



Philippine
Space
Agency



9th Joint Project Team Meeting

Defining Fire Regime in Palawan, Philippines using satellite-based Fire Products

Cara Patricia. Canlas
Science Research Specialist II, Philippine Space Agency
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Presentation Outline

I. Introduction

- I. Fire Activities in the Philippines
- II. Fire Regimes

II. Conceptual Framework

III. Methodology

- I. Datasets
- II. Analyses

IV. Preliminary Results



Introduction

Fire Activities in the Philippines

Fire is used as a land clearing tool for purposes such as swidden agriculture, land conversions for agricultural expansion, infrastructural development.



Human-induced Fire

Driven by economic development such as agricultural and infrastructural expansion.



Natural Causes

Fuel and heat instigate dry-fuel combustion; lightning.

1 Ilocos Norte logs over P40-M damage from grass, forest fires
 "Damage caused by the over 70 grass and forest fires recorded in Ilocos Norte since the start of the year until the second week of April is estimated to have reached over PHP40 million."

2 Forest fires hit Occidental Mindoro mountains
 "Two forest fires razed parts of the mountains of Occidental Mindoro in the last nine days, destroying at least 150 hectares of endemic pine trees"

3 Forest fire sumiklab sa Roxas, Palawan (Jan 2022)
 "bandang alas 3:00 ng hapon nagsimula ang sunog na tumagal pa hanggang hating gabi"

4 Fire destroys 160K trees, saplings at Mount Pulag (Feb 2020)
 "eight-day forest fire at the "playground of the gods", Mount Pulag, in Kabayan town razed 191.54 hectares planted with trees, killing a total of 160,547 trees and saplings under the expanded NGP-DENR sites"

5 Eastern Samar town mayor cries SOS vs forest fire
 "The fire started at the forest of Naparaan village around 7 a.m. on Tuesday (April 14) and was still raging as of 5 p.m."

6 Massive forest fire rages on Mt. Apo; hikers flee inferno (Mar 2016)
 "affected more than 100 hectares of forest cover"

Introduction

Fire Activities in the Philippines

	Location	Cause	Fire duration	Time of Fire	Burned Area	Land Cover Affected	Date
1	Solsona, Piddig, Carasi, Vintar, and Pasuquin, Ilocos Norte	hunting wild boar and collecting wild honey	-	-	>5,000 ha	Forest, grasslands	Jan to Apr 2024
2	Occidental Mindoro	Kaingin, honey gatherers	12 hours	5:25 pm	~150 ha of endemic pine trees	Forest, grassy area, vegetation trail	Mar 25, 2023
3	Roxas, Palawan	-	-	3:00 pm	-	Forest in mountains of Brgy Minara, San Nicolas, Sandoval	Jan 4, 2022
4	Mt. Pulag, Benguet	Community livelihood activities	8 days	-	-	Grassland and pine forest in ENGP	Feb 11-18, 2020
5	Eastern Samar	-	-	7:00 am	-	Forest of Naparaan village	Apr 14, 2020
6	Mt. Apo	-	-	1:00 pm	100 ha of Makilala and Magpet	Forest	Mar 26, 2016



Ilocos Norte logs over P40-M damage from grass, forest fires

"Damage caused by the over 70 grass and forest fires recorded in Ilocos Norte since the start of the year until the second week of April is estimated to have reached over PHP40 million."

Fire destroys 160K trees, saplings at Mount Pulag (Feb 2020)

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Forest fires hit Occidental Mindoro mountains.

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Eastern Samar town mayor cries SOS vs forest fire

"The fire started at the forest of Naparaan village around 7 a.m. on Tuesday (April 14) and was still raging as of 5 p.m."



Forest fire sumiklab sa Roxas, Palawan (Jan 2022)

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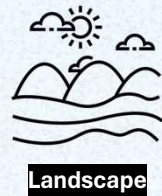
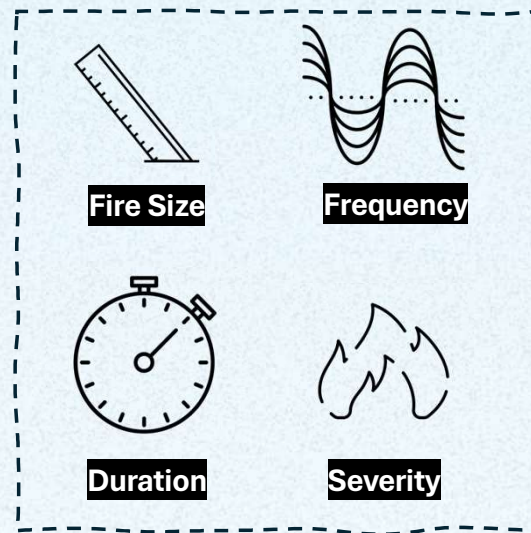


Massive forest fire rages on Mt. Apo; hikers flee inferno (Mar 2016)

"affected more than 100 hectares of forest cover"

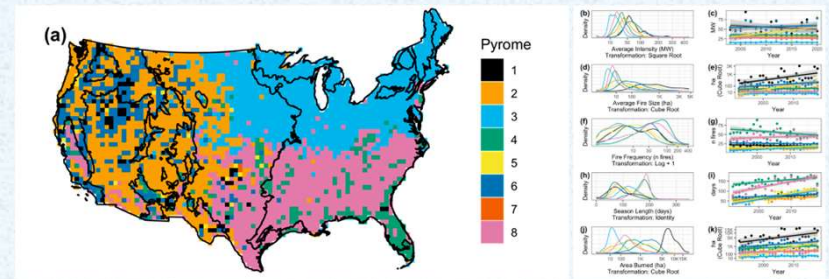
Introduction Fire Regimes

The concept of fire regime is a description of fire's physical characteristics in spatial and temporal:

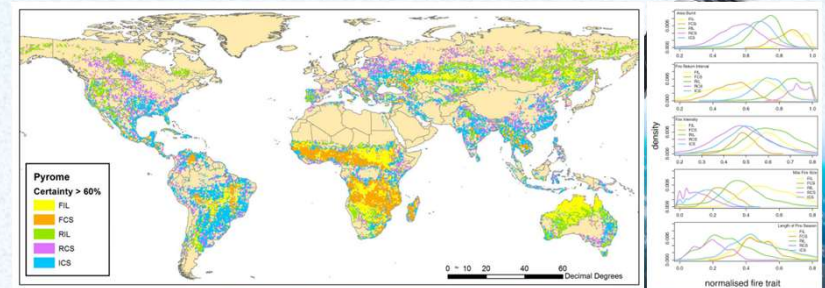


Pyromes

Delineation of areas that hold similar fire frequencies, intensities, sizes, burned areas, and fire season lengths



