them ready :)

Looking forward for this!!!

Charles

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Gian Marco Palamara <gianmarco.palamara@gmail.com> Tue, Dec 19, 2017 at 12:36 PM
To: Charles Novaes de Santana <charles.santana@gmail.com>
Cc: Alejandro Rozenfeld <alejandro.rozenfeld@gmail.com>, Carlos Melián - GMAIL <maruca.melian@gmail.com>

Hey Charles!

thanks for the info now the plots look clearer. It is very interesting to observe the fluctuations in species richness in the dynamic case, This will need to be done with more replicates, but we are happy to have, also in these very simple simulations, convergence and steady state.
Another few comments/questions:
- Regarding the dynamic case, it is should be clear that our codes only differ by a factor two in amplitude and a factor 1/2 in frequency. We are going to re-doublechek this today.

- Regarding the static case, in the way it is explained I understand that when r0=0 i.e., when A=0, we have not only static dynamics, but also a completely connected graph, that is the threshold of connectivity is zero and therefore all sites are connected independently of their distance. Do you confirm? If that is the case, do you have a way to change the connectivity threshold in your code in the static case?

More soon,
Ciao ;)
GM
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Gian Marco Palamara <gianmarco.palamara@gmail.com> Tue, Dec 19, 2017 at 12:41 PM
To: Charles Novaes de Santana <charles.santana@gmail.com>
Cc: Alejandro Rozenfeld <alejandro.rozenfeld@gmail.com>, Carlos Melián - GMAIL <maruca.melian@gmail.com>

** Regarding the static case, in the way it is explained I understand that when r0=0 i.e., when A=0, we have not only static dynamics, but also a completely DISCONNECTED graph, that is the threshold of connectivity is zero and therefore all sites are DISCONNECTED independently of their distance. Do you confirm?
If that is the case, do you have a way to change the connectivity threshold in your code in the static case?

[Quoted text hidden]

Charles Novaes de Santana <charles.santana@gmail.com> Tue, Dec 19, 2017 at 3:09 PM
To: Gian Marco Palamara <gianmarco.palamara@gmail.com>
Cc: Alejandro Rozenfeld <alejandro.rozenfeld@gmail.com>, Carlos Melián - GMAIL <maruca.melian@gmail.com>

Hi GM, thanks for writing! Please take a look at my answers below:

- Regarding the dynamic case, it is should be clear that our codes only differ by a factor two in amplitude and a factor 1/2 in frequency. We are going to re-doublechek this today.

Charles: Good point! We really need to re-check. Could you please remind me which values for A and w you suggested in our last meeting with Alex? So I can run new simulations with the equivalent values of f and r0.

- Regarding the static case, in the way it is explained I understand that when r0=0 i.e., when A=0, we have not only static dynamics, but also a completely DISCONNECTED graph, that is the threshold of connectivity is zero and therefore all sites are DISCONNECTED independently of their distance. Do you confirm?

Charles: Yes. You are right. The figure I sent you was the result of a static simulation with mean dispersal radius r0=0. That means that the "initial condition" of the Random Geometric Graph is a DISCONNECTED network. But I have the results for other values of r0 in static landscapes too. I have a parameter I give to the Julia code in order to indicate STATIC or DYNAMIC landscape. No problem :)

Lets keep in touch!

Charles
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Gian Marco Palamara <gianmarco.palamara@gmail.com> Tue, Dec 19, 2017 at 5:24 PM

To: Charles Novaes de Santana <charles.santana@gmail.com>, Alejandro Rozenfeld <alejandro.rozenfeld@gmail.com>, Carlos Melián - GMAIL <maruca.melian@gmail.com>

Hey Charles,

good that we understand each other ;)
before discussing further, I'm quickly sending you the values Carlos and I decided today for the first simulation to explore the dynamic landscape.
We are currently testing the code Alex developed in Salvador last week adding some changes to it. feel fee to play with those values and test variations of them in sum we want to tell a story above and below the percolation threshold PT = 0.12L

For this first run we have 100 replicates and 1000 generations per replicate and we are varying all possible combinations of 10 values for amplitude (5 below and 5 above the PT) and 10 values of frequency that is:
A /L = (0.025, 0.05, 0.075, 0.1, 1.12, 0.2, 0.4, 0.6, 0.8, 1) for the amplitude. You should have r0 = A/2L
GPT = (1,5,10,50,100,500,1000,5000,10000,50000) for the generations per period where omega=1/GPT thereofre you should have f=2/GPT

All the other FIXED PARAMETERS are
S = 100 number of sites --> PT = 0.12L
J = 100 individuals per site
L= 1000 size of the landscape
m = 0.1 migration rate
nu = 0.001 speciation rate

We are aiming to have 100 output files, one for every combination of parameters and every output should contain 1000 values of gamma and alpha diversity.
This is all for today, feel free to play with your codes and those parameter values. We will start running these codes soon so if you have any question, suggestion and/or comment they are welcome!

