



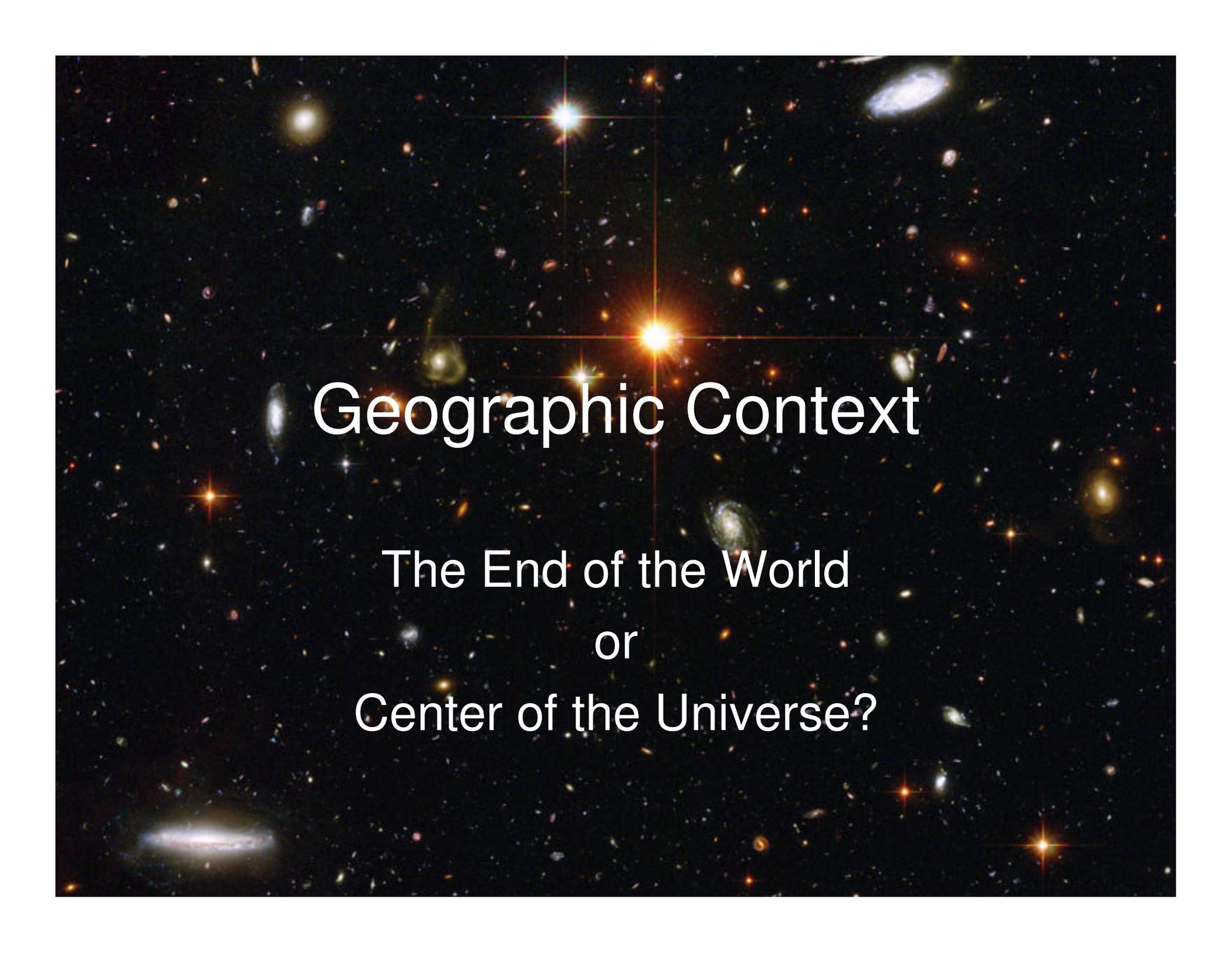
# Linking Science to Development and Conservation in SW Amazonia:

## Activities of the LBA-Acre Group During and After the Drought of 2005

Foster Brown and LBA-Acre Group  
WHRC/UFAC  
LBA-Eco 11<sup>th</sup> Science Team Meeting  
Salvador, Bahia  
28set07  
[fbrown@uol.com.br](mailto:fbrown@uol.com.br)

# Acre-LBA- participants (partial list)

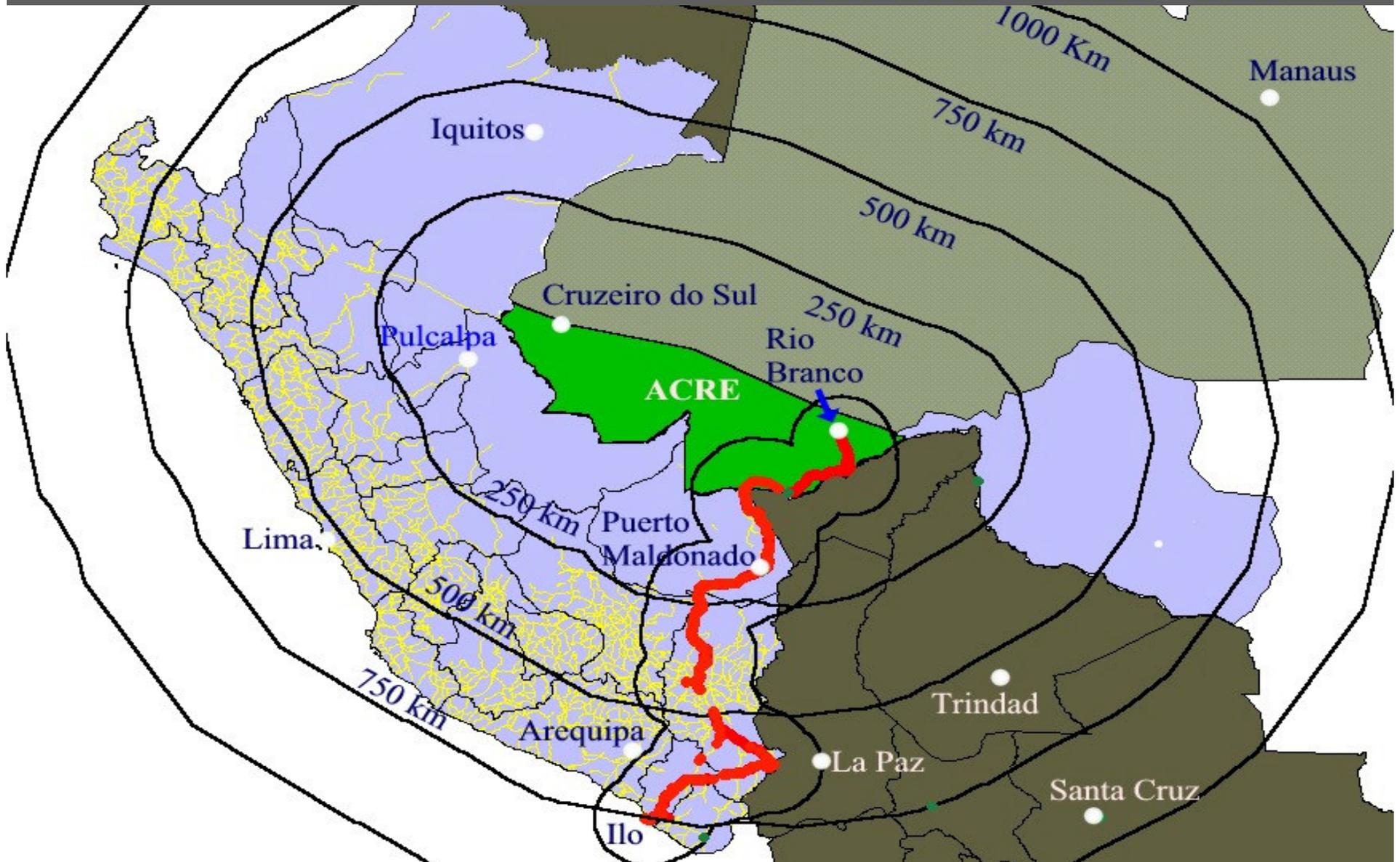
- Alejandro Duarte, Cleber Salimon, Marcos Silveira, Elsa Mendoza, Monica de los Rios, Diogo Selhorst, Eufra do Amaral, Willian Flores, Nara Pantoja, Sumaia Vasconcelos, Rodrigo Serrano, Andrea Alechandre, Silvia Brilhante, Ramene dos Santos, Vera Reis, Amy Rosenthal, Larissa Saraiva, Renata Abreu, Cynara França, Geazi Pinto, Hiromi Sassagawa, Kennedy Souza, Wilfrid Schroeder (hon,men,)
- 5 now professors at UFAC, 4 in Acre Secretariat for Environment and Natural Resources, 1 director and 3 researchers in environmental ngos, etc.



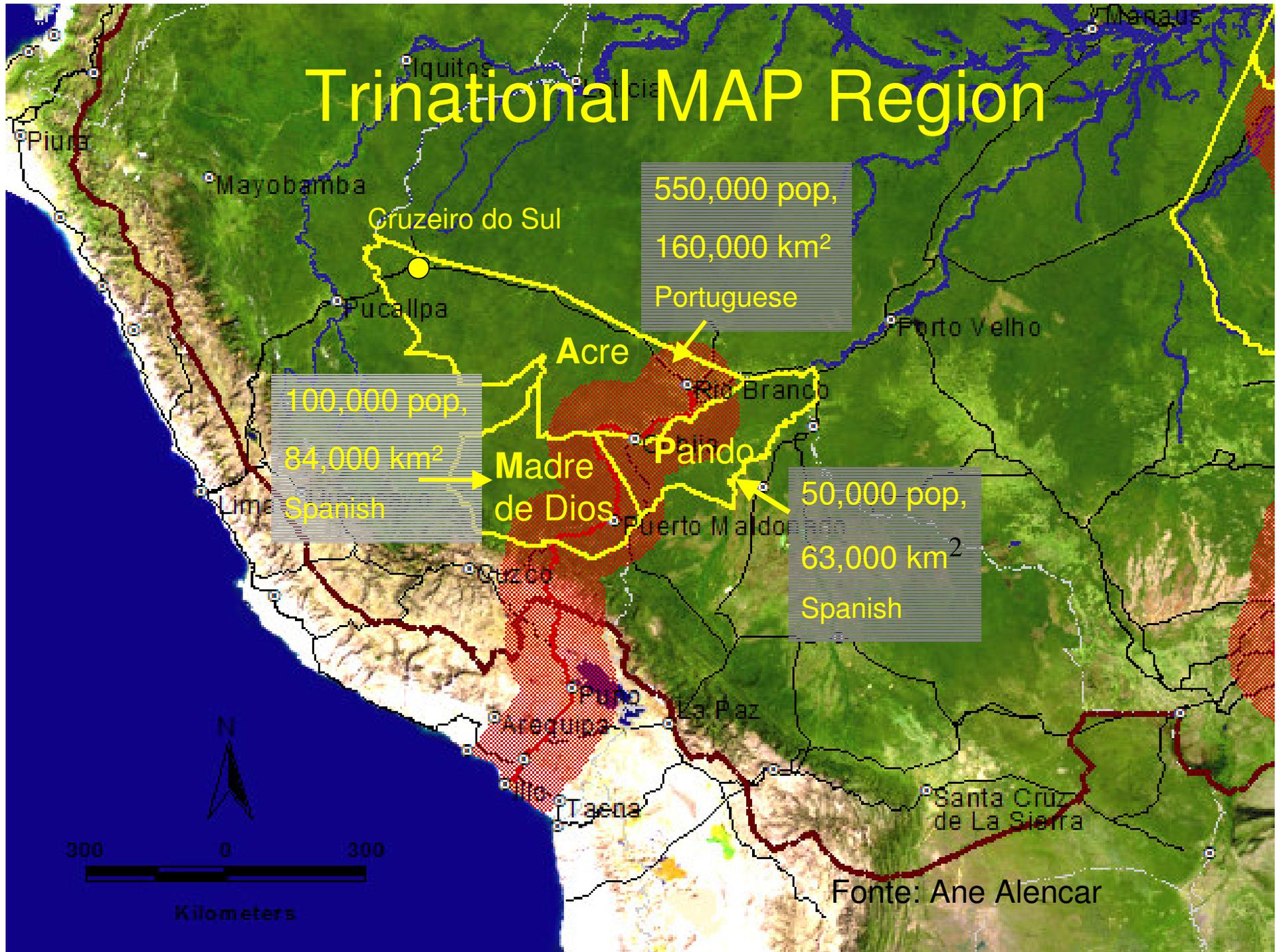
# Geographic Context

The End of the World  
or  
Center of the Universe?

More people live within 750 km of Acre (>30 million) than in the entire Brazilian Amazon, and most speak Spanish, Quechua or Aymara.



# Trinational MAP Region

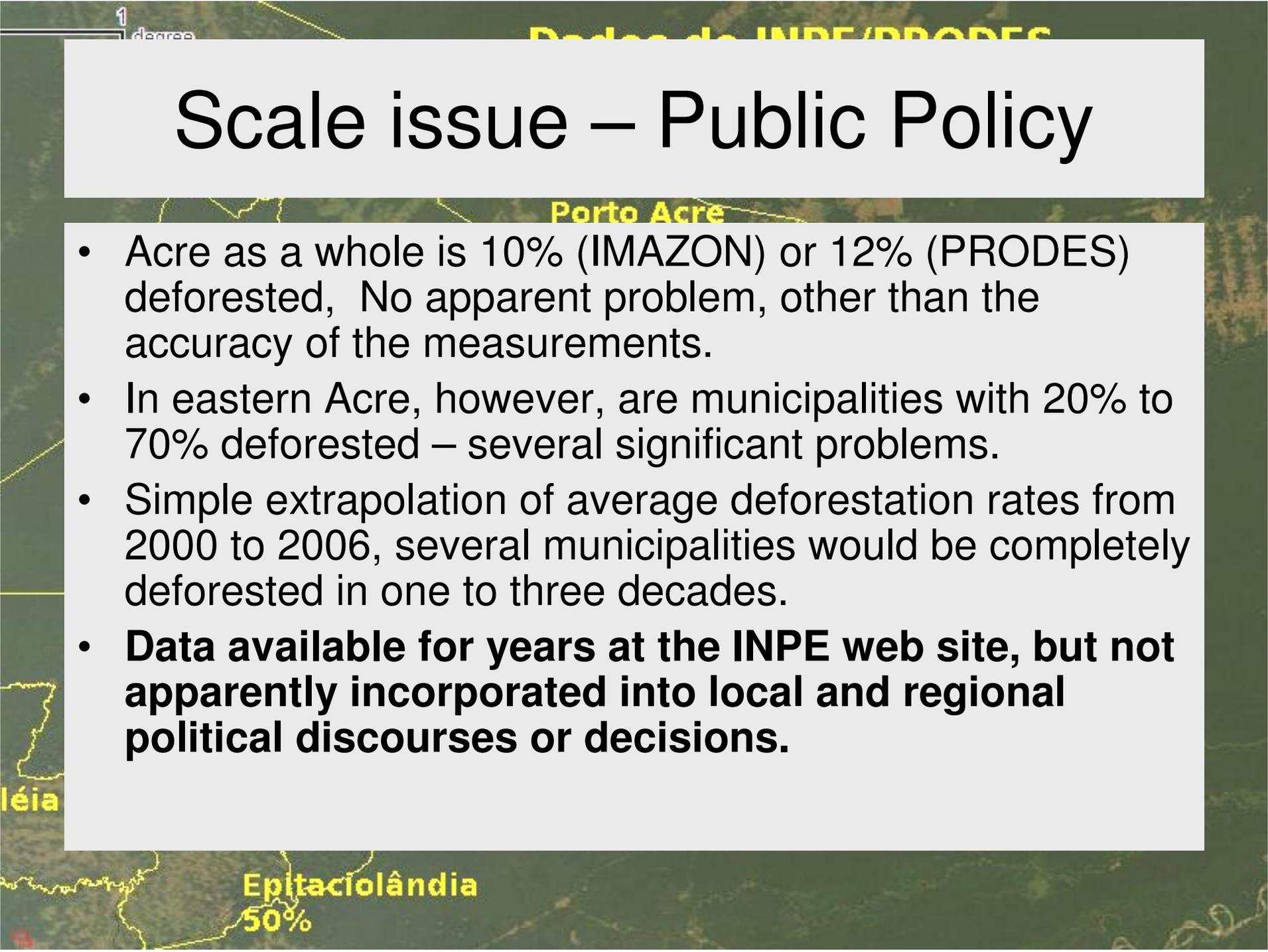


# Utility: a major motivation for LBA

- Much of the rationale for funding LBA is utilitarian, i.e. “informing society for decision making.”
  - (“...para que a sociedade e os tomadores de decisão possam usufruir dos resultados das pesquisas,”) <http://lba,cptec,inpe,br/lba/site/?p=intro&t=1#>
- If so, besides the **generation** of knowledge we need to incorporate two other links in the chain:
  - Link 2: **Dissemination**
  - Link 3: **Application**
- **The chain is as strong as its weakest link.**

