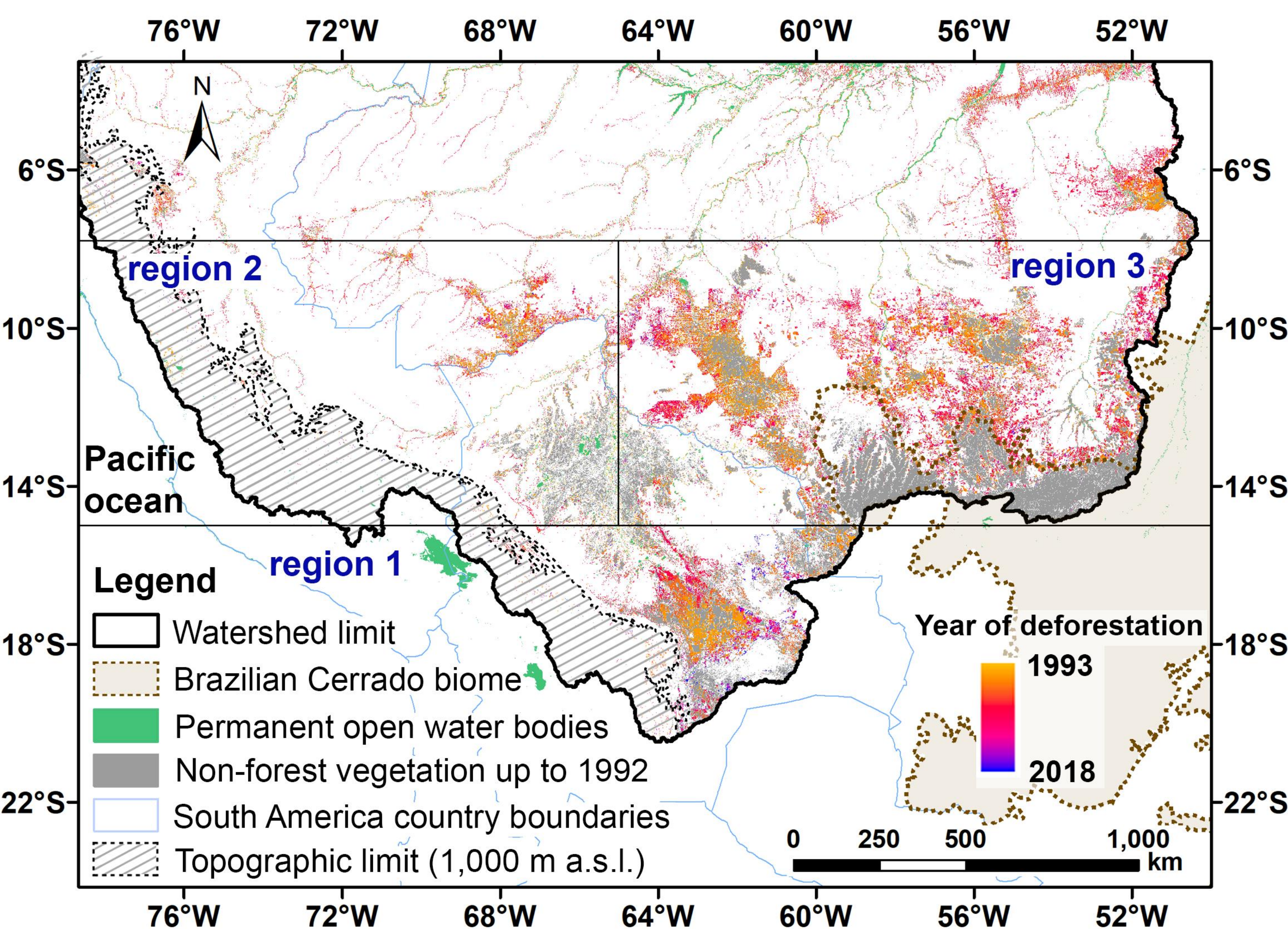


## 1. Introduction

- The **loss of the tropical forest** is frequently related to changes in the hydrological cycle. However, how these relationships, from local to regional scales, occur throughout the Amazon rainforest remain under debate.
- Large evidences support **the coupling between forest lost in the Amazonia and changes in key variables of the hydrological cycle**. However, most of these studies are spatially limited (i.e. using in-situ stations mostly limited to the Brazilian Amazon).
- In this research we assess statistical approaches to investigate the relations between changes in forest cover and hydroclimate processes from local to regional scales in the **southern Amazon Basin** (South of 8°S) over a relative long-term period.

