



Eulophia sp.



Satyrium amoenum

Madagascar's open ecosystems: patterns of orchid diversity in space and time

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A photograph of an open woodland landscape. The foreground is filled with tall, vibrant green grasses. In the middle ground, several thin, dark tree trunks stand scattered across the field. The background shows a dense canopy of green trees under a clear blue sky with a few wispy white clouds.

OPEN

A photograph of a closed woodland landscape. The scene is dominated by a dense thicket of trees and undergrowth. The ground is covered with a layer of brown, fallen leaves and twigs. The lighting is dappled, with sunlight filtering through the dense canopy of green leaves.

CLOSED

Ecosystem groups

Open

Grassland-woodland mosaic
1.8% protected

Tapia
17.9% protected

Spiny forest
21.5% protected

Dry forest
13.3% protected

Closed

Subhumid forest
5.7% protected

Humid forest
18.5% protected

Mangroves
29.4% protected



grassland



Tapia savanna



marsh



rocky outcrop



scrub





Credits: T. Randriamboavonjy, L. Rajaovelona, A. Rakotoarisoa, O. P. Nanjarisoa, R. Rabarijaona

Questions

- 1 In which open ecosystems do we find orchids, and are they endemic?
- 2 Do open ecosystem orchids occupy a distinct environmental niche and have different distribution from closed ecosystem orchids?
- 3 What are the phenological patterns of open ecosystem orchids?



Cynorkis speciosa

Methods



**Ecosystem classification
assignment**

(Open vs Closed vs Mixed)



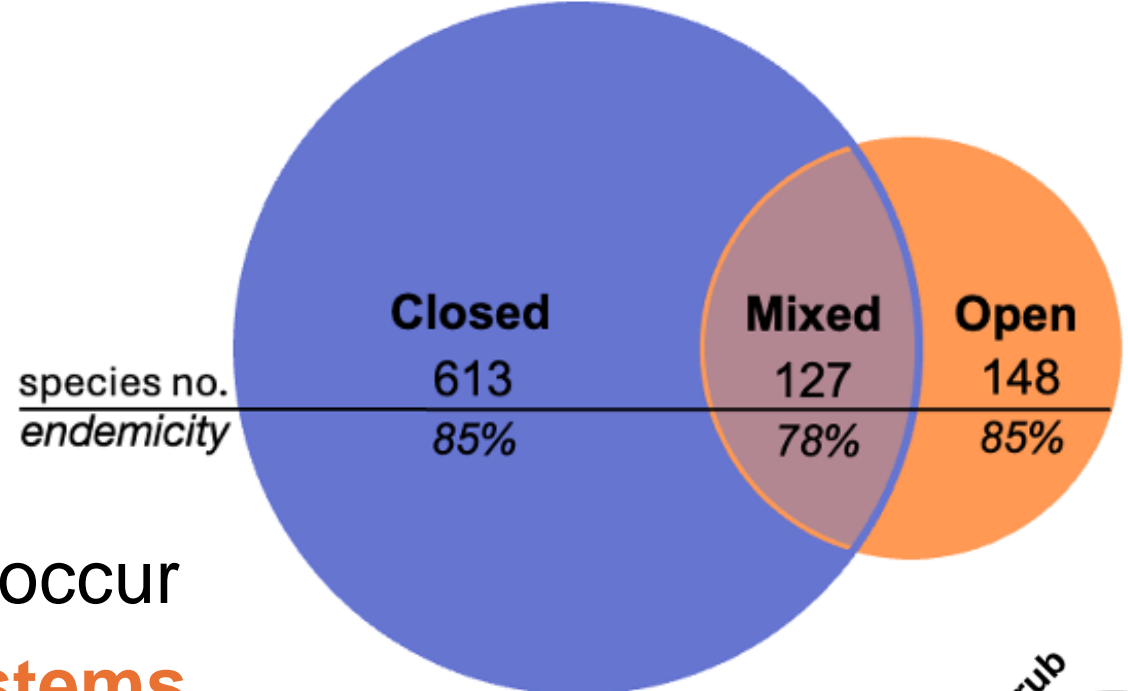
**Environmental niche
& habitat suitability**

(PCA + PERMANOVA + SDM)



