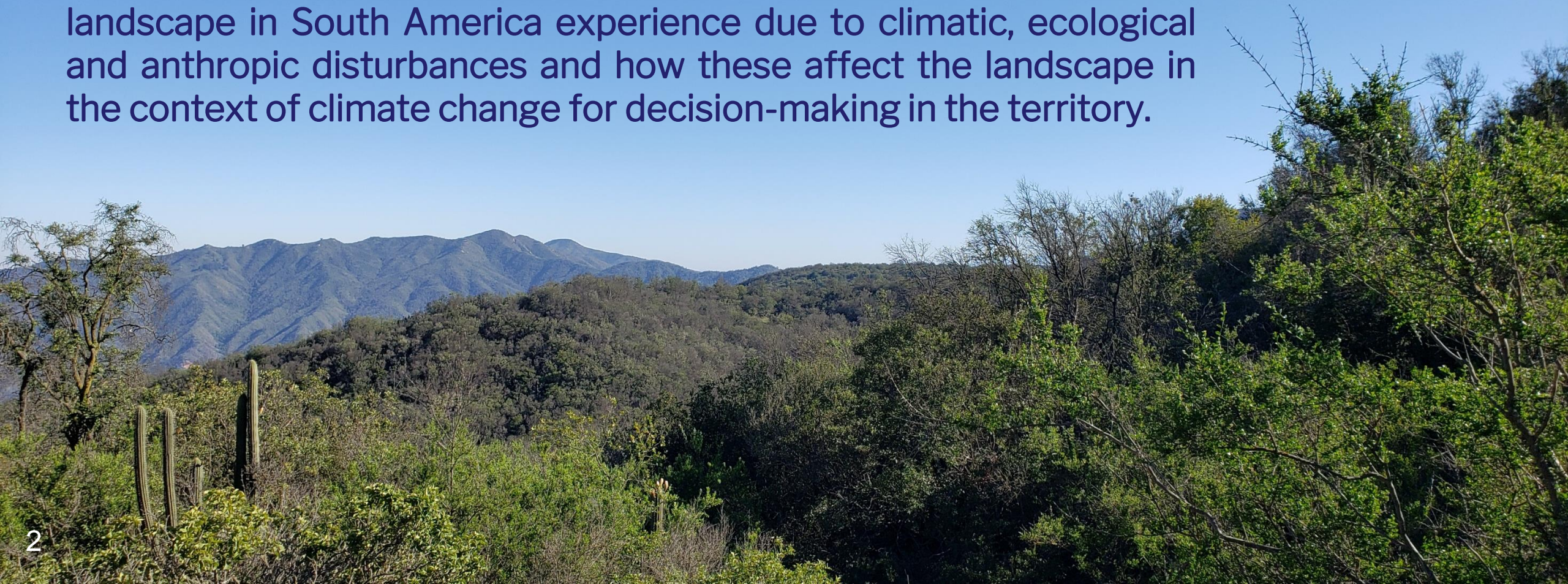# MOTIVATION

Understand the changes that ecosystems like the Mediterranean landscape in South America experience due to climatic, ecological and anthropic disturbances and how these affect the landscape in the context of climate change for decision-making in the territory.

What is the interaction between drought and wildfires and their effects in recovery patterns in the Mediterranean sclerophyllous forests ?