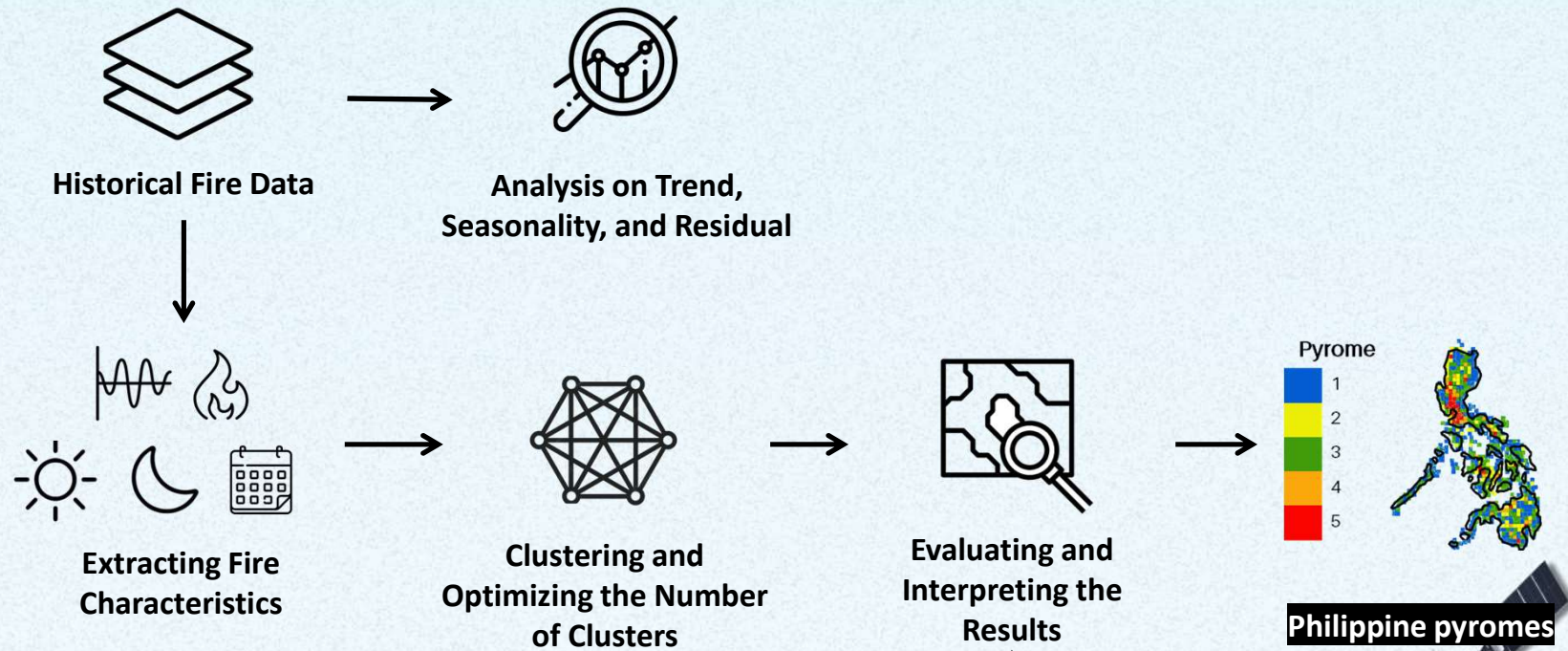
Modern Pyromes: Biogeographical Patterns of Fire Characteristics across the Contiguous United States (2022)



Defining pyromes and global syndromes of fire regimes (2013)

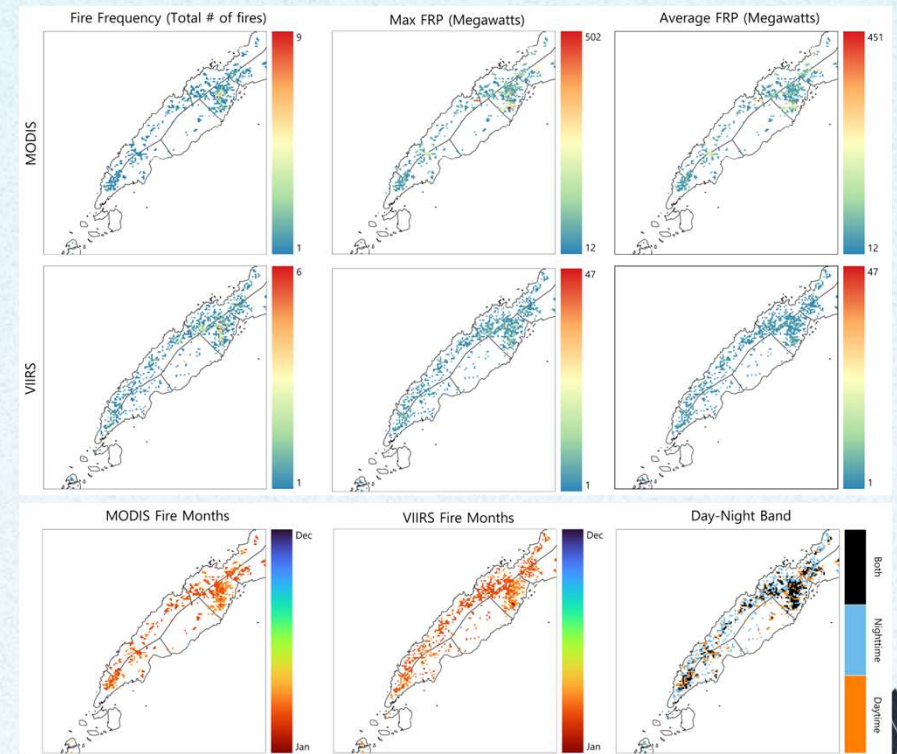


Conceptual Framework

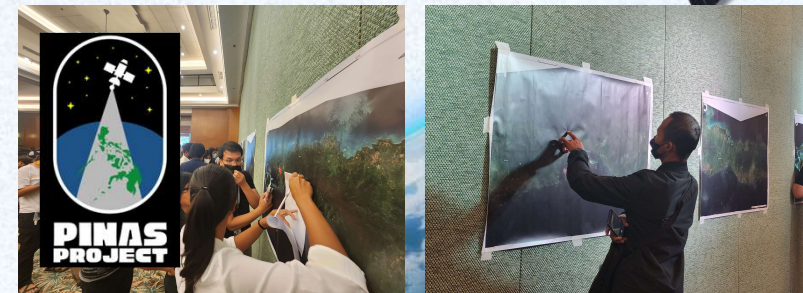


Methodology Dataset

PRODUCT	MEASUREMENT
MODIS Thermal Anomalies & Fire VIIRS Thermal Anomalies & Fire	<ul style="list-style-type: none"> • Fire frequency • Fire radiative power • Time of fire • Fire months
PINAS Project Participatory Mapping	Anecdotal data



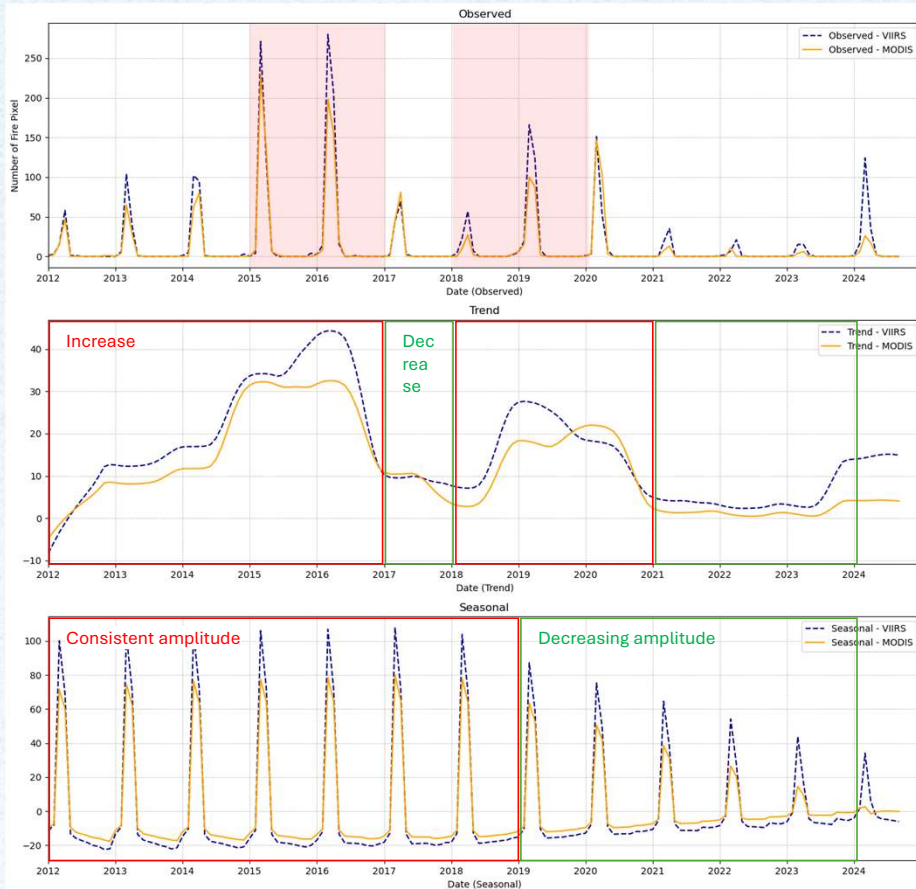
MOD14A1.061: Terra, Aqua Thermal Anomalies & Fire Daily Global 1km
 VNP14A1.002: Thermal Anomalies/Fire Daily L3 Global 1km SIN Grid



Results

Time-series

Palawan Province



Observed Data

Frequent fire occurs every year in the province. Activity is enhanced during **El Niño** years.