Phenology

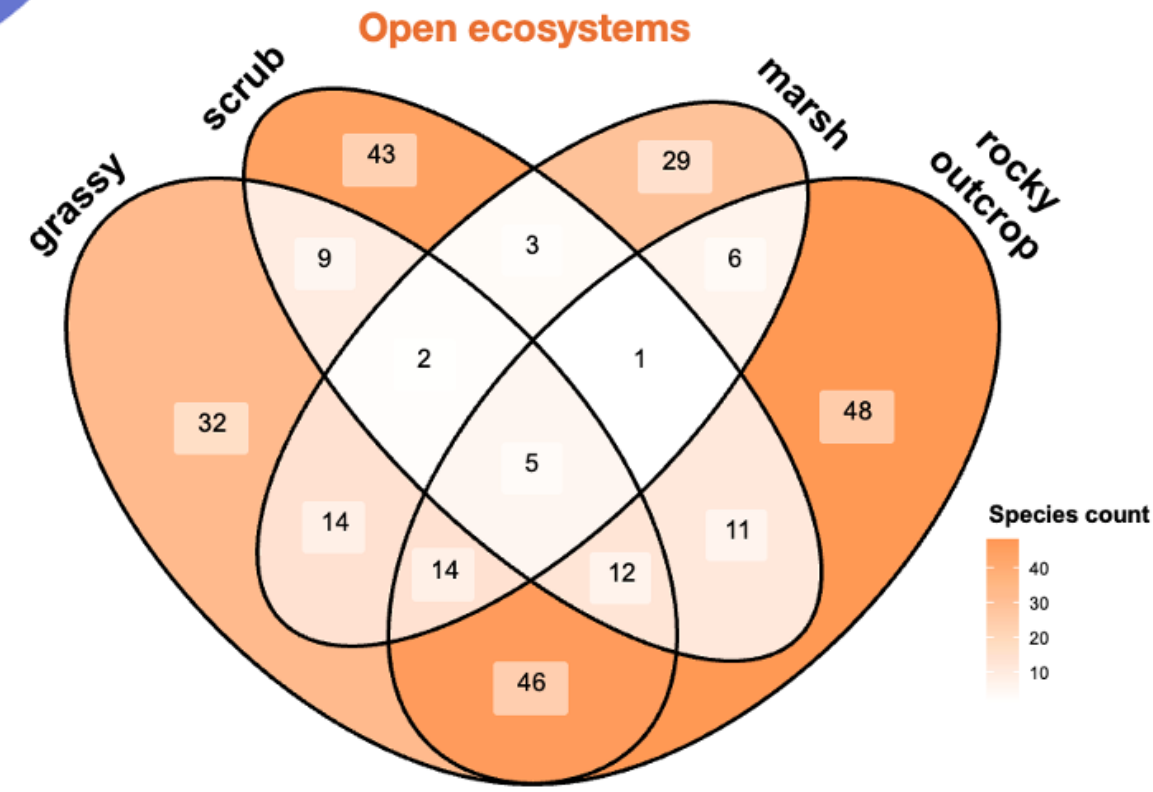
(Flowering season -> linear model)



