

VEGETATION DYNAMICS IN TROPICAL TREELINE ECOTONES



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Workshop: “The future of mountain forest”

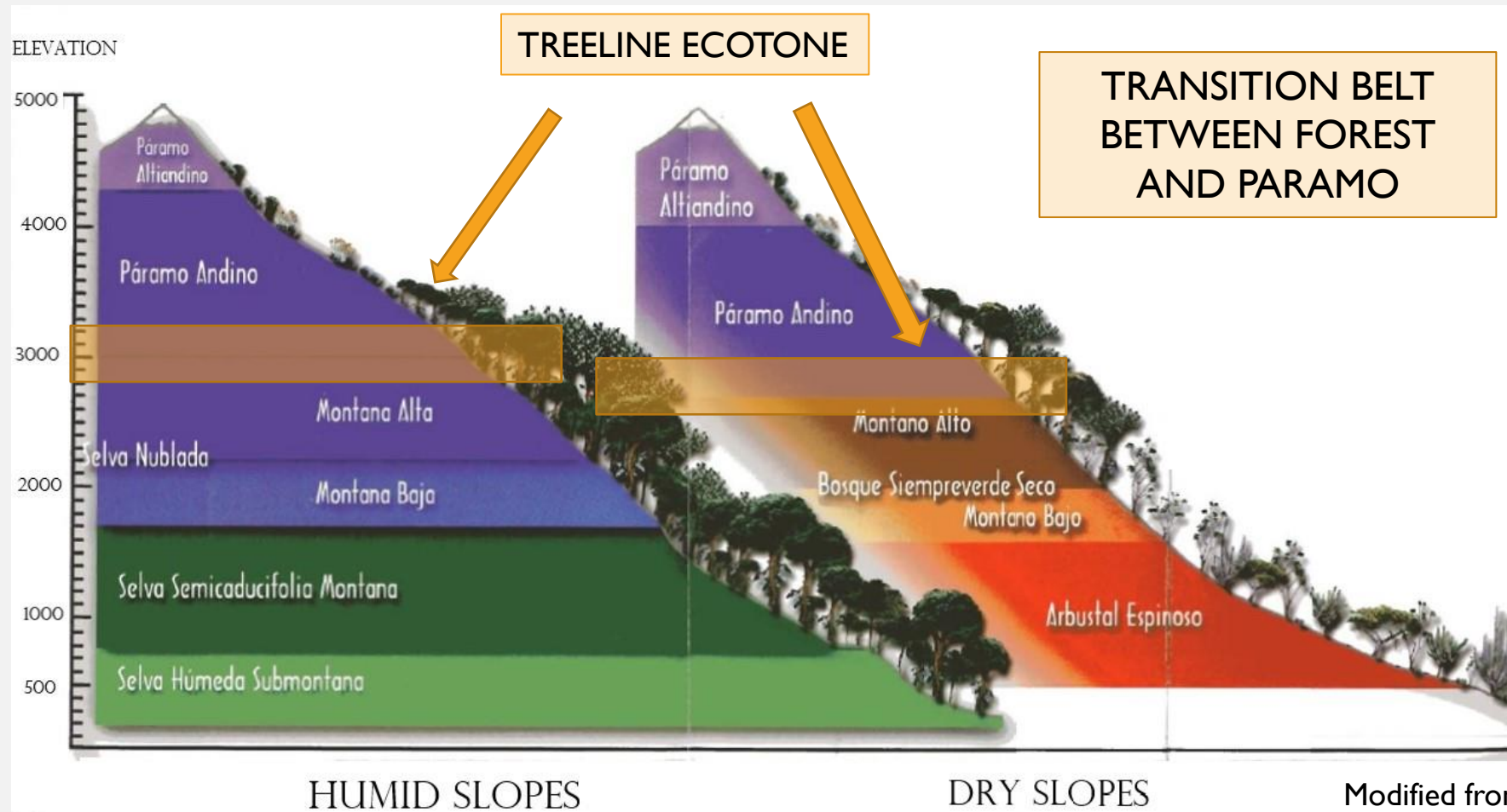
TROPICAL ALPINE ECOSYSTEMS

- Daily temperature fluctuations – thermal stress

“Summer every day, winter every night”

- Precipitation seasonality – water stress

- High radiation input all year – light stress
- No snow cover, no avalanches
- High diversity: species and life form

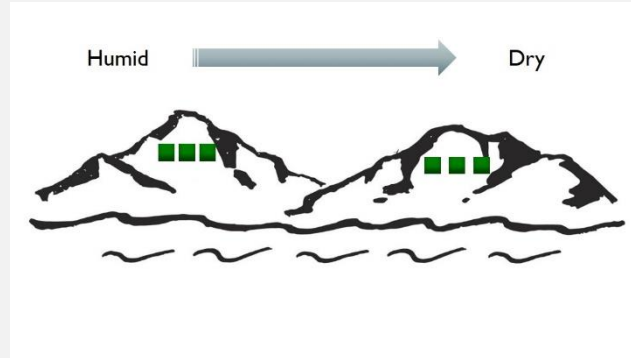


ECOSYSTEM ENGINEERING AT TROPICAL TREELINE: HOW DO **WATER AVAILABILITY** AND **FACILITATION** INFLUENCE THE **ESTABLISHMENT DYNAMICS** OF TREE SPECIES AT ANDEAN TREELINES?