GOALS

Quantify interaction effects between drought and wildfires in sclerophyllous forests.
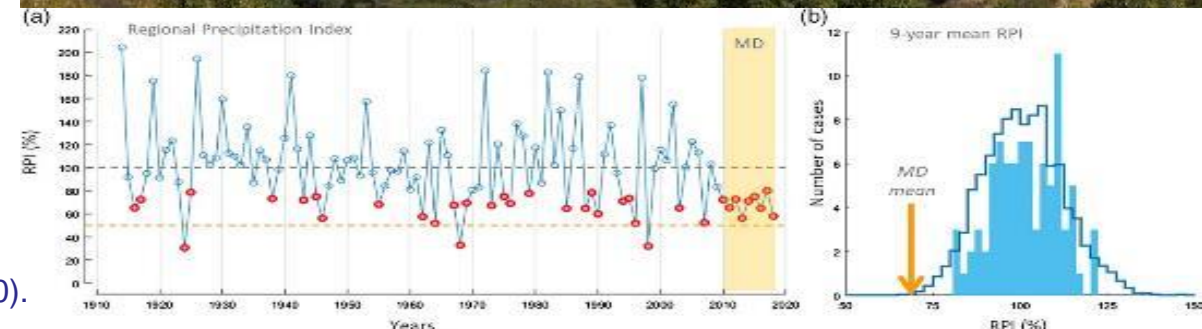
1. Analyze the spatial location, the direction of the trend, and the timing of the forest's spectral change.

2. Determine the relationship between spectral change and vegetation productivity after fire and drought, taking into account influences on climate and topography.