Beijos
GM

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Charles Novaes de Santana <charles.santana@gmail.com> Tue, Dec 19, 2017 at 7:32 PM
To: Gian Marco Palamara <gianmarco.palamara@gmail.com>
Cc: Alejandro Rozenfeld <alejandro.rozenfeld@gmail.com>, Carlos Melián - GMAIL <maruca.melian@gmail.com>

Great!

GM: We are currently testing the code Alex developed in Salvador last week adding some changes to it. feel fee to play with those values and test variations of them in sum we want to tell a story above and below the percolation threshold PT = 0.12L

Charles: Which equation are you using to calculate PT? For a 100 sites network we have calculated 0.06, right?

GM: For this first run we have 100 replicates and 1000 generations per replicate and we are varying all possible combinations of 10 values for amplitude (5 below and 5 above the PT) and 10 values of frequency that is:
A /L = (0.025, 0.05, 0.075, 0.1, 1.12, 0.2, 0.4, 0.6, 0.8, 1) for the amplitude.

GM: You should have r0 = A/2L GPT = (1,5,10,50,100,500,1000,5000,10000,50000) for the generations per period where omega=1/GPT thereofre you should have f=2/GPT

Charles: Can re re-discuss the values of those parameters? I think I did not understand what you said. Can you please fulfil below the values of r0 and f according to the settings of your simulation?

r0 = A/2 =

f = 2/GPT =

GM: We are aiming to have 100 output files, one for every combination of parameters and every output should contain 1000 values of gamma and alpha diversity.

Charles: So, one output file per replicate? Or one output file per combination of parameters?

Lets keep in touch! :)

Charles
[Quoted text hidden]

Gian Marco Palamara <gianmarco.palamara@gmail.com> Wed, Dec 20, 2017 at 5:24 PM

To: Charles Novaes de Santana <charles.santana@gmail.com>
Cc: Alejandro Rozenfeld <alejandro.rozenfeld@gmail.com>, Carlos Melián - GMAIL <maruca.melian@gmail.com>

Dear Charles,

It is a quite long email, but I think it is an important exercise for the writing of the paper.

I'm attaching a page of my notebook where I tried to make the comparison between our models clearer. I'm explaining in detail every step:

-In the submission to PLOS, you have implemented a version of the periodic dynamics that has 3 PARAMETERS: critical radius (ro), amplitude (A) and frequency (f). You slightly changed this version in the response to the reviewers but you keep still the 3 different parameters. We (Alex), instead, have a version with only 2 PARAMETERS, amplitude (A) and frequency (omega). See the attached pdf for a visual representation of the two versions.

- Your equation is more general than ours as it allows fluctuations of any amplitude and frequency around the critical radius (see equation 1 in the attached page), but has the problem that can give unrealistic negative values of connectivity, if the amplitude is bigger than the critical radius. Our version is less general (see equation 2 of attached page) and in a complete period of the landscape, there will always be a time, at the minimum of the sinus function, where our landscape is completely disconnected. (compare the two last plots in the attached page to see clearly this difference)

- In order to compare the two models, FIRST you need to call with the same name critical radius and amplitude (r0) in your equation, thus reducing the degrees of freedom from 3 to 2 and THEN, in order to get our values of amplitude and frequency, you have to multiply by a factor two your amplitude/critical radius (A=2r0) and divide by a factor 2 your frequency (omega = f/2) as it is written in the last mail (see also translation in the attached page)

- Finally, we measure amplitudes in adimensional units given by fractions of the total landscape size L (0<A/L<1) and we measure frequency in number of generations per period (GPT) where one period is the time needed to have a complete oscillation (2PI) in connectivity, that is the period is the inverse of the frequency; therefore omega = 1/GPT

- Given all the above is extremely clear for both of us, AND more importantly in our codes, and we don't have any further doubt in the way we want to implement and compare the simulations, we can continue the discussion and I can answer to your questions:

Charles: Which equation are you using to calculate PT? For a 100 sites network we have calculated 0.06, right?

GM: We used the same equation you have, but we have a factor two in the translation, i.e., the percolation threshold for the static case is indeed 0.06L. Therefore, having an amplitude A of 0.12L means that connectivity fluctuates around that threshold symmetrically. In other words r0 = A/2 = 0.06L.