BY: L. RAMIREZ AND M. BADER

3 SCALES OF ANALYSIS

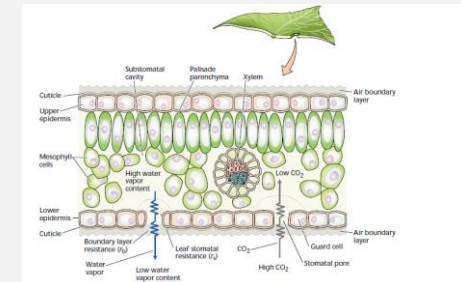
SPATIAL PATTERNS DRY vs HUMID SLOPES

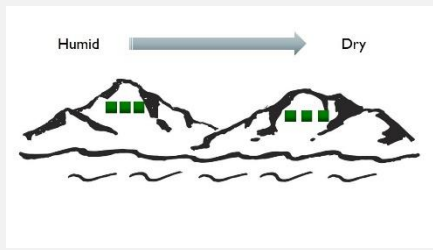


2 SPATIAL ASSOCIATIONS SEEDLINGS - PARAMO VEGETATION



3 SEEDLING PHYSIOLOGY



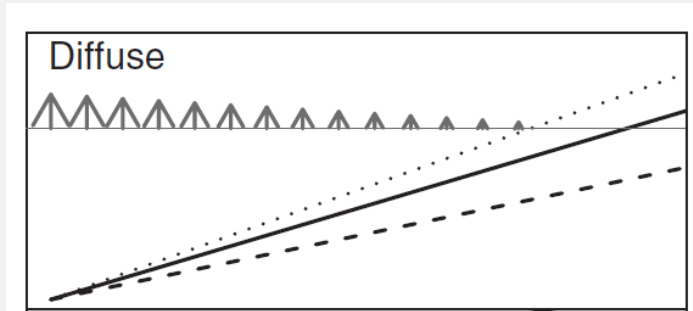


SPATIAL PATTERNS

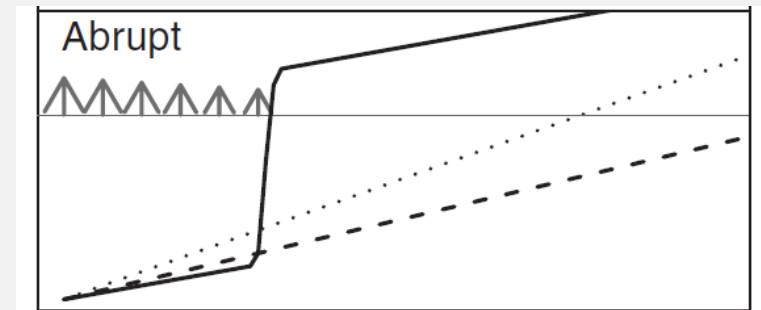
➤ Maps of woody stratum in the treeline ecotone → Spatial point pattern analysis


Expected Results

☼ Diffuse transitions on humid slopes



☼ Abrupt transitions on dry slopes





2 SPATIAL ASSOCIATIONS

- Spatial point pattern analysis
- Plots at “seedling-neighbourhood” scale

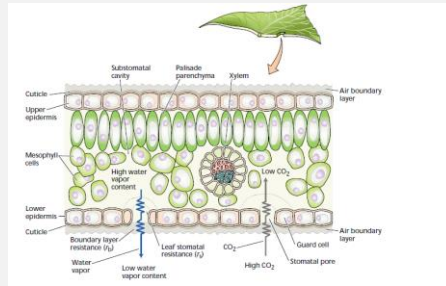


Expected Results

- ✱ Strong positive seedling-neighbor interactions on dry slopes
- ✱ Shrubs as ecosystem engineers



3



PHYSIOLOGICAL RESPONSES

- Gas Exchange, water potential and growth in seedlings **established near other plants** and in open areas

Expected Results

- ✱ Improved physiological status in seedlings and juvenile trees growing in association
- ✱ Improved growth and survival



POSTER SESSION!

VEGETATION STRUCTURE ALONG THE FOREST - PÁRAMO TRANSITION BELT IN TROPICAL TREELINES : IMPLICATIONS FOR UNDERSTANDING TREELINE DYNAMICS

Ramirez , Lirey (1,2) ; Llambi, Luis Daniel(2); Schwarzkopf, Teresa (2); Gamez, Luis Enrique (3)
(1) Marburg University. Germany. (2) ICAE-ULA. Venezuela. (3) FCFA. ULA. Venezuela

INTRODUCTION

In the Andes, treeline ecotones are the transition belt between cloud forest and páramo.

WHY ARE TROPICAL TREELINES DIFFERENT?