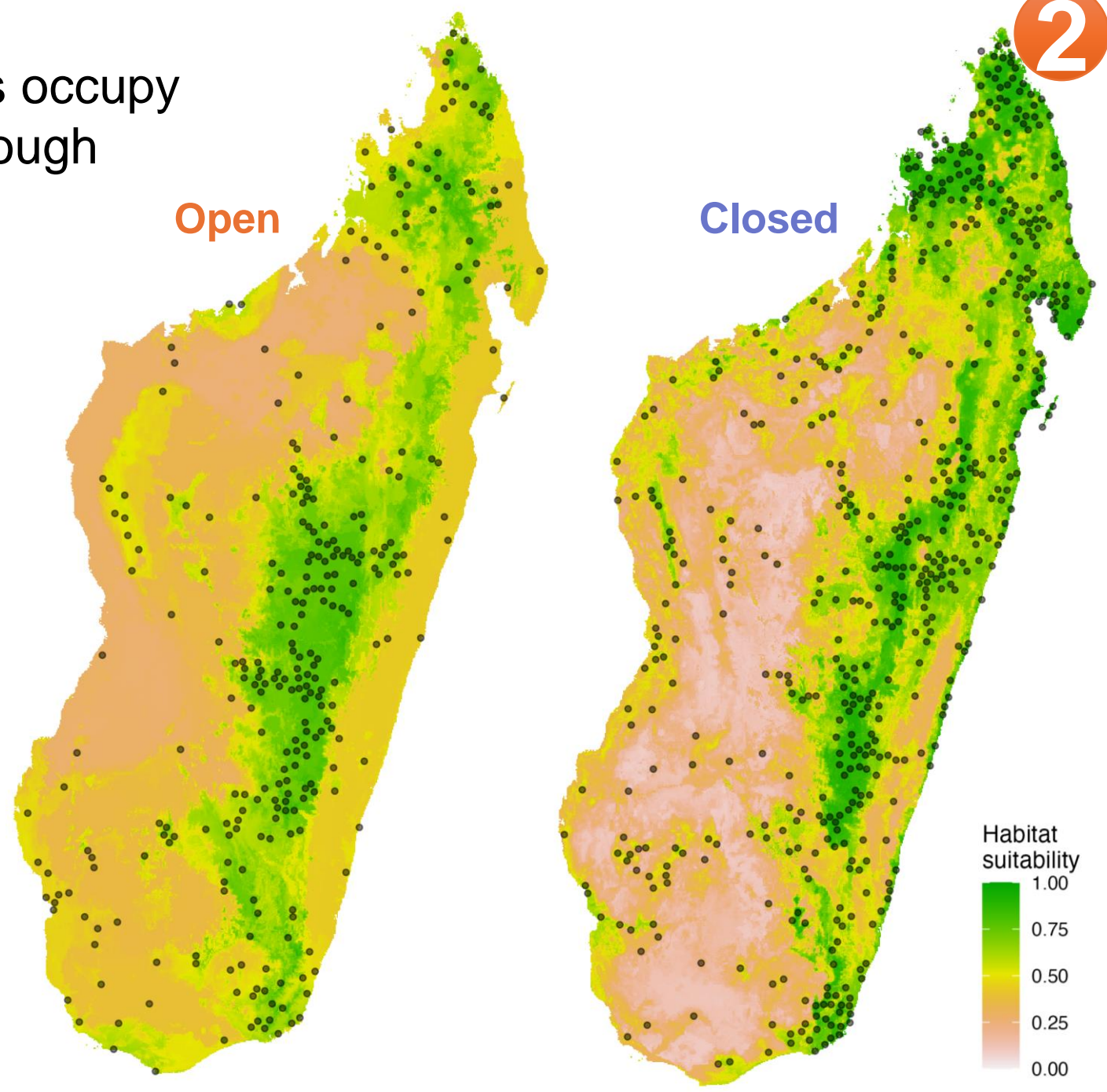
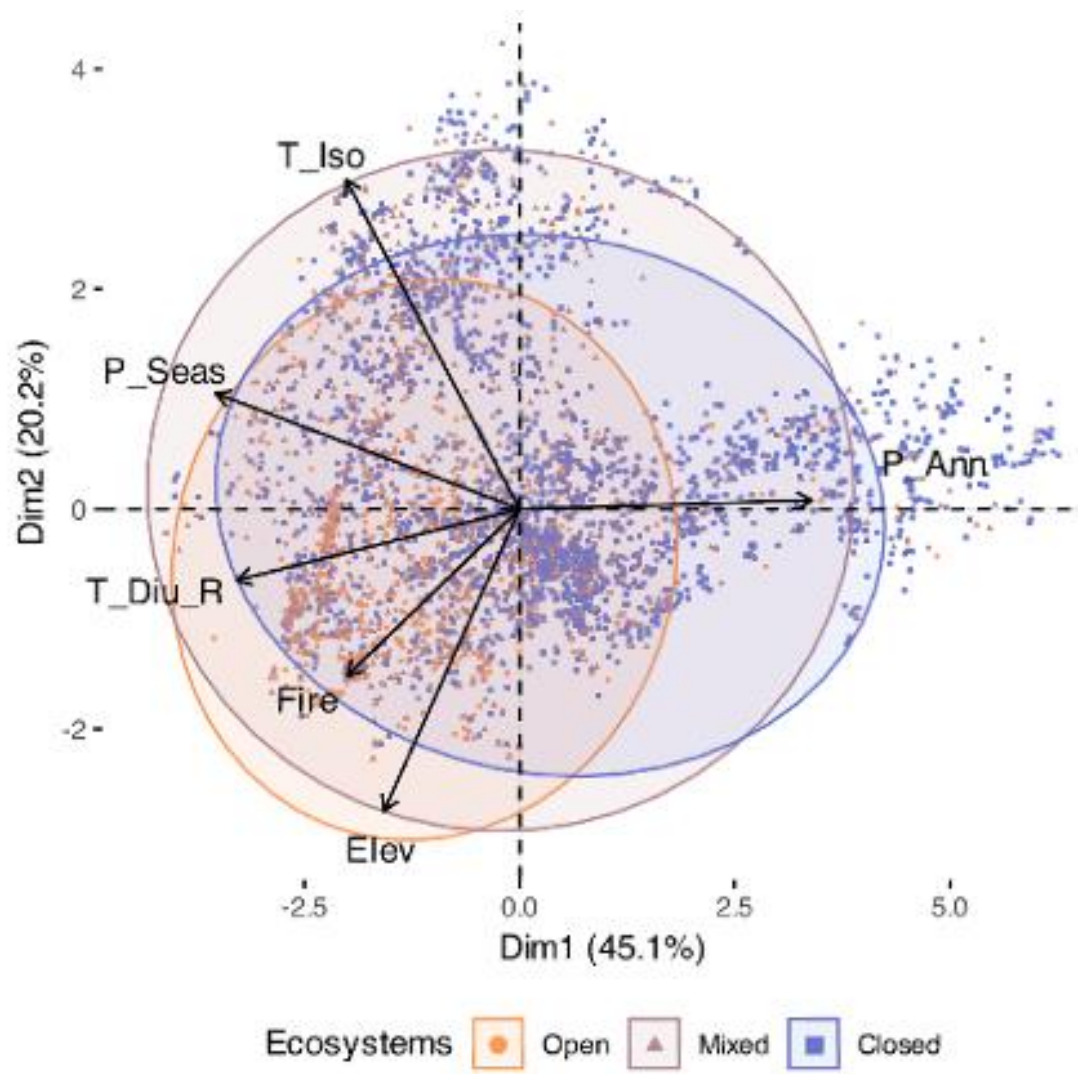
30% of orchids occur in open ecosystems