GM: You should have r0 = A/2L GPT = (1,5,10,50,100,500,1000,5000,10000,50000) for the generations per period where omega=1/GPT thereofre you should have f=2/GPT

Charles: Can re re-discuss the values of those parameters? I think I did not understand what you said. Can you please fulfil below the values of r0 and f according to the settings of your simulation?

r0 = A/2 = (0.025, 0.05, 0.075, 0.1, 1.12, 0.2, 0.4, 0.6, 0.8, 1)/2 But remember these values are all normalised over L!!
f = 2/GPT = 2/(1,5,10,50,100,500,1000,5000,10000,50000)

please double check them carefully! You should be able to fill those values based on the knowledge of what your code is doing, if you have any further doubt after this message we should Skype.

GM: We are aiming to have 100 output files, one for every combination of parameters and every output should contain 1000 values of gamma and alpha diversity.

Charles: So, one output file per replicate? Or one output file per combination of parameters?

GM: I meant, One output file per combination of parameters (10X10 = 100 files), each file with 100X1000 values of both alpha and gamma diversity, i.e., per 1000 generations per 100 replicates.

Let me know if you haven further question
That's all for today :)

let's keep updated!!
GM
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SinusoidalFunction.pdf
236K

Charles Novaes de Santana <charles.santana@gmail.com> Wed, Dec 20, 2017 at 10:59 PM
To: Gian Marco Palamara <gianmarco.palamara@gmail.com>
Cc: Alejandro Rozenfeld <alejandro.rozenfeld@gmail.com>, Carlos Melián - GMAIL <maruca.melian@gmail.com>

Hi again,

Thanks for the explanation. I can not answer in details right now, but I guess I understand the similarities and differences between the two versions of the code (I don't like to say "my" and "yours", because both codes simulate the same model, the idea does not change and both codes are part of the same project! so I call them "Julia" and "Matlab" codes :)).

I see the main limitation of the Julia code is that it allows negative mean dispersal radius when Amplitude

is higher than 1. In that occasion we thought we would only consider Amplitude equal to 1, but now I see the advantage of talking about only Amplitude and Frequency parameters.

I got the translation of the parameters between the Matlab and Julia codes. Thanks for clarifying it :)

My last question for today is:

1) When you say you want "alpha diversity" as an output of the model, you mean "Mean Alpha-Diversity across all sites" or "Alpha Diversity for each site"?

Thanks, lets keep in touch! :)

Best,

Charles
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Gian Marco Palamara <gianmarco.palamara@gmail.com> Thu, Dec 21, 2017 at 2:28 PM

To: Carlos Melián - GMAIL <maruca.melian@gmail.com>, Alejandro Rozenfeld <alejandro.rozenfeld@gmail.com>

---------- Forwarded message ----------
From: **Gian Marco Palamara** <gianmarco.palamara@gmail.com>
Date: 2017-12-21 14:28 GMT+01:00
Subject: Re: Dynamic Landscape
To: Charles Novaes de Santana <charles.santana@gmail.com>

Buongiorno!

I agree on the way of differentiating the codes and am glad things are converging in a timely manner.

1) When you say you want "alpha diversity" as an output of the model, you mean "Mean Alpha-Diversity across all sites" or "Alpha Diversity for each site"?

We should compute, at every generation and for every replicate mean and standard deviation of alpha diversity together with gamma diversity that is 3X10^5 values per output file. This would allow us to compute the coefficient of variability CV of alpha diversity across replicates and across generations.

Carlos is sending to the cluster the simulations today. We aim to have, for each of the combination of parameters (amplitude and frequency), at least 3 different scenarios:
- Intrinsic (or weak) asymmetry i.e., migration rates dependent on the topology of the network. That is the scenario implemented in the julia and the matlab code
- complete symmetry i.e., the migration rates depend only on the inverse of the distance between sites. This scenario has been implemented by alex in the matlab code
- complete asymmetry i.e., assigning a random direction to the edges of the RGG. This scenario still needs to be implemented in the matlab code.

Lastly we should carefully run some static simulations allowing meaningful comparison between static and dynamics scenarios.
As reviewer 1 was suggesting, the static migration rate should be obtained averaging the dynamic migration rate over a period of connectivity. I double checked (and found a small imprecision) in the expression of such average obtained by reviewer1 using the version of the connectivity threshold with 3 parameters, and I calculated the same average with the new expression of the threshold with two parameters (see attached page).

Ideally we should be able to get the results with the matlab code by the end of the year.
I'm now going to italy and will take a week break from this work.
Sending my best wishes to all of you for a lovely Xmas time

ciao ciao!
GM

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comparing_migrations.pdf
181K