Fire interactions with climate, deforestation and forest fragmentation in Colombia

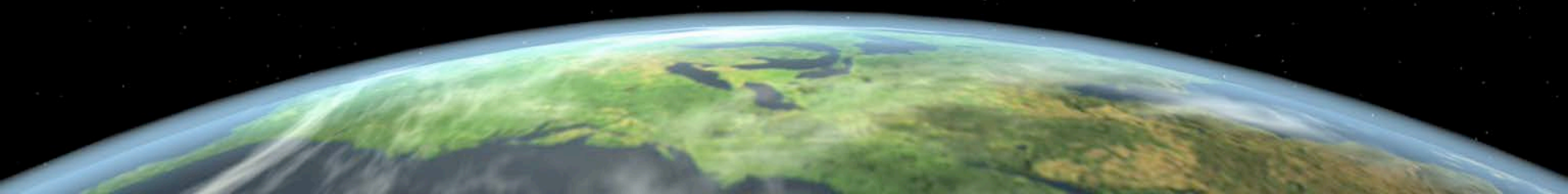
Dolors Armenteras MSc, PhD

ECOLMOD - Landscape Ecology and Ecosystem Modelling

Departamento de Biología

Sede Bogotá

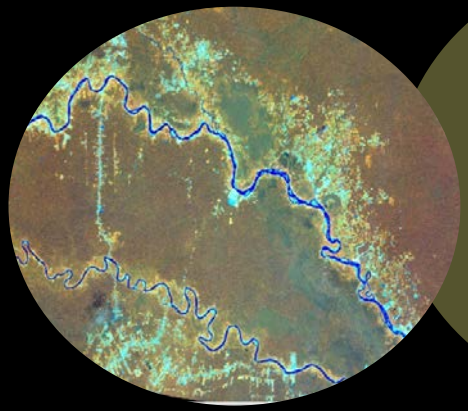
Universidad Nacional de Colombia



Teaching and Research

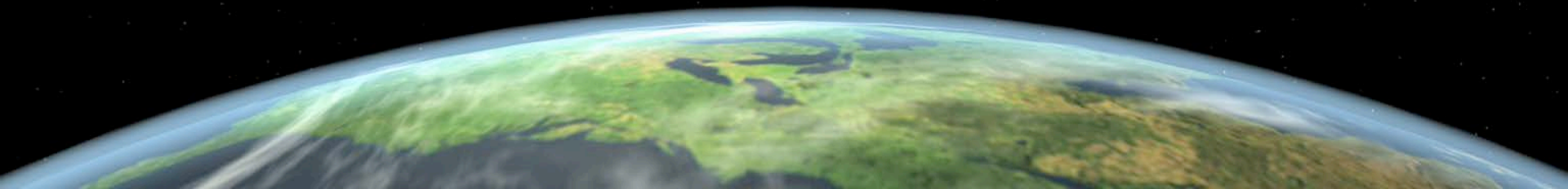
Biodiversity & Conservation

Fire geography and ecology

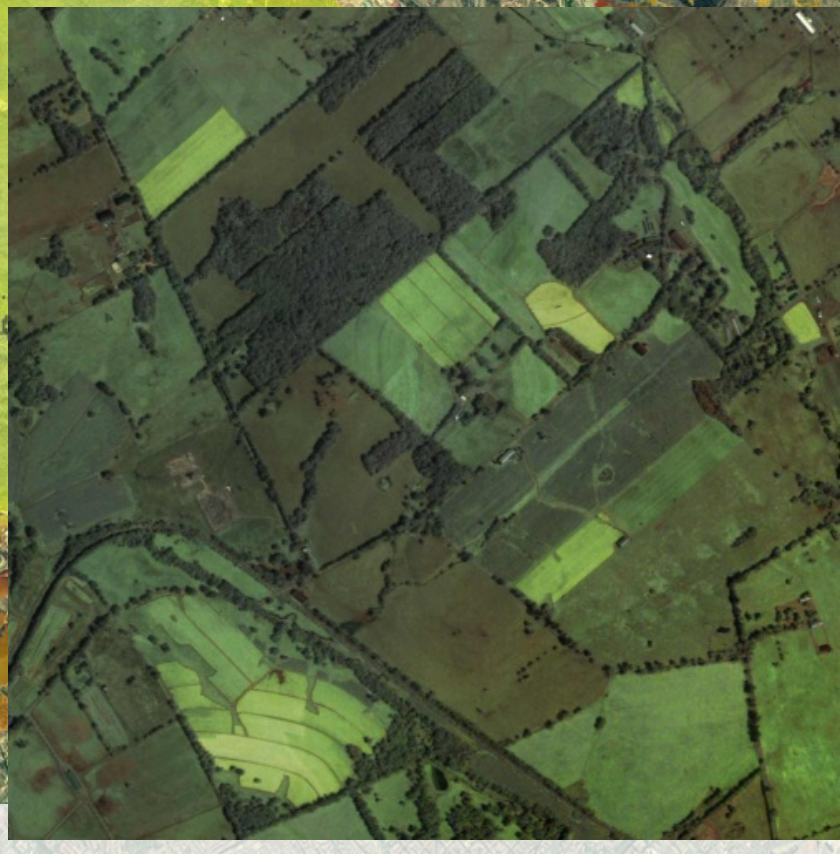


Spatial Modelling

Land Use Deforestation Fragmentation



Deforestation, land use, fragmetnation



Deforestatiom Fragmentation and Fire dynamics

First deforestation.. Need to know...

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Biological Conservation 113 (2003) 245–256

BIOLOGICAL CONSERVATION

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Andean forest fragmentation and the representativeness of protected natural areas in the eastern Andes, Colombia

D. Armenteras*, F. Gast, H. Villareal

Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Calle 37#8-40 Mezzanine, Bogotá, Colombia

Received 1 May 2002; received in revised form 20 October 2002; accepted 8 November 2002

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Ecological Indicators 6 (2006) 353–368

ECOLOGICAL INDICATORS

This article is also available online at:
www.elsevier.com/locate/ecolind

Patterns and causes of deforestation in the Colombian Amazon

Dolors Armenteras [a,b,*], Guillermo Rudas [c], Nelly Rodriguez [a], Sonia Sua [a], Milton Romero [a]

Biological Conservation 142 (2009) 1411–1419

Contents lists available at ScienceDirect

Biological Conservation

journal homepage: www.elsevier.com/locate/biocon

Are conservation strategies effective in avoiding the deforestation of the Colombian Guyana Shield?

Dolors Armenteras [a,b,*], Nelly Rodríguez [b,c], Javier Retana [c]

Reg Environ Change (2011) 11:693–705
DOI 10.1007/s10113-010-0200-y

ORIGINAL ARTICLE

Understanding deforestation in montane and lowland forests of the Colombian Andes

Dolors Armenteras · Nelly Rodríguez · Javier Retana · Mónica Morales

Reg Environ Change
DOI 10.1007/s10113-013-0433-7

ORIGINAL ARTICLE

National and regional determinants of tropical deforestation in Colombia

Dolors Armenteras · Edersson Cabrera · Nelly Rodríguez · Javier Retana

Scenarios

Journal of Land Use Science, 2013
Vol. 8, No. 2, 154–174, http://dx.doi.org/10.1080/1747423X.2011.650228

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Land use and land cover change in the Colombian Andes: dynamics and future scenarios

Nelly Rodríguez Eraso[a,b], Dolors Armenteras-Pascual[b]* and Javier Retana Alumbreros[a]

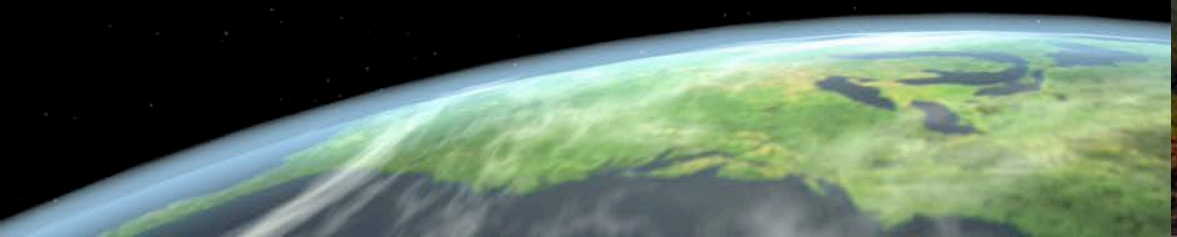
[a]*Centre for Ecological Research and Forestry Applications (CREAF) and Unit of Ecology, Autonomous University of Barcelona, Barcelona, Spain;* [b]*Department of Biology, Colombia National University, Bogotá, Colombia*

