

1 Analysis of critical transitions at the Global Forest

2 the idea is to do a global analysis using early warning signals of ecological transitions [1]

3 Thus the question is how near/far is the global forest from a catastrophic transition?

4 We will use the MODIS vegetation continuous field, so we can analyze temporal changes.

- 5 • Hypothesis: two power laws, small patches related to deforestation dynamics, large patches related to
6 forest inner dynamics.

7 Methods

- 8 • The United Nations' International Geosphere-Biosphere Programme definition of forest (Belward 1996)
9 defined forest as pixels with tree cover equal or greater than 30%
- 10 • We should define areas with different levels of degradation to apply the spatial indicators [Very difficult
11 because is not possible to establish reliable controls]
- 12 • We should use 2D DFT and multifractals in continuous data and fit patch size distributions in discretized
13 data.[Not implemented]
- 14 • Rates of growth and shrink of patches [2]
- 15 • Portfolio concept relating [2] and [4]

Results

South America

Table 1: Model selection using Akaike criterion, and goodness of fit calculated by bootstrap.

year	xmin	model_name	par1	par2	delta_AICc	GOFp
2000	1	Power	1.918	NA	0	1
		PowerExp	1.918	3.36e-11	2.019	NA
		LogNorm	1.151	1.631	683753	NA
		Exp	0.003986	NA	7511320	NA
2010		Power	1.833	NA	0	1
		PowerExp	1.831	2.233e-10	6.217	NA
		LogNorm	1.266	1.653	577578	NA
		Exp	0.003998	NA	6827242	NA
2000	265	Power	2.013	NA	0	1
		LogNorm	-1532	39.04	2.261	NA
		PowerExp	2.003	1.38e-13	2.688	NA
		Exp	0.0005124	NA	139893	NA
2010	216	Power	2.021	NA	0	1
		PowerExp	2.015	6.11e-12	2.312	NA
		LogNorm	-1228	34.87	2.548	NA
		Exp	0.0005397	NA	150593	NA

- The α with Estimated Xmin correspond to big forest patches and natural forest dynamics, and there is no variation in these. The α with xmin=1 correspond to small patches probably influenced by deforestation.

Related papers

- About fitting power laws [5] [6]
- About global maps [7] [8] [9]

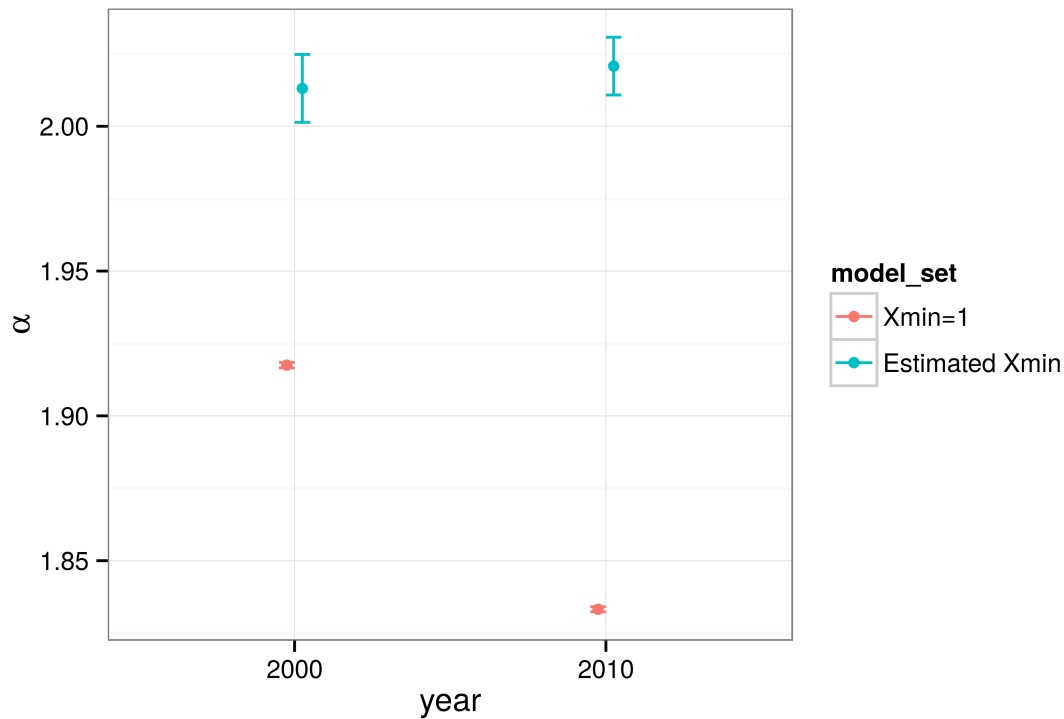


Figure 1: Power law exponent by year and with different starting point: $x_{min}=1$ the minimum patches size was fixed at 1, *Estimated Xmin* the minimum patch size was estimated from data.

- About cluster statistics

[10] [2]

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