Trend

Increasing during the first five years (2012 to 2016) of the study period, followed by a **decline** in 2017 and 2018. It **rises** again during 2019 and 2020, then **decreases** until 2023.

Seasonality

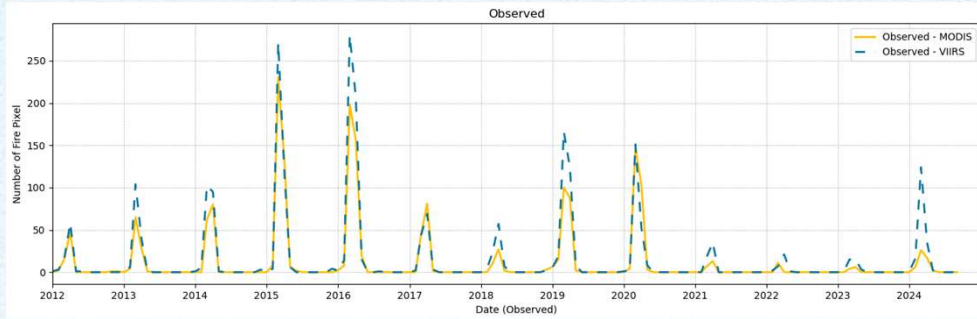
Oscillates between March/April of every year;
Consistent in amplitude during 2012 to 2018, then **decreased** from 2019 onwards.
This indicates seasonality of fire, and its frequency is decreasing overtime.