(*Received 2 March 2011; final version received 13 December 2011*)

Land use and land cover changes (LUCC) are recognized as one of the most relevant drivers of biodiversity loss in ecosystems. Through the analysis of satellite images, this article quantifies the LUCC that occurred between 1985 and 2008 in the Colombian Andes. Four submodels of changes were analyzed: deforestation, crop intensification, conversion to pastures, and abandonment. We associated these changes with demo-

Fire in the tropics

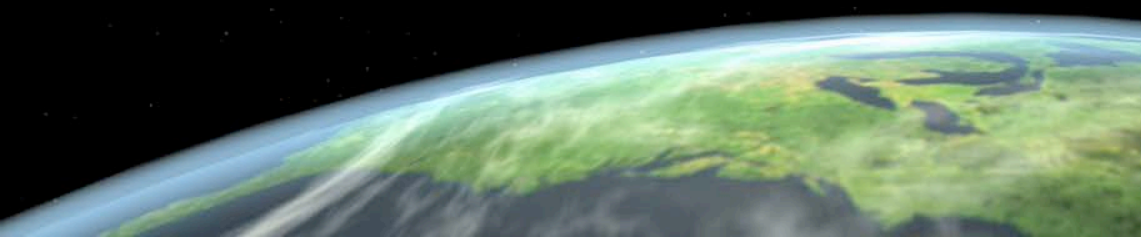
- 1/3 terrestrial surface
- 40% of forest
- 35-40% of the world´s population
- Last decades in the tropical zone:
  - larger fires, million ha burnt
  - $$$



impacts

- Effects at the ecosystem level
  - Changes in composition and structure
  - Biodiversity (fauna)
  - Ecos Services (biomass, C storage, regulation, etc)

- Emissions
  - 7.5-70 Mg C/ha per year



La apertura de vías afecta la integridad del bosque, incluyendo la de la fauna que alberga.

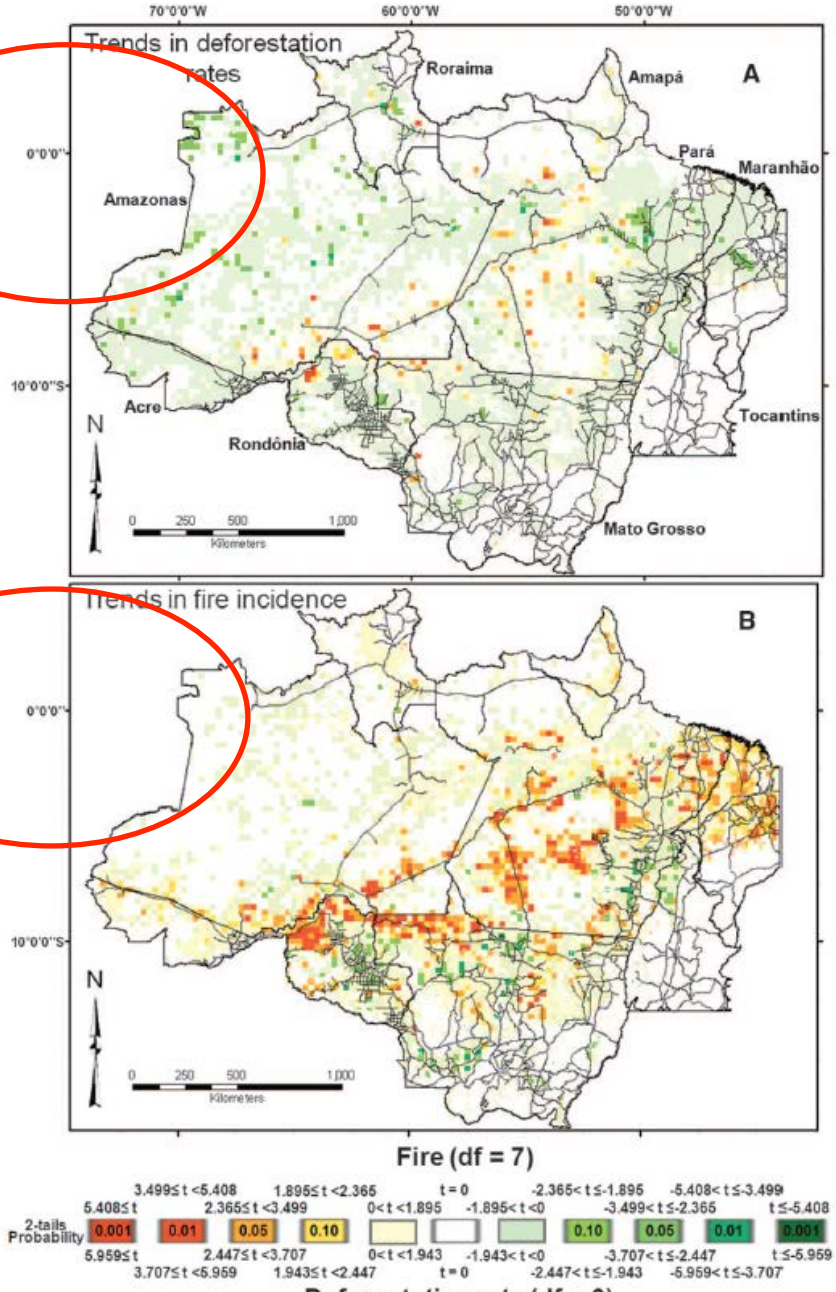


Fig. 1. Maps showing the significance of the trend regression slopes based on the two-tailed Student's *t* distribution for changes in (**A**) deforestation rates and (**B**) fire incidence over the time periods analyzed. From yellow to red, slopes are positive, which indicates an increase in deforestation rates or fire incidence. From light to dark green, slopes are negative, which indicates a reduction in deforestation rates or fire