## 2. Study area

- Three regions of analysis** are selected by considering geographical, climate and deforestation characteristics.
- They belong to the Southern region of the Bolivian Amazon (region 1), the Southwestern Amazon (which covers the Southern Peruvian Amazon and the Northwest Bolivian Amazon) (region 2) and the Southern Brazilian and Northeast Bolivian Amazon (region 3)



## Acknowledgments

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## 3. Data and methods

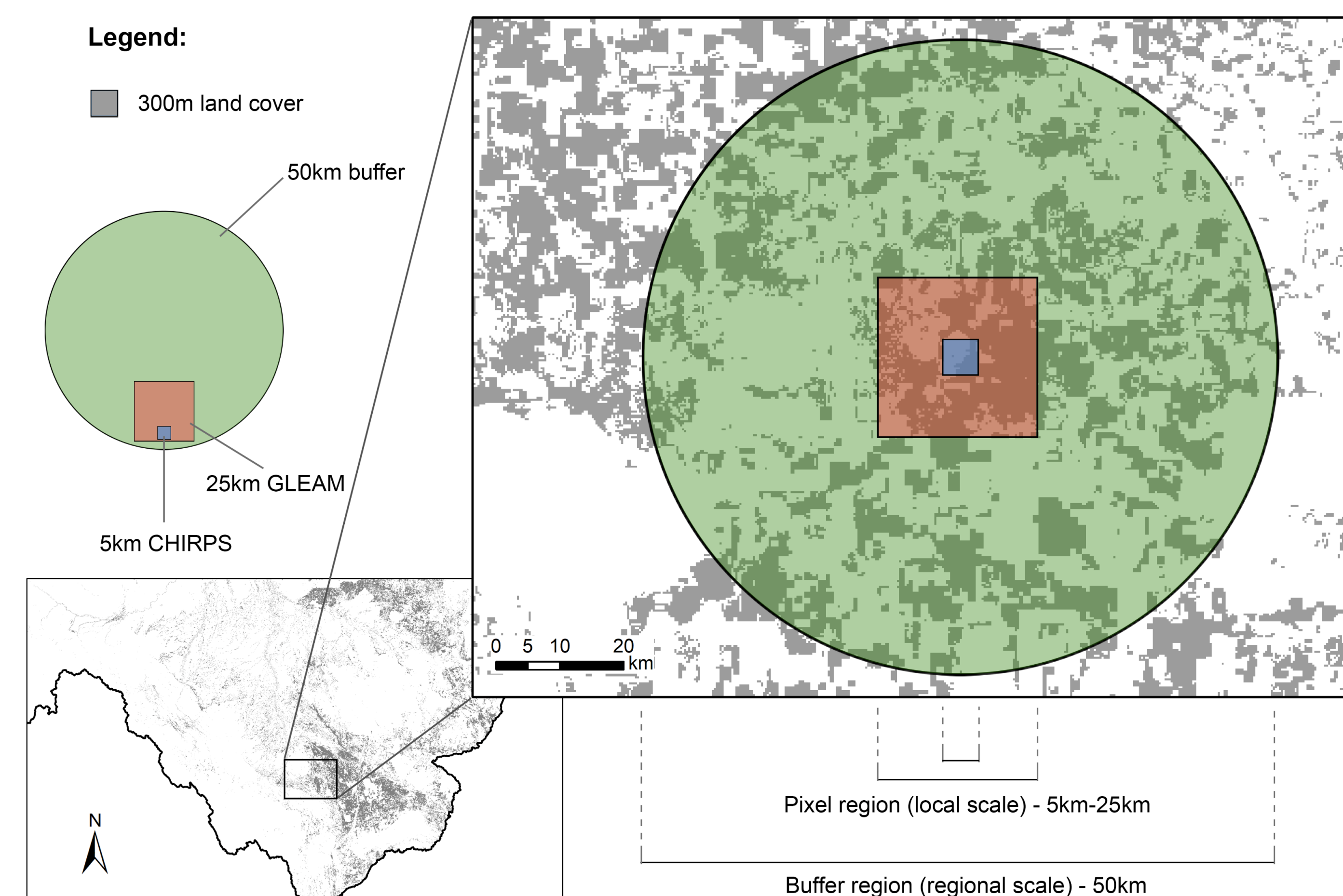
### 3.1. Datasets

- Hydroclimatic variables such as **precipitation (P)**, **potential and actual evapotranspiration (PET and AET, respectively)** are analyzed.
- We analyzed total amounts of P and P intensity (i.e. the dry day frequency (DDF,  $P < 1\text{mm/day}$ ) and wet day frequency (WDF,  $P > 10\text{mm/day}$ )) from CHIRPS (Funk et al., 2015) and total amounts of PET and AET from GLEAM (Martens et al. 2017) for the **1981-2018** period.
- We used the **yearly land cover (LC) maps** for the 1992-2018 period at 300m resolution from ESA-CCI (ESA, 2017).

