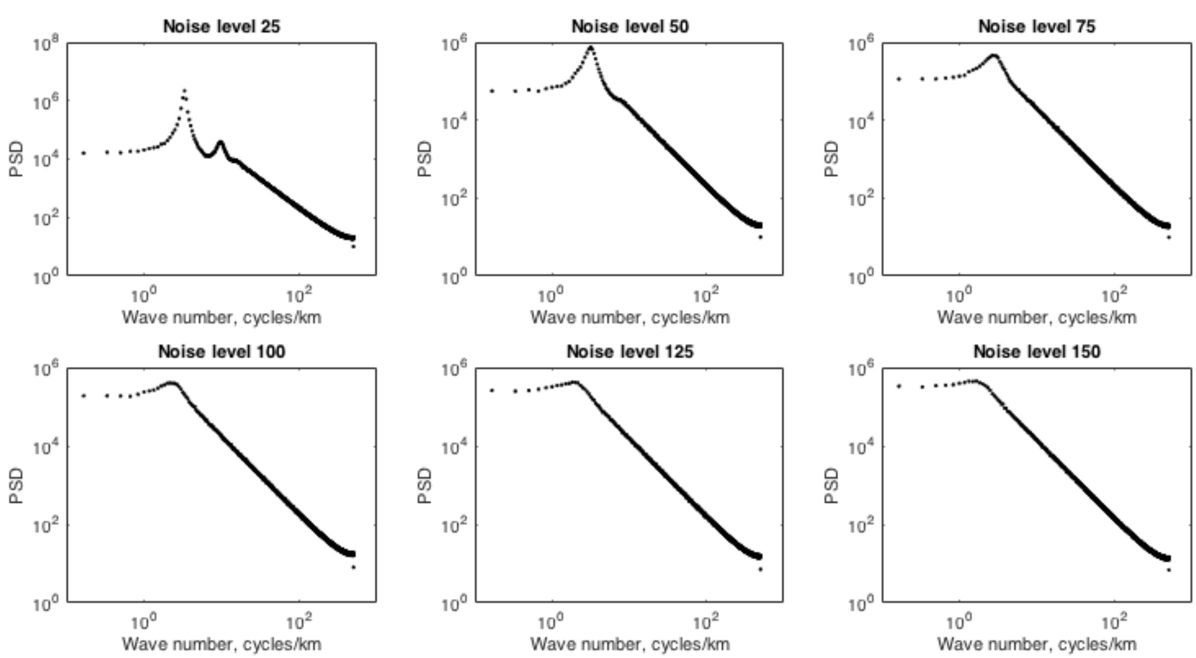
Let me preface this review by stating that although I was not one of the original reviewers of this paper, I read the earlier draft, as it a topic of great interest, and provided feedback to the authors, which was implemented in this draft. I am happy to see the new set of figures with the directional *r* spectra. (More on these later.)

First of all, I am eager to see this work published. I think the community of Everglades researchers desperately needs metrics that can help resolve questions of mechanisms responsible for the evolution of ridge and slough landscape patterns. More broadly, equifinality is a universal challenge in understanding the feedbacks responsible for ecological patterns, and this paper could provide an example that can enhance understanding of the relationship between ecological pattern and process in general. However, I also think the conclusions that can be drawn from the analyses presented here are a little more nuanced than comes across in the manuscript right now.

As the authors know, I have been a bit troubled by the lack of a characteristic wavelength in the spectral analyses. This is because when I look at an areal image of the ridge and slough landscape, my eye tells me that there is a pattern with some regularity, albeit a noisy one. In this review, I found myself very curious about how noise in a regular coherent pattern would affect the appearance of the power spectral density. I designed a brief numerical experiment to generate a 1D “slice” through a landscape, in which the width of each ridge and slough was selected randomly from a normal distribution centered on 150 m and with a specified standard deviation (“noise level” in the plot below). As with the images the authors used, the pixel size was 1 m and the extent of the domain 6 km. For each noise level, I generated 1000 slices through the landscape and averaged their power spectra to produce the plots below. (I’m also attaching my code, which I wrote in Matlab.)



What these plots suggest is that as the noise begins to approach the mean width of the ridges and sloughs (and this assumes that ridges and sloughs have the same width), the power spectra conform increasingly well to a straight line on log-log axes, with just a small bump at the mean period. To me, these plots in the lower row of my figure don't look terribly different from Figure 3B. Maybe I'm reading too much into these figures at this point, but in Fig. 3B, sites 2, 5, and 11 seem to have more of a "bump" around the expected characteristic wavelength of 150 m (around 6-7 cycles/km) than the other sites, which is what I would have guessed from Fig. 1. Certainly, the "bump" is more subtle in Fig. 3B than in my figures, and the data in 3B are also noisier, which may be due to ridges and sloughs having different mean widths from each other and to the fact that these images actually have three modalities (tree islands) rather than the assumed two (ridges and sloughs).