Aragao et al 2010

Climate-Fire-Deforestation Amazonia

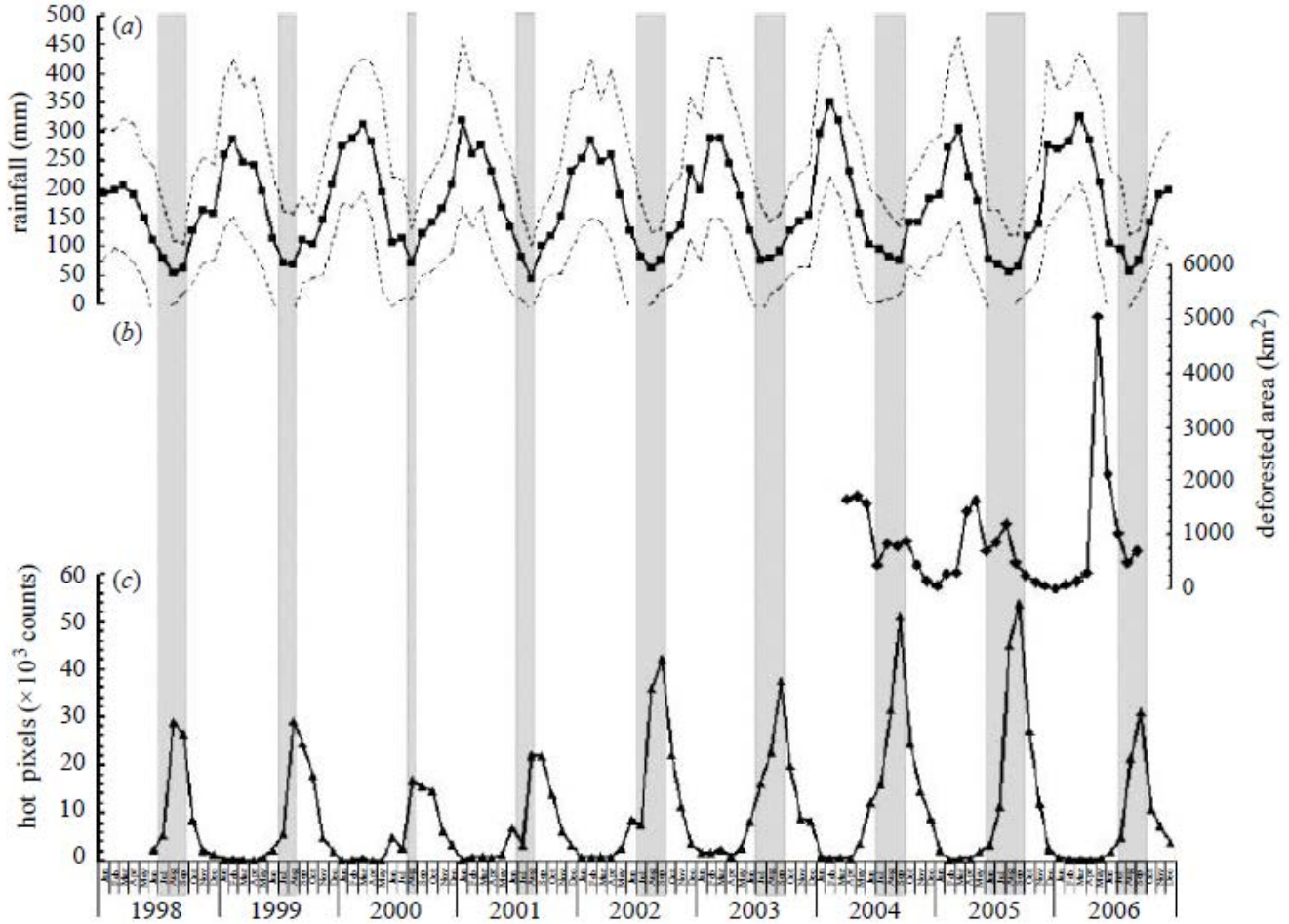


Figure 1. Monthly time series of (*a*) mean rainfall (mm) derived from the TRMM dataset (January 1998–December 2006), (*b*) cumulative deforested area (km^2) from the INPE-DETER dataset (April 2004–September 2006) and (*c*) cumulative number of hot pixel detections from NOAA-12 dataset (May 1998–December 2006) within the limits of the Brazilian Legal Amazonia. Dashed lines in (*a*) correspond to the s.d. of the mean monthly rainfall ($n = 6705$ pixels). Grey bars indicate the dry season length for each year (months with rainfall below 100 mm month^{-1}).

Aragao et al 2007

Quantifying fire In Colomb

395,644 ha
±377,000 ha

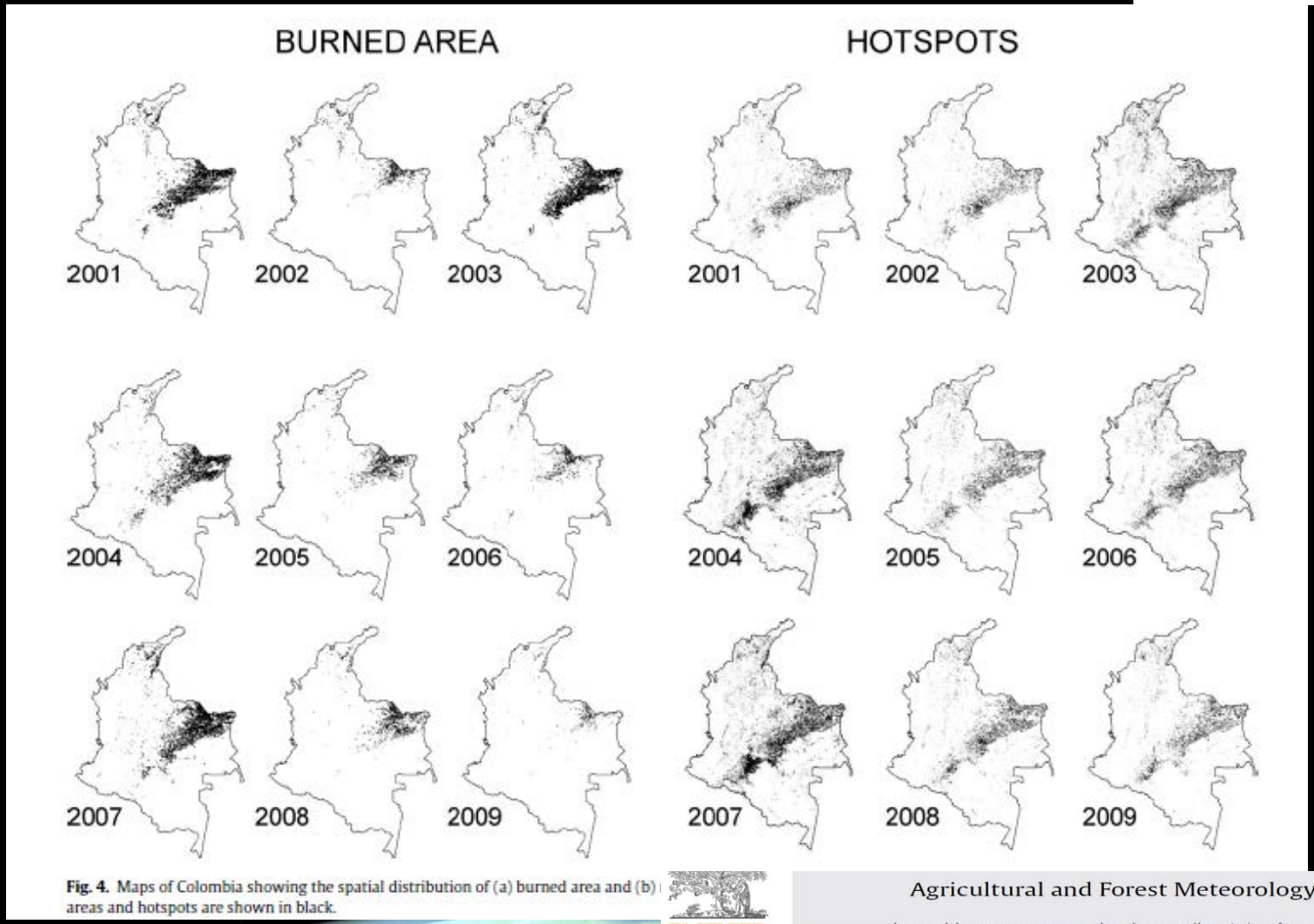


Fig. 4. Maps of Colombia showing the spatial distribution of (a) burned area and (b) areas and hotspots are shown in black.

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Characterising fire spatial pattern interactions with climate and vegetation in Colombia

Dolors Armenteras-Pascual[a,*], Javier Retana-Alumbreros[b], Roberto Molowny-Horas[b], Rosa María Roman-Cuesta[b], Federico Gonzalez-Alonso[c], Mónica Morales-Rivas[a]

In Colombia ???