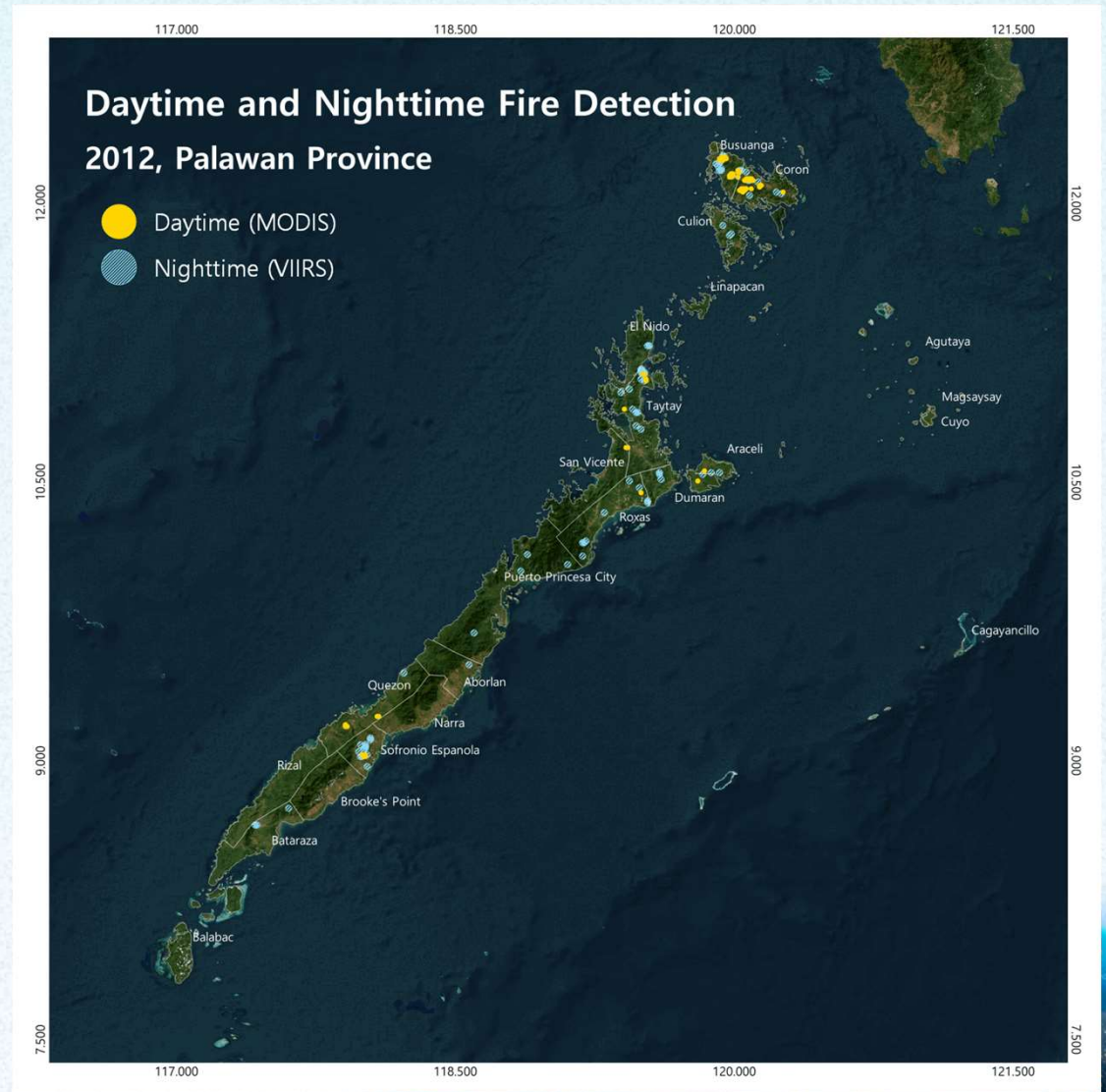
Results

Time-series

Palawan Province

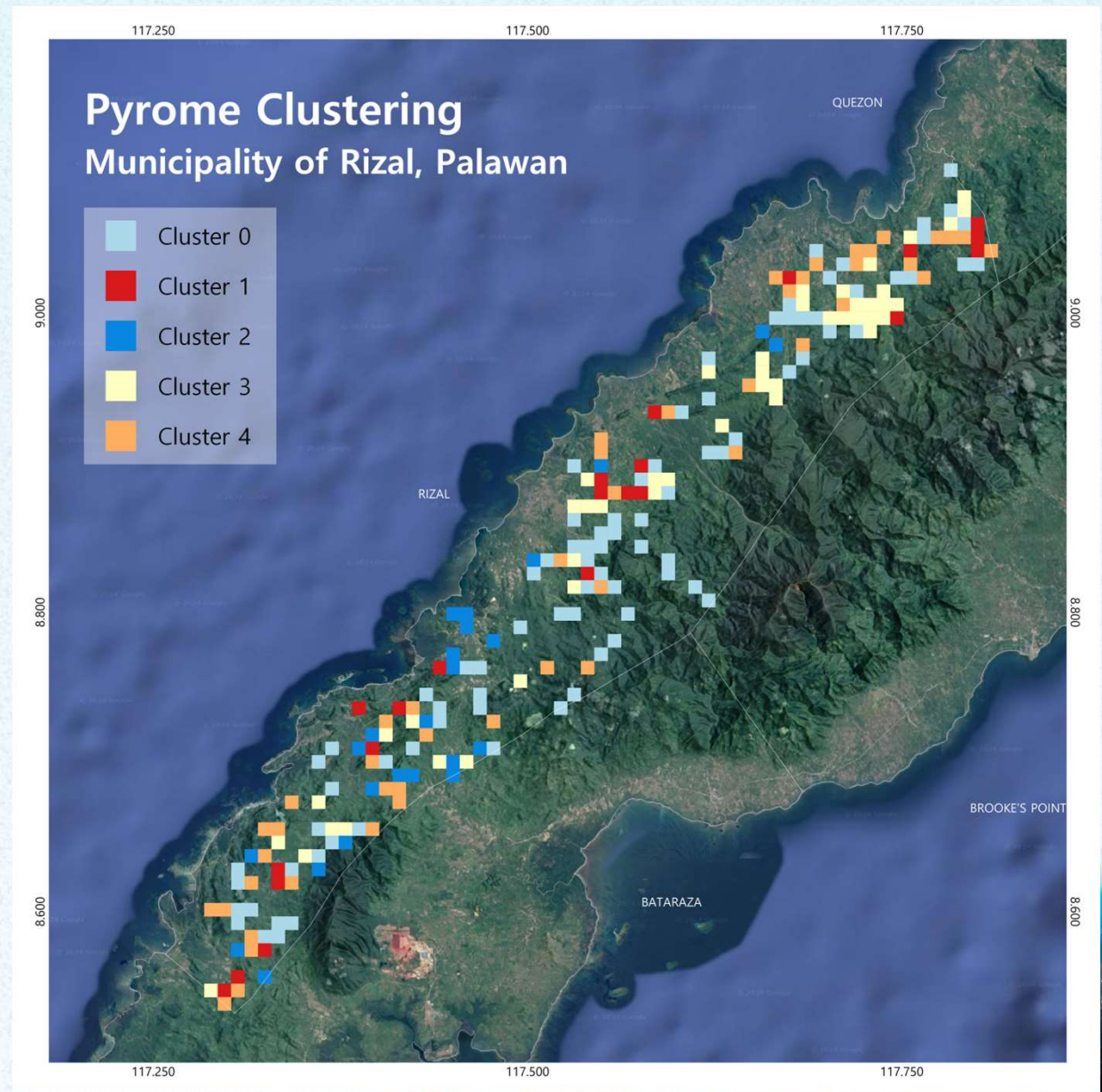
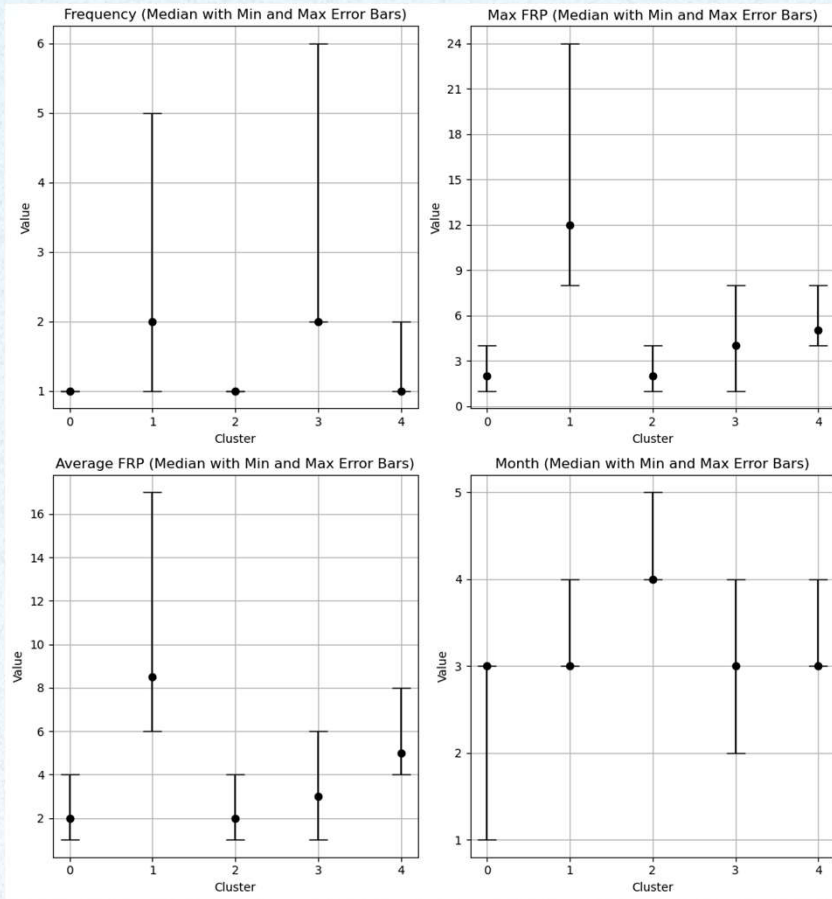


Occurrence: Nighttime fires > Daytime fires
Intensity: Nighttime FRP < Daytime FRP



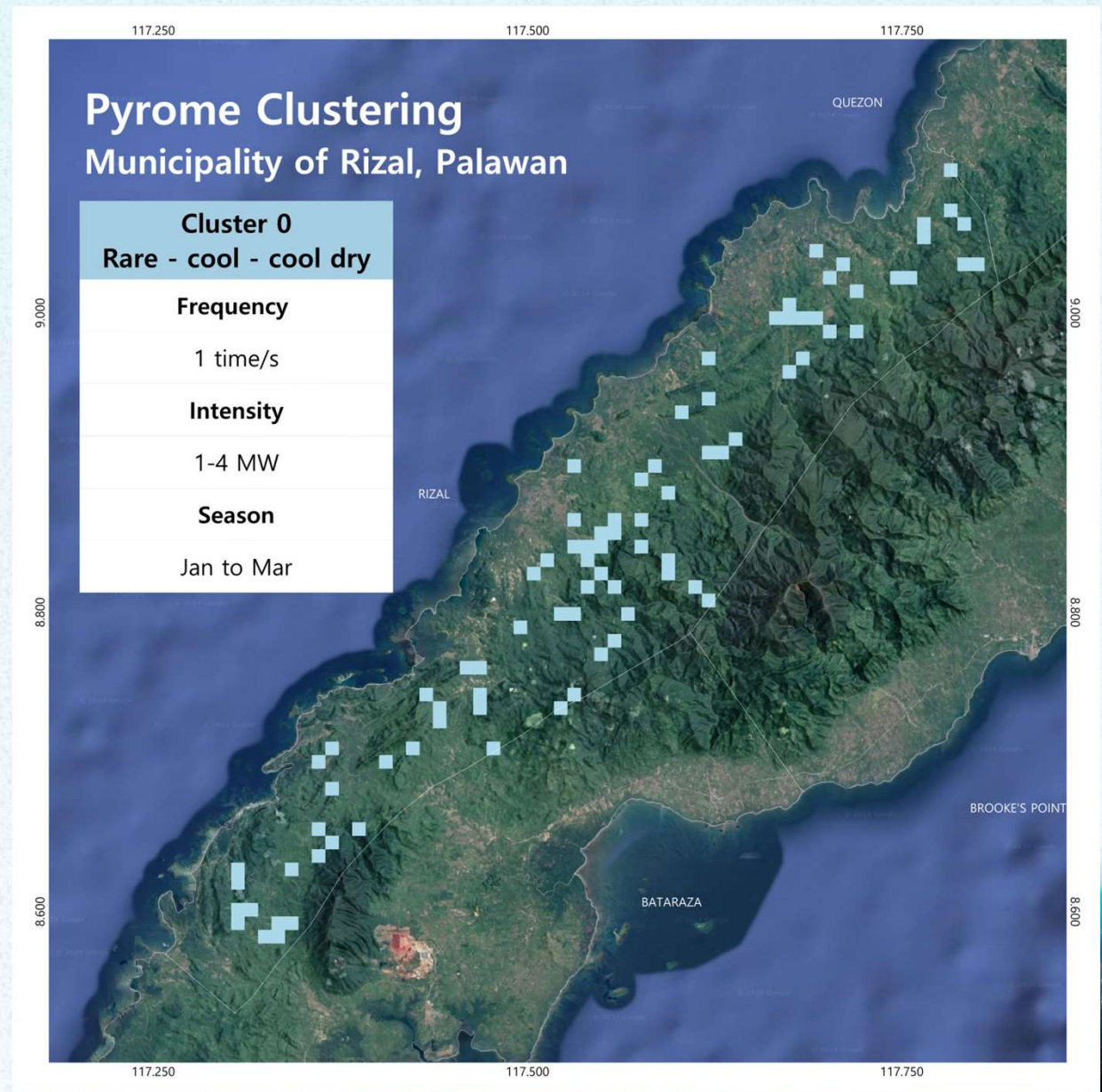
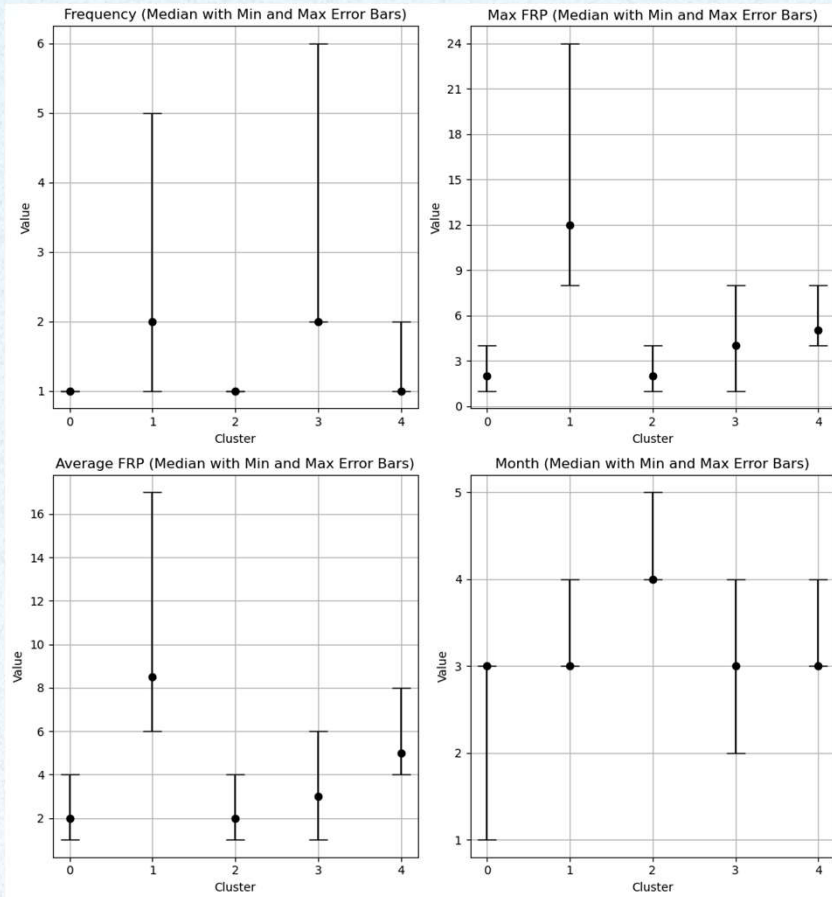
Results