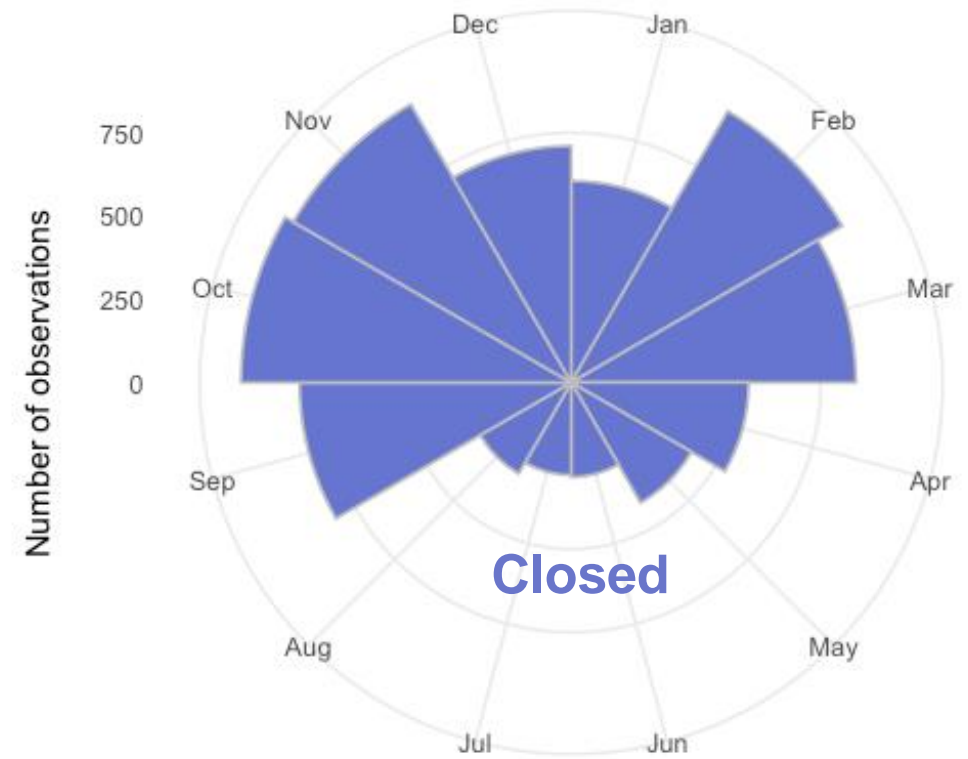
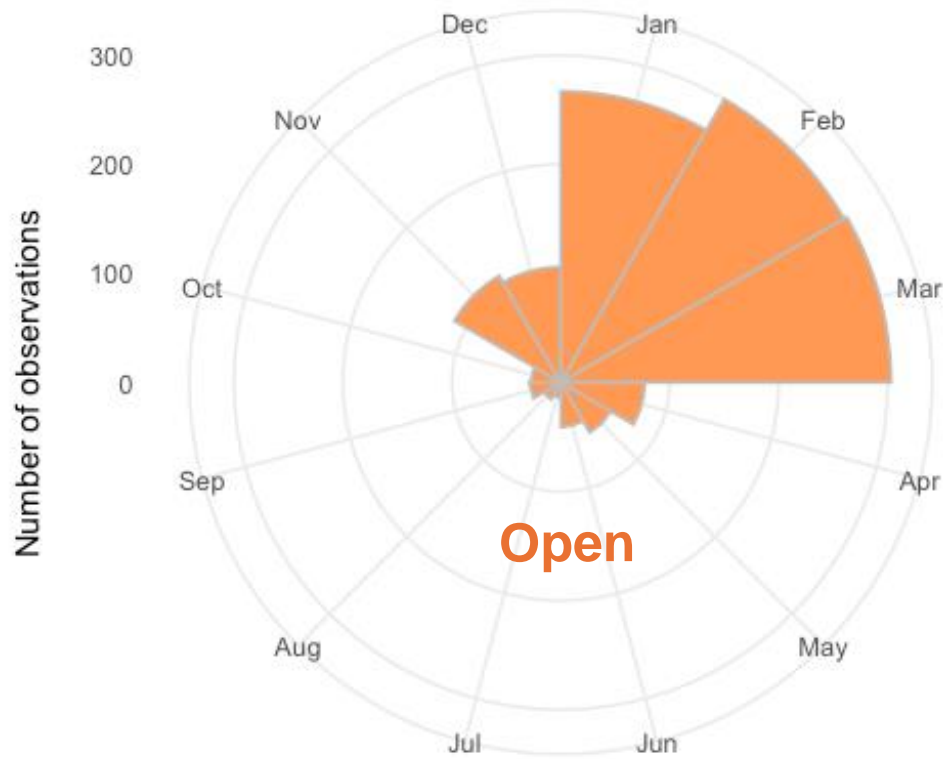
17% occur exclusively there

