# Determining extent and flowering rhythm of Amazonian bamboo forests from satellite time series

Jasper Van doninck[1], Jan Westerholm[2], Kalle Ruokolainen[3], Hanna Tuomisto[3], Risto Kalliola[1]
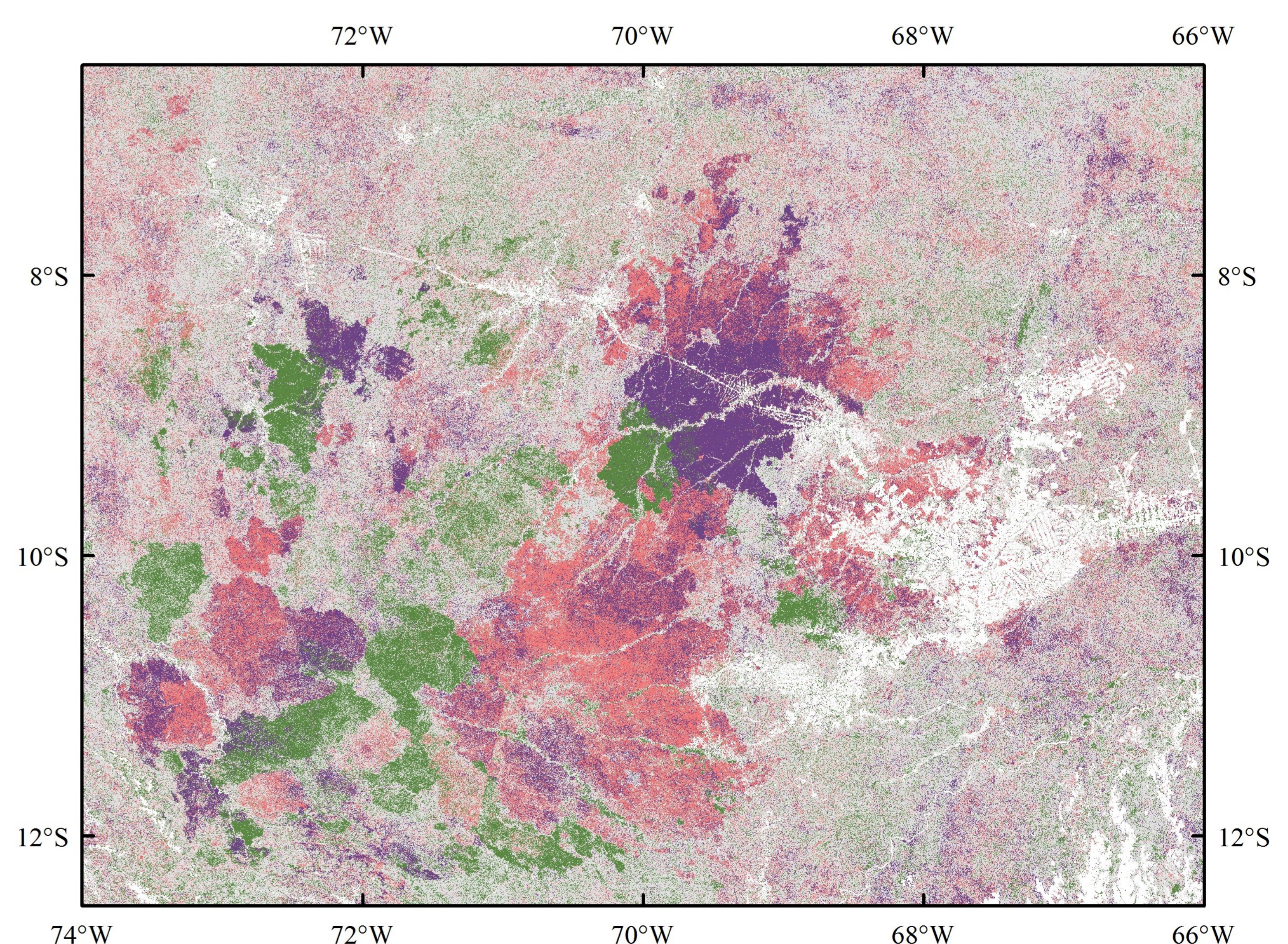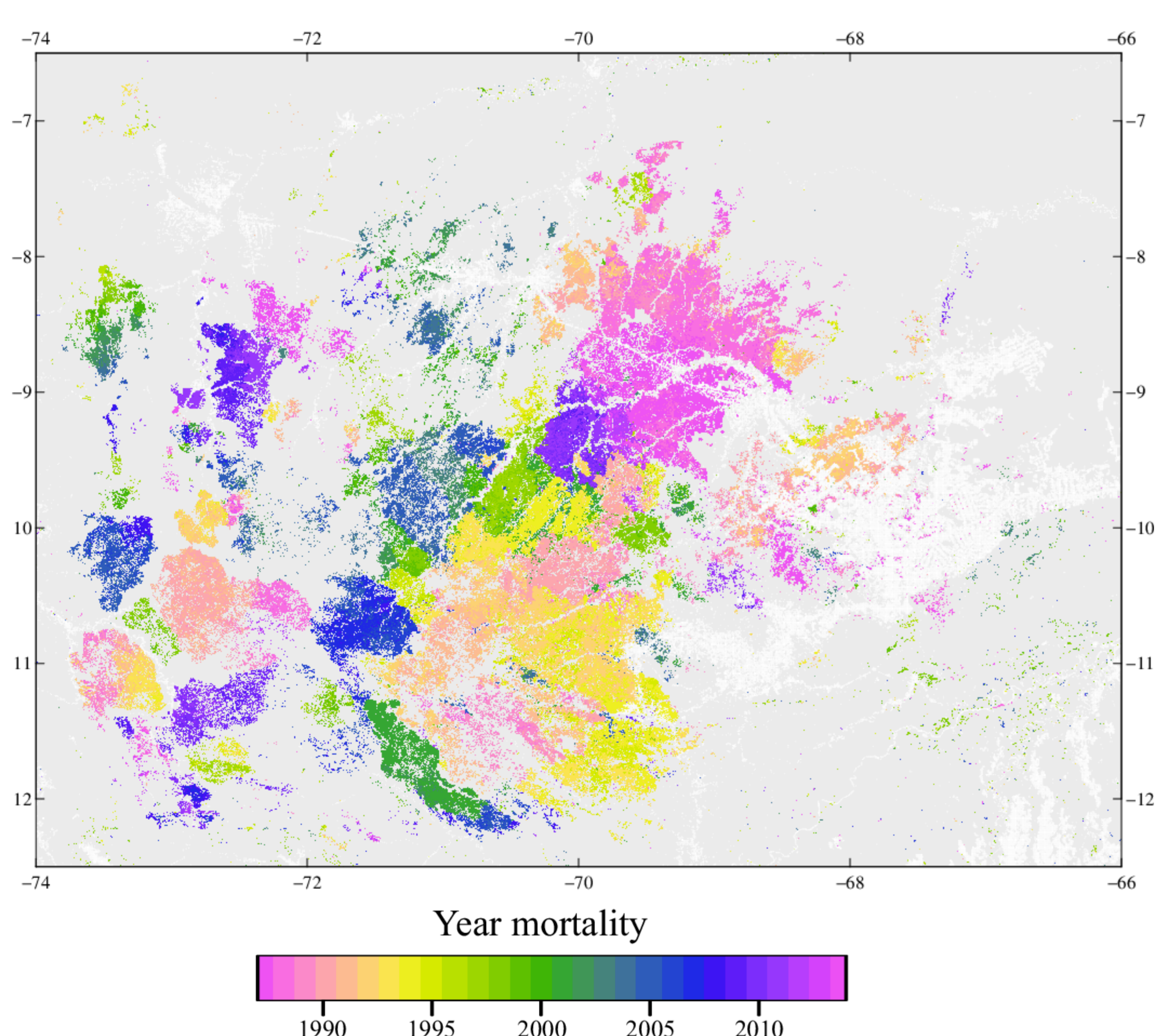
## Amazonian Bamboo forests