Pyromes



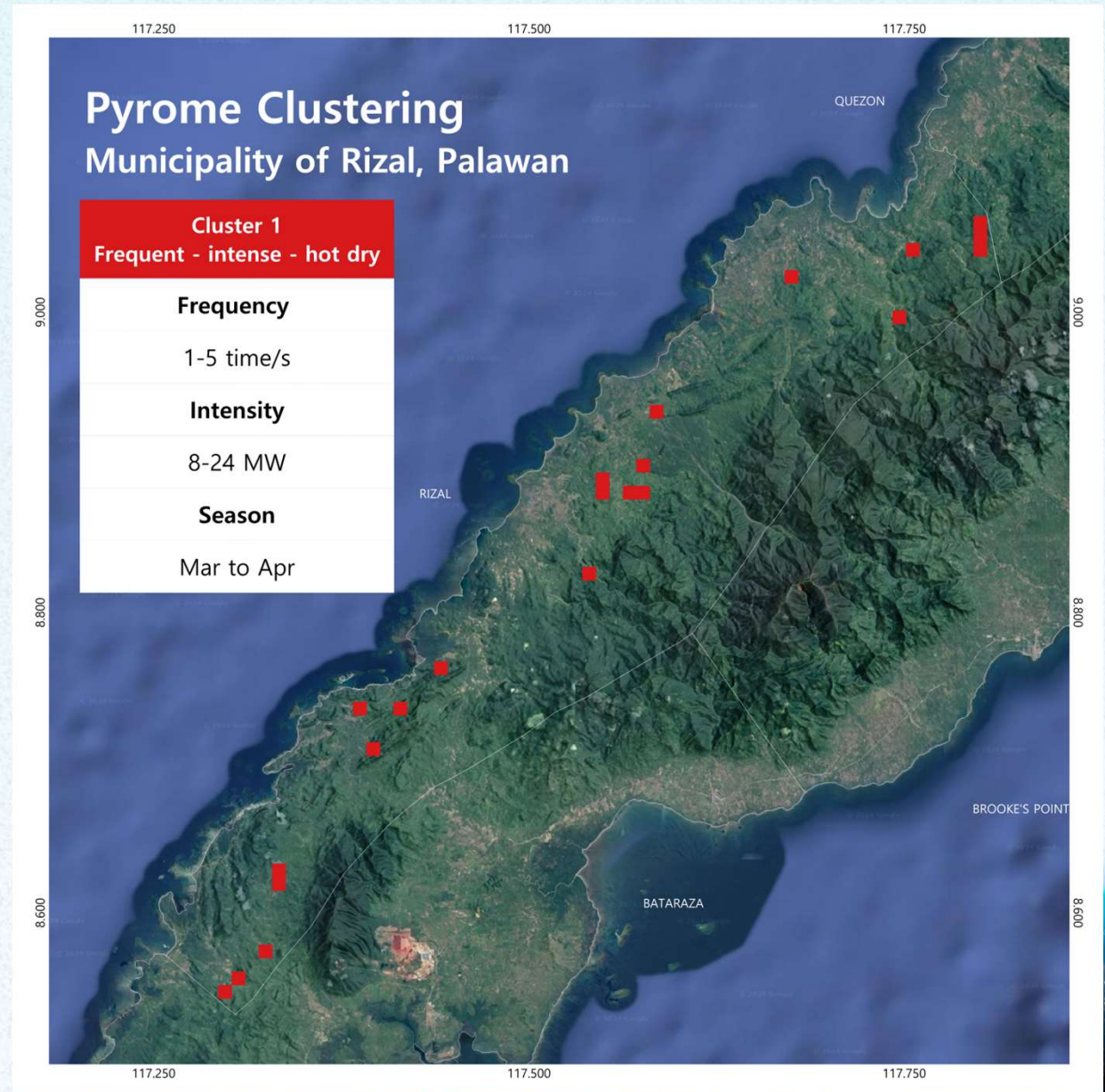
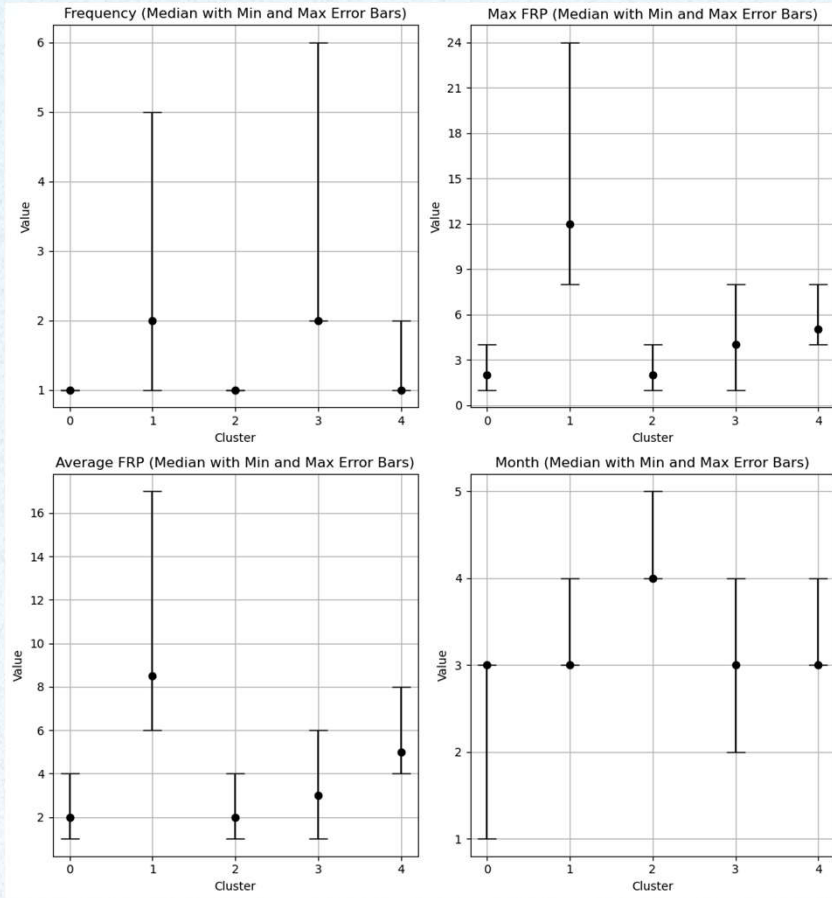
Results