Fire and climate

Agricultural and Forest Meteorology

journal homepage: www.elsevier.com/locate/agrformet

Characterising fire spatial pattern interactions with climate and vegetation in Colombia

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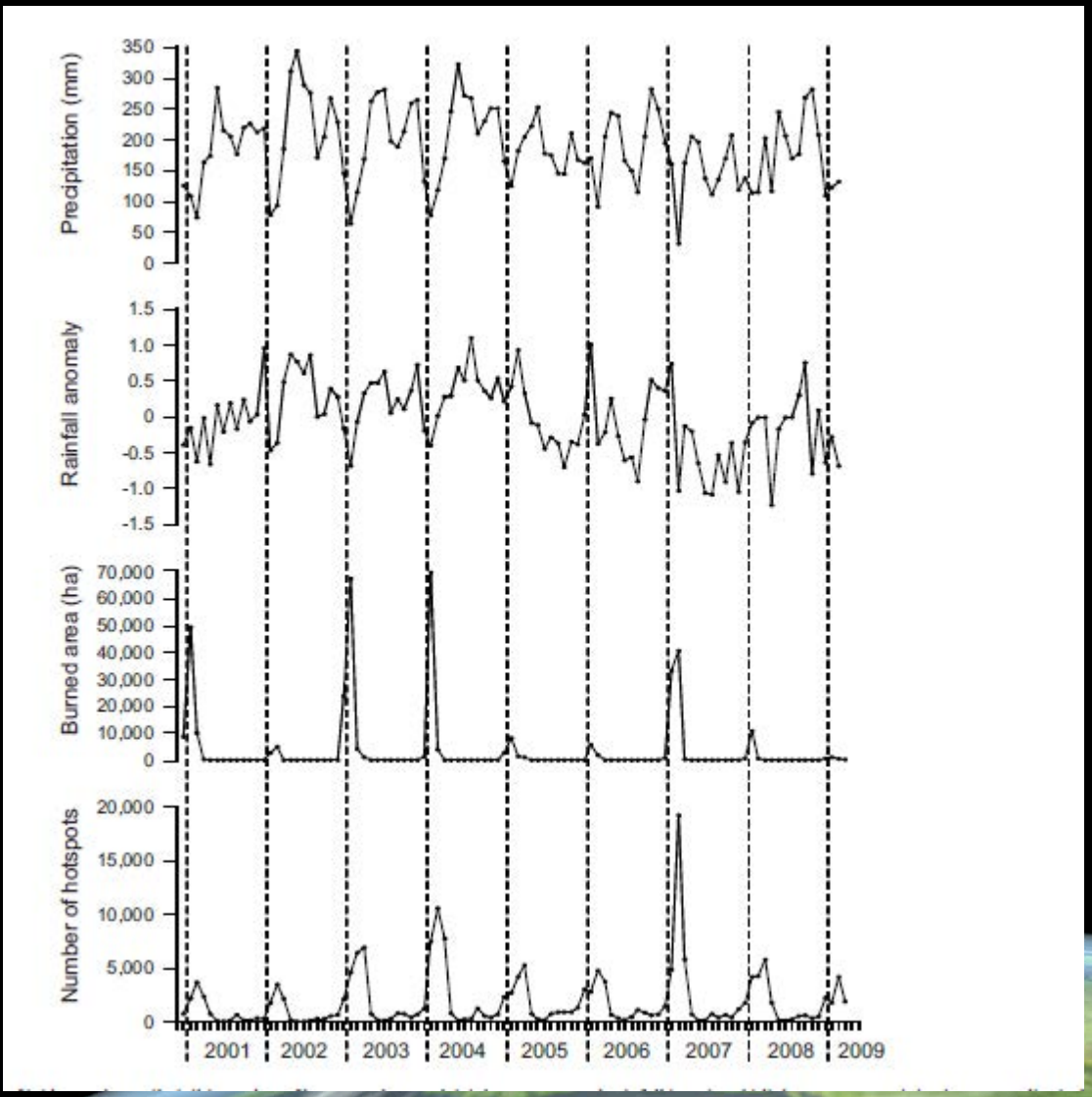
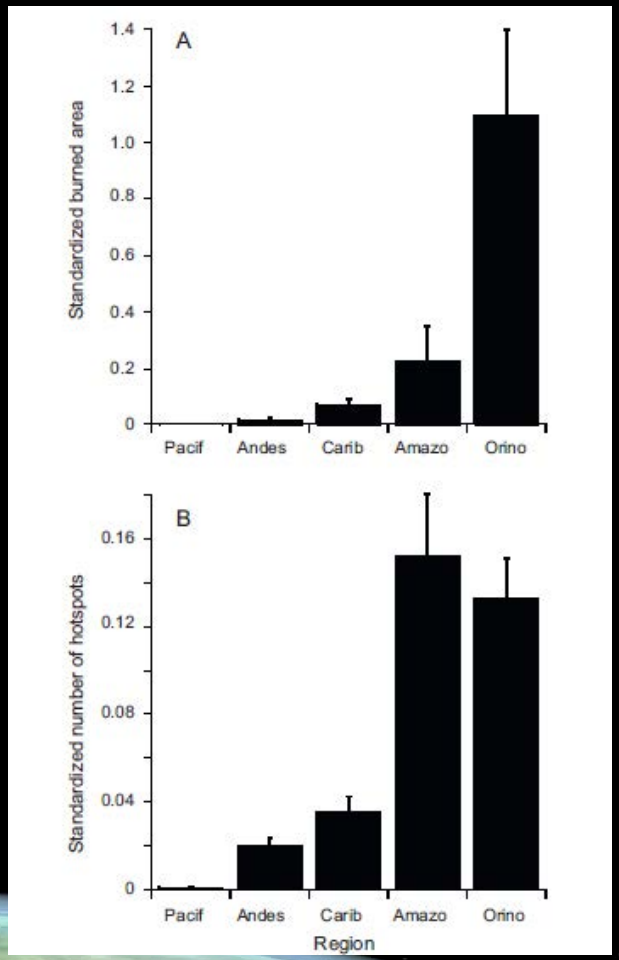
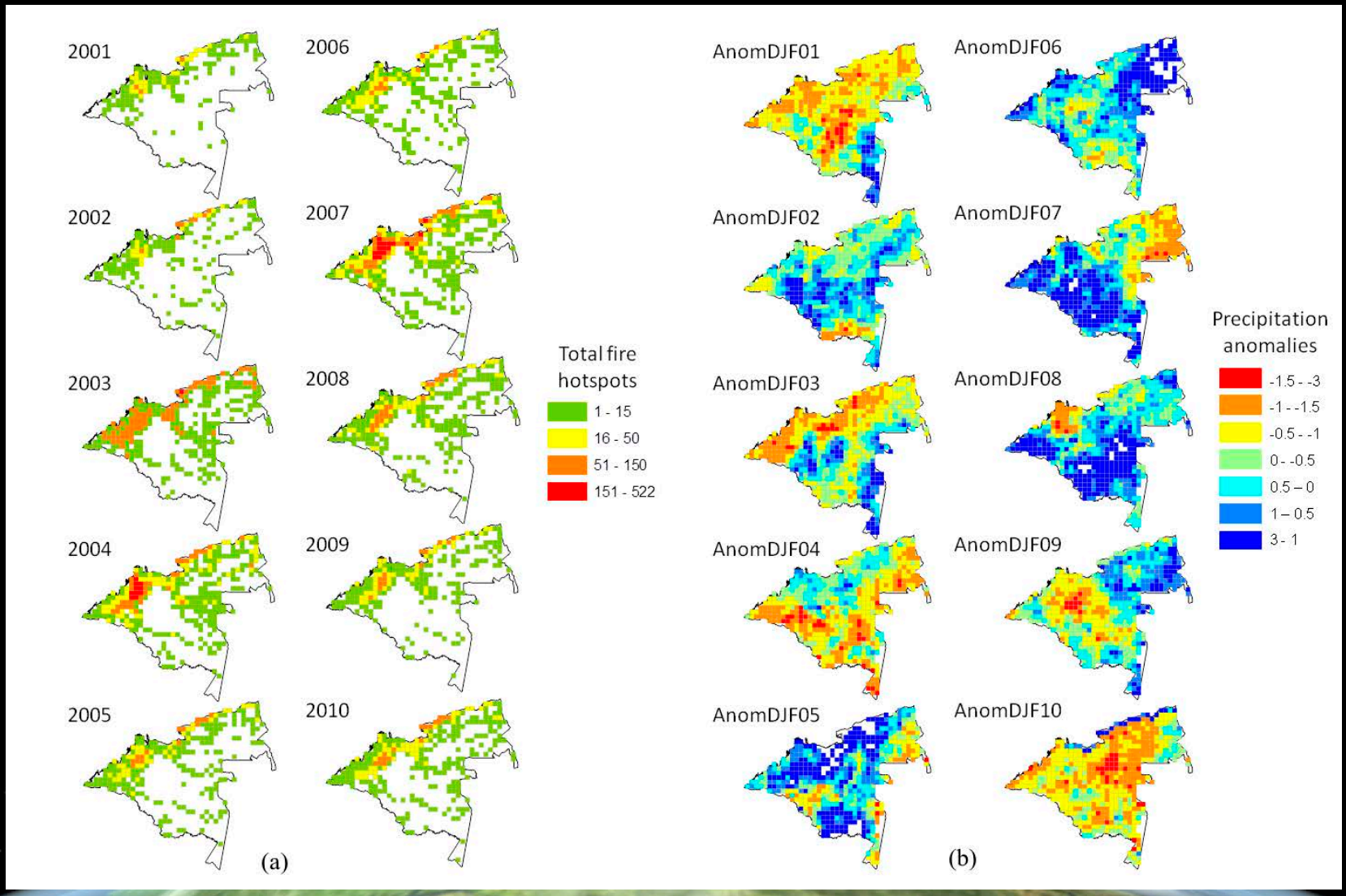


