



Research

Community structure of vascular epiphytes: a neutral perspective

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Author contributions – RSE and GZ are joint last authors. Order of last authors was determined by coin toss.

Epiphytes

- **What are epiphytes?**

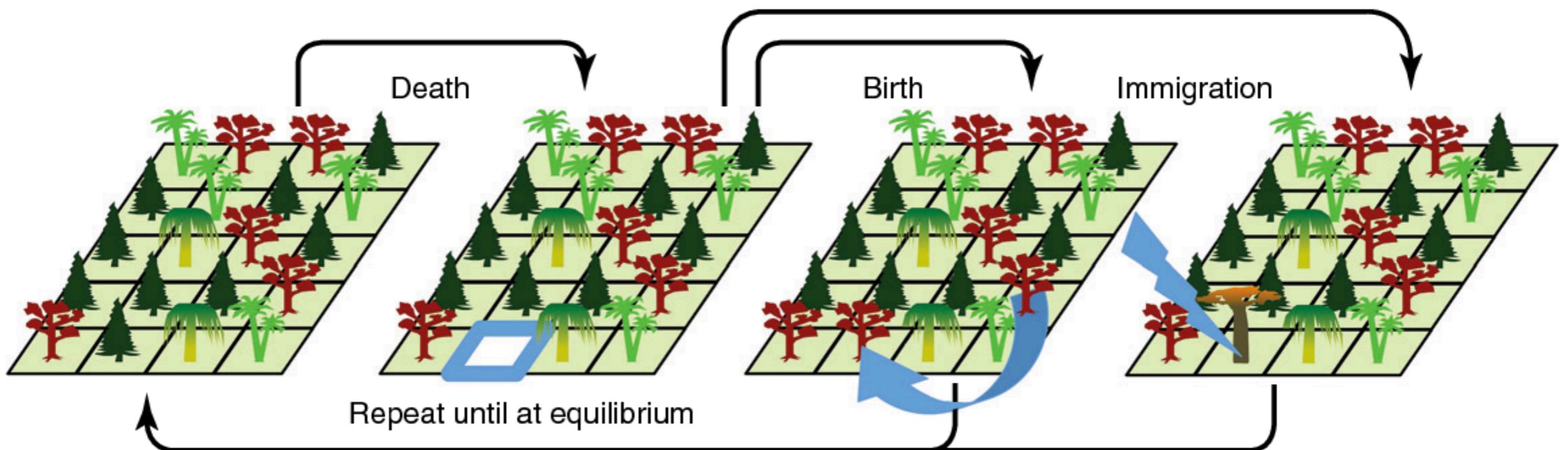
“plants that germinate and establish on trees without ever making contact with the forest soil”

- Highly **diverse** group of species (> **30,000** species) yet, no understanding of **community structure**
- Many species **functionally equivalent**