Pyromes



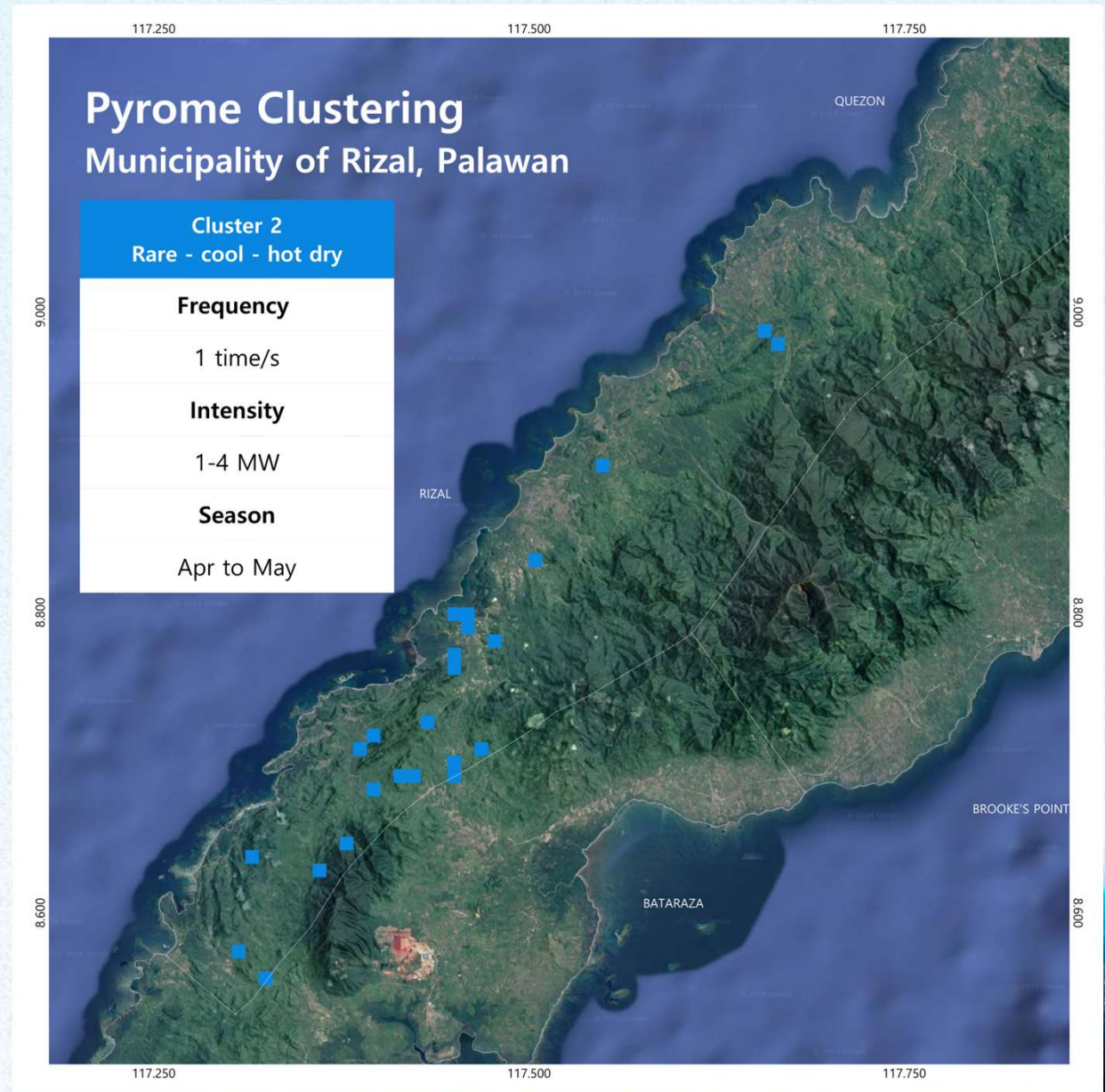
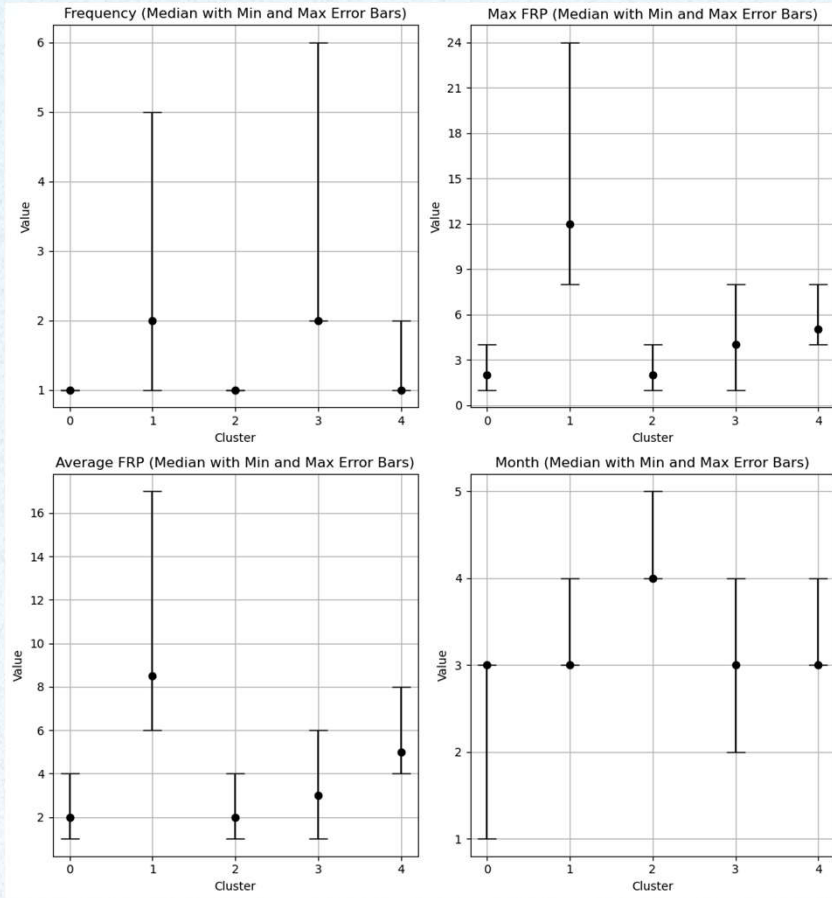
Results