# Human dimensions

- **Application** of knowledge generated by LBA, examples from LBA-Acre:
  - Reducing risks of disasters
  - Improving basic education
  - Managing water resources
  - Mitigating road impact
  - Facilitating cross-boundary collaboration for regional development and conservation – MAP Initiative
  - Adapting to and mitigating climatic variability



# Scale issue – Public Policy

- Acre as a whole is 10% (IMAZON) or 12% (PRODES) deforested, No apparent problem, other than the accuracy of the measurements.
- In eastern Acre, however, are municipalities with 20% to 70% deforested – several significant problems.
- Simple extrapolation of average deforestation rates from 2000 to 2006, several municipalities would be completely deforested in one to three decades.
- **Data available for years at the INPE web site, but not apparently incorporated into local and regional political discourses or decisions.**

1 degree

## Dados do INPE/PRODES Desflorestamento até 2006

In Acre, this is news =>  
and it shouldn't be.

All the data have been  
available for years.

*Problems in  
dissemination, and  
consequently, in  
application.*

Porto Acre  
43%

Senador  
Guimard  
68%

Acrelândia  
53%

Placido  
de C  
71%

ixaba

Leste Acre, Brasil  
MODIS-Terra-12ago07  
2007224 - UFAC/WHRC/IFB

iléia

Epitaciolândia  
50%

# Other scale issue: infrastructure and energy investments in the MAP Region vs. local/regional governments

10+ billion dollars for two hydroelectric reservoirs (Others planned).

1.5 billion dollars for three highways with goal to link with the Pacific.

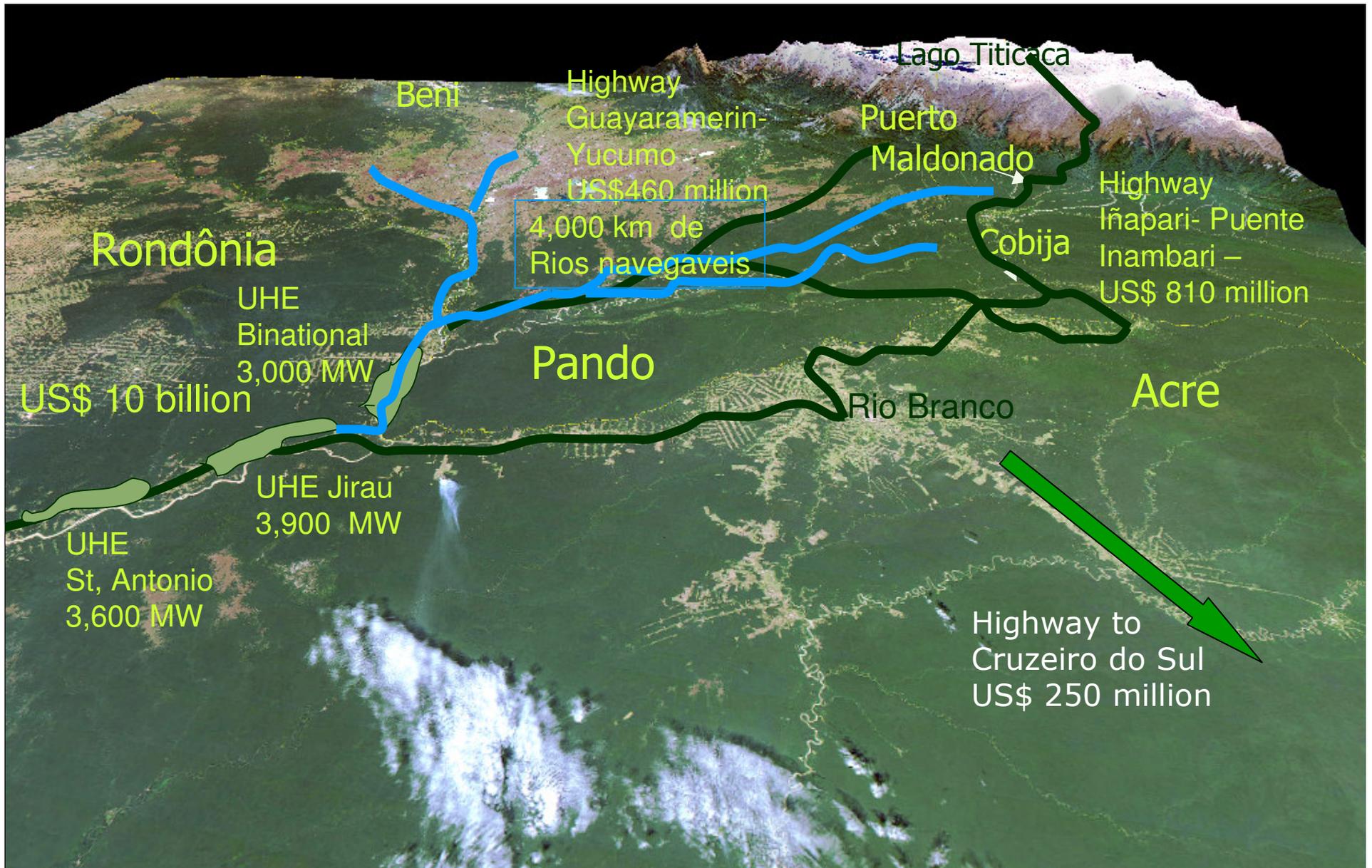
X million dollars for oil and gas prospecting and production.

Y million dollars for biofuels.

Budgets for regional and local governments are orders of magnitude less.

# Large-scale infrastructure investments in the MAP Region

(source: NASA e M,Steininger, CI, IIRSA)

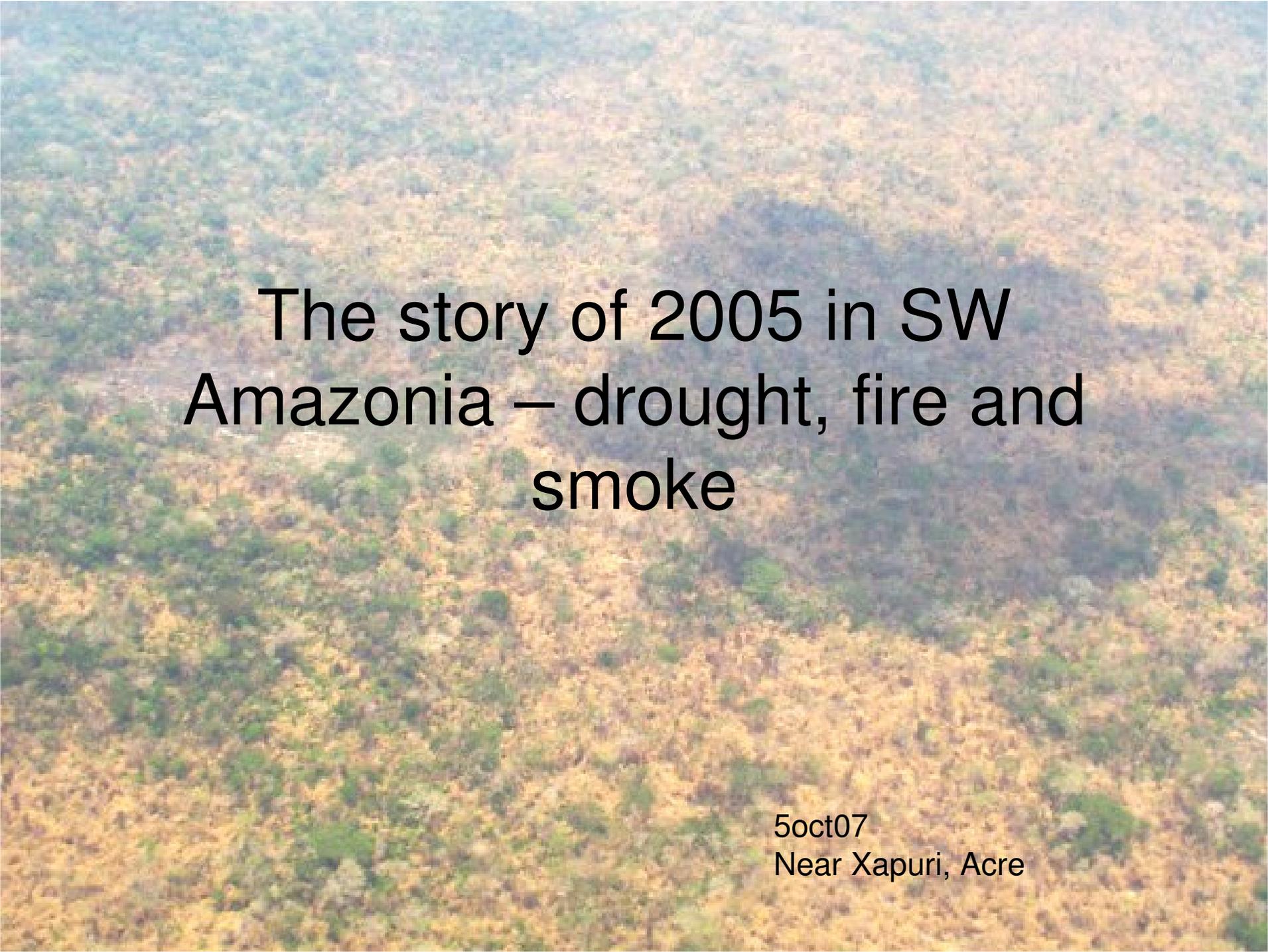




# Explosive growth of sugar cane production for ethanol in eastern Acre: 40,000 ha planned.

MODIS 03jul07 – Rio Branco - Capixaba





The story of 2005 in SW  
Amazonia – drought, fire and  
smoke

5oct07  
Near Xapuri, Acre



## The Drought in Amazonia of 2005

(In press, Journal of Climate)



José A, Marengo\*, Carlos A, Nobre\*, Javier Tomasella\*, Marcos D, Oyama\*\*, Gilvan Sampaio de Oliveira\*, Rafael de Oliveira\*, Helio Camargo\*, Lincoln M, Alves\*, Irving F, Brown\*\*\*