Camaridium ochroleucum

Neutral theory



Epiphyte datasets

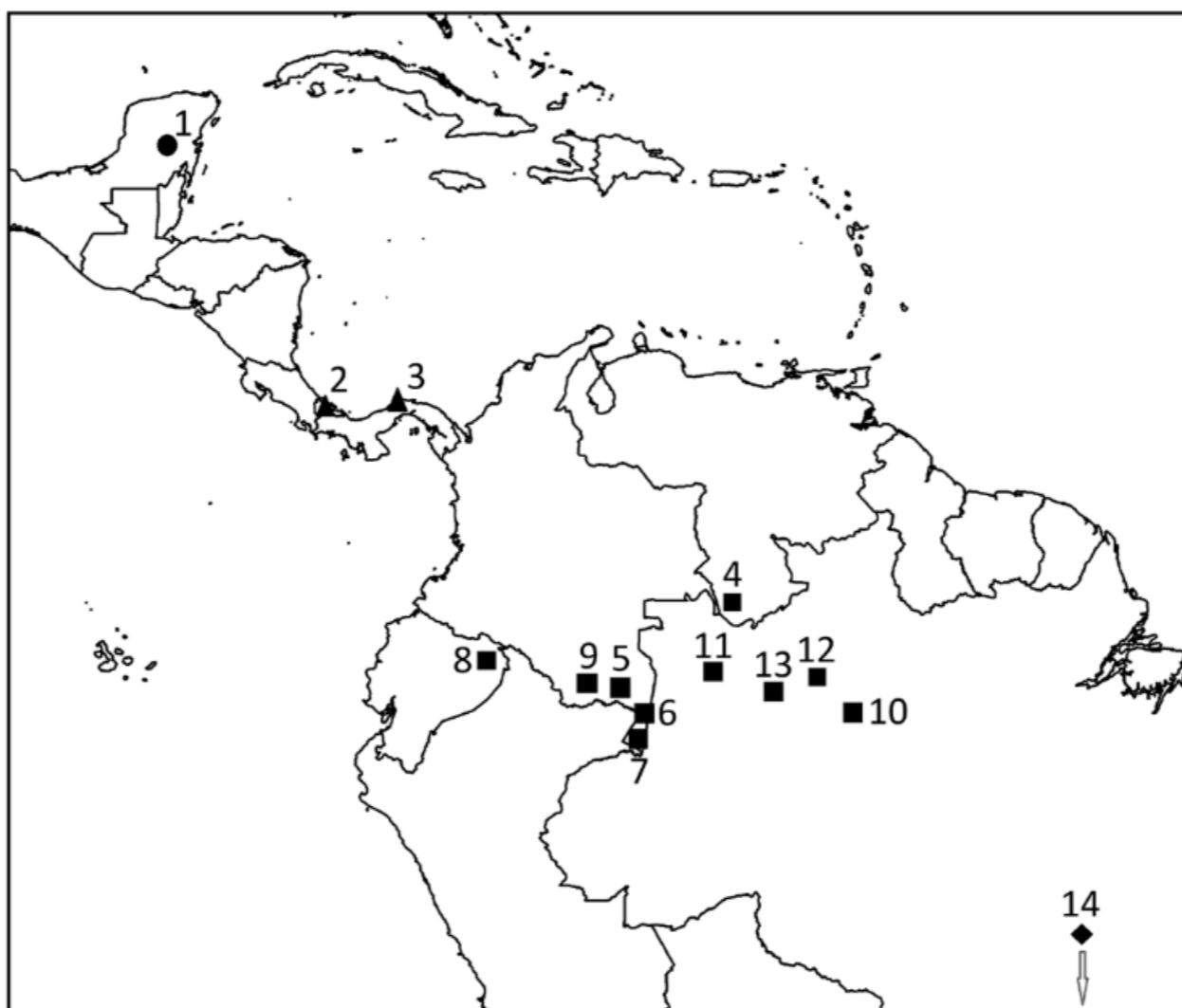


Figure 1. Locations of the four metacommunities and the sampled local communities within them. Mesoamerica (circle) with two samples: 'Tintal' wetland (1) and mature forest (1). Central America (triangle) with two samples: Río Changuinola (2) and San Lorenzo (3). Amazonia (squares) with twelve samples: four samples in Caquetá (5), one in Surumoni (4), one in Tiputini (8), one on Mocagua Island (7), one in Amacayacu National Park (9), one in Adolpho Ducke Reserve (10), one in Coari (11), two in Parna Miraraua (12/13). Paraná (diamond) with one sample: Campo Mourão (14).