Pyromes



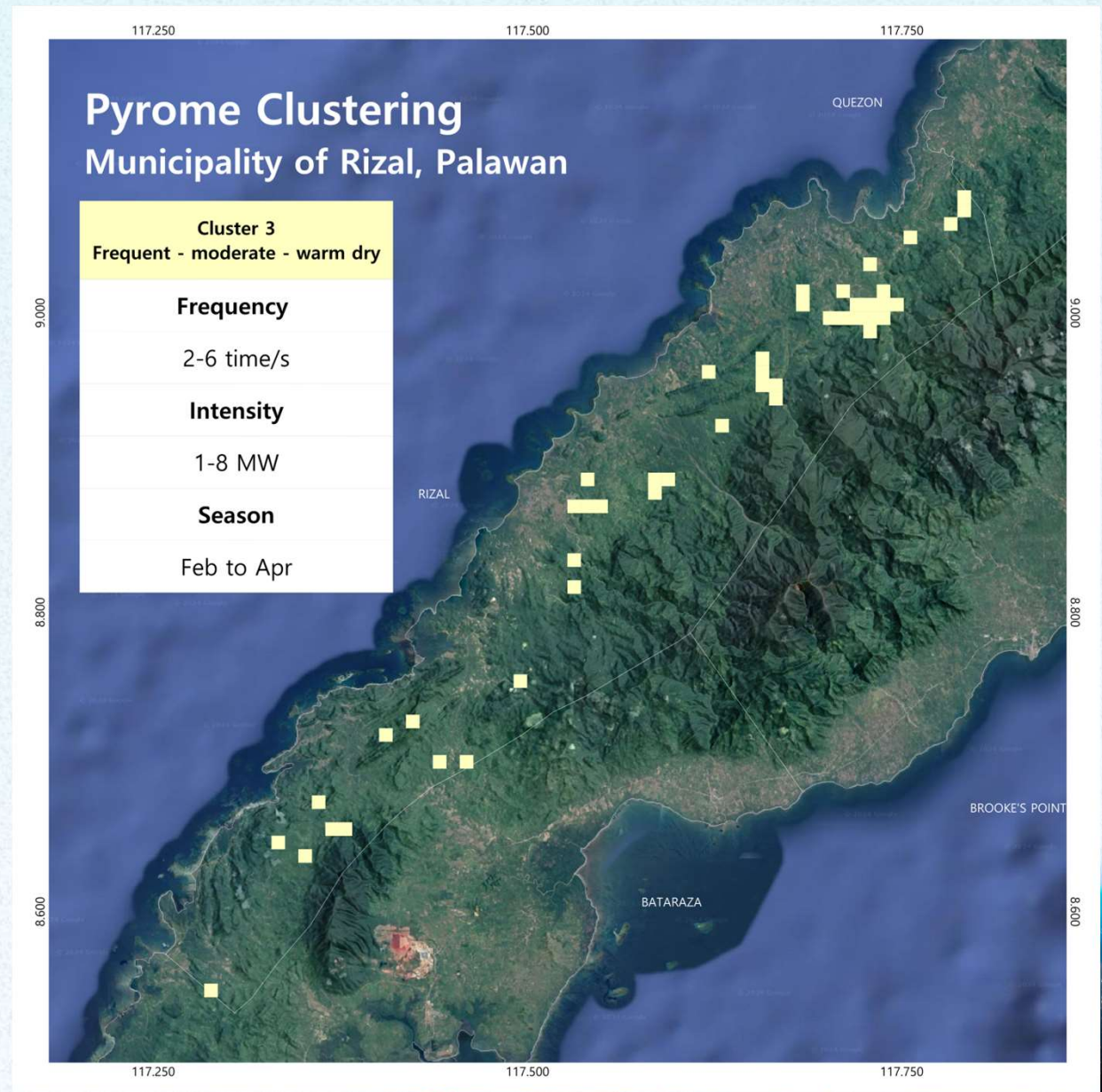
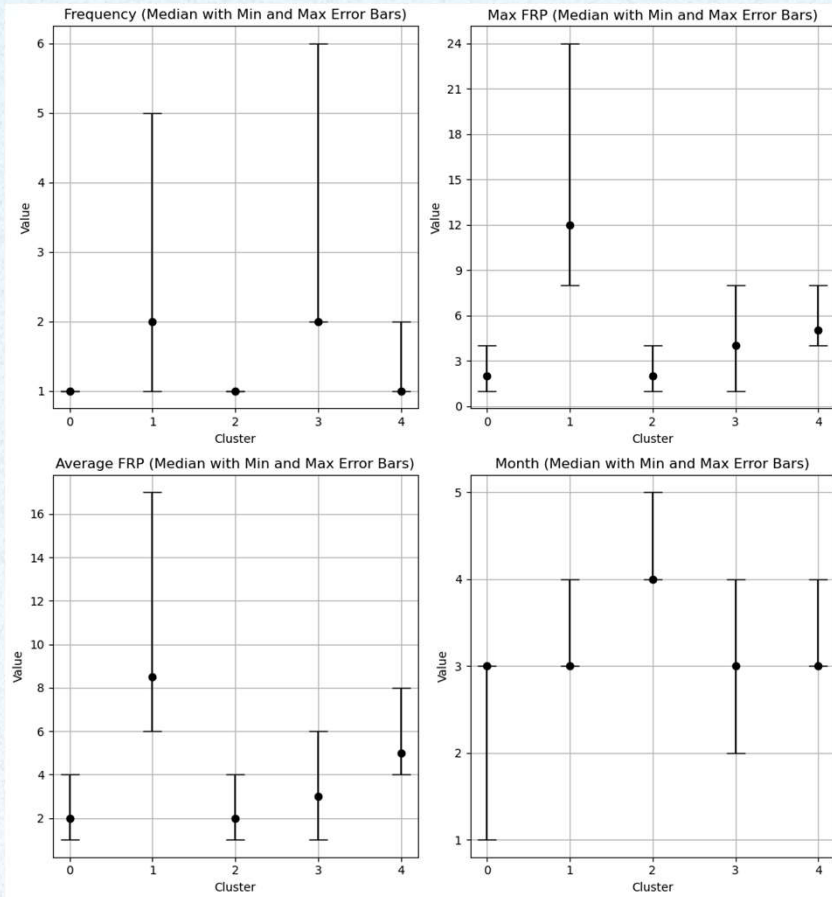
Results