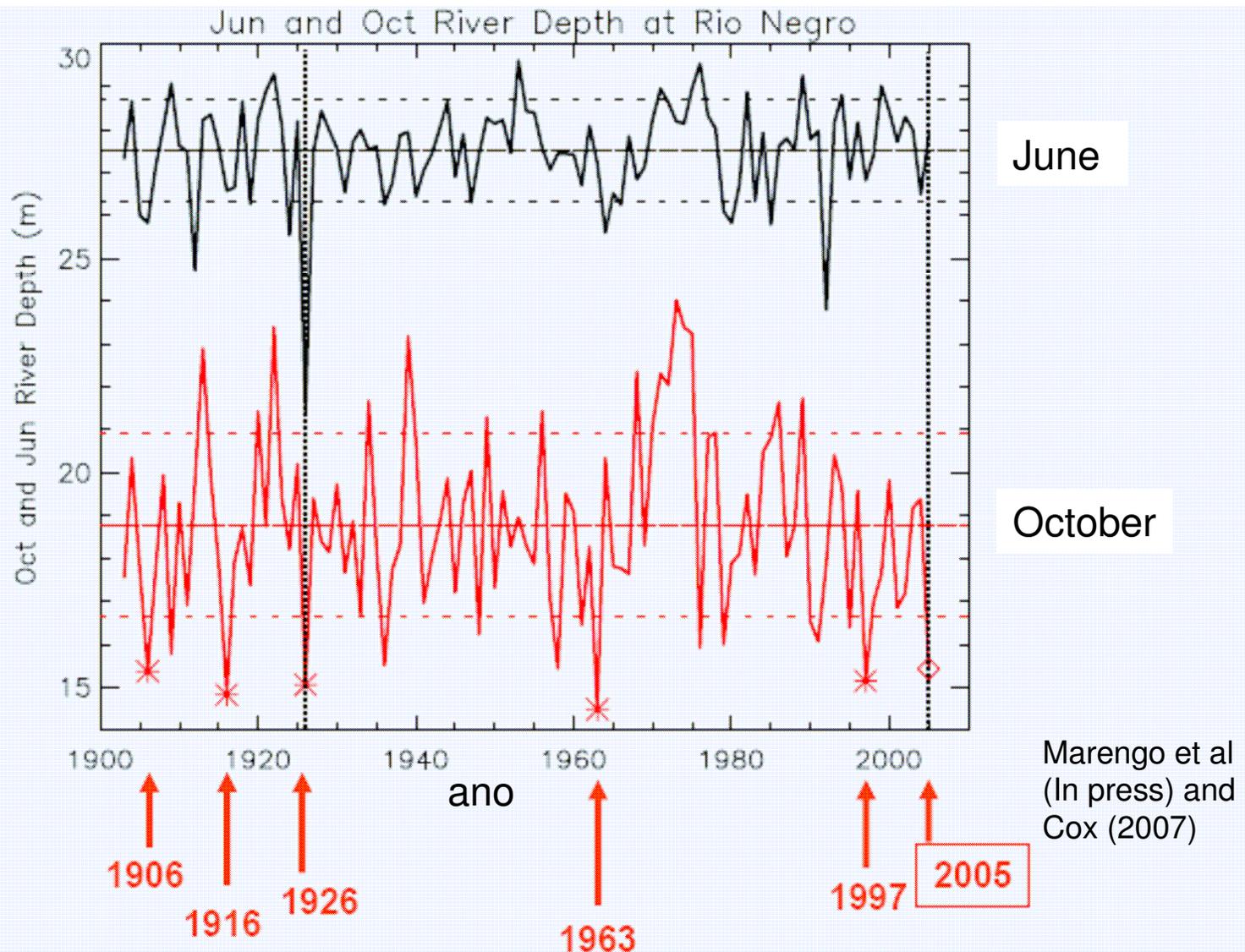


\*CPTEC/INPE, São Paulo, Brazil

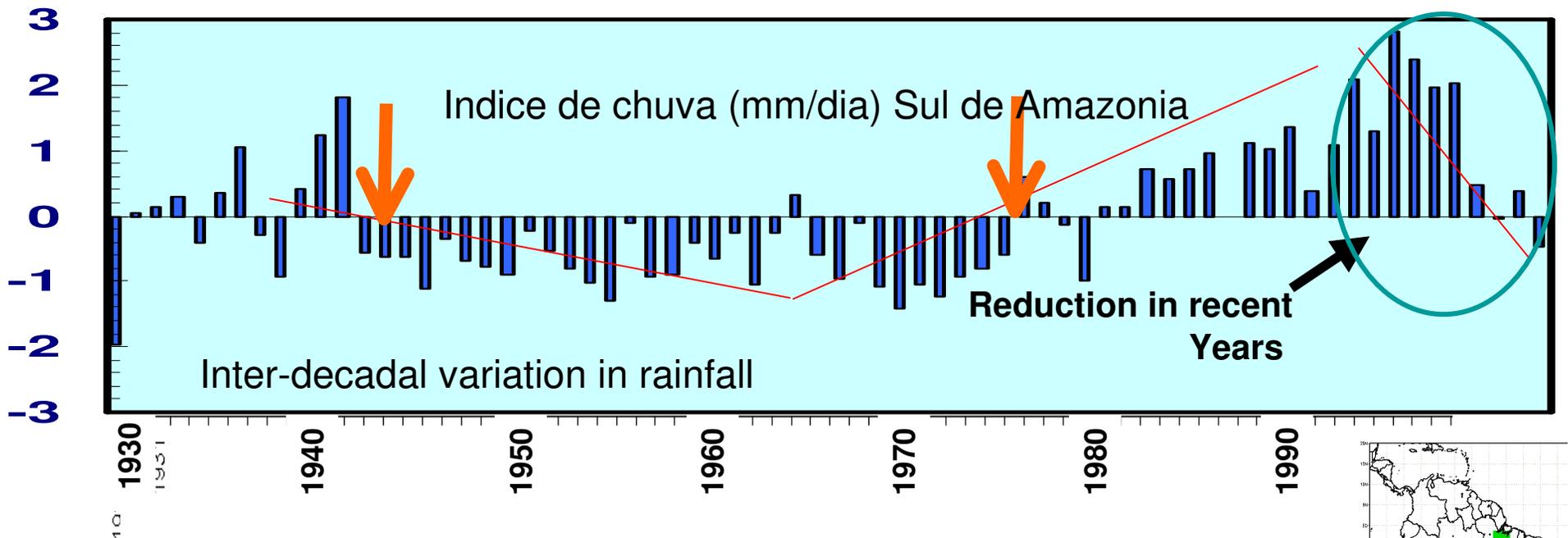
\*\* CTA/IAE, São Paulo, Brazil

\*\*\*WHRC/UFAC

*The rivers reflect rainfall,*  
The year 2005 was the 6<sup>th</sup> lowest in 103 years of measurement of the height of the Rio Negro.



Marengo (2004) TAC



**Recent decline corroborated by local rainfall data (Dr. Alejandro Duarte) and perceptions of rubber tappers.**

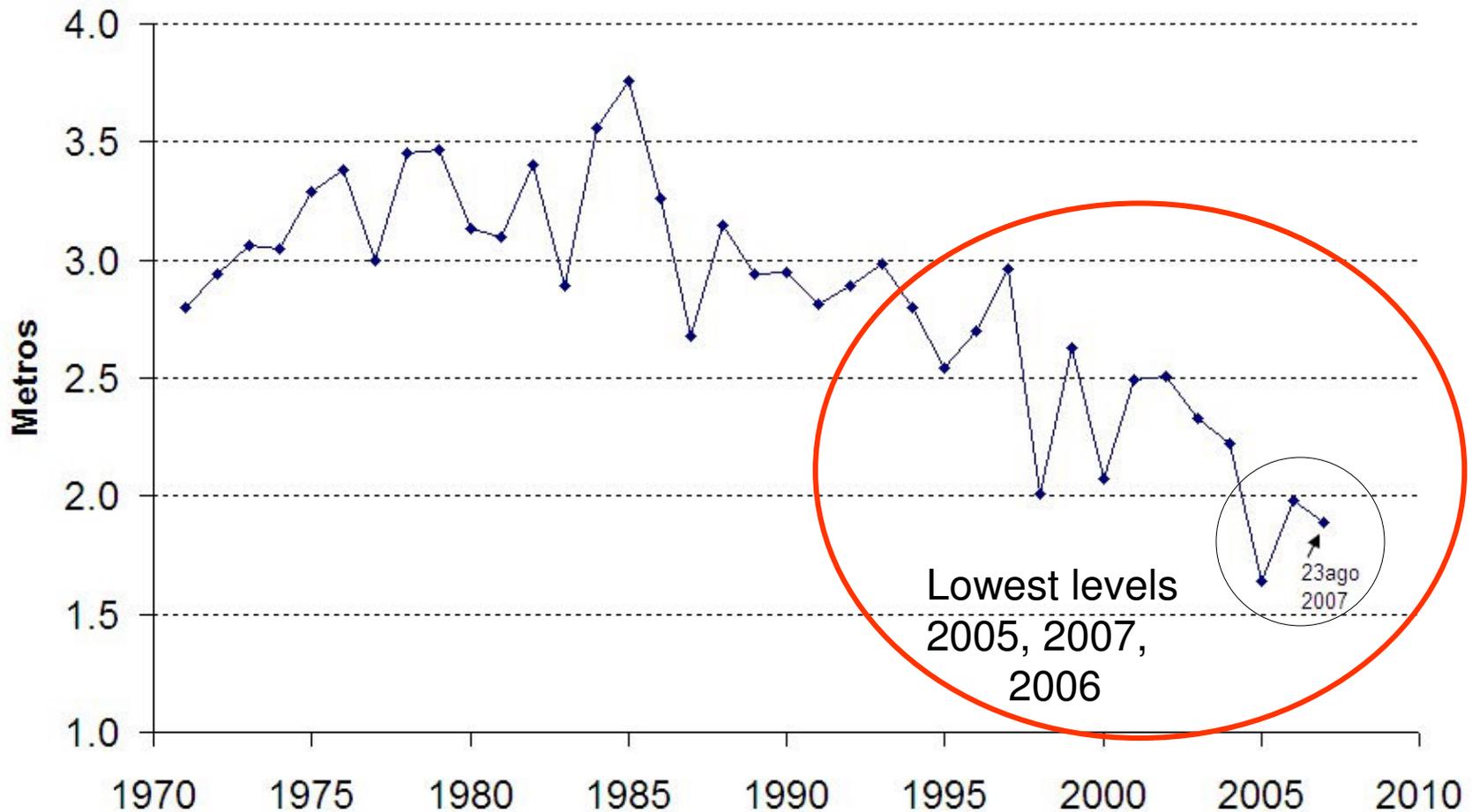
**Natural variation? Effect of anthropogenic climate change?**

# The rivers reflect rainfall - II

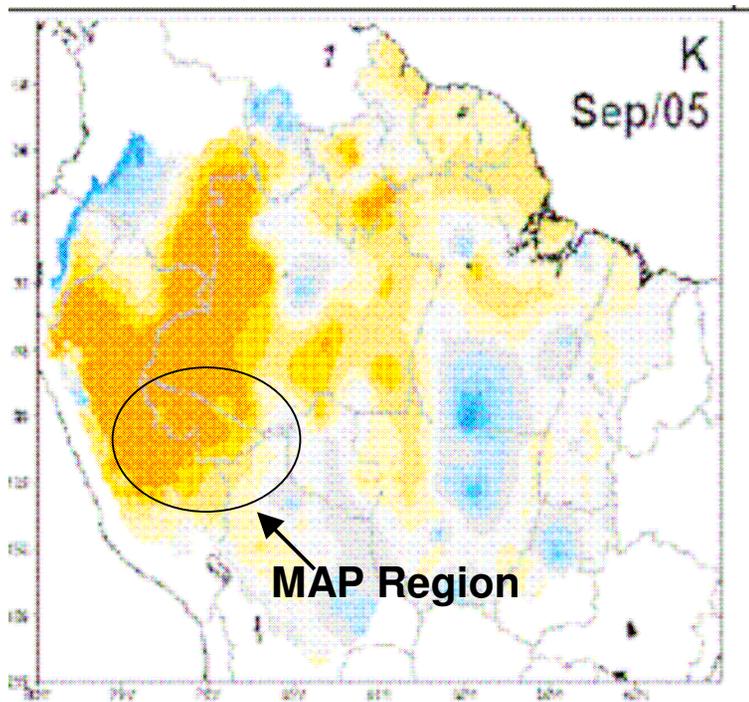
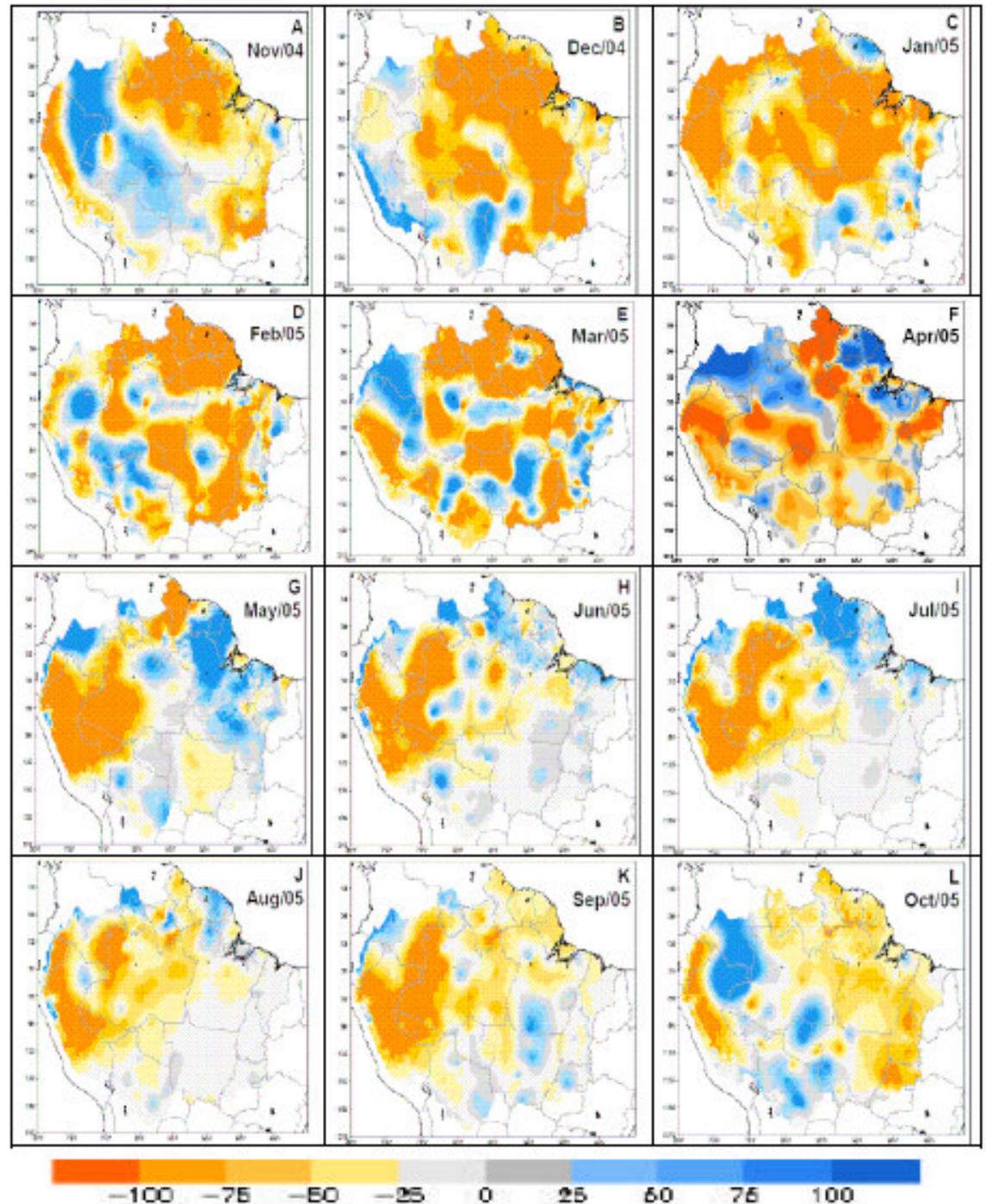
Lowest river levels occur in the last few years after a decadal decline,  
Acre River at Rio Branco, Acre

## Cota mínima do Rio Acre em Rio Branco, Acre

(Dados de Rio Branco da Defesa Civil Estadual, 23ago07)



Rainfall anomalies  
CPTC product 2004-  
2005,  
Note the dry season  
anomaly from May on  
concentrates in the west  
of Amazonia (Marengo  
et al. In press).



# Crisis in the water supply Government and Municipality fear total collapse with the drying of the River

## CRISE NO ABASTECIMENTO

# GOVERNO E PREFEITURA TEMEM COLAPSO TOTAL NO COM SECA DO RIO

• O governador Jorge Viana e o prefeito Raimundo Angelim reuniram-se ontem para montar um programa de emergência a fim de evitar

que o abastecimento de água potável na cidade entre em colapso em função do período de estiagem que está levando o rio Acre a atingir a mais baixa cota

Pagina 20, 30Jun05

metros, número a que o rio chegava no auge do verão, no

gnifica menos ção da ombas

Esgotos de Rio Branco) diretamente do rio, nas proximidades da Praia do Amapá, ficaria comprometida.

PÁGINA 5

Bombeiros atraem multidão no Centro

Justica condena



# The impacts of fires in 2005

Burned forests, 5oct07  
Near Xapuri, Acre

# Changing Paradigm for this part of Amazônia

- Before 1998: SW Amazonian forests are not susceptible to fire.
- 1998 (El Niño): Forests can become susceptible. (Elsa Mendoza's M.Sc. Thesis)
- 2005 (Drought): Extensive regions of forests can become susceptible, and if burned, can take decades to recover.