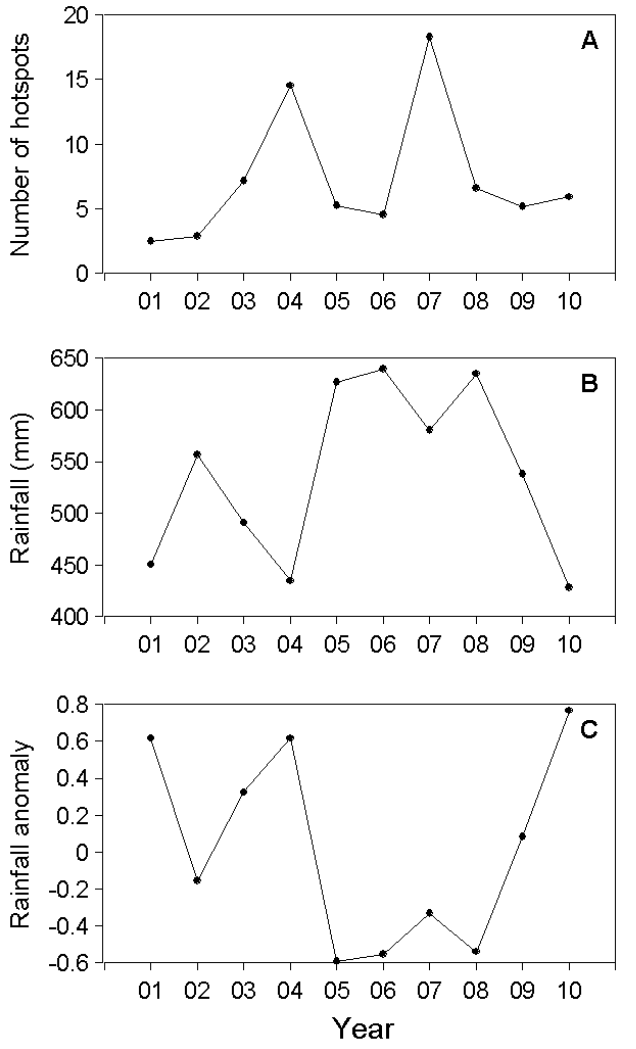


Amazonia en Colombia…

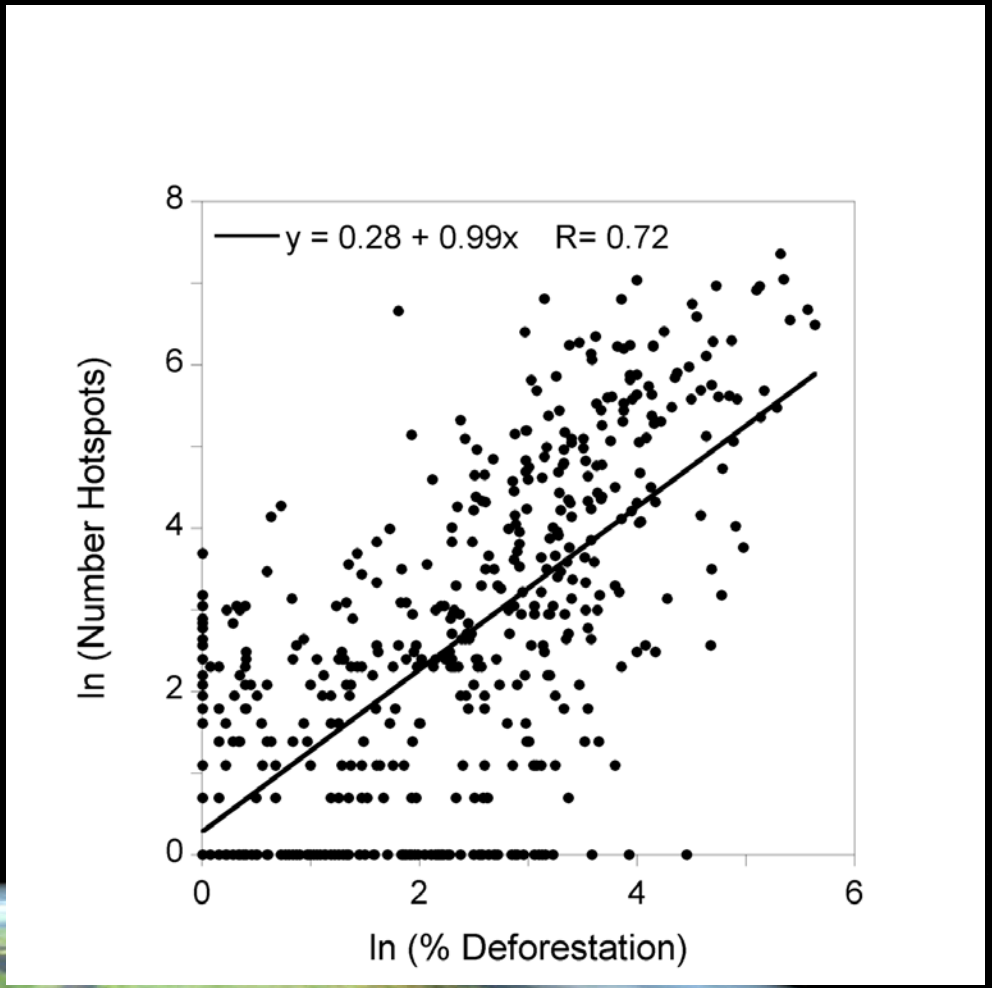


Armenteras & Retana (2012)

Def and fire

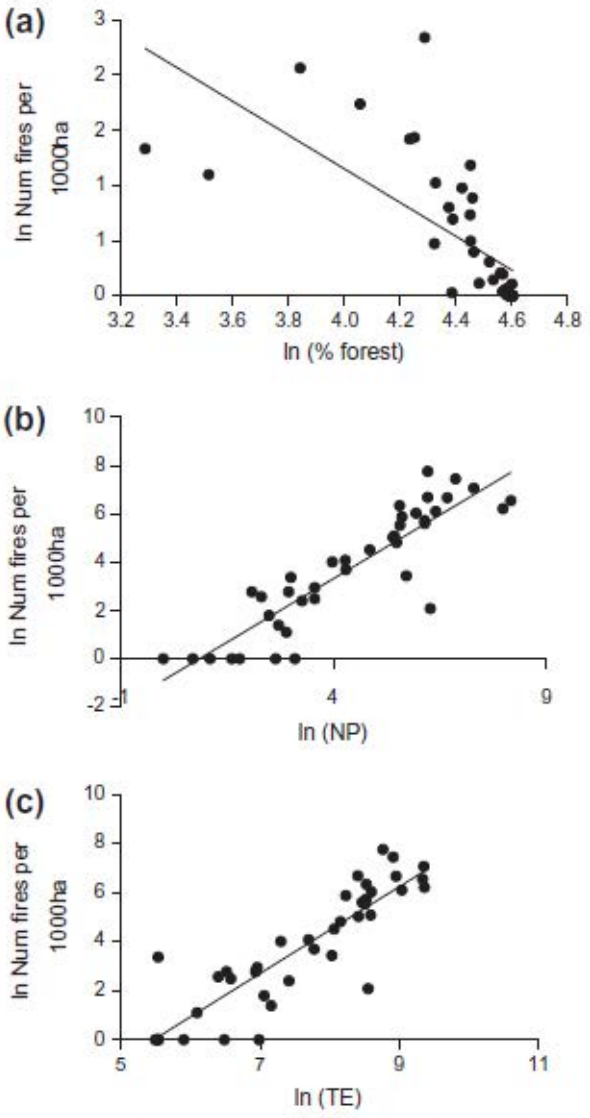


High correlation with anthropogenic activities
% pastures (Rho = 0.76, p,0.001, N= 580),
Population (Rho = 0.25, p,0.001, N= 580)
% crops(Rho = 0.17,p,0.001, N= 580).