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BACKGROUND

Mediterranean region

- One of the world's biodiversity hotspots (Myers *et al.*, 2000).

- Region exposed to intense transformations in its landscape as a result of anthropogenic activities.

- Increase in the frequency and intensity of natural phenomena as a consequence of climate change: mega-drought, mega-fires.
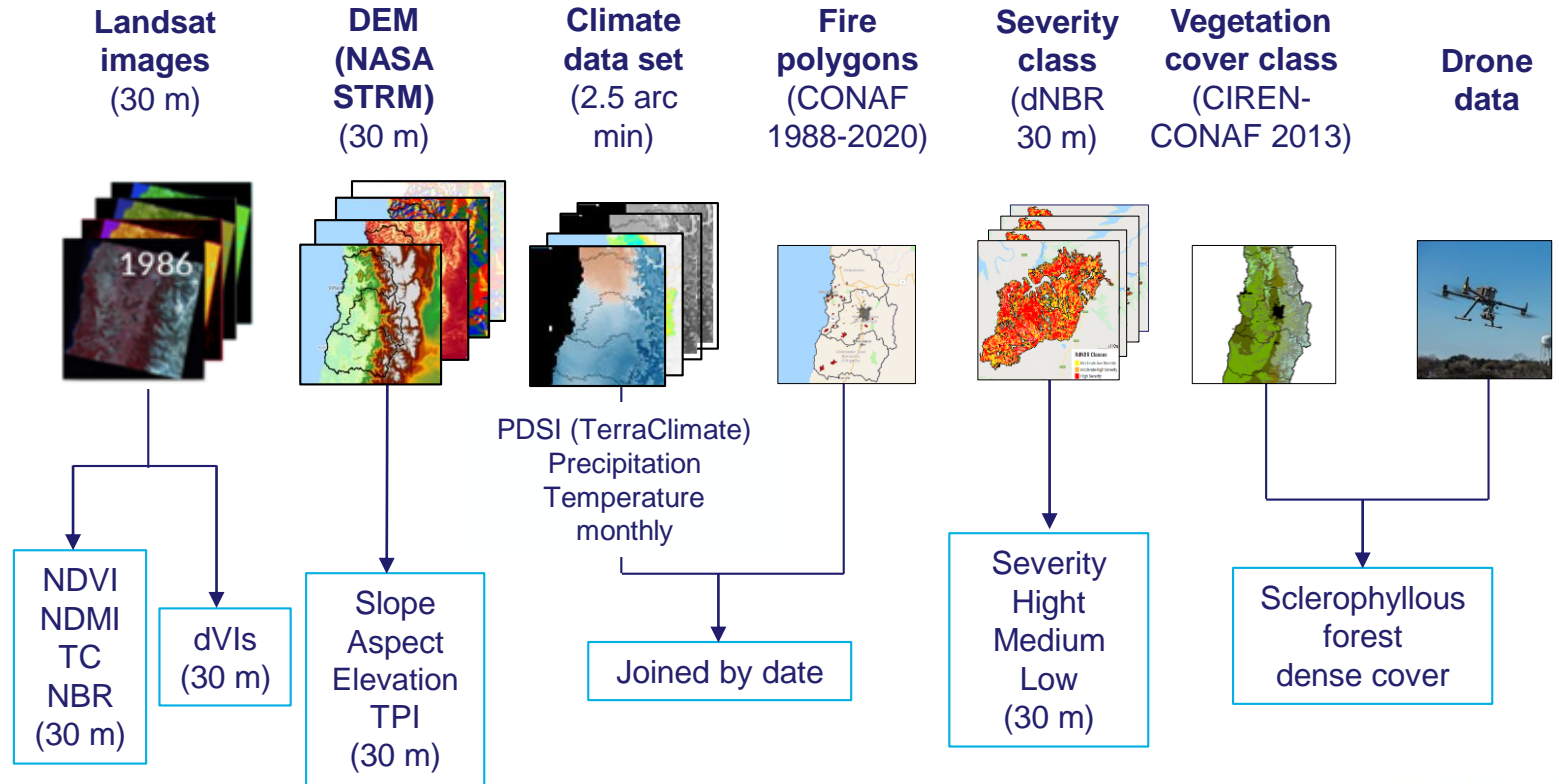
- Poorly monitored regions.