Burned forests 05oct05  
Near Xapuri, Acre

COTIDIANO

COLUNAS

EDITORIAL

ENTREVISTA

ESPECIAL

ESPORTE

POLÍTICA

OPINIÃO

VIA PÚBLICA

VARIEDADES

EDIÇÕES

EXPEDIENTE

OPINIÃO

**OPINIÃO**

Irving Foster Brown \*

Nara Vidal Pantoja \*\*

### **Seca do rio e fogo na floresta**

O nível do Rio Acre está baixo, muito baixo para esta fase da época seca. Segundo dados da Coordenadoria Estadual de Defesa Civil, as cotas de maio, junho e julho deste ano são as mais baixas em 34 anos. Além de criar um problema social de abastecimento de água para a cidade de Rio Branco, este baixo nível indica uma realidade preocupante: pouca água no subsolo de toda a bacia do Rio Acre. Esta bacia se estende até os territórios peruano e boliviano, sendo uma das poucas bacias trinacionais na Amazônia, e uma das mais problemáticas porque dezenas de milhares de pessoas dependem das suas águas para abastecimento.

Drought in the River and Fire in the Forest – Op-Ed in Regional newspaper, 2aug05,

[http://www2,uol.com,br/pagina20/02082005/index,htm](http://www2.uol.com.br/pagina20/02082005/index.htm)

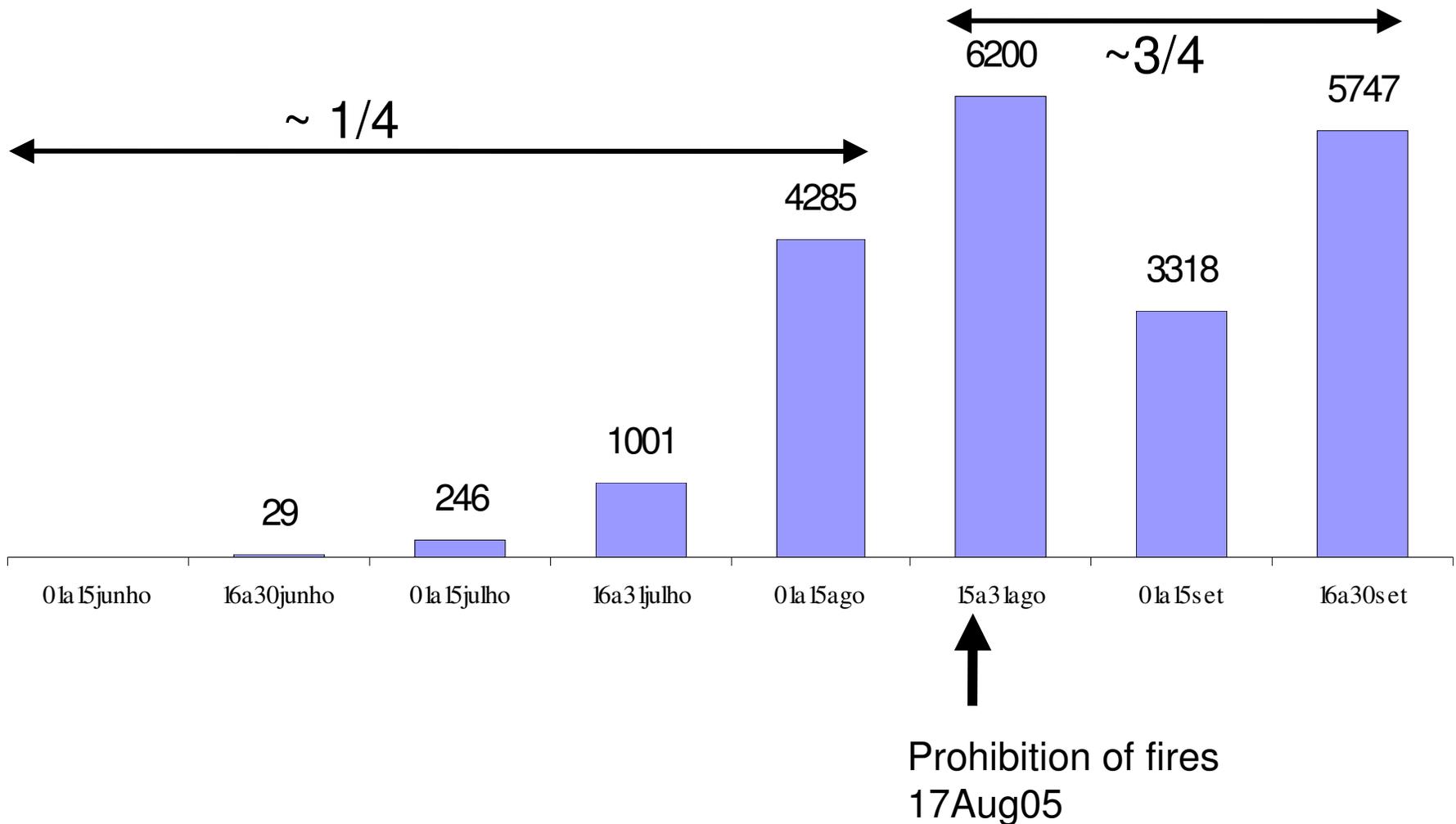
- Op-Ed Article a product of LBA meetings, research, influence of colleagues (Dan Nepstad in particular), and simple logic: if the drought continues, the forests will burn.
- It led to a meeting of the state fire committee.

# Evolution of hot pixels in Acre, 2005

(all satellites, source: [www.cptec.inpe.br/queimadas](http://www.cptec.inpe.br/queimadas))

Note the ineffectiveness of this prohibition:

***application of knowledge didn't work.***



Fire propagating within the forest, little direct impact on canopy, probably not detectable by routine satellite observations.



Meio dia, Acrelândia, 17set05

# Página 20



RIO BRANCO - ACRE - JORNAL DIÁRIO - ANO XI - Nº 2.800 - QUARTA-FEIRA, 21 DE SETEMBRO DE 2005 - PREÇO DO EXEMPLAR - R\$ 1,50

GOVERNO ANUNCIA CONCURSO PARA CONTRATAÇÃO DE 2.500 NOVOS PROFESSORES - PÁGINA 7

## ACRE TERÁ SITUAÇÃO DE EMERGÊNCIA DECRETADA

Acre will declare a state of  
emergency  
21 de setembro de 2005

Jorge Viana deve anunciar também uma série de medidas para conter as queimadas, consideradas fora de controle.

tão perdendo o seu principal meio de sustento. Na Aleac e Câmara Municipal, deputados e vereadores se manifestam

Fire in the Forest 27Sep05



Fire in the Forest 27Sep05 Near Acrelândia, border with Pando



LBA-Acre Group asked to help in Situation Room of the State Civil Defense, focusing on locating fires and providing GIS/RS support.



Monica De Los Rios  
MS Student at UFAC



Claudio Cavalcante  
Geography student



Nara Pantoja  
Forestry Student



Clarice Farias  
Forestry student



Luis André Correia  
Computer Science student

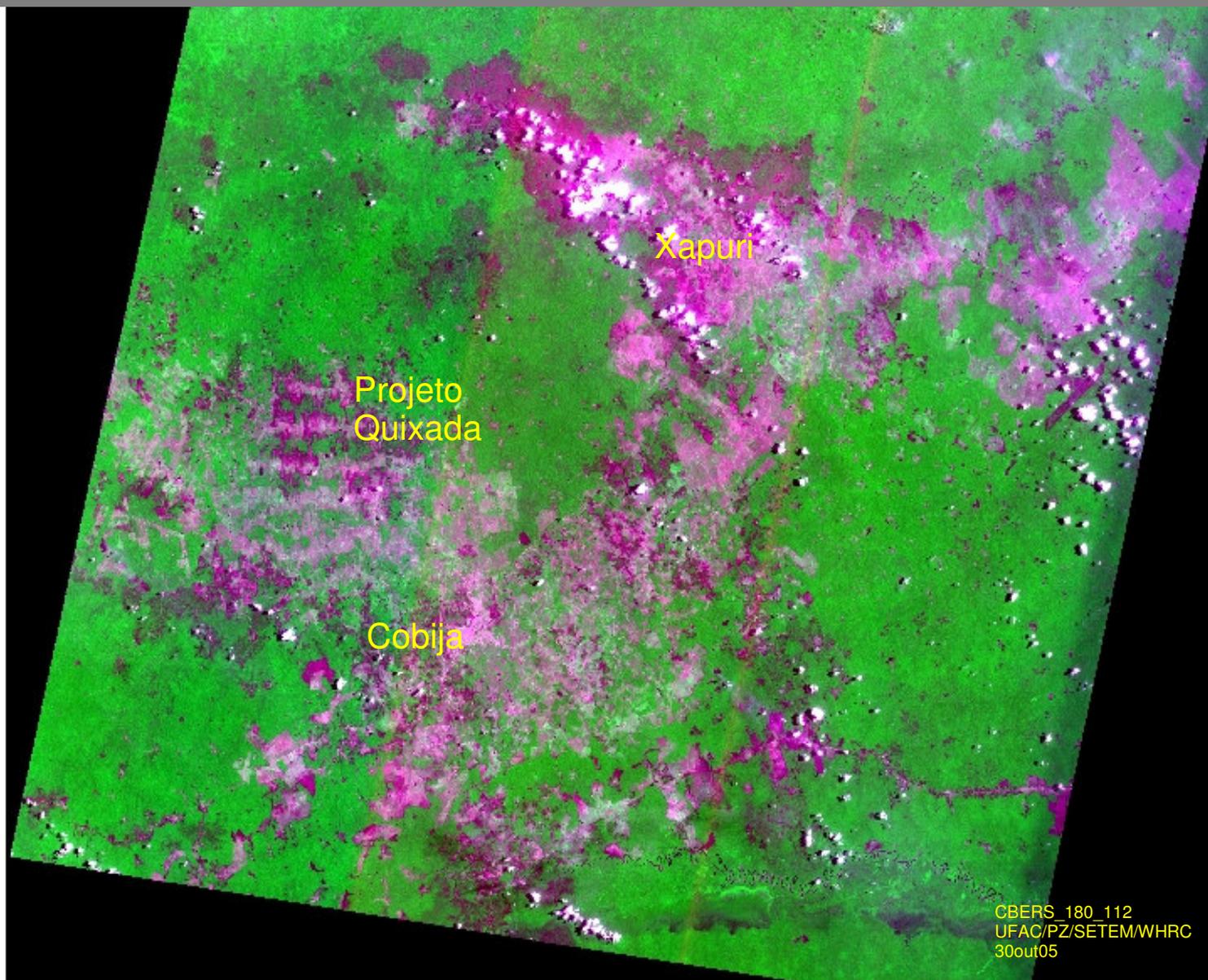
**Burned forests**  
**28Sep05 near de Acrelândia**



LBA-Acre Group responsible for 5 PM briefing of the Fire Fighting Commission of Civil Defense, advising as to where to fight fires.



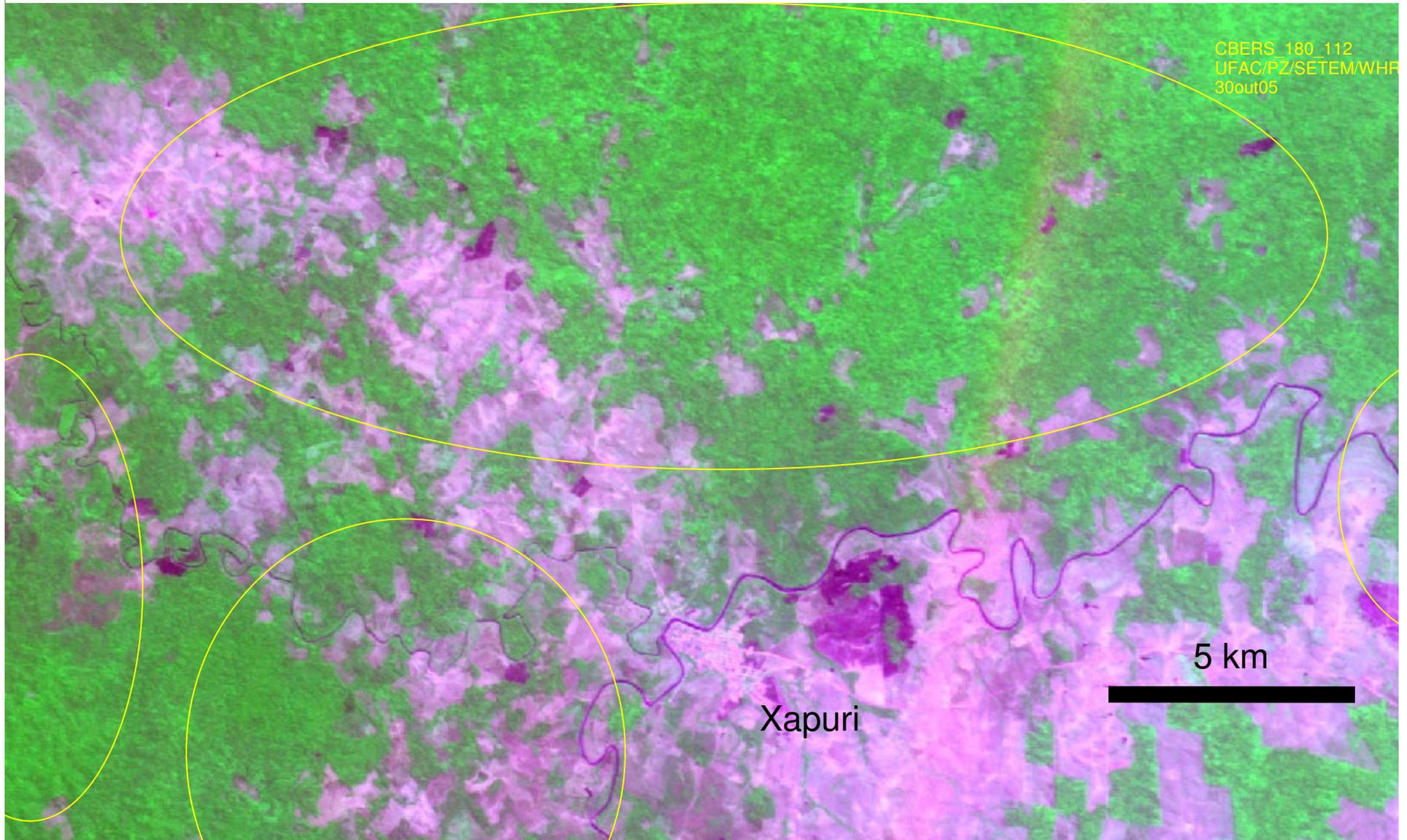
# CBERS – Cena 12Oct05 180-112 ~100 km wide