Armenteras & Retana, PlosOne 2012

Fragmentation



g. 2. Relationship between the number of fires between 2005 and 2011 and rest fragmentation variables (% forest, Number of patches or NP, Total Edge or NW Amazonia. $N = 40$ quadrats.

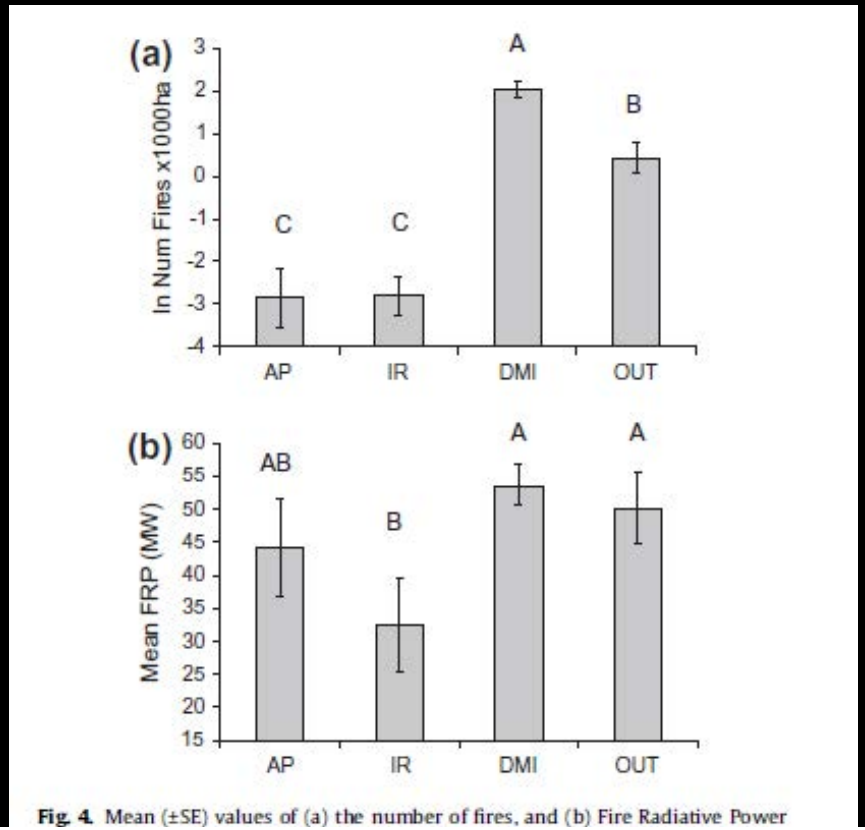


Fig. 4. Mean (±SE) values of (a) the number of fires, and (b) Fire Radiative Power

Biological Conservation 159 (2013) 73–79

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Biological Conservation

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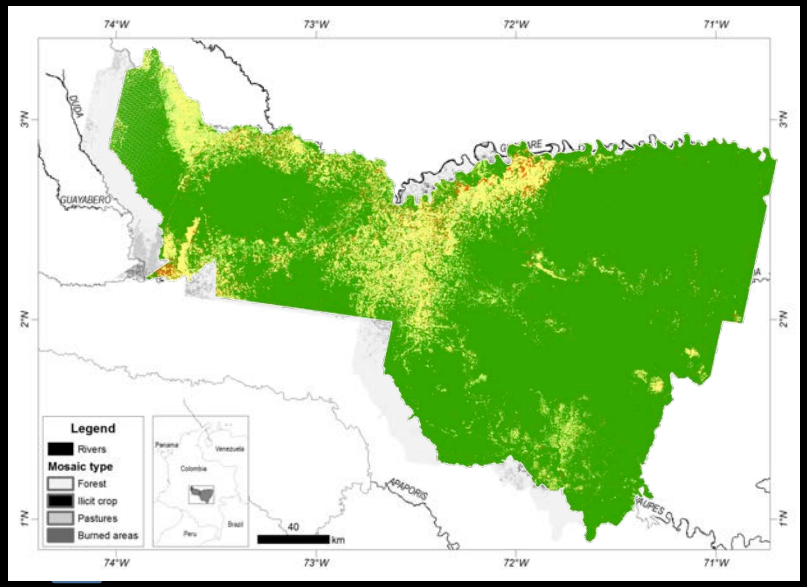
Forest fragmentation and edge influence on fire occurrence and intensity under different management types in Amazon forests

Dolors Armenteras [a,*], Tania Marisol González [a], Javier Retana [b]

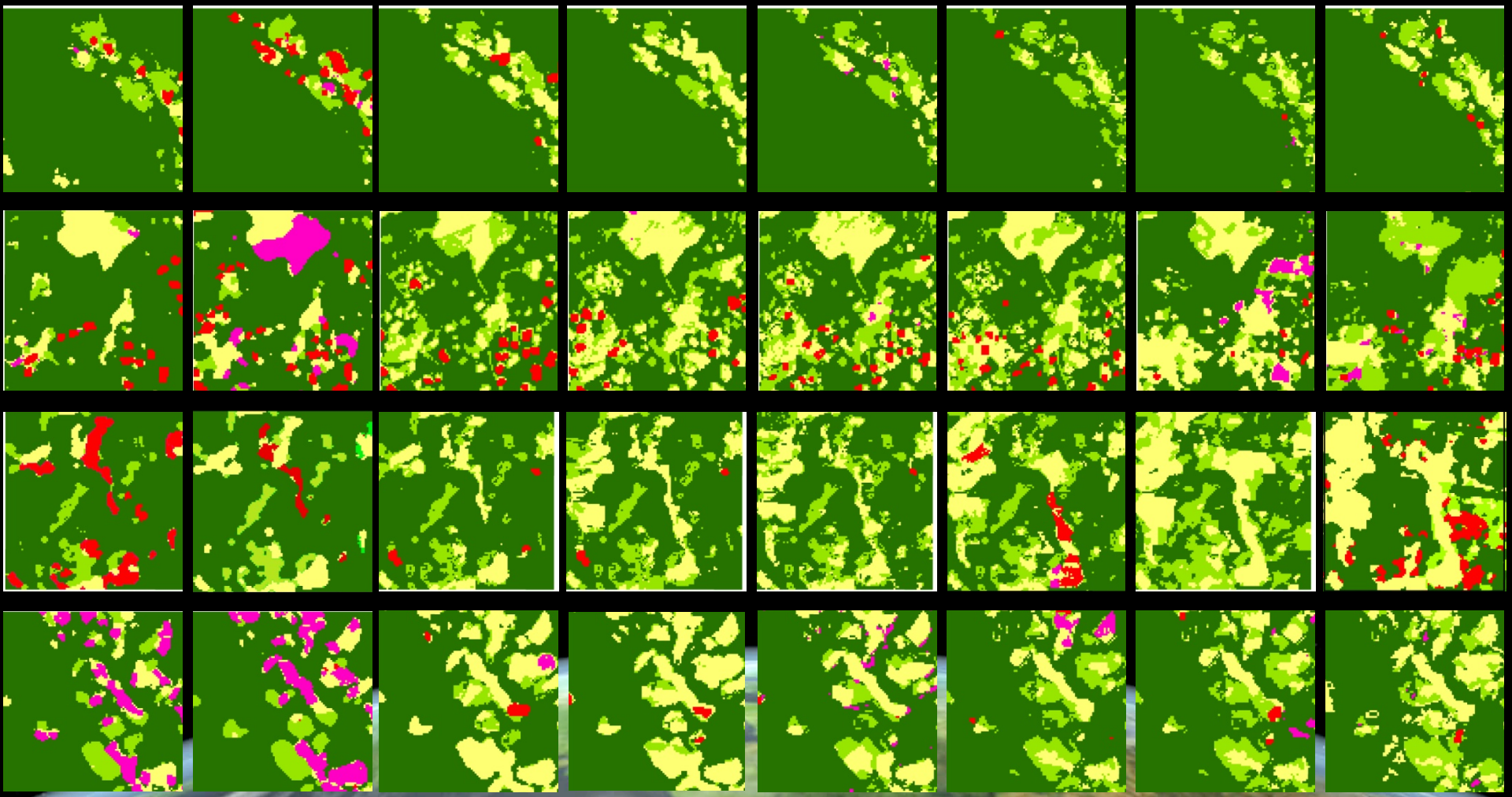
[a] Laboratorio de Ecología del Paisaje y Modelación de Ecosistemas, Departamento de Biología, Facultad de Ciencias, Universidad Nacional de Colombia, Edificio 421, Bogotá,
[b] CREAF (Centre for Ecological Research and Forestry Applications) and Ecology Unit, Autonomous University of Barcelona, E-08193 Bellaterra, Catalonia, Spain