85% of both open and closed ecosystem species are endemic to Madagascar

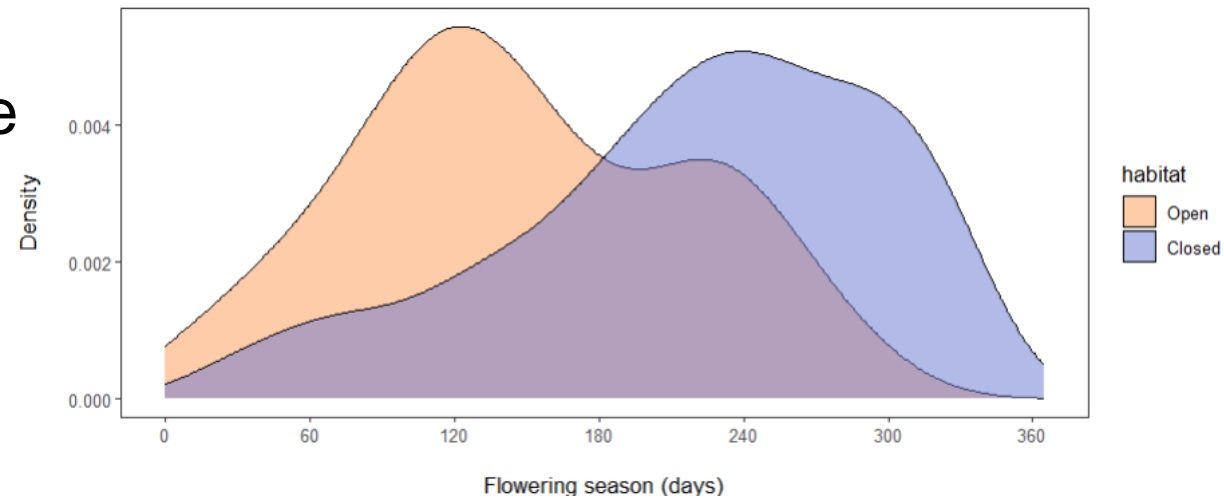


Open and **closed** ecosystem species occupy **distinct environmental niches**, although with large **overlaps in distribution**





Open and **closed** ecosystem species have **distinct flowering patterns**, open ecosystems being more seasonal and having a **shorter flowering season**



Key messages

- 1 Notable and endemic diversity of terrestrial & lithophytic orchids in Madagascar's open ecosystems
- 2 Distinct environmental niches across open and closed ecosystems, although with large overlaps in distribution
- 3 Short flowering season and constrained flowering times in open ecosystems



Eulophia rutenbergiana

Thank you

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Credit: M. Vorontsova; *Andringitra plateau*