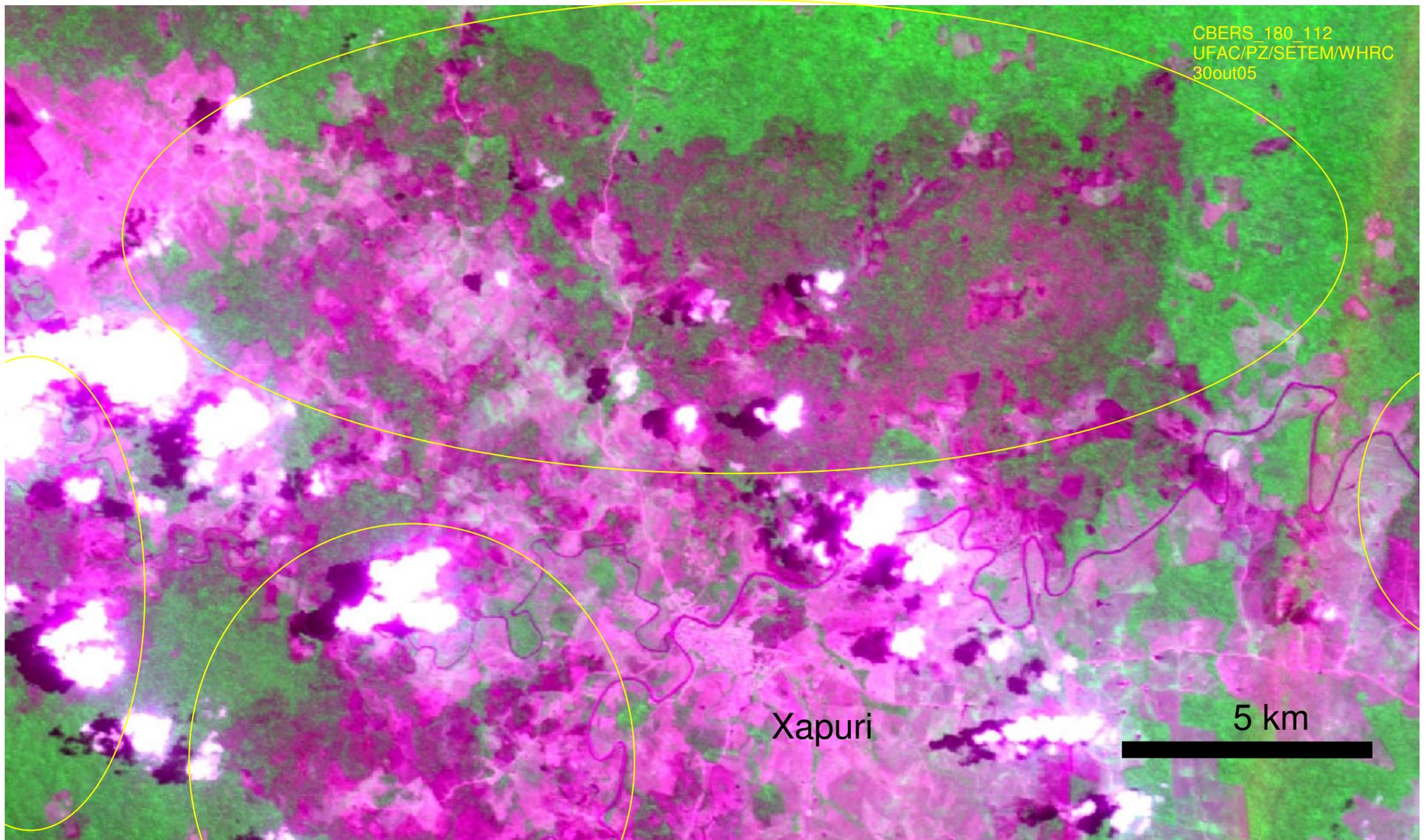
Burned Forest, Canopy directly affected.  
05Oct05, Near Xapuri, Acre



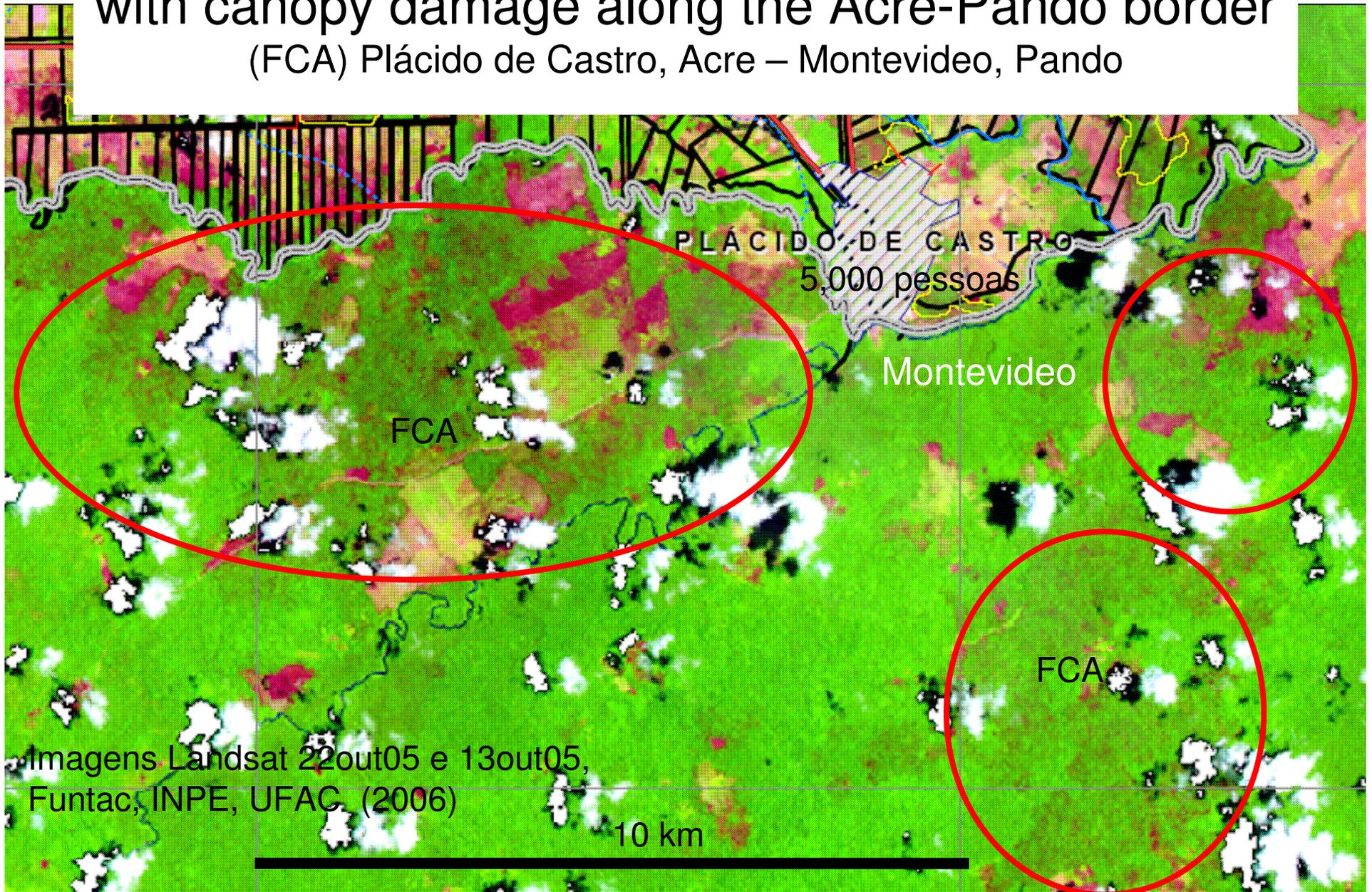
# Xapuri 21ago05



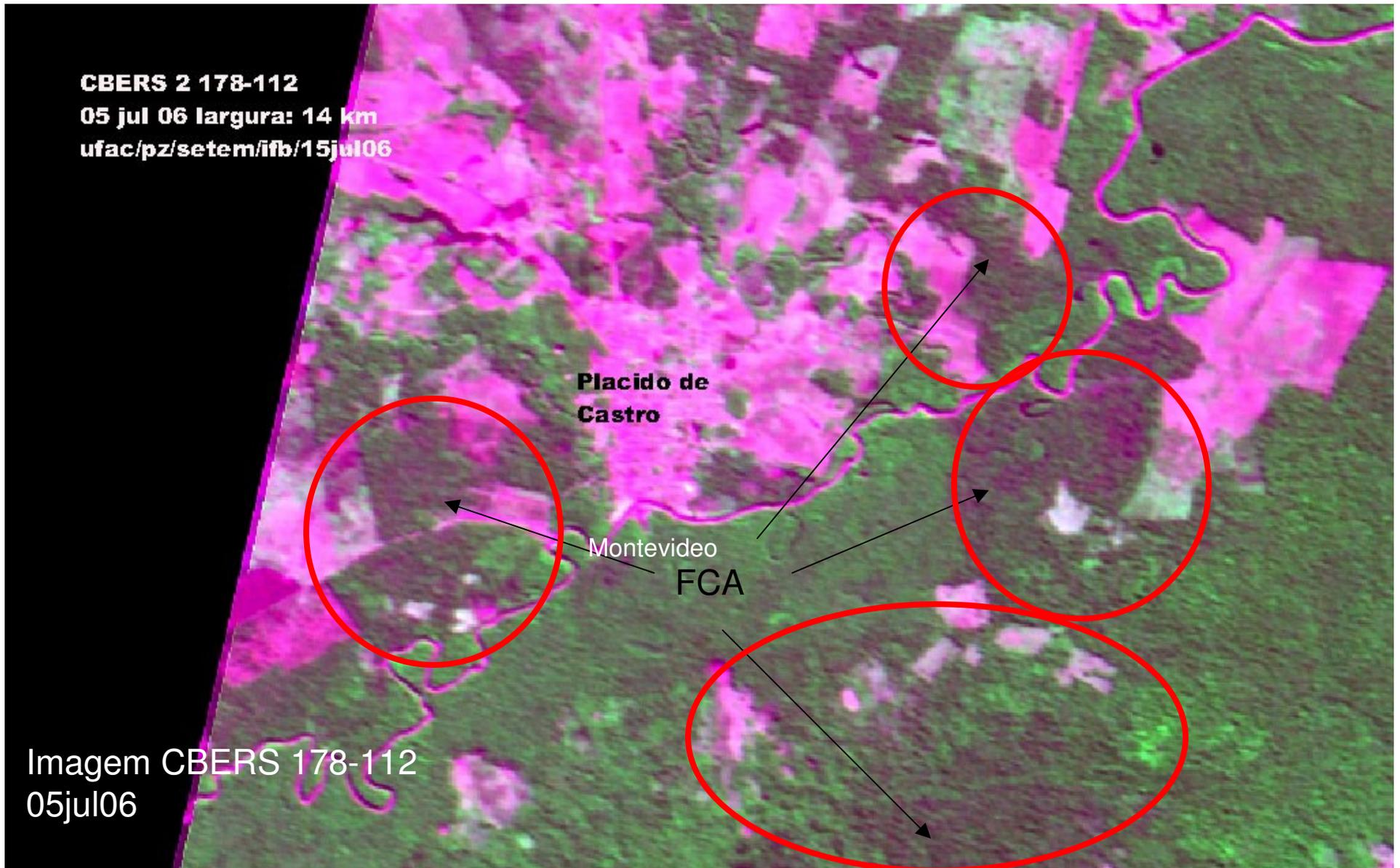
# Xapuri 12out05



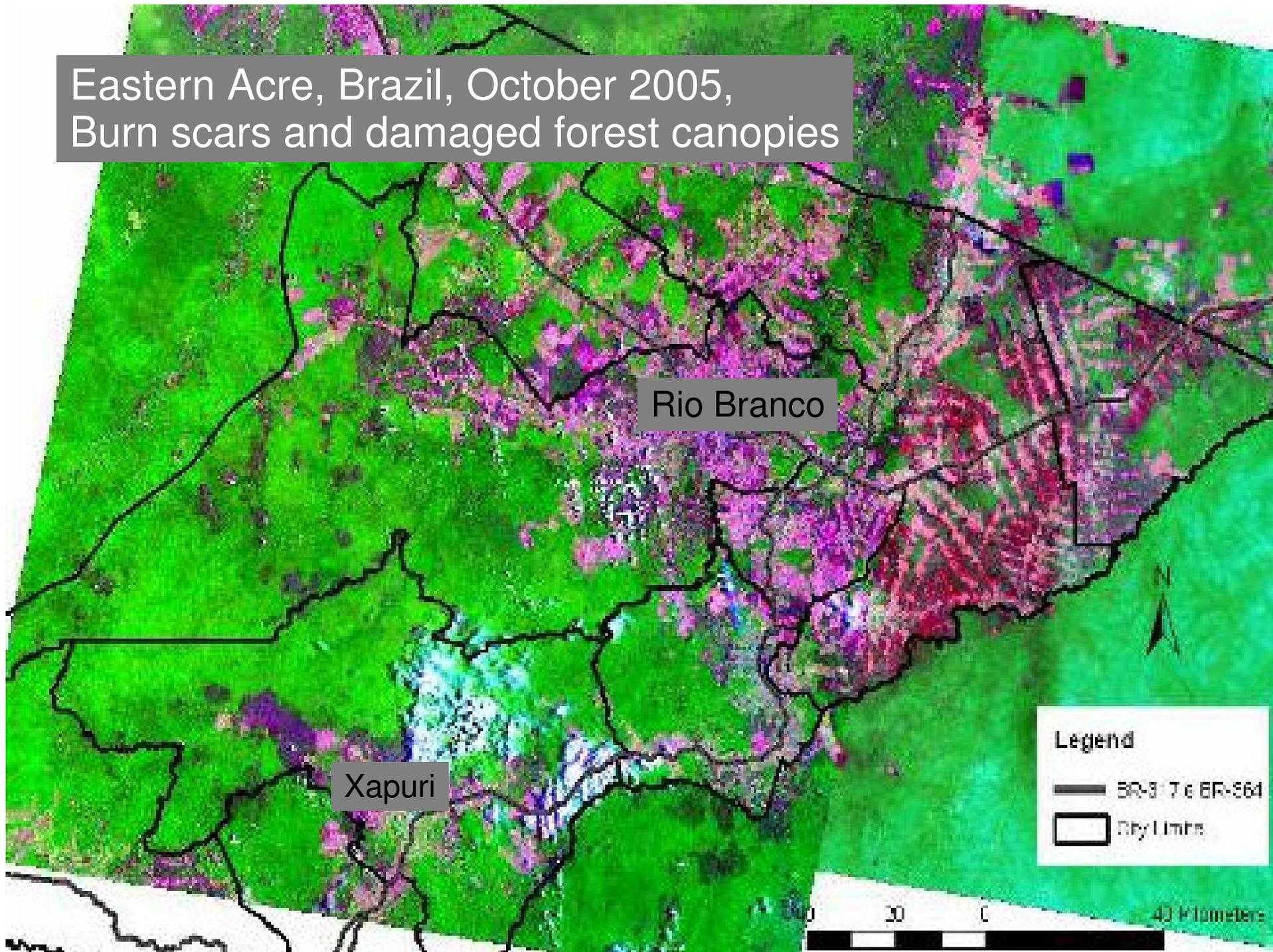
# The need for cross-boundary collaboration, forests with canopy damage along the Acre-Pando border (FCA) Plácido de Castro, Acre – Montevidео, Pando