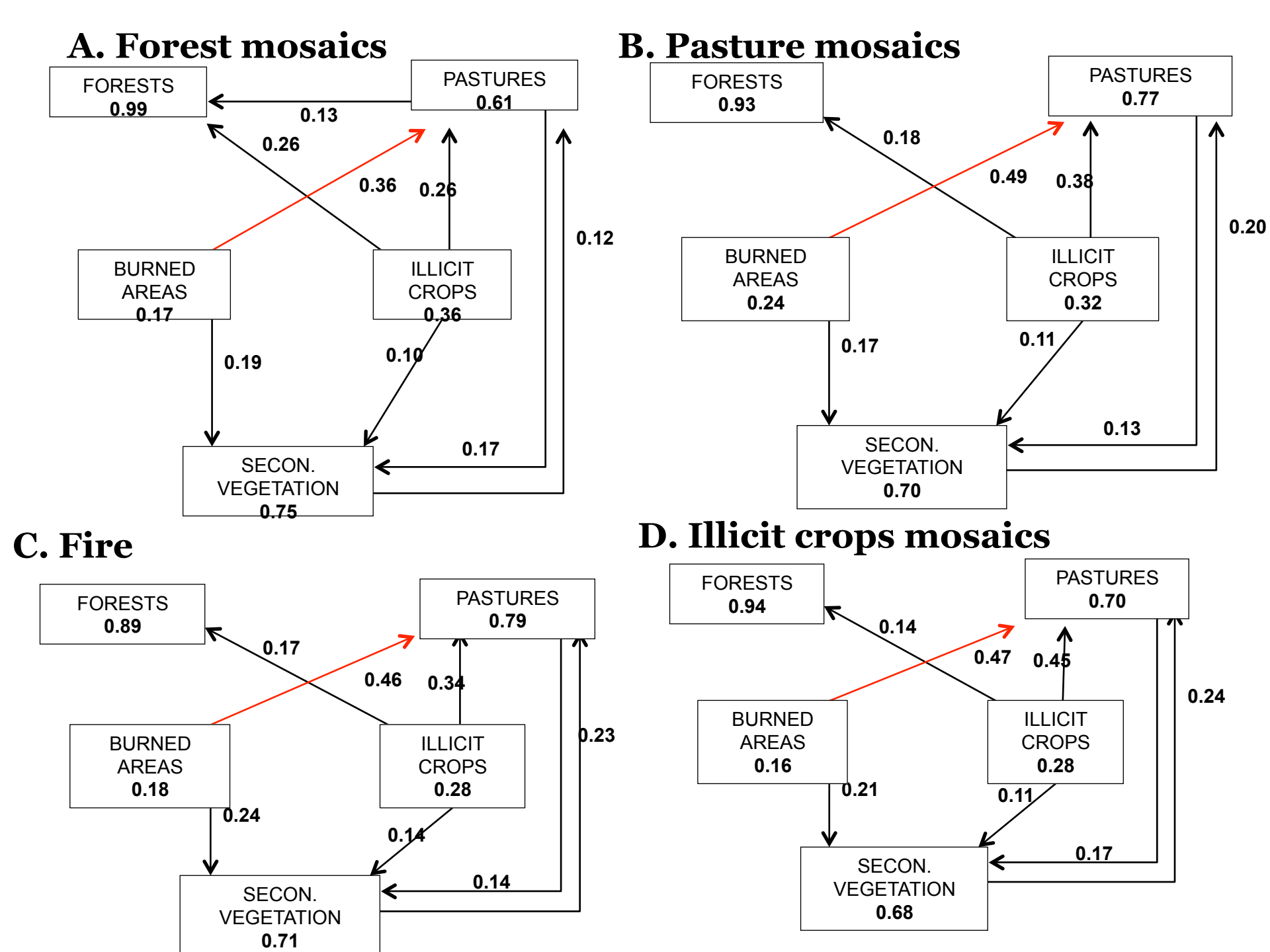
Local cases: Study Area



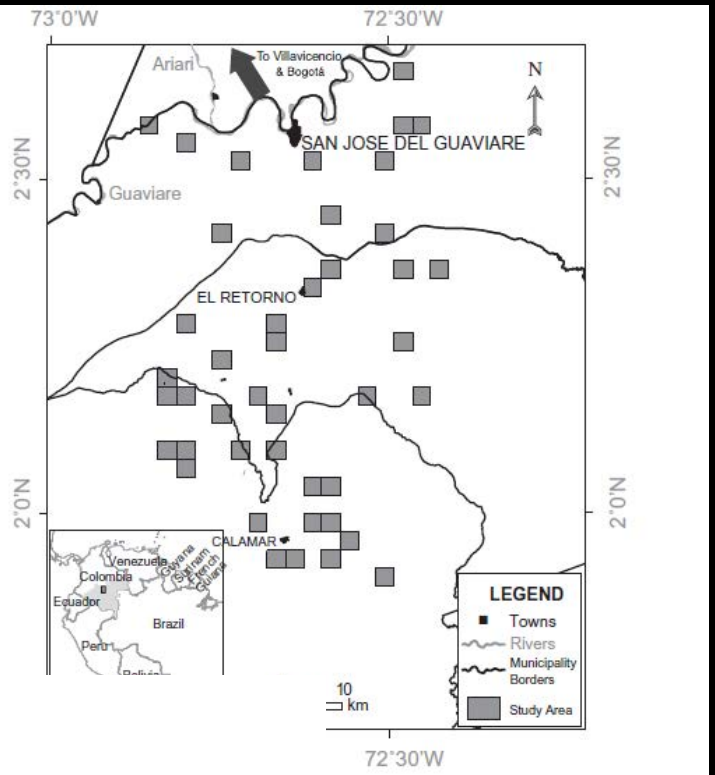
analyse forest dynamics in north-western Amazonia by studying the interactions between deforestation, the use of fire and the establishment of both illicit crops and pastures for grazing

2000 – 2001 - 2003 - 2004 - 2005 - 2006 - 2008 - 2009




A. Forest mosaics
FORESTS
0.99
PASTURES
0.61
0.13
0.26
0.36
0.26
0.12
BURNED
AREAS
0.17
ILLICIT
CROPS
0.36
0.19
0.10
0.17
SECON.
VEGETATION
0.75
B. Pasture mosaics
FORESTS
0.93
PASTURES
0.77
0.18
0.49
0.38
0.20
BURNED
AREAS
0.24
ILLICIT
CROPS
0.32
0.17
0.11
0.13
SECON.
VEGETATION
0.70
C. Fire
FORESTS
0.89
PASTURES
0.79
0.17
0.46
0.34
0.23
BURNED
AREAS
0.18
ILLICIT
CROPS
0.28
0.24
0.14
0.14
SECON.
VEGETATION
0.71
D. Illicit crops mosaics
FORESTS
0.94
PASTURES
0.70
0.14
0.47
0.45
0.24
BURNED
AREAS
0.16
ILLICIT
CROPS
0.28
0.21
0.11
0.17
SECON.
VEGETATION
0.68

Add complexity.. Land acquisition…



Colombia northwestern Amazonia. Inset
es were selected at random and cover the
ir.