	Short name	Institution	Data source(s)	Temporal coverage	Spatial resolution
P	CHIRPS v2	CHG	Gauge, satellite	1981/01 - 2018/12	0.05° x 0.05°
PET and AET	GLEAM v3	ICDC	Model, reanalysis	1981/01 - 2018/12	0.25° x 0.25°
Land Use maps cover	CCI	ESA	Satellite	1992/01 - 2018/12	300m x 300m

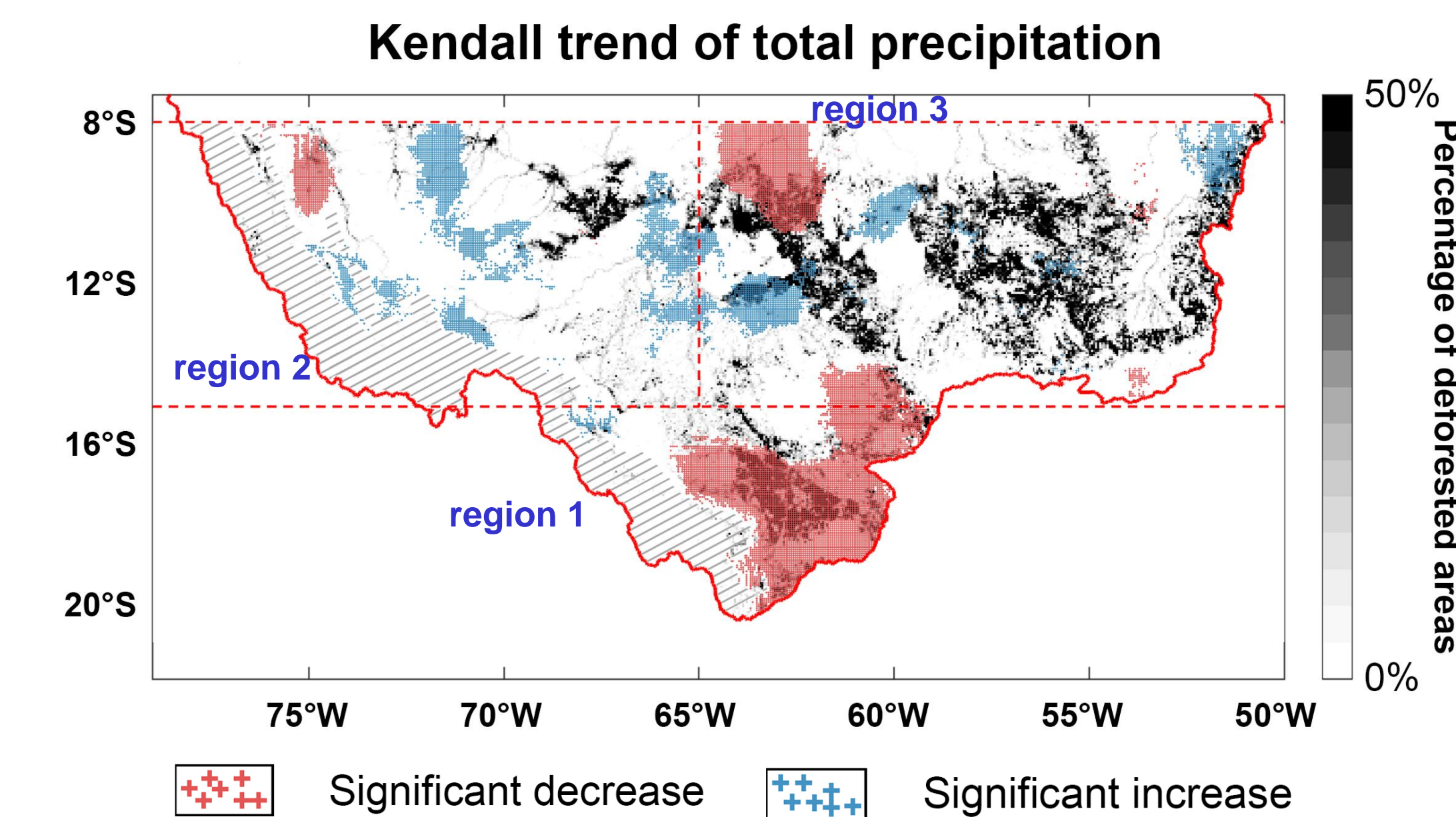
### 3.2. Deforestation and buffer approach