Forests with canopy damage Plácido de Castro, Acre,  
Brasil, **8 months after the fires ( 05Jul06)**



Eastern Acre, Brazil, October 2005,  
Burn scars and damaged forest canopies

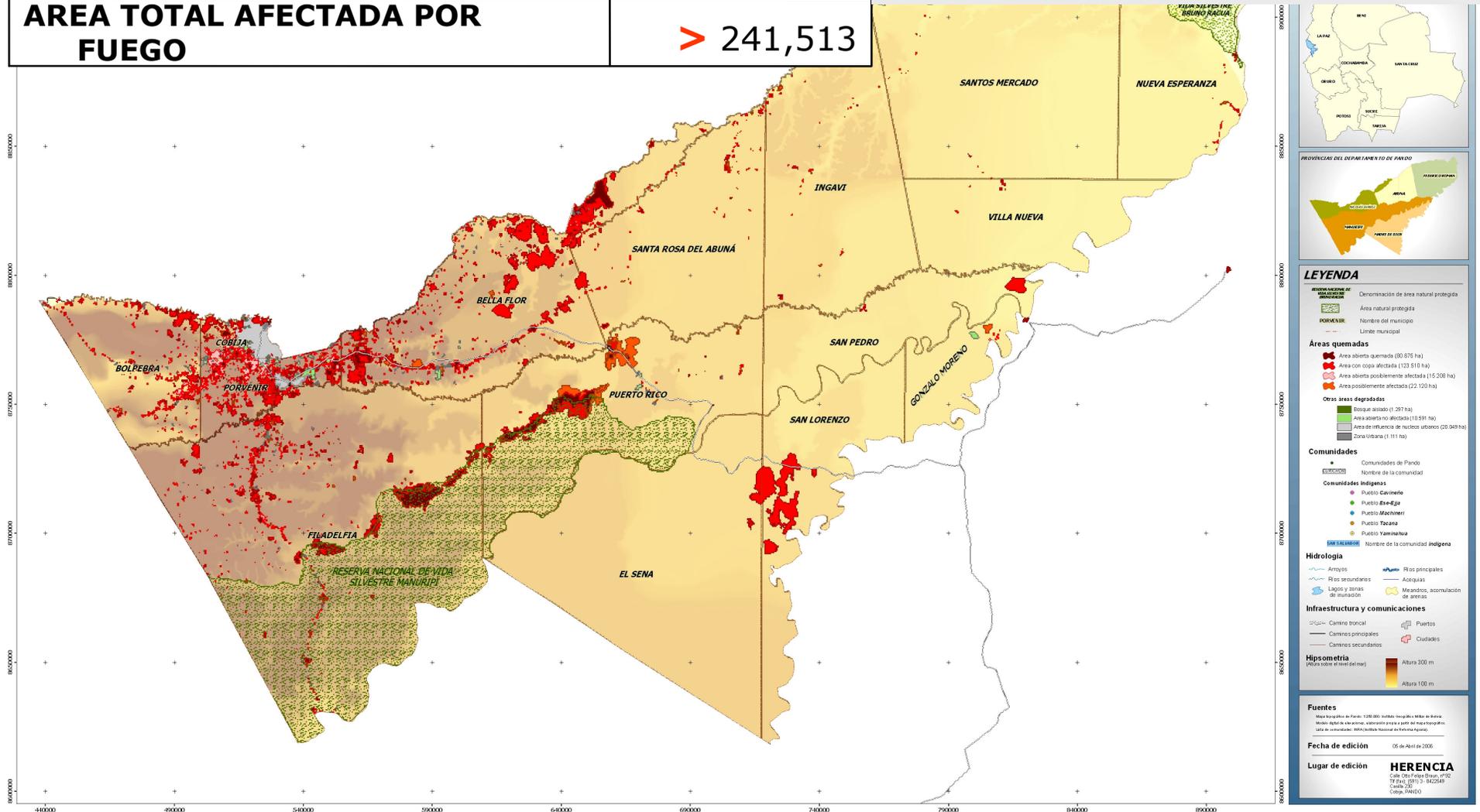


State of Acre affected by fires (FCA – Forests with canopy affected) in 2005 (Brown et al, 2006)

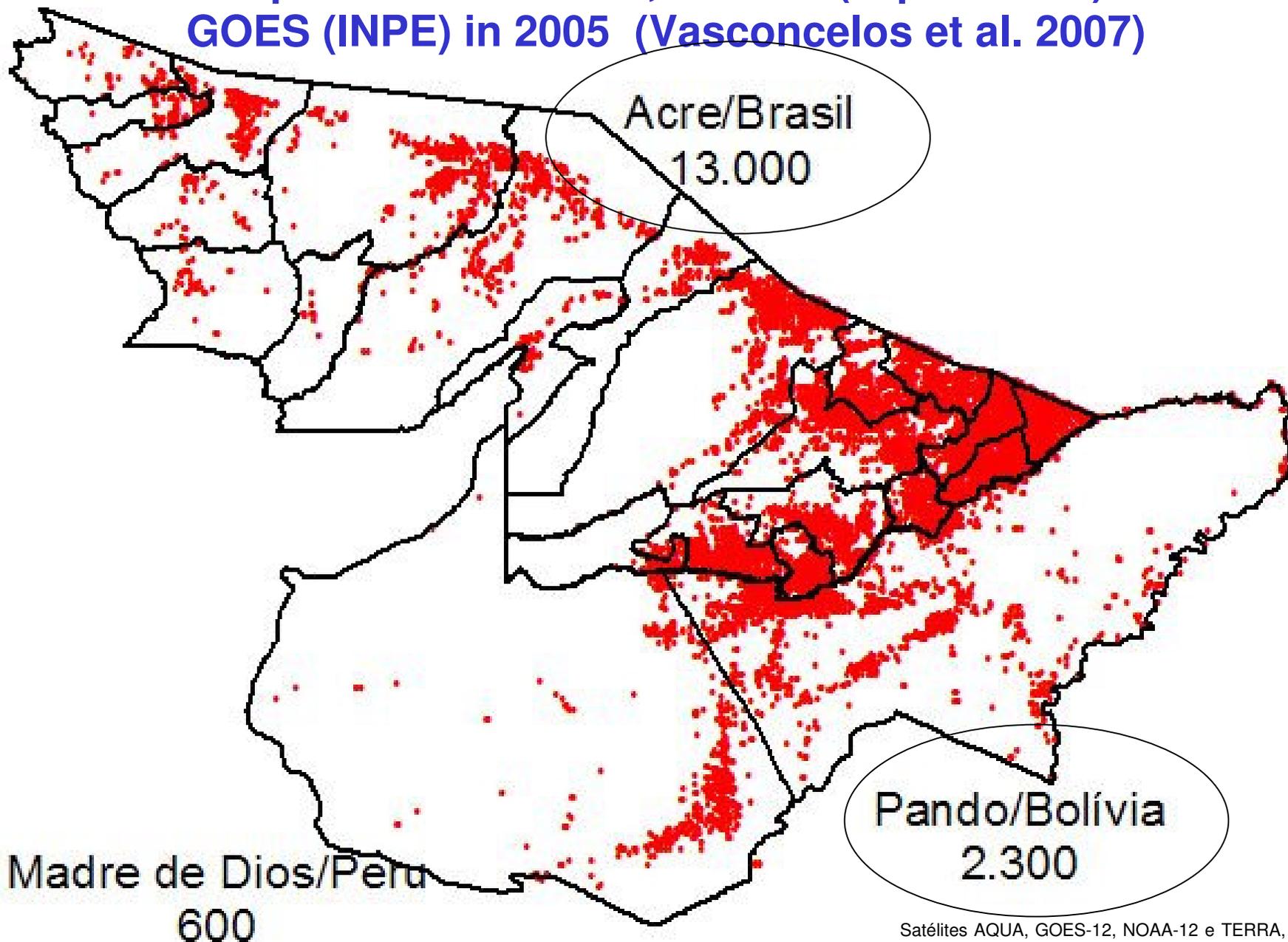
Regional	Municípios	Municipal Area (ha)	FCA (ha)	Open Area affected (ha)	Total of area affected (ha)	% Municipality affected
Lower Acre	Acrelândia	181,378	>24,000	>31,800	>55,800	>31%
	Bujari	303,729	>14,600	>33,100	>47,700	>16%
	Capixaba	169,650	>4,600	>500	>5,100	>3%
	Plácido de Castro	194,526	>31,400	>5,900	>37,300	>19%
	Porto Acre	260,888	>13,700	>11,200	>24,900	>9%
	Rio Branco	883,144	>66,100	>48,100	>114,200	>13%
	Senador Guiomard	232,063	>31,500	>4,700	>36,200	>16%
<b>Sub-Total</b>		<b>2,225,378</b>	<b>&gt;185,900</b>	<b>&gt;135,300</b>	<b>&gt;321,200</b>	<b>&gt;14%</b>
Upper Acre	Assis Brasil	497,663	>2,000	0	>2,000	>0,4%
	Brasiléia	391,828	>6,700	>17,500	>24,200	>6%
	Epitaciolândia	165,504	>8,900	>19,100	>28,000	>17%
	Xapuri	534,695	>40,400	>25,700	>66,100	>12%
<b>Sub-Total</b>		<b>1,589,691</b>	<b>&gt;58,000</b>	<b>&gt;62,300</b>	<b>&gt;120,300</b>	<b>&gt;7%</b>
Purus	Sena Madureira	2,373,174	>23,200	>5,600	>28,800	>1%
<b>Total</b>		<b>6,188,243</b>	<b>&gt;267,100</b>	<b>&gt;203,200</b>	<b>&gt;470,300</b>	<b>&gt;8%</b>

TIPO DE QUEMA	SUPERFICIE (ha)
Área abierta afectada	80,675
Área abierta posiblemente afectada	15,208
Área con copa afectada	123,510
Área posiblemente afectada	22,120
<b>AREA TOTAL AFECTADA POR FUEGO</b>	<b>&gt; 241,513</b>

Forest with canopy affected in Pando, Bolivia >120,000 ha (Cots et al. 2007)