Biological Conservation 170 (2014) 64–73

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Demand for beef is unrelated to pasture expansion in northwestern Amazonia

Liliana M. Dávalos [a,*], Jennifer S. Holmes [b], Nelly Rodríguez [c], Dolors Armenteras [c]

[a] Department of Ecology and Evolution and Consortium for Inter-Disciplinary Environmental Research, SUNY Stony Brook, NY, USA
[b] School of Economic, Political and Policy Sciences, University of Texas at Dallas, Richardson, TX, USA
[c] Landscape Ecology and Ecosystem Modelling Laboratory, Department of Biology, Sciences Faculty, National University of Colombia, Bogotá, Colombia

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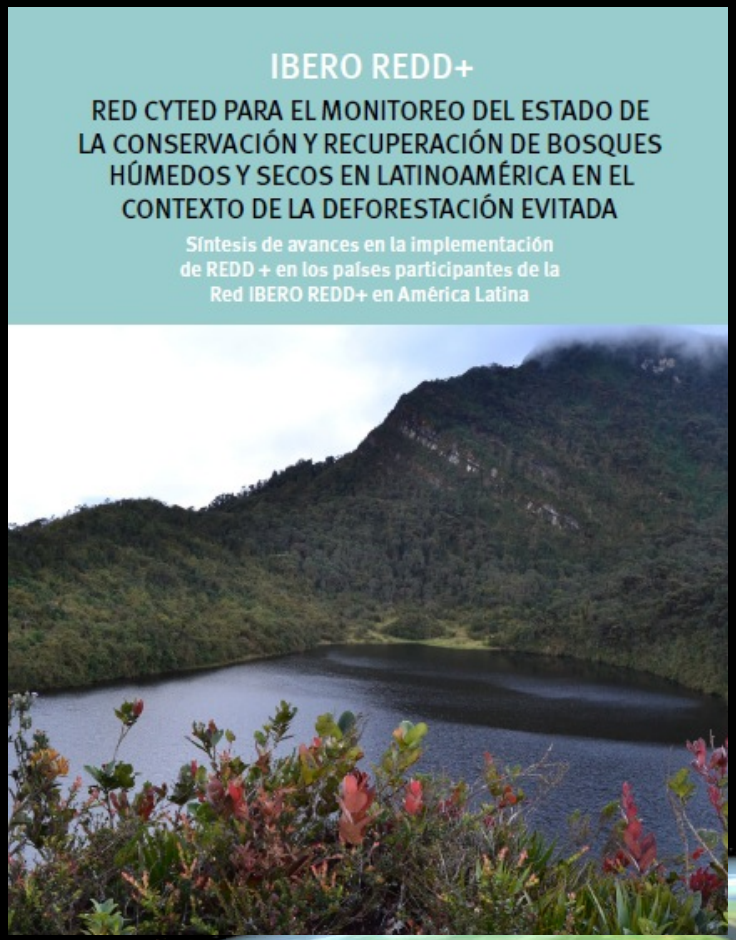
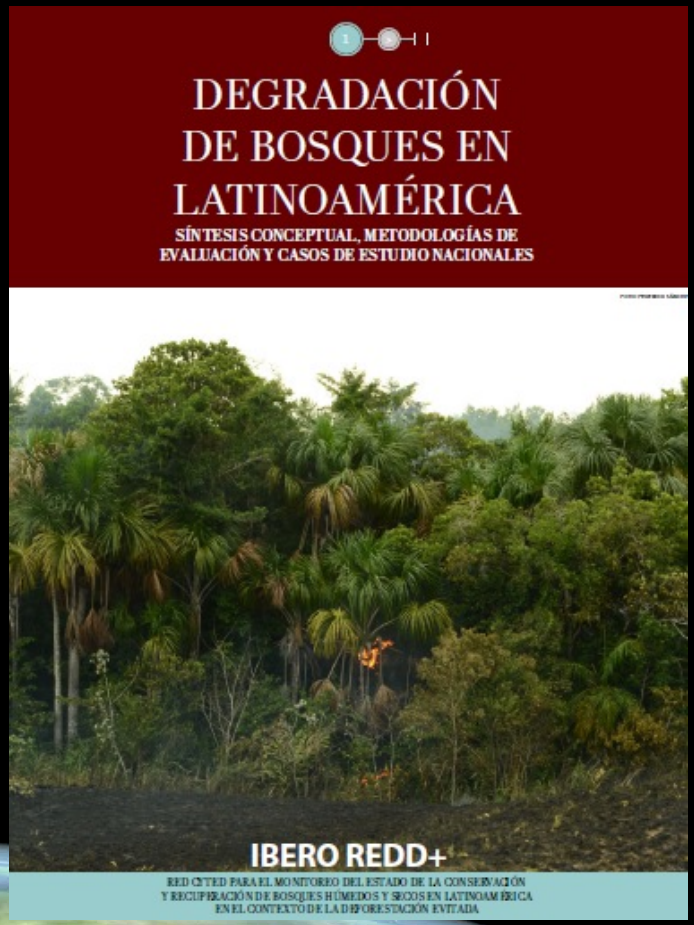

IBERO REDD+
RED CYTED PARA EL MONITOREO DEL ESTADO DE LA CONSERVACIÓN Y RECUPERACIÓN DE BOSQUES HÚMEDOS Y SECOS EN LATINOAMÉRICA EN EL CONTEXTO DE LA DEFORESTACIÓN EVITADA
Síntesis de avances en la implementación de REDD + en los países participantes de la Red IBERO REDD+ en América Latina

2015


DEGRADACIÓN DE BOSQUES EN LATINOAMÉRICA
SÍNTESIS CONCEPTUAL, METODOLOGÍAS DE EVALUACIÓN Y CASOS DE ESTUDIO NACIONALES
IBERO REDD+
RED CYTED PARA EL MONITOREO DEL ESTADO DE LA CONSERVACIÓN Y RECUPERACIÓN DE BOSQUES HÚMEDOS Y SECOS EN LATINOAMÉRICA EN EL CONTEXTO DE LA DEFORESTACIÓN EVITADA

UNIVERSIDAD NACIONAL DE COLOMBIA
SEDE BOGOTÁ
FACULTAD DE CIENCIAS
DEPARTAMENTO DE BIOLOGÍA

PROGRAMA ONU-REDD COLOMBIA

CONTRATO No. 2302831 de 2016

OBJETO

Realizar la Caracterización de motores de degradación forestal en Colombia

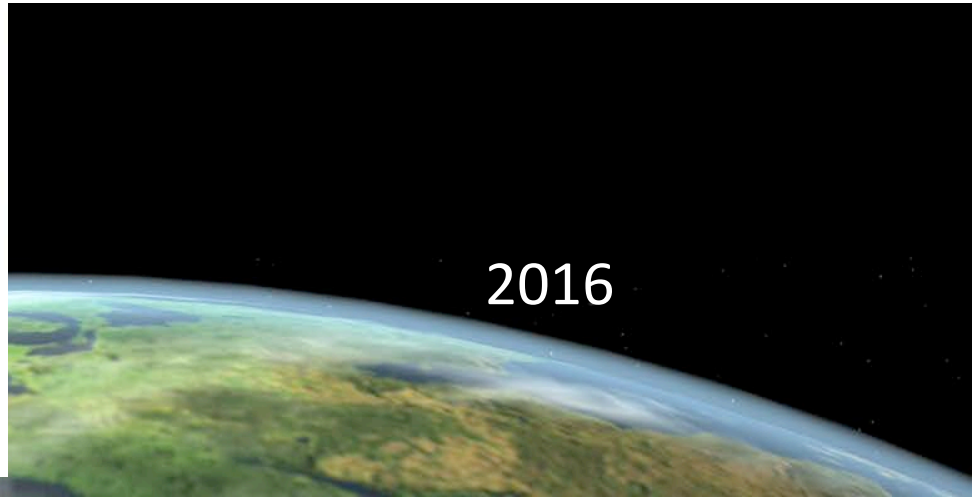
Motores de la degradación forestal en Colombia

Motores directos

- Los incendios forestales

Contratista

Facultad de Ciencias
Universidad Nacional de Colombia



Thank you

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https://www.researchgate.net/profile/Dolors_Armenteras/

darmenterasp@unal.edu.co

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