Certainly, when we consider patch areas (i.e., Fig 3C), the claim can be made that the landscape has a scale-free distribution. And I'm almost willing to believe that it is scale-free in the direction parallel to flow (although I'm not entirely convinced that, for the less degraded sites like 2,5, and 11, there is a characteristic scale that is mostly obscured by noise on the power spectra*). But I think what my exercise here suggests is that great caution needs to be exerted in inferring mechanism from spectral density plots that look like this. Here, a stochastic process that generated coherent ridges and sloughs produced spectral density plots that looked strikingly like those in Fig. 3B, with more similarity for the highest levels of stochasticity in the generating process. There are other examples of how combined stochastic/deterministic processes (particularly in networks) can generate scale-free distributions in the literature. The authors have done a great job in the Discussion of describing some of the other processes that can produce scale-free distributions and then arguing that they are unlikely, but the mixed stochastic/deterministic mechanisms are missing.

I do think the authors' analysis makes a strong case for the lack of a *strong* local-scale negative feedback, but I don't think it follows that there is necessarily a large-scale negative feedback (though mechanistically, I believe in the existence of such a feedback). However, I do think that this paper provides another piece of evidence consistent with the existence of a large-scale negative feedback in the Everglades, and that it provides another important test of simulation models. In other words, it establishes "necessary but not sufficient" criteria for model validation and support for the hypothesis of a global negative feedback.

Finally, I would argue that the mechanisms described in my set of papers (Larsen et al. 2007; Larsen and Harvey 2010; 2011) do invoke a large-scale negative feedback rather than simply being restricted to the local scale as implied in lines 444-448. In the RASCAL model, it is only when ridges become sufficiently dense at the landscape scale, raising water levels and funneling more flow into sloughs, that ridges cease to expand. I would argue that this is primarily a landscape-scale phenomenon (it happens very suddenly across the landscape in the simulations) rather than a local one (or, at least that the local control is relatively *weak* compared to the *strong* landscape-scale control). One of the often-forgotten details of this model is that the boundary condition forcing flow is a constant volumetric flow rate (averaged over the course of a year), which effectively captures the reduced competence of the landscape to flow as ridges expand. I believe that a primary reason it has been so difficult to distinguish between alternate models of ridge formation is that RASCAL does not disentangle sediment transport processes from water level-induced feedbacks; they both occur simultaneously.

Aside from the slight re-writing of the conclusions and discussion that my above commentary should prompt, I have a few other minor comments I would like the authors to address:

- Discussion of impacts of tree islands on this analysis: See my above comment about the tri-modality of the landscape. As generally larger features than ridges, tree islands will likely introduce noise (as a spreading of power over a wider range of frequencies) into the spectral analysis and should probably be discussed at some point.
- Omnidirectional *r* spectra: Because the landscape is so clearly anisotropic, I really do not think the omnidirectional *r* spectra add value at all. I would recommend eliminating them (or moving them to the supplementary information and only mentioning them briefly) in favor of focusing on the directional *r* spectra.
- In Figure 3, it would be helpful to arrange the sites along the same gradient of wetness on which they are depicted in Figure 1.
- Line 100: "anisotropic local contagion processes" is a phrase that would be unclear to a general reader of this paper.
- Section 3.1: What are the letters referred to here? There are only numbers distinguishing sites in the figure.
- Lines 304-306: There is a stray ")", and this sentence is also missing a subject. I think it can be fixed by eliminating "may possess underestimated," but verify.

FOOTNOTE
* I think that one way this could be teased out—but probably for another paper—would be to use an erosion image processing routine (Matlab has one of these) to erode the ridges down to their single-pixel centers, and then take transects across the landscape to come up with a distribution of distances between centers. Seeing a distinctive mode emerge would be indicative of some characteristic scale.

Signed,

Laurel Larsen
laurel@berkeley.edu

APPENDIX:
```
%PSD_random_ridge_sloughs.m
%This routine randomly generates coherent ridges and sloughs (1's and 0's)
%that are spaced at a mean distance of 150 m, though with varying degrees
%of noise. Pixels are in meters, and the 1-D domain is 6 km. The code then
%generates a power spectrum, which is the average power spectrum of 1000
%realizations of these 1D slices through the landscape.
```

```
noise = [25 50 75 100 125 150]; %In meters
for n = 1:6
Psdx = [];
for jj = 1:1000
    Test = [];
    N = 6000;
    while length(Test)<N
        len0 = max(0,round(150+noise(n)*randn(1)));
        len1 = max(0,round(150+noise(n)*randn(1)));
        Test = [Test; zeros(len0,1); ones(len1,1)];
    end
    Test = Test(1:N);
    xdft = fft(Test);
    xdft = xdft(1:N/2+1);
    psdx = abs(xdft).^2; %Normalized would be x1/N
    psdx(2:end-1) = 2*psdx(2:end-1); %Final power spectrum up to Nyquist freq
    Psdx = [Psdx, psdx]; %Add this to the matrix of power spectra
end
    freq = (0:1/N:1/2)*1000; %cycles/km
    subplot(2,3,n)
    loglog(freq, mean(Psdx,2), 'k.')
    xlabel('Wave number, cycles/km')
    ylabel('PSD')
    title(sprintf('%s%u', 'Noise level ', noise(n)))
    set(gca, 'XLim', [1e-1 1e3])
end
```