### We found evidence that the shapes of the SADs for a range of real ecological communities are statistically unlikely when compared to their feasible sets.

Our results suggest that nonrandom processes drive observed SADs to be less even than would occur by chance. This may be the signature of ecological mechanisms operating on top of the statistical constraint.

### Some of the variation across our datasets in how communities compare to their feasible sets may be due to statistical issues related to community size

Community size may affect our ability to distinguish between deviations and randomness via its effect on how similar the elements of the FS are to each other.

FIA are small and have weak deviations

So do similarly small communities

“This” would be consistent with the possibility that small communities don’t have enough possible arrangements to generate highly resolved distributions for the most probable shapes.

### When we compared the distributions of shape metrics for small communities to those for large ones, we found that samples from the feasible sets for small communities generate broader distributions of evenness, and especially skewness, than those for large communities.

This is consistent with concepts from statistical mechanics: large communities have many component have many components……..

Although we cannot definitively show that small community size accounts for the pronounced difference in deviations between FIA and other datasets,

we think it the most likely explanation, given that

we observe broad statistical constraints for small communities and

we see similarly less-common deviations in small communities from non-FIA datasets

If this is the case, small community considerations are relevant for ranges of S and N that are common in ecology.

### In general, our results suggest that the shape of the SAD is not entirely a statistical artefact

Identifying the processes will require further exploration

Test whether existing theories can predict deviations

Prevailing processes push towards unevenness

### While our results provide support for process, they also suggest there may be limits to our ability to distinguish random v process – particularly for small communities

FIA size are x to y

These may be a general range of values below which we have relatively diminished power to detect deviations

Unless we can develop more sensitive methods to detect deviations, may need to focus on large communities

Sampling the range of forms present allows us to identify when the distribution is broad – power analysis???

### It is also important to recognize that there are multiple plausible approaches to the defining the statistical baseline for the SAD, of which we have taken only one.

### Characterizing and adjusting for a statistical baseline for the SAD refreshes our perspective on the distribution and opens up several new avenues for better understanding how and when biological drivers affect its shape.

Persistent deviations may be evidence of process

Focusing on deviations may be leverage for evaluating predictions

Nuance: small n problems

Other baselines

Our results here suggest that constraints have strong effects, but do not fully account for the uneven SADs we observe in nature, leaving an important role for ecological process.

Continuing to explore and account for the interplay between statistical constraint and biological process constitutes a promising and profound new approach to this pattern