- The deforestation is defined as the **stand-replacement disturbance of tree cover canopy** (complete removal of tree cover canopy at each pixel) (Hansen et al. 2013).
- The ratio of the deforested area was based on the concept of **buffer zones**, similar to Debortoli et al. (2015).
- Therefore, the forest loss rate within a buffer zone for the total period (**regional forest loss rate, "RFL"**) and for decadal periods (**regional non-forest vegetation, "RNF"**).

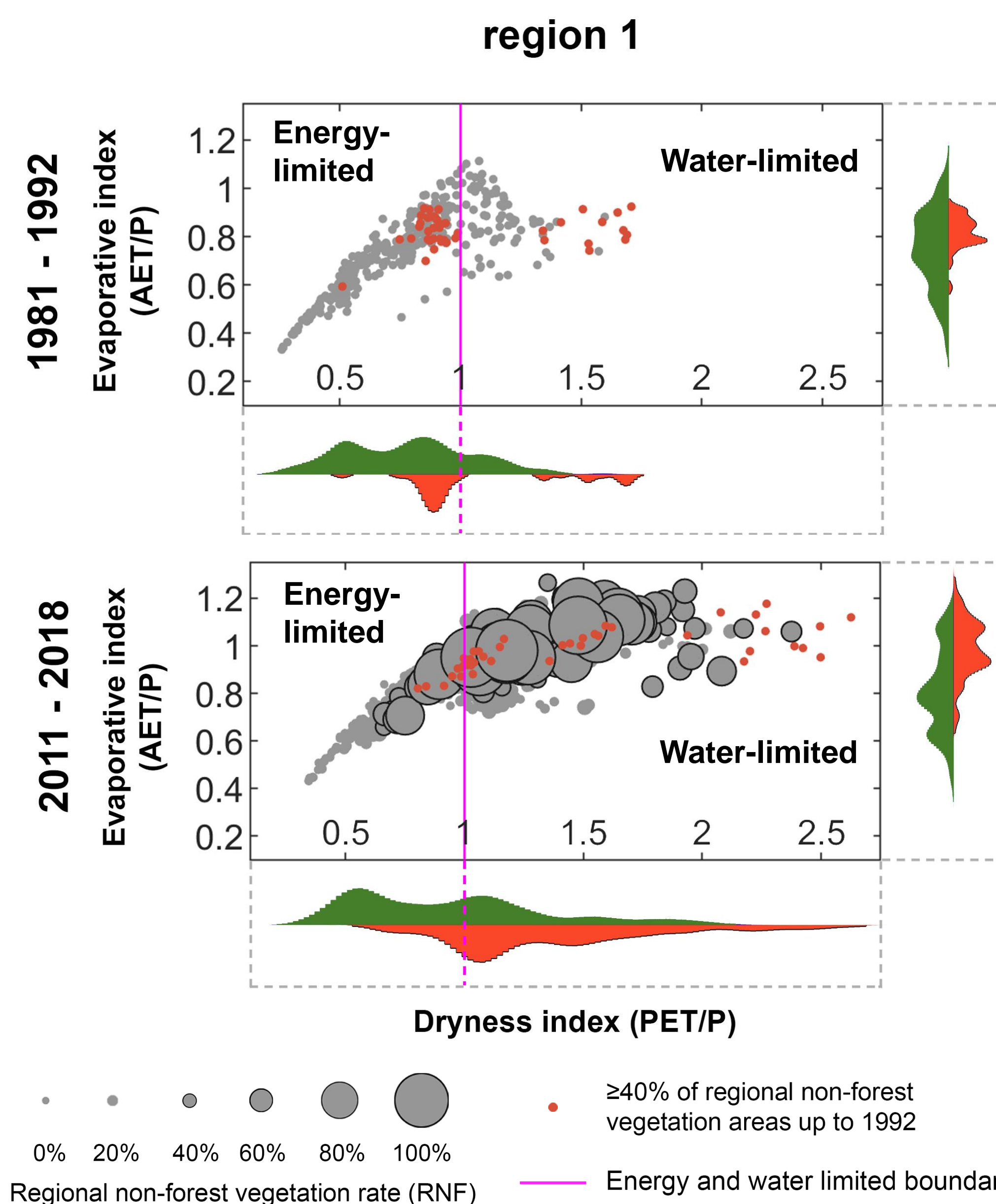


## 4. Results

- In the Southern Bolivian Amazon (south of 15°S), there is a significant relation between **rainfall decrease** and RFL above 30-40%.