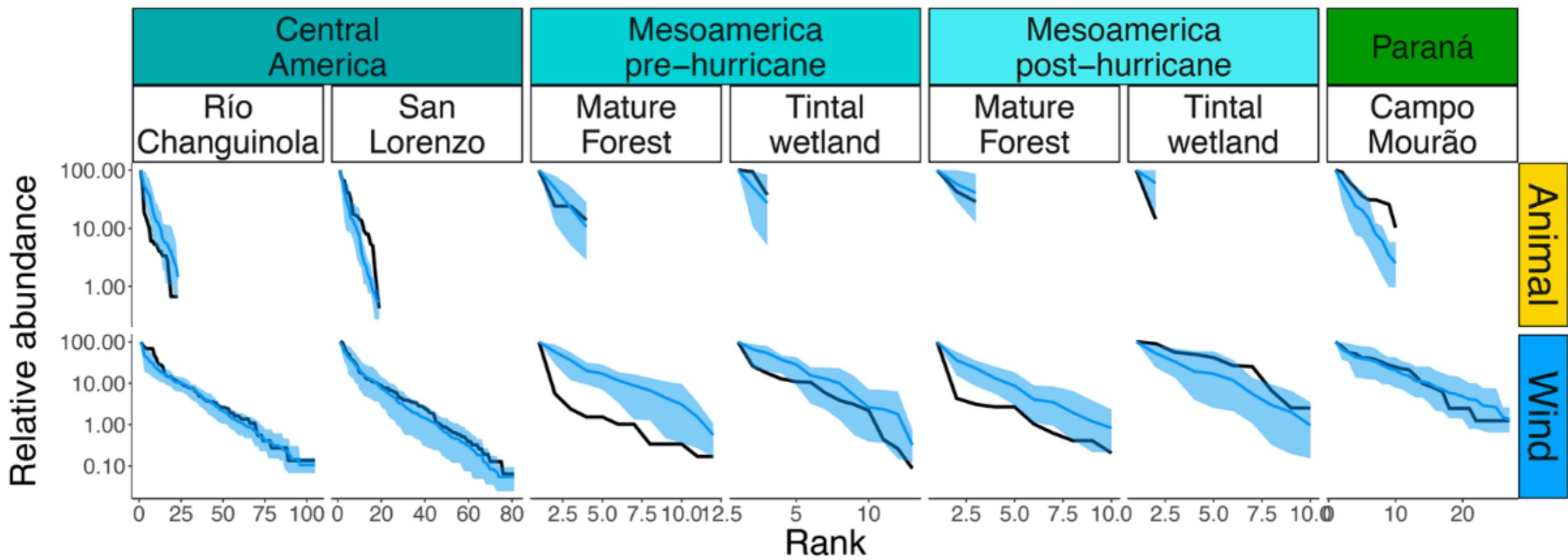
Neutral models tested

- We used the multiple-sites, multiple-guilds model, with two dispersal guilds:
 - wind dispersal
 - animal dispersal
- In the metacommunity, we considered 3 different speciation models:
 - point mutation (pm)
 - protracted speciation (pr)
 - density dependent speciation (dd)