"Summer every day, winter every night"

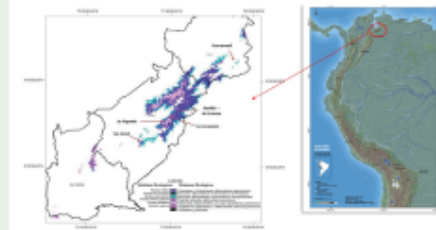
Different precipitation patterns and seasonality . No snow

Vegetation structure is complex: High species and life form diversity

Important ecosystem services under threat from anthropogenic activities.

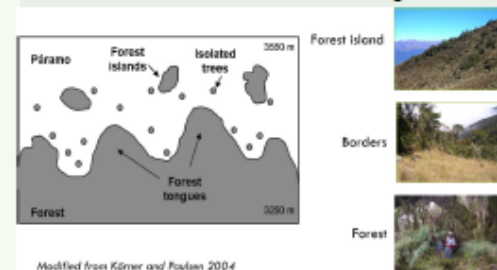
METHODS

South America -Venezuelan Andes



Chacón-Moreno ,2015; Josa et al, 2009

4 elevations- 2 transects- Woody stratum



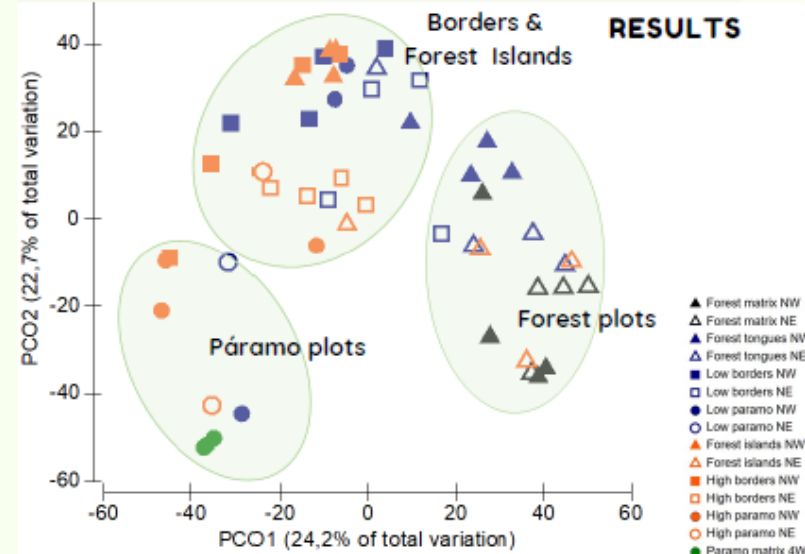
Modified from Körner and Paulsen 2004

QUESTIONS

- How different are the forests along the elevation gradient?
- Do the borders have a particular vegetation structure?
- What tree species are able to establish in open paramo areas? Are they different between elevations?

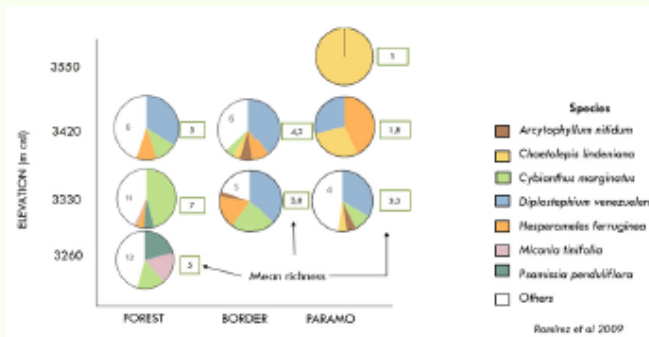
CONCLUSIONS:

Paramo shrubs could act as pioneer species in scenarios of altitudinal advance of the treeline induced by climate change



RESULTS

- Forest matrix NW
- Forest matrix NE
- Forest tongues NW
- Forest tongues NE
- Low borders NW
- Low borders NE
- Low paramo NW
- Low paramo NE
- Forest islands NW
- Forest islands NE
- High borders NW
- High borders NE
- High paramo NW
- High paramo NE
- Paramo matrix 4W



Ramirez et al 2009

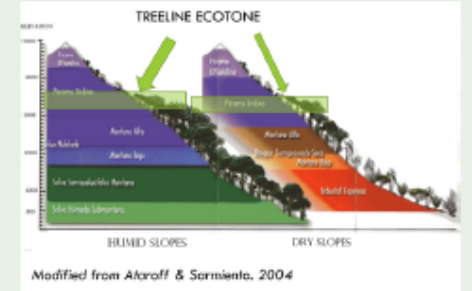
NEXT STEPS

ECOSYSTEM ENGINEERING AT TROPICAL TREELINE

By: Lirey Ramirez and Madoke Bader
Marburg University. Germany

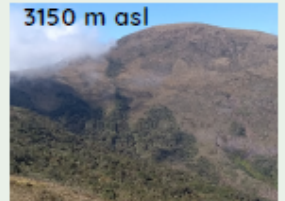
MAIN QUESTION

How do water availability and facilitation influence the establishment dynamics of tree species at andean treelines?



Plant-plant interactions in a dry tropical treeline ecotone

Cybianthus marginatus



Clusia multiflora

Preliminary results:
Positive spatial association with mosses and ferns