Pyromes



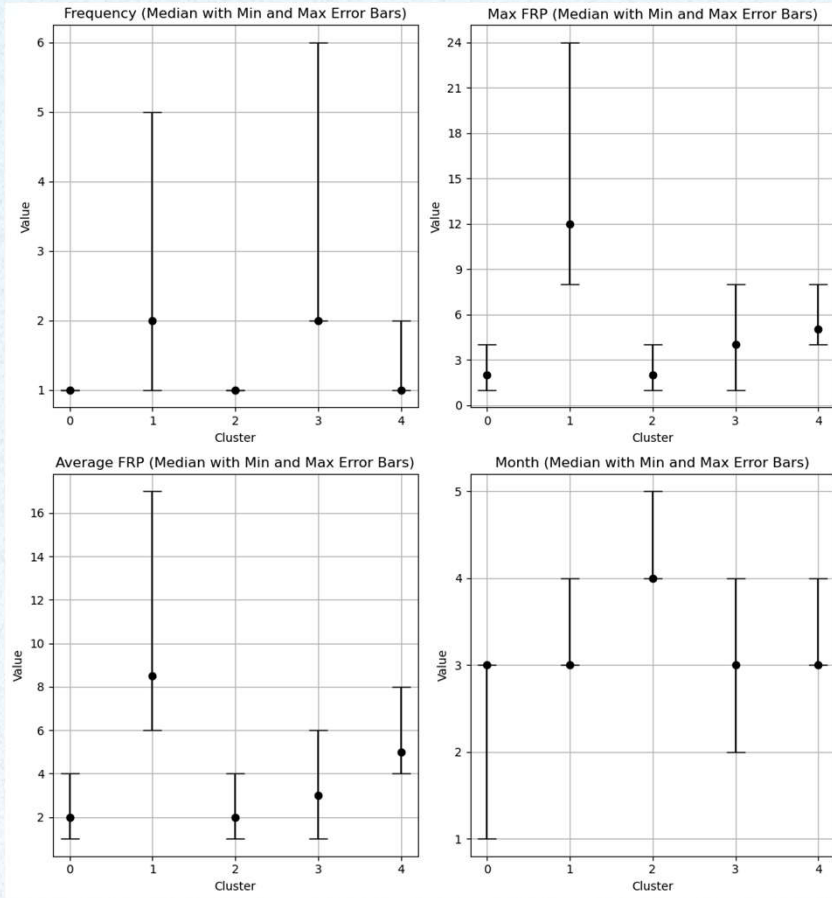
Results

Pyromes

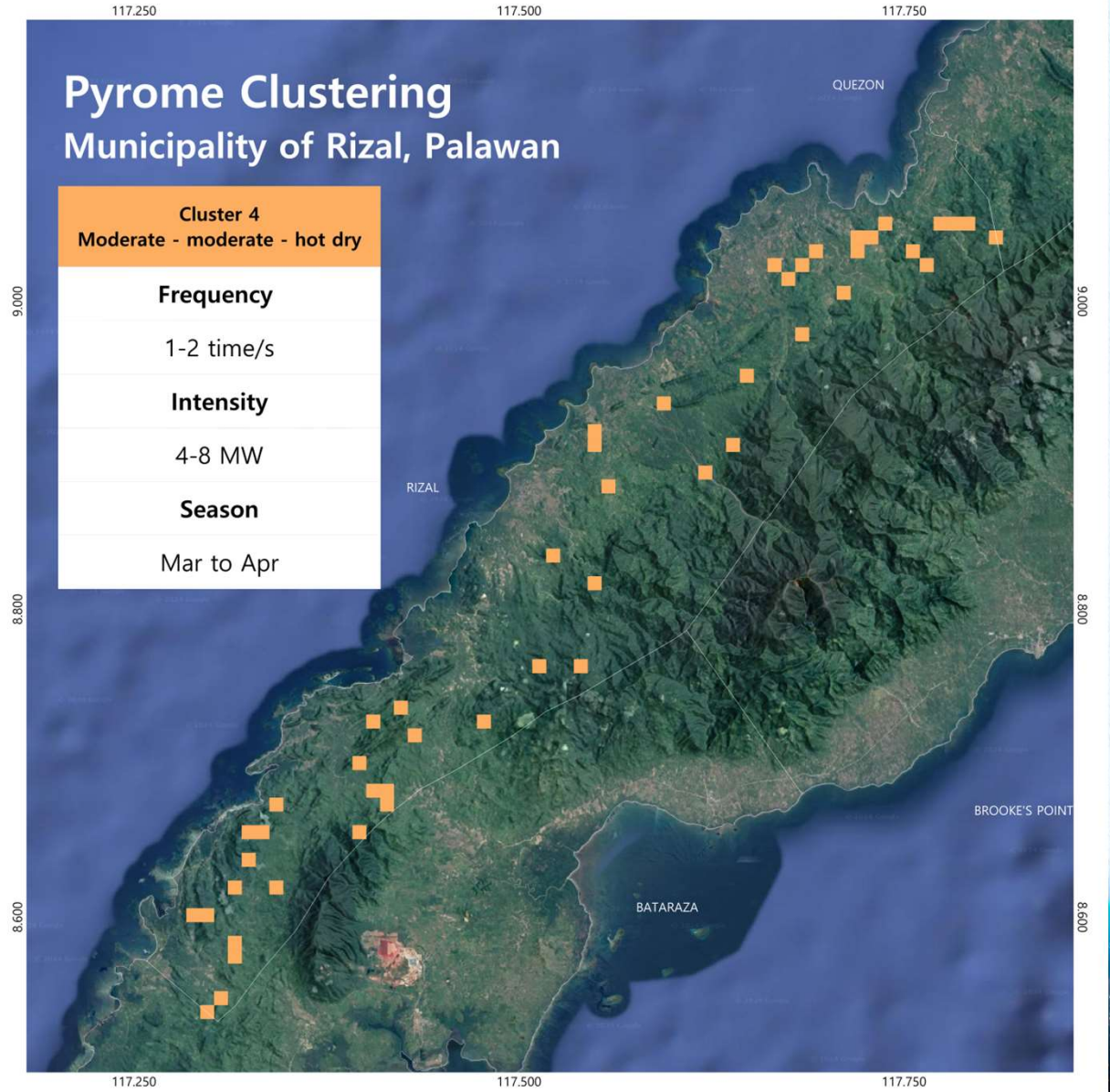


Results

Pyromes



Pyrome Clustering Municipality of Rizal, Palawan



Results

Pyromes



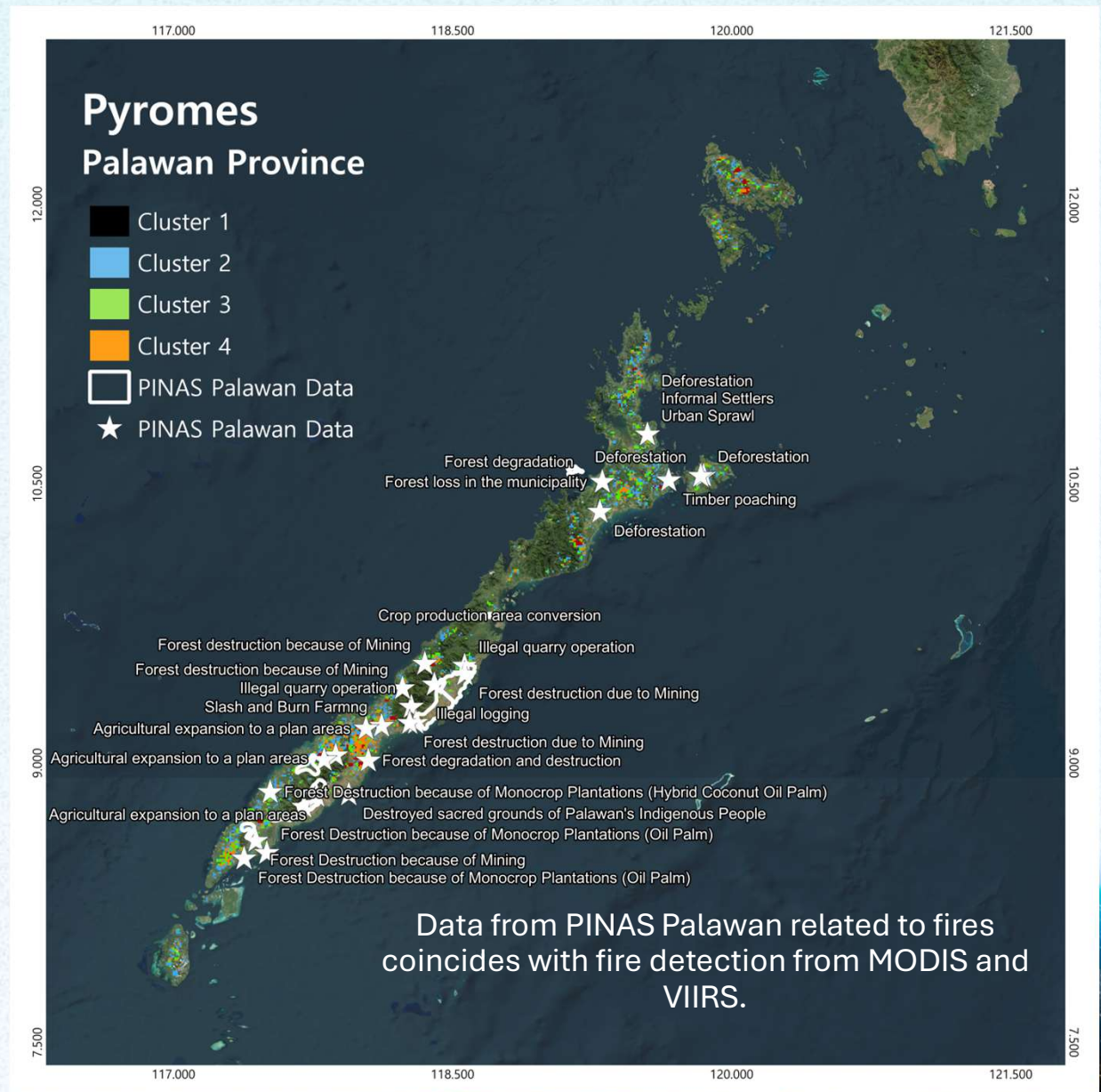
The result on the vegetation fire trends can help to address fire management and mitigation-related issues.



It will provide a national-scale framework and map of Philippines *pyromes*.



Best supported and complemented with sound decision-making, preventive measures, and rehabilitation efforts, this will help in sustainable forestry in the country.





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