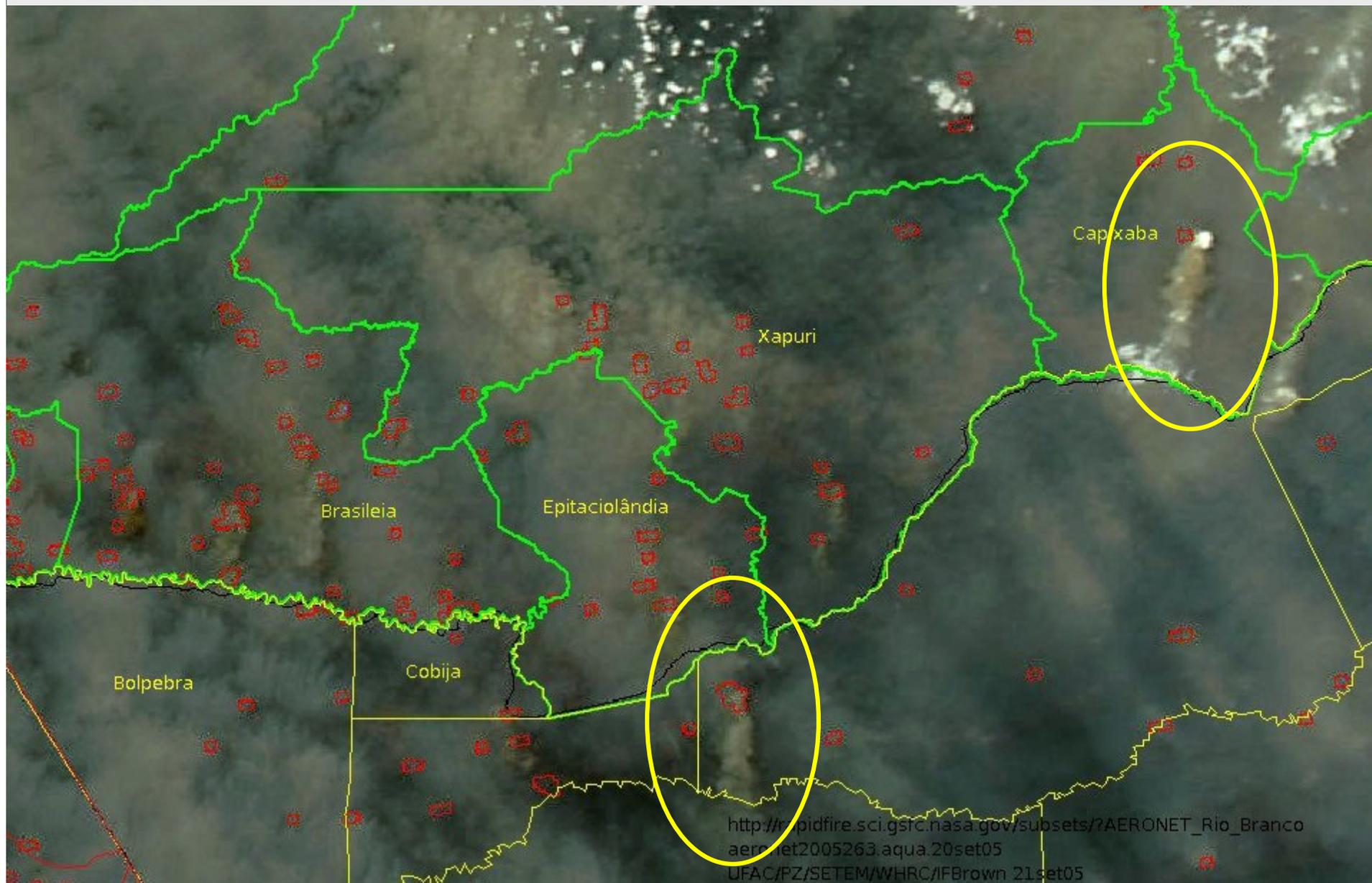


**Hot pixels of NOAA-12, MODIS (Aqua+Terra)  
GOES (INPE) in 2005 (Vasconcelos et al. 2007)**



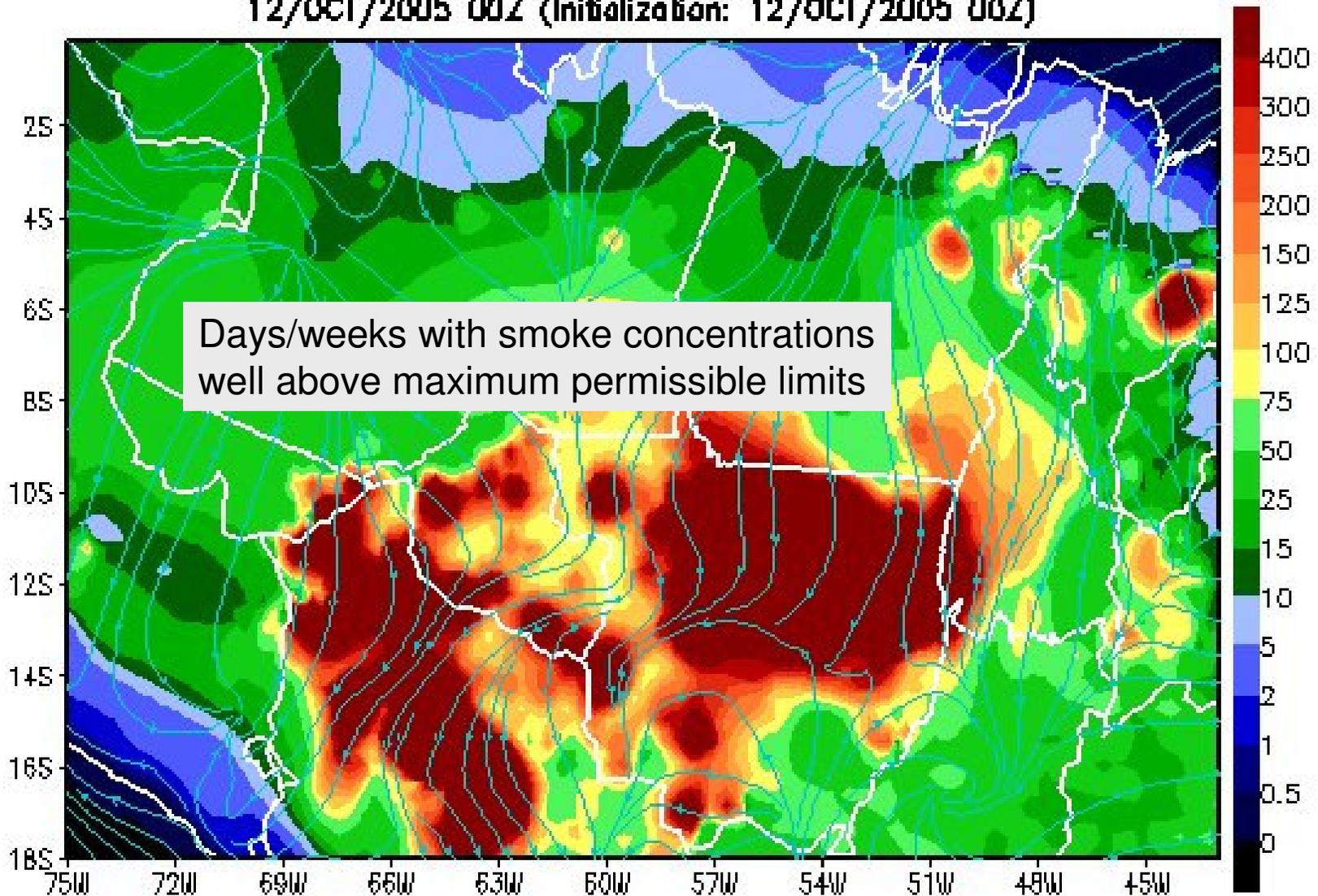
Satélites AQUA, GOES-12, NOAA-12 e TERRA,  
em 2005 na região MAP, Fonte:  
<http://www.dpi.inpe.br/proarco/bdqueimadas>

# Smoke in eastern Acre on 20Sep05, Modis/Terra



# Use of transport models (USP/CPTEC) to determine sources (Duarte et al. 2007)

CPTEC/INPE/MCT - MASTER/IAG/USP  
Vento e MP(dp<2.5um) ( $\mu\text{g}/\text{m}^3$ ) 72m  
12/OCT/2005 00Z (Initialization: 12/OCT/2005 00Z)



*Environmental and social costs are 'invisible' if they are not quantified and understood,  
another task for Human Dimensions of LBA II*

- Example: forests with canopies affected by fire, detected by CBERS and Landsat imagery.
- Acre: > 267,000 ha
- Pando: > 120,000 ha
- Madre de Dios: >> 20,000 ha
- Total: > 400,000 ha
- If the environmental impact was equal to the fine of 1,000 reals/ha (500 dollars/ha), the region became **180 million dollars poorer.**
- **Official AVADAN estimates: ~80 million dollars**

How much would society pay to reduce this loss of  $10^7$  to  $10^8$  dollars by half?

Ministra anuncia plano para recuperar áreas atingidas pelo fogo

**Minister announces plan to recuperate areas affected by fire**



Pagina 20 04oct05

MIN. MINISTRA MARINA SILVA E O GOVERNADOR JORGE VIANA EM SOBREVÔO À ÁREA

How much should be invested in risk reduction and adaptation?

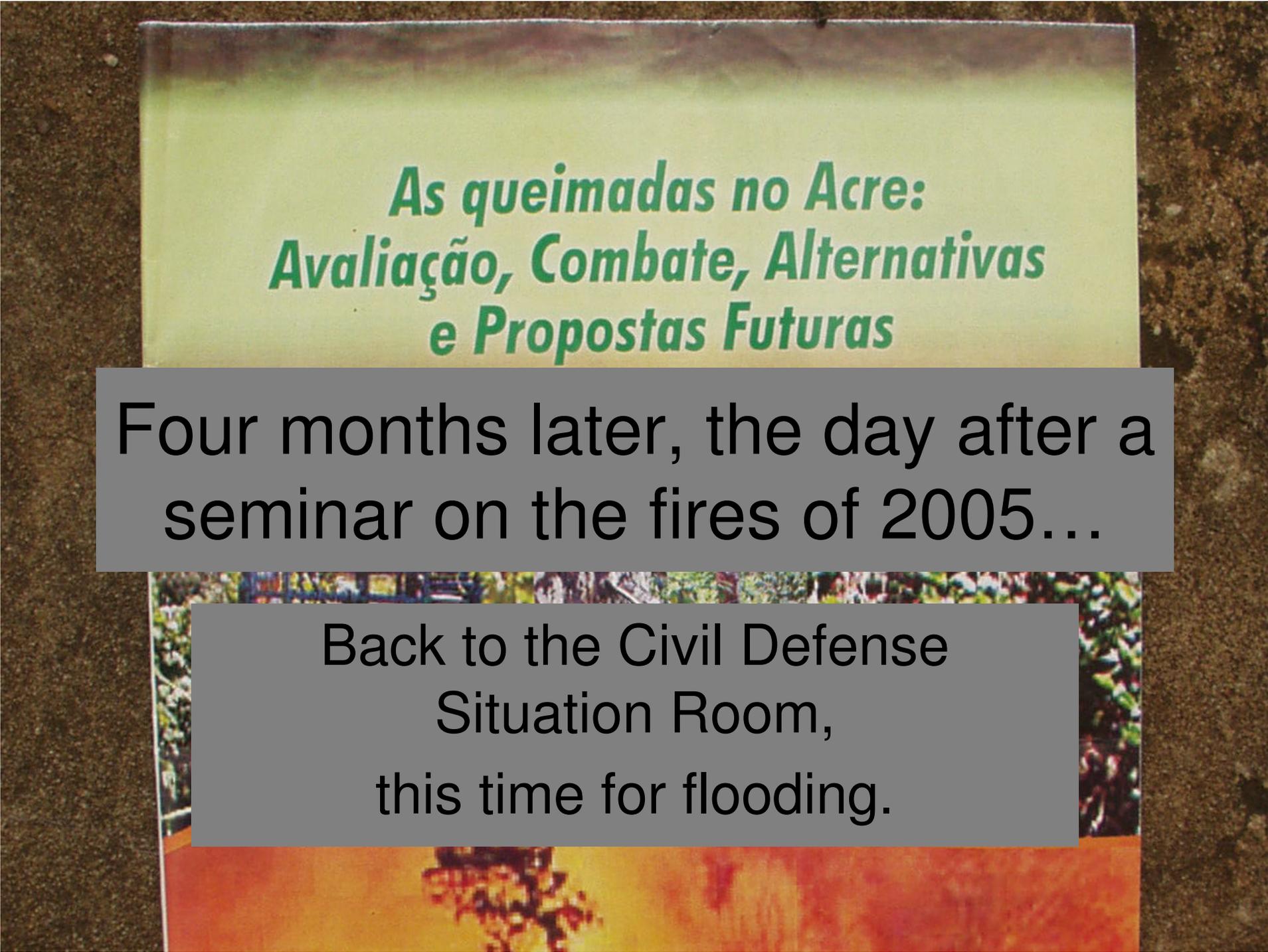
**Questions for Human Dimensions of LBA II**

# Results I

- The combined number of hot pixels for all satellites ([www.cptec,inpe,br/quiemadas](http://www.cptec.inpe.br/quiemadas)) is ~ half of the number of fire events in eastern Acre in late September and early October 2005 (Pantoja & Brown 2007).
- Hot pixel data detected few (~4%) forest fires (Pantoja & Brown 2007; Vasconcelos et al. 2007).
- Urgent need for inexpensive techniques that allow for real time location of forest fires.
- It was God, not firemen, that put out the forest fires, We didn't know where many (most?) were, One overflight per day was not enough.

Governor and Vice-Governor (now Governor) thank the LBA-Acre group for volunteering in October 2005





*As queimadas no Acre:  
Avaliação, Combate, Alternativas  
e Propostas Futuras*

Four months later, the day after a seminar on the fires of 2005...

Back to the Civil Defense Situation Room,  
this time for flooding.



# A GAZETA

20 Anos  
A GAZETA  
DE BEM COM O LEITOR

DIRETOR-GERAL: SEVIO MARTINELLO • RIO BRANCO, SEXTA-FEIRA, 17 DE FEVEREIRO DE 2006 • ANO XX, Nº 5.996 • Site: www.agazeta-acre.com.br • E-mail: agazeta@agazeta-acre.com.br

ACRE R\$ 1,50 - DISTRITO FEDERAL E OUTROS ESTADOS R\$ 2,00

## Mais de 20 mil pessoas são atingidas pelas enchentes em Rio Branco

More than 20 thousand persons affected by flooding in Rio Branco  
Gazeta, 17feb07 p,1





# Government creates science group to monitor rains and flooding

Dr, Alejandro Duarte, LBA-Acre, with emergency pluviometers

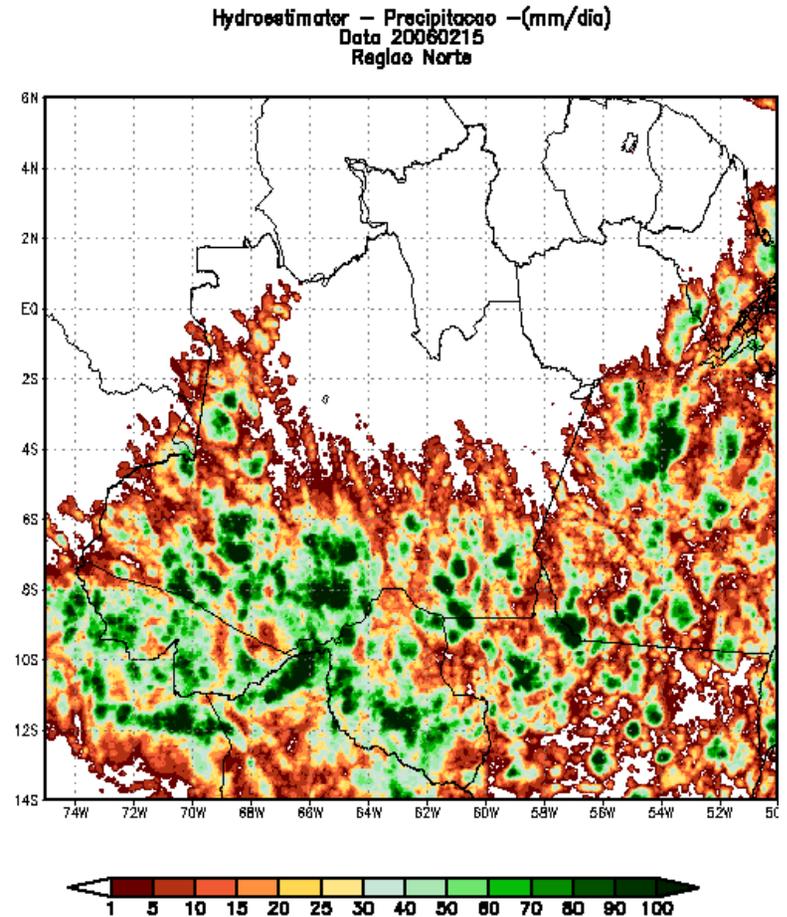
## Governo cria grupo de estudos científicos para monitorar as chuvas e as enchentes

O Governo do Estado, a Prefeitura de Rio Branco e Universidade Federal do Acre (Ufac) criaram ontem o que chamaram Sala de Situação no Quartel de Comando do Corpo de Bombeiros para monitorar o fenômeno das chuvas no Estado do Acre e da alagação em Rio Branco. Participam da Sala os cientistas especialistas em meio ambiente e meteorologia, como o norte-americano Irving Foster Braun e Alejandro Fonseca.

influenciando na ocorrência anormal de chuvas neste mês de fevereiro. Alejandro Fonseca avalia que uma convergência de umidade seja o principal fenômeno. Isso estaria provocando a prevalência de chuvas rápidas e sempre no período da tarde no Acre. O fenômeno está sendo criteriosamente avaliado pelo pesquisador. "Não é possível afirmar se a seca do ano passado tem alguma relação com o que está acontecendo este ano",

desta quinta-feira pelo governador Jorge Viana, que pediu o máximo de esforço possível para que a população sinta o menos possível os efeitos da alagação. O presidente do Instituto de Meio Ambiente do Acre (Imac), Edegar de Deus, também faz parte do grupo de cientistas e reafirmou o compromisso governamental de buscar todos os meios para mitigar os impactos da cheia na rotina da população. A Sala contém equipamentos tecnológicos que auxiliam no acompanhamento da situação.

Pagina20 p 13, 17feb07



# Results II

- More planning for risk reduction of disasters needed: we seem to be entering a period of extremes.
- Urgent need for greater network of pluviometers (now being addressed by Dr. Alejandro Duarte and by the State Civil Defense).
- More groups at state-level needed to analyze hydroestimator data for flooding alerts.
- River flow modeling necessary to improve predictions of flooding and water availability.