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(Garreaud et al., 2020).

MATERIAL & METHODS

- Satellite and climate data
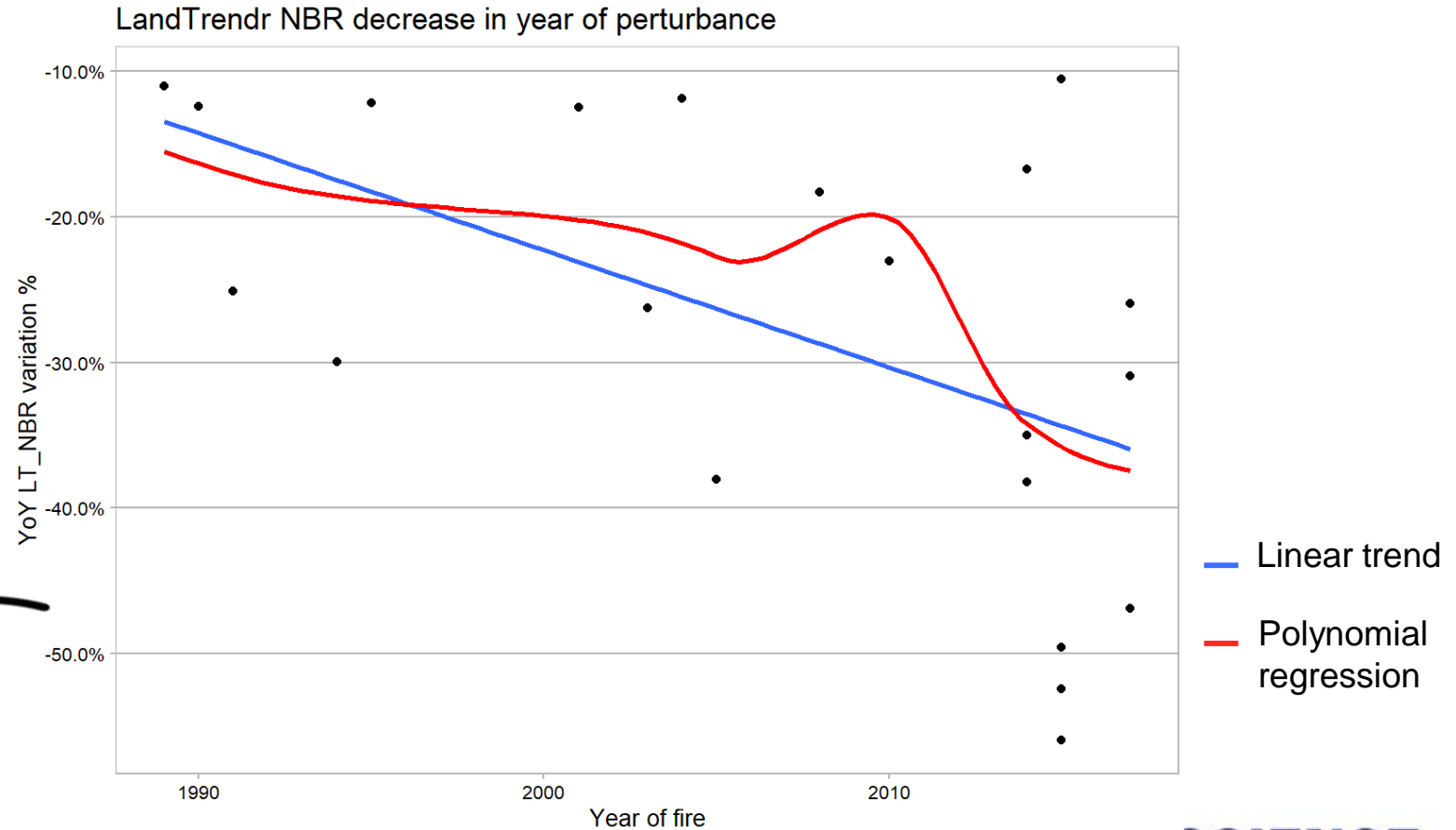- Field data
- Trend analysis
- Driver analysis (model)