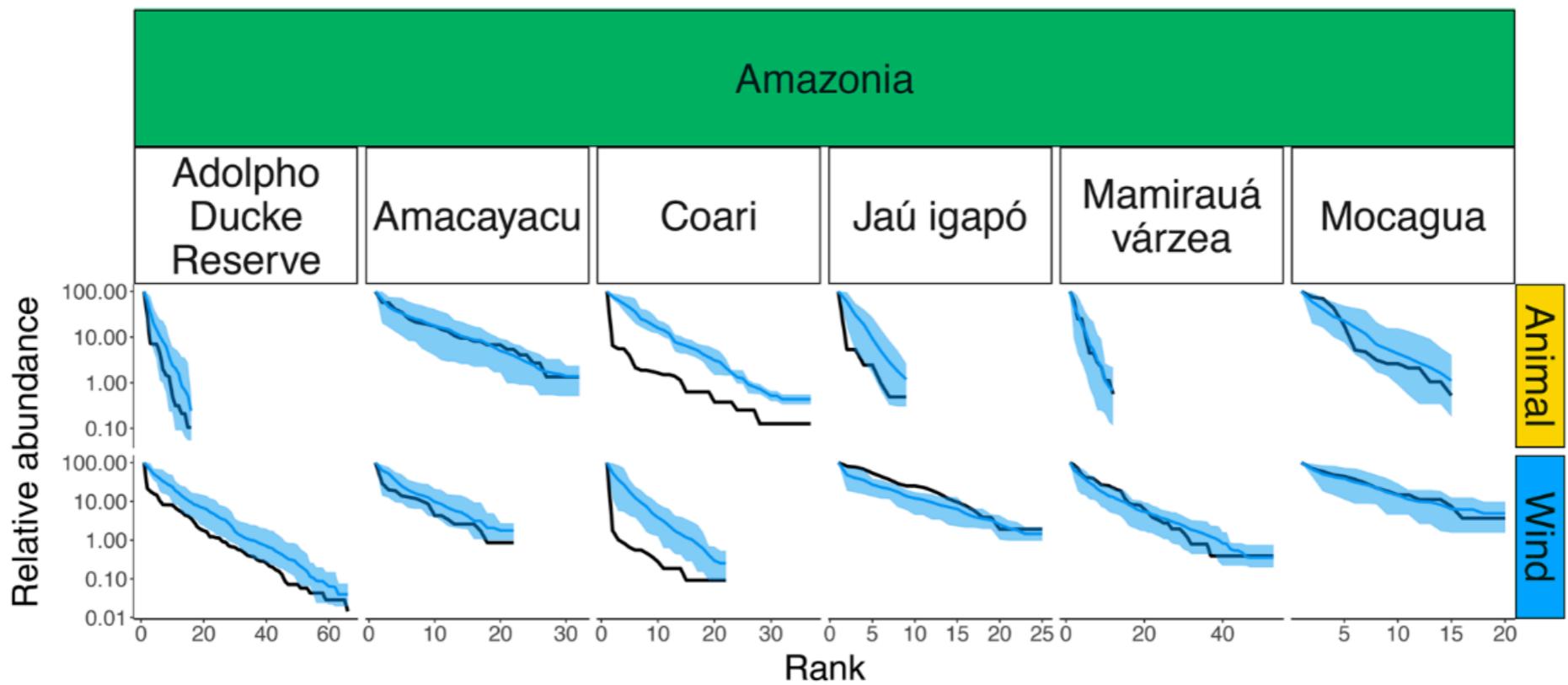
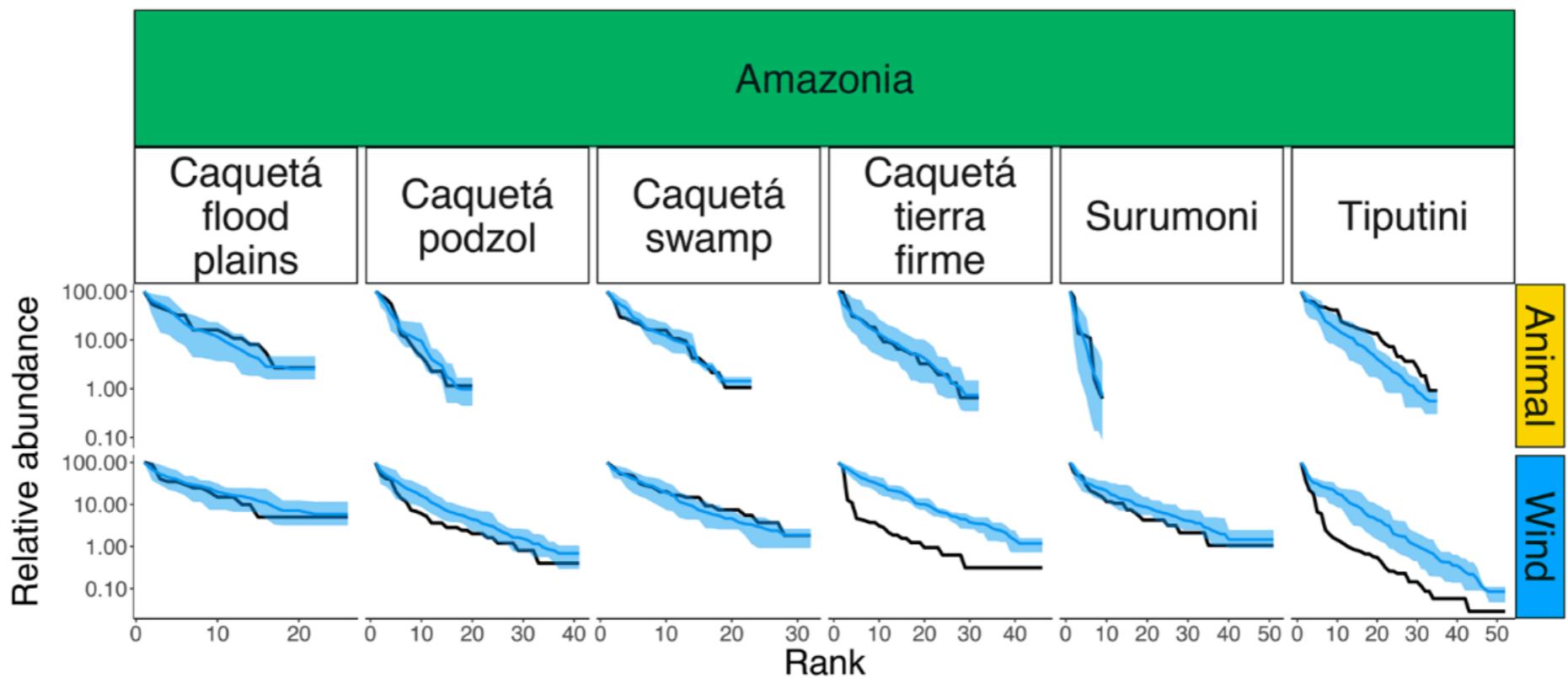
Results

		Epiphytes				
		df	LL	AIC	ΔAIC	AIC_weight
Central America						
pm	free	5	-611.8	1233.7	8.8	0.01
	sites	3	-634.8	1275.6	50.7	0.00
	guilds	3	-615.7	1237.5	12.7	0.00
pr	free	6	-611.8	1235.7	10.8	0.00
	sites	4	-634.8	1277.6	52.7	0.00
	guilds	4	-615.7	1239.5	14.7	0.00
dd	free	6	-606.4	1224.8	0.0	0.81
	sites	4	-629.6	1267.1	42.3	0.00
	guilds	4	-609.9	1227.9	3.0	0.18
Amazonia						
pm	free	25	-2762.4	5574.9	48.6	0.00
	sites	13	-2813.8	5653.5	127.2	0.00
	guilds	3	-2819.3	5644.7	118.4	0.00
pr	free	26	-2762.4	5576.9	50.6	0.00
	sites	14	-2813.8	5655.5	129.2	0.00
	guilds	4	-2819.3	5646.7	120.4	0.00
dd	free	26	-2737.2	5526.3	0.0	1.00
	sites	14	-2801.9	5631.7	105.4	0.00
	guilds	4	-2795.7	5599.4	73.1	0.00