# From one extreme to another in early 2006

19Feb06

Rio Branco, flooding

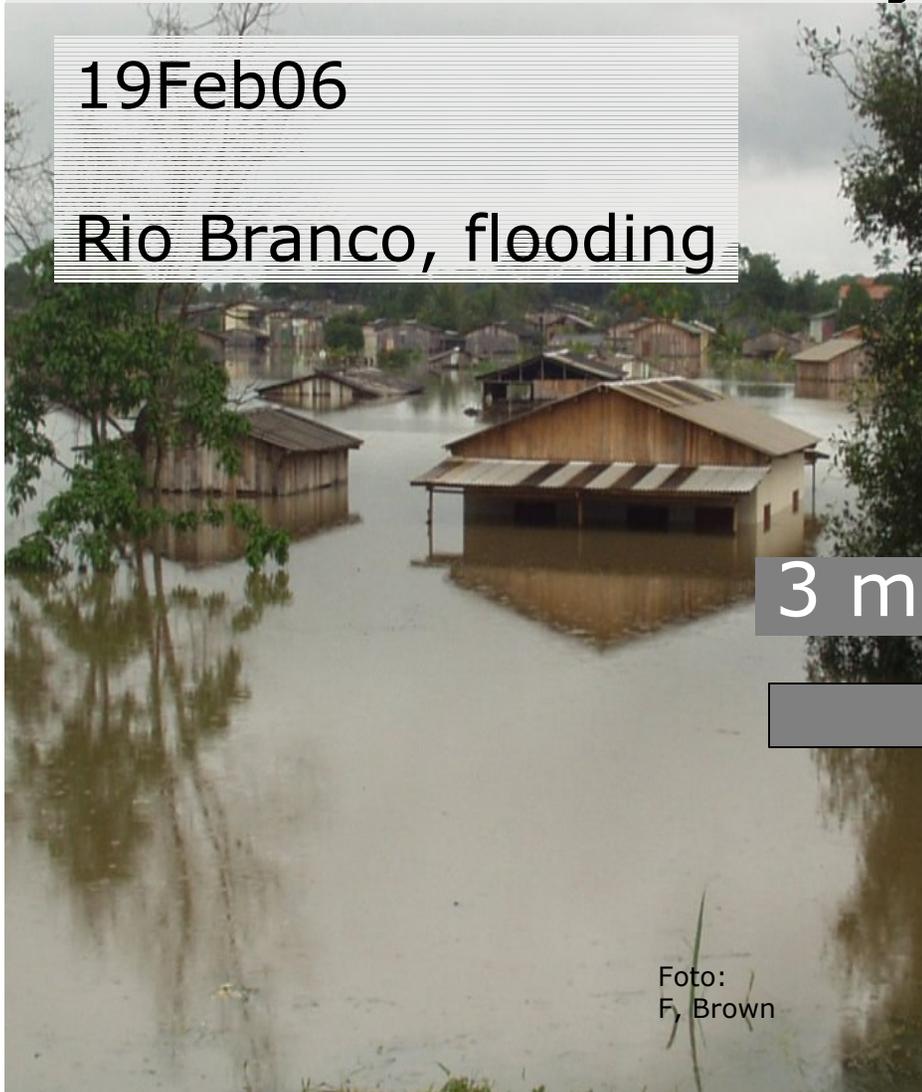


Foto:  
F. Brown

3 months



13May06 GAZETA p, 1  
Drop in water level below  
that of 2005

With a drought and memories of 2005, rural producers became nervous, as did the Public Ministry of Acre



- The Public Ministry of Acre requested LBA-Acre to coordinate a study of forests damaged by fires (now considered areas of risk) with professionals from FUNTAC, IBAMA, UFAC, WHRC, and U. Maryland involved, Result: Brown et al (2006).

Fire-damaged forests, increased dead wood fuel –  
enhanced risk for fires in subsequent years

Acrelândia 28jul06



**With more than 400,000 ha of forests damaged by fires in the MAP Region (> 267,000 ha in eastern Acre), the Public Ministry recommends suspension of burning on 25Jul06.**

# Página 20

O JORNAL MAIS PREMIADO DO ACRE

RIO BRANCO - ACRE - JORNAL DIÁRIO - ANO XII - Nº 3.043 - TERÇA-FEIRA, 25 DE JULHO DE 2006 - PREÇO DO EXEMPLAR - RS 1,50

## **INSTITUIÇÕES FAZEM RECOMENDAÇÃO CONJUNTA QUE PROÍBE A PRÁTICA DA QUEIMADA NO VALE DO ACRE**

Página 5

**P**ara evitar as queimadas descontroladas e incêndios florestais, o Ministério Público Estadual (MPE) fez uma recomendação conjunta com o Instituto Brasileiro de Meio Ambiente e Recursos Naturais Renováveis (Ibama) e Instituto de Meio Ambiente do Acre (Imac) para que eles

proibam o uso do fogo para prática de atividades de agricultura extensiva e pecuária, bem como para fins de limpeza ou recuperação de pasto em todo o Estado.

A recomendação é de que as queimadas sejam suspensas por 75 dias em todo o Vale do Acre (Acrelândia,

Bujari, Capixaba, Plácido de Castro, Porto Acre, Rio Branco, Senador Guiomard, Assis Brasil, Brasília Epitaciolândia e Xapuri) e em Sena Madureira, no Vale do Iaco. Os pequenos produtores familiares não estão incluídos na proibição porque dependem de seus roçados para sobreviver.

Simultaneous with suspension of burning, LBA-Acre helped in capacity-building of Civil Defense at the state and municipal levels in collaboration with FUNTAC, Rural Worker Unions, and the Public Ministry.



Acrelândia, jul/06



Seater/Bujarí - Funtac

LBA-Acre participated in collaborative monitoring of fires in 2006 with the Civil Defenses of Acre, Brazil and Pando, Bolivia.



West of Montevideo and Plácido de Castro, 09Aug06

Dissemination at the Brazilian Symposium of Remote Sensing in April 2007: 10 papers, 2 of which had first authors from the Public Ministry and the Civil Defense on the incorporation of RS techniques during the drought of 2005.



Articles available at:  
<http://www.dsr.inpe.br/sbsr2007/>



# Cross-boundary challenges in the MAP Region

Mitigation of adverse road impact

River basin management

# Letter of Intent

Proposal of regional governments (Madre de Dios, Acre, Pando) – 45+ million dollars to mitigate the impact of the Interoceanic highways,

Elsa Mendoza, facilitator, [elsa\\_mendoza@ipama.org.br](mailto:elsa_mendoza@ipama.org.br)

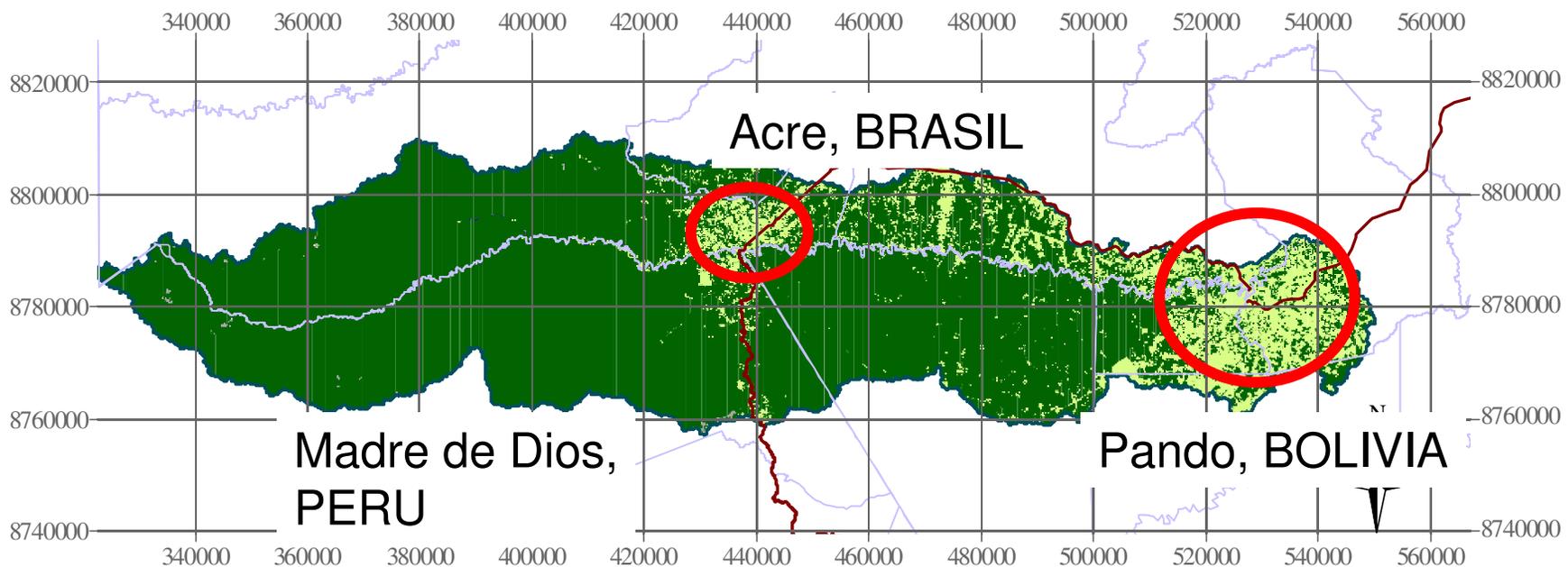


# BI- AND TR-INATIONAL RIVER BASINS IN THE MAP +UCAYALI REGION



**Fuentes:** SRTM/NASA, IMAC/ACRE  
**Software:** ArcGis  
**Informaciones:** SETEM/PZ/UFAC  
 55-68-3901-2691  
 setem@ufac.br  
**Fecha:** 03/07/2005  
**Cartografia:** Antonio Willian Flores de Melo

# Deforestation in the trinational Acre River Basin – impact on management plans



**13%** (1,014 km<sup>2</sup>) deforested, the greatest part (68%) in Brazil (Maldonado 2006)

# WORKING TOGETHER SO THAT LIFE IN THE ACRE RIVER WILL CONTINUE TO FLOW.

## Working Group (Brazilian component) for Acre River Basin Management:

ANA, MMA-SNRH, Ministério de Justiça,  
Ministério das Cidades, Min, da Defesa,  
Secretaria da Presidencia da Republica,  
Marinha do Brasil, Div, América Meridional  
II-MRE, CONDIAC, GTA, CTAC, Pesacre,  
MPE, PGE, UFAC, DEAS, IBAMA, IMAC,  
SEMEIA, FUNTAC – BR

Contact: Dr. Vera Reis,  
[vlreis.ac@uol.com.br](mailto:vlreis.ac@uol.com.br)



## ***Basic Education (grades 1-4) – Why?***

Change in a democratic society needs wide-spread participation with access to information, such as that generated by LBA.

- Median age of population in Acre ~20 years.
- 40% of adult population in Acre < 5 years of formal education.
- 20% of total population in grades 1-4, Steep drop-off after grade 4. (The pipeline narrows quickly.)

(Census data, 2000)

# PROJECT – CHILDREN’S FORESTS - FLOC

RESEARCH PROGRAM IN CONSERVATION AND NATURAL RESOURCE MANAGEMENT  
IN BASIC EDUCATION



UFAC, SEMECs Assis Brasil, Brasileia e Epitaciolândia



Teachers  
Ivanir e Zeila  
Assis Brasil, Acre  
2001

Implementation of the Children's Forests (Natural Resource Management) - now public policy of three Brazilian municipalities for about 80 rural schools > 1,000 children. Full program gradually being implemented.

Next step: Developing a global change program in urban and rural schools 1-8 grades of Assis Brasil, Brasileia and Epitaciolandia.

MAP Initiative began as an idea in June 1999 at a meeting to develop a program on global change related to land use in SW Amazonia.

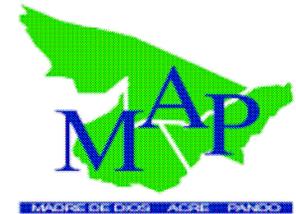


One recent result of the MAP Initiative was the Workshop in Pucallpa, Peru on Climate Change, 16-17 May 2007.



# 19 Recommendations for mitigation of and adaptation to climate change in SW Amazonia

## *Declaración de Pucallpa Sobre Cambio Climático y Amazonía Sudoccidental*



Los representantes de las organizaciones e instituciones y personas presentes en el Taller Sub Regional sobre Cambio Climático y Amazonia<sup>1</sup>, realizado los días 16 y 17 de Mayo del 2007 en la ciudad de Pucallpa, Perú, expresamos por intermedio de esta declaración nuestra profunda preocupación por los impactos del cambio climático en la Región **MAP** (**M**adre de Dios-Perú, **A**cre-Brasil y **P**ando-Bolivia) y Ucayali-Perú, así como por el ecosistema amazónico como un todo. Reconocemos la urgencia de implementar mecanismos que permitan la disminución de las emisiones de gases de efecto invernadero (GEI) y que, de forma simultánea, promuevan el desarrollo sostenible regional.

## FOLLOW-UPS

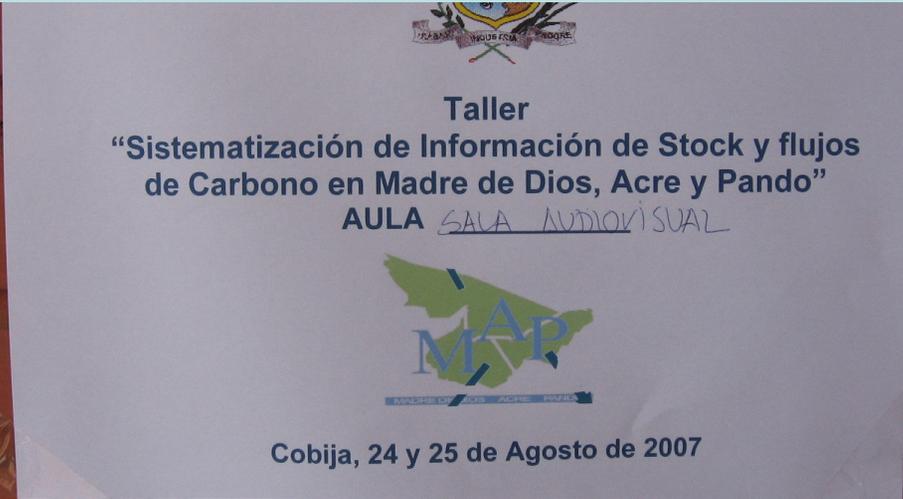
### Short course on **Climate Change And Reduced Emissions from Deforestation and Degradation (REDD)**

National Amazonian University of Madre de Dios (UNAMAD), 25-26Jul07, Puerto Maldonado, Madre de Dios, Peru.



**Mini-MAP Remote Sensing**, First Meeting, 6-7May07, Amazonian University of Pando (UAP), Cobija, Pando, Bolivia.

Workshop on Carbon Stocks and Flows in the MAP Region,  
Cobija, Pando, Bolivia 24Aug07: ***Please get your data sets  
in order – Amazonian countries may need them for REDD.***



Taller  
"Sistematización de Información de Stock y flujos  
de Carbono en Madre de Dios, Acre y Pando"  
AULA SALA AUDIODIVISUAL



Cobija, 24 y 25 de Agosto de 2007



MAP VII Forum to take place 15-17 November  
in Epitaciolândia and Brasileia, Acre.

Theme:  
*Global Change:  
local societies  
designing  
regional solutions.*

*Come and  
participate!*



VII FORUM TRINACIONAL  
MUDANÇAS GLOBAIS:

Sociedades locais desenhando soluções regionais  
MADRE DE DIOS-PERU, ACRE-BRASIL, PANDO-BOLIVIA.  
Epitaciolândia – Brasileia – Acre, 15 a 17 de novembro de 2007.



# Conclusions

- Given the utilitarian justification for LBA, **generation** of knowledge needs to be followed by **dissemination**, providing the critical information to those who need it for public policy or local land use decisions.
- Dissemination needs to be planned and budgeted, but serendipity often rules.
- To address issues of adaptation to climate change, state civil defense organizations and the LBA science community can be natural partners.

Epilogue – regional integration via a thousand-kilometer plume of smoke, Bolivia –Peru – Brazil. 25Sep07.