Tropical forests dominated by bamboos (*Guadua spp.*) cover an area of approximately 180.000 km² in southwestern Amazonia. *Guadua* bamboos form patches, measuring up to several tens of kilometers in diameter. Bamboo populations simultaneously grow, flower, fruit and finally die (right), after which this 28-year cycle is repeated. Until now, little is known about the spatial distribution of bamboo-dominated forests, or about how the different bamboo population are synchronized relative to each other.
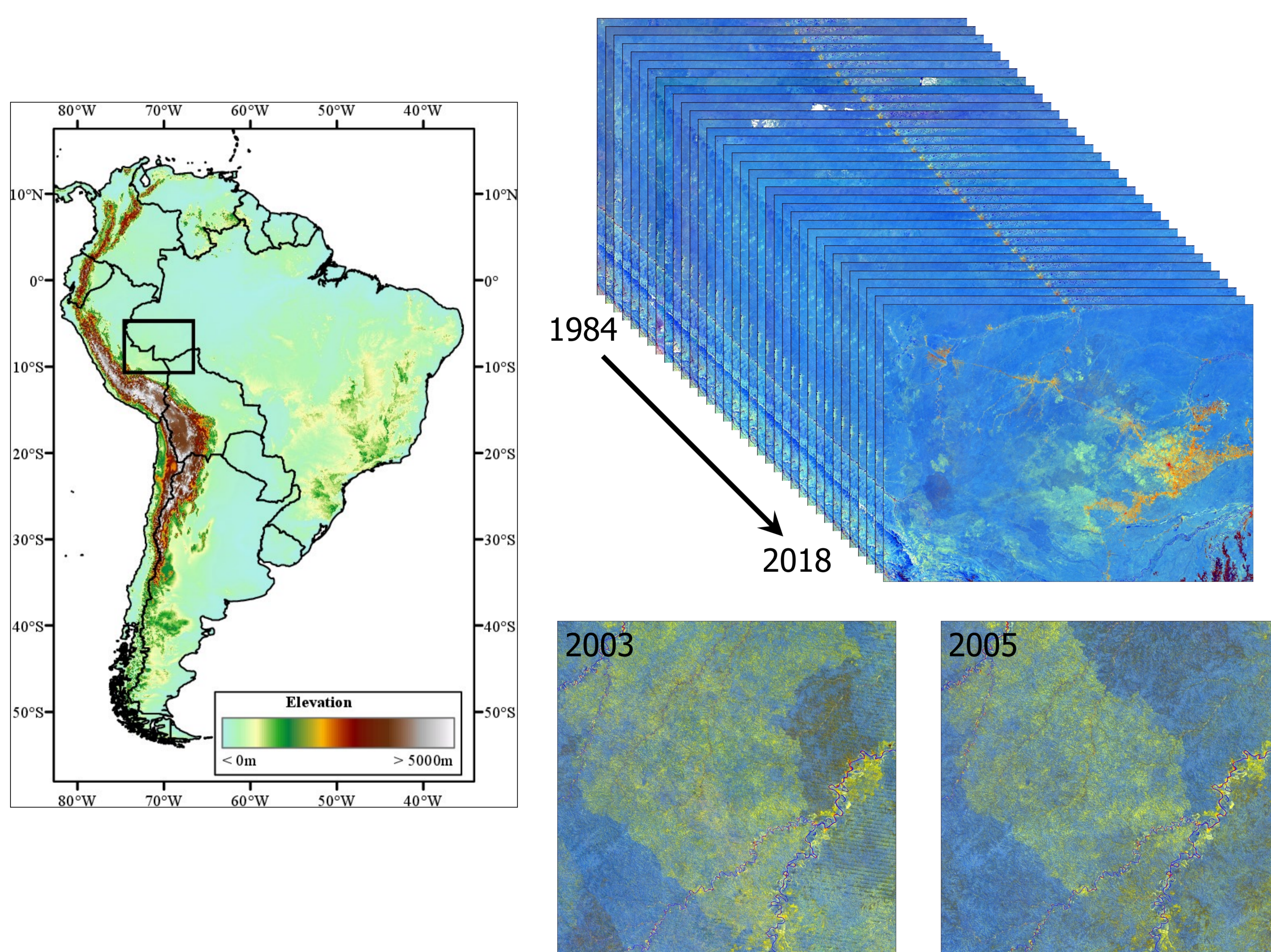


## Methods and results

We compiled a time series of 35 yearly composite images over the area from all data in the Landsat TM/ETM+ archive (left). Forests dominated by mature bamboo show up as yellow in these false-colour composites, due to their high reflectance in the infrared, against the blue shades of canopies without bamboos and deforested areas in orange. The extent of the bamboo-dominated forests was estimated using unsupervised clustering based on Dynamic Time Warping (below, right). The flowering and mortality rhythm was independently determined using a pixel-based time series analysis (below, left). Results show for the first time the spatiality of the synchronously timed *Guadua* patches over the entire bamboo area in Amazonia at high (30m) spatial resolution.





Year mortality

**UNIVERSITY OF TURKU**

**Åbo Akademi**