Landsat images (30 m)

DEM (NASA STRM) (30 m)

Climate data set (2.5 arc min)

Fire polygons (CONAF 1988-2020)

Severity class (dNBR 30 m)

Vegetation cover class (CIREN-CONAF 2013)

Drone data

PDSI (TerraClimate)
Precipitation
Temperature
monthly

NDVI
NDMI
TC
NBR
(30 m)

dVIs
(30 m)

Slope
Aspect
Elevation
TPI
(30 m)

Joined by date

Severity
Hight
Medium
Low
(30 m)

Sclerophyllous
forest
dense cover

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RESULT

Fires LT-NBR

NBR value dropped as a percentage in the year the fire occurred compared to its previous value

LandTrendr NBR decrease in year of perturbance

The loess regression, it seems that the drop in NBR values were grater or more severe in the years with drought, after 2010.

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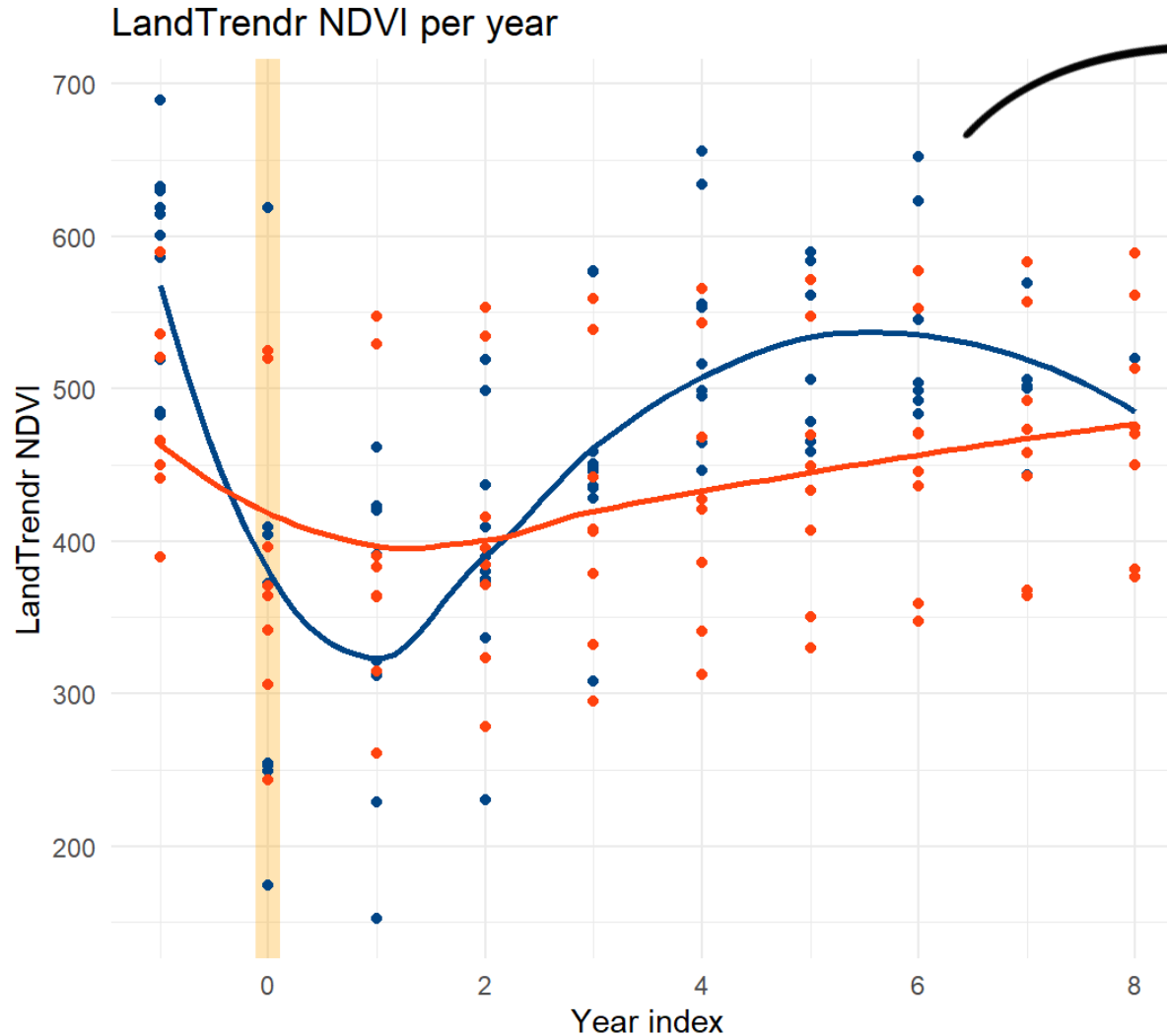SCIENCE is SOCIETY

RESULT

NDVI Recovery

Aligned every disturbance, in this case fires, to the same year scale from -1 to 8.