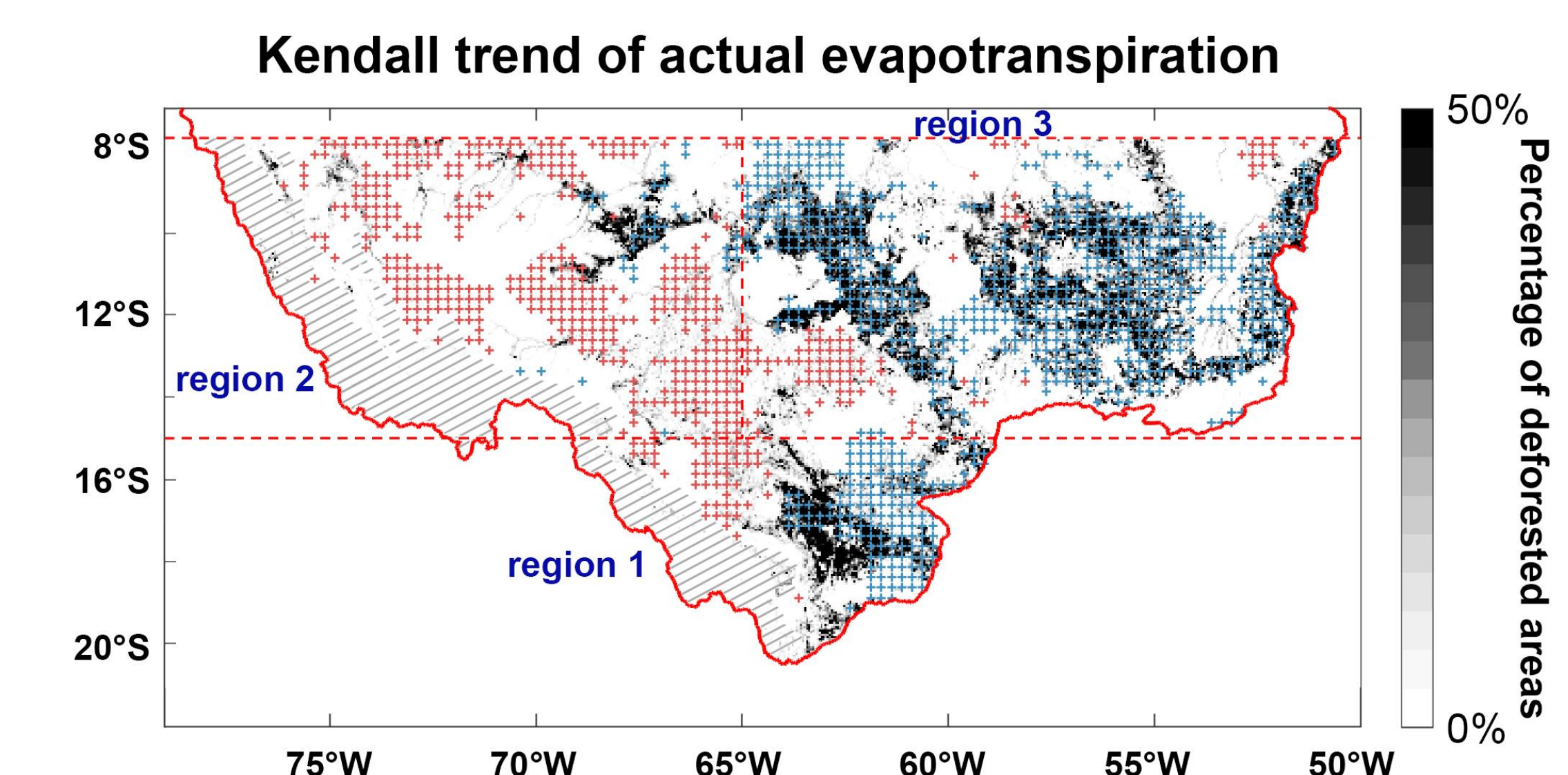
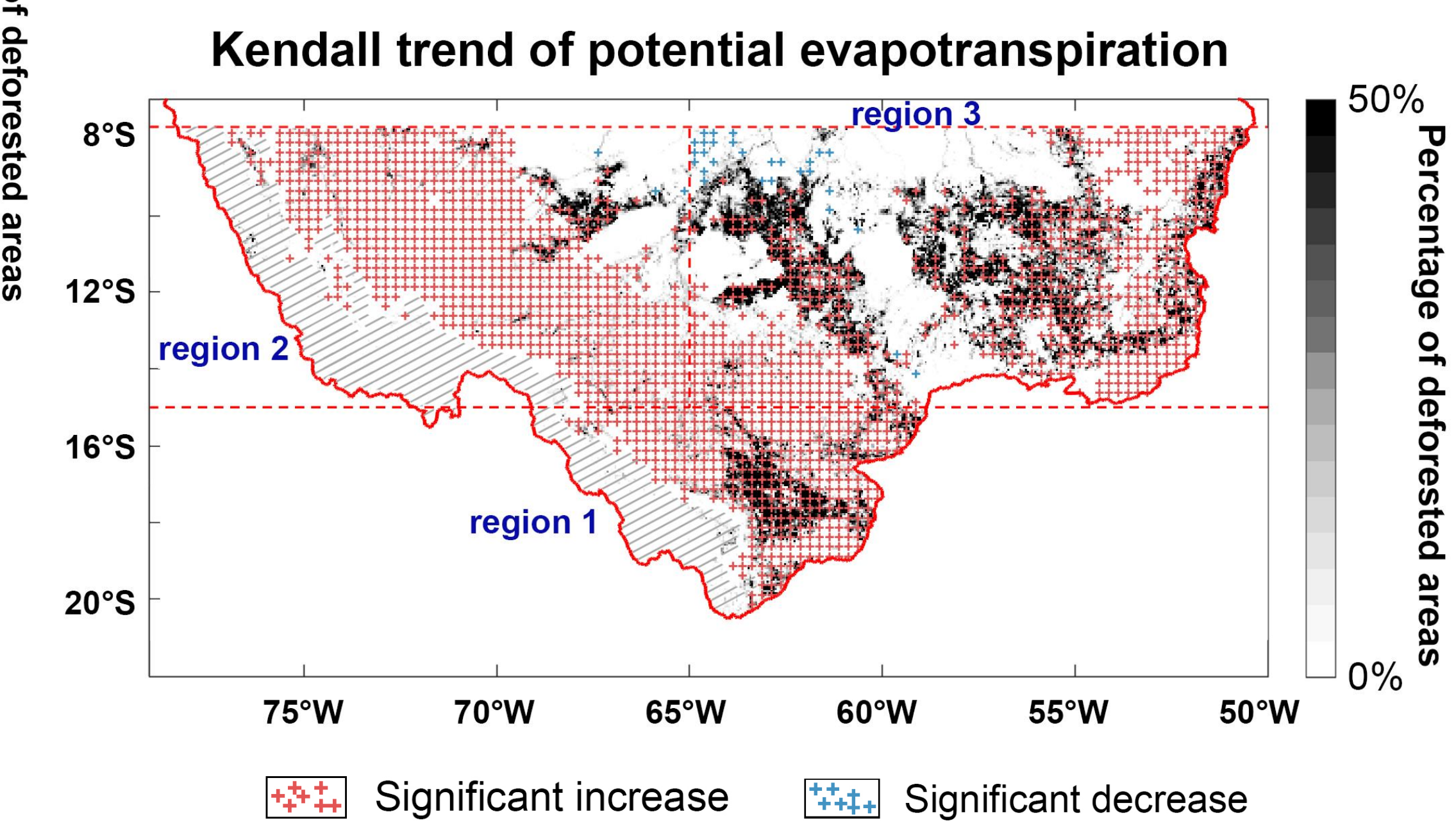
- Vegetation in the **Southern Bolivian Amazon** shows a tendency to become **water-limited** in association with rainfall diminution over the last four decades.



## References

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- The **increase of potential evapotranspiration is a general pattern in the western Amazon**, whereas it is also directly related to higher RFL areas.
- Besides, the **decrease of actual evapotranspiration is systematically related with higher RFL**, as observed in the 'Arc of Deforestation' area.



## 5. Conclusions

- Relations between forest loss and climate **vary considerably depending on the location** (e.g. Southern Amazon rainforest as a whole, Southern Bolivian Amazon or just the Arc of Deforestation zone).
- Additionally, in the Southern Bolivian Amazon, **hydroclimatic changes imply a future risk** for areas that are not still highly deforested and tend to become water-limited zones.