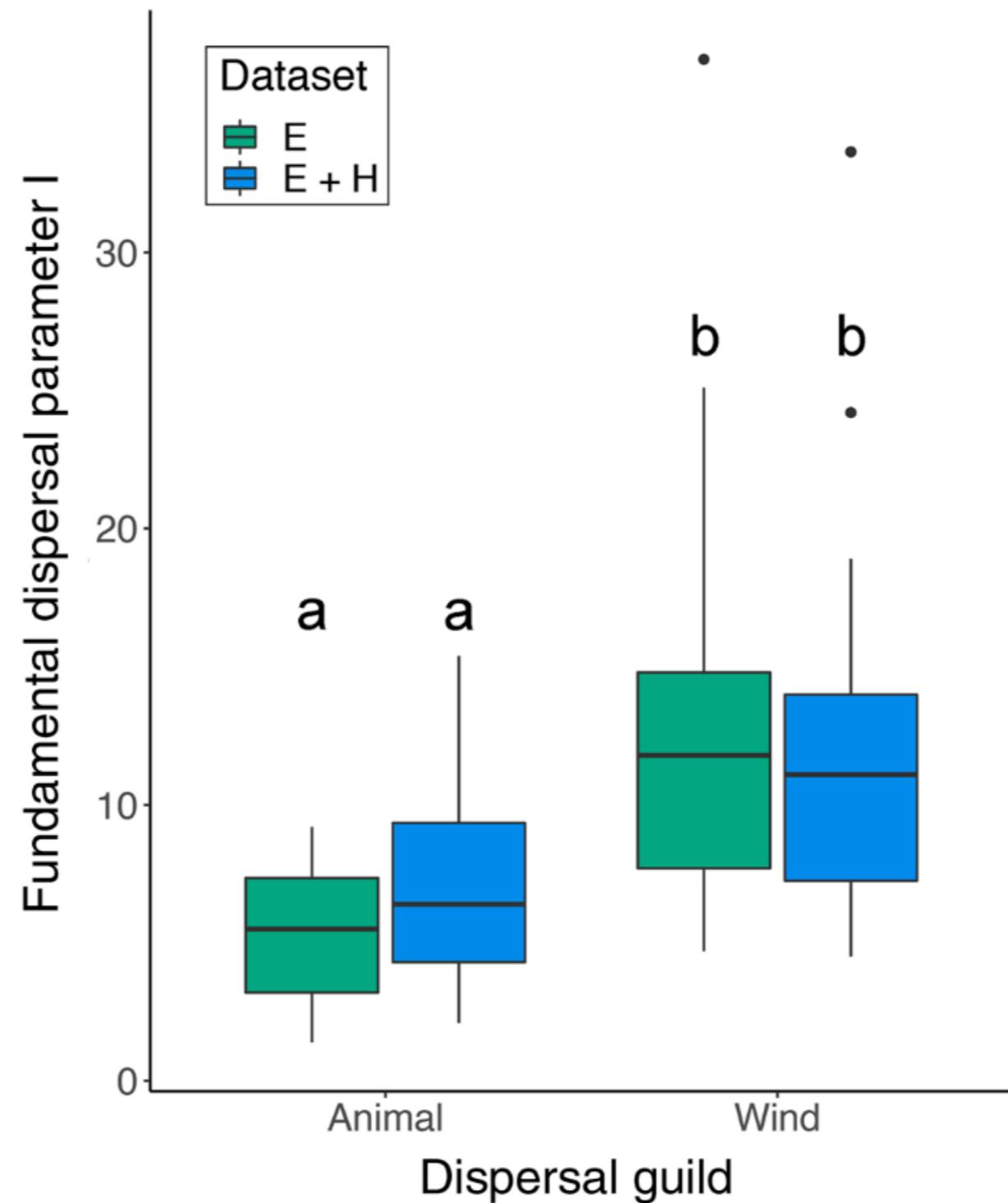
Model fit



Model fit



Dispersal



Conclusions

- Epiphyte communities display neutral patterns
- Larger datasets provided support for more complex speciation patterns
- In these large datasets, we found density dependent speciation to be the most likely model (amongst the models we explored)
- Density dependence was generally positive, suggesting 'hyperdominance'

Thank you!



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Rampal Etienne