LandTrendr NDVI per year

DROUGHT

The level of recovery doesn't completely reach the NDVI levels from before the disturbance, it even seems to decrease in the last years as the drought became more severe.
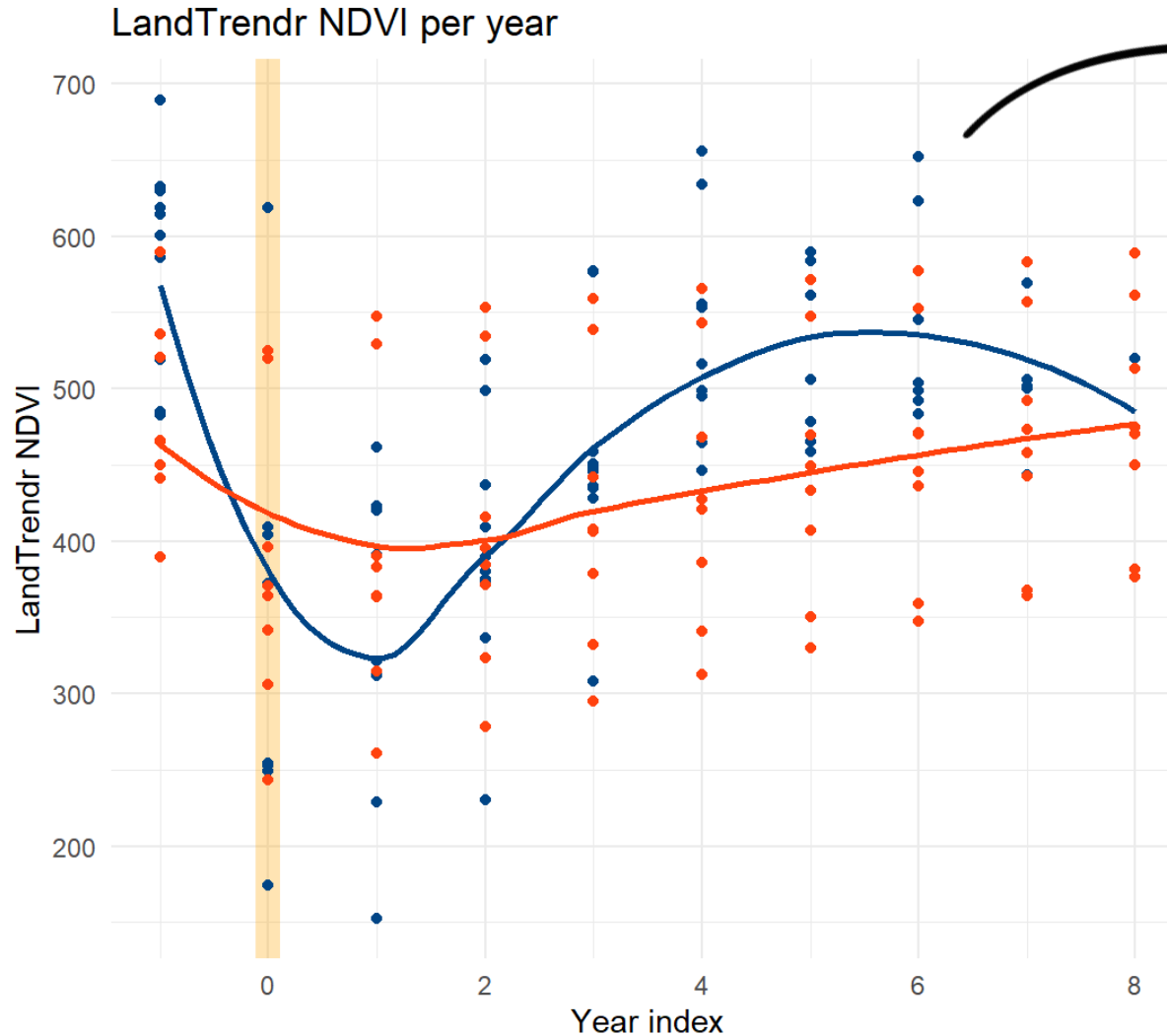
Fire year groups

— Drought (after 2010)

— Non drought (before 2010)

7

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RESULT

NDVI Recovery

Aligned every disturbance, in this case fires, to the same year scale from -1 to 8.

LandTrendr NDVI per year

Fire year groups
- Drought (after 2010)
- Non drought (before 2010)

NON DROUGHT

Show more extended periods to recovery but they reach a point where the value of the NDVI returns to the levels prior to the fire.

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GO FOWARD

- We will take a deeper look into the samples. We will include more variables to the model like spectral indices associated with humidity, topographic and climate variables.
  - each fire
  - between fires

- Validate some points in the field, which were delayed due to the pandemic.

NDVI(+4&8 Yfire) ~ Dvi + Slope + Aspect + Elevation + TPI + PDSIpre + PDSI post + mean air temperature + mean precipitation + NDVI(preDr)

INSIGHTS

- We feel confident that we can use time series data and detection algorithm in this case LandTrend inputs to provide relevant information for this analysis.

- Remote sensing offer various opportunities to generate valuable inputs for the monitoring of ecosystems and to support the country's commitments to safeguard the natural assets, mainly associated with Sustainable Development Goals.

- Even though our results are inconclusive so far, we believe it is possible to identify potential new fire regimes and forest recovery based on climate change condition.

- This research can contribute to the monitoring of the forest status of large areas of forest for climate and ecologically intelligent decision making.

THANK YOU

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