Monitoramento Ambiental e Florestal

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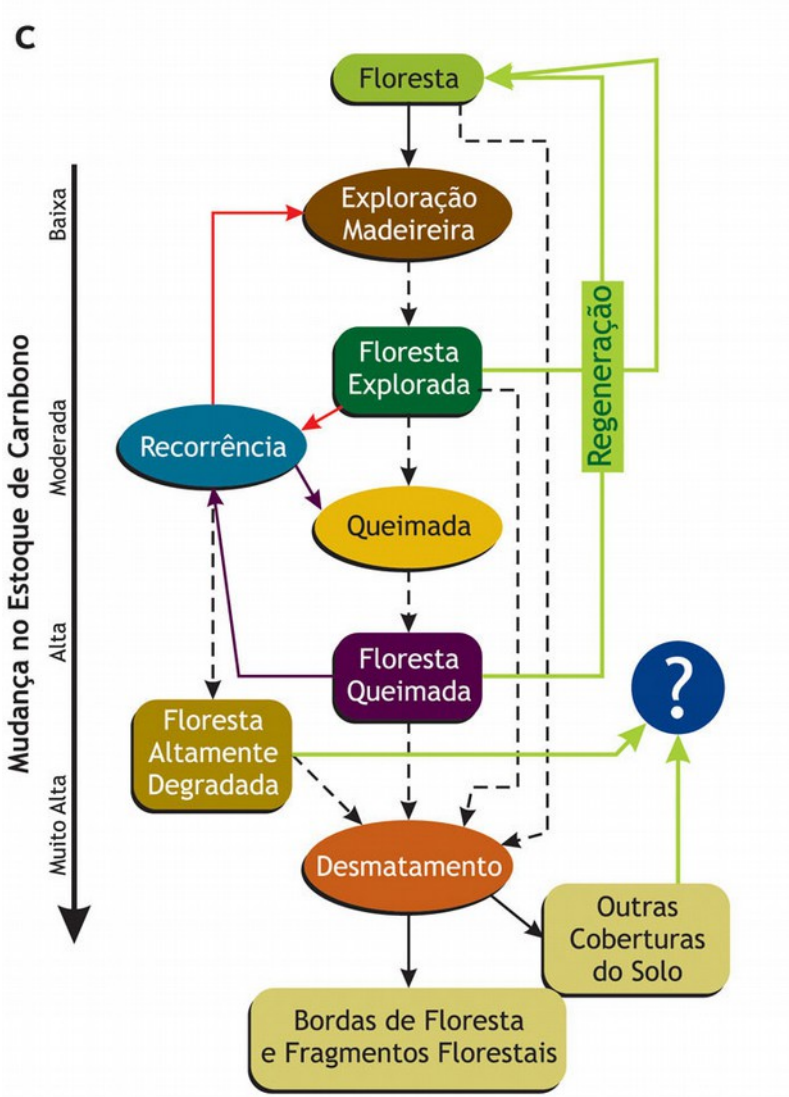
MONGABAY.COM Next big idea in forest conservation?

ideiasparaomonitoramentoambientaleflorestal

1. Monitorandoahistóriado pixel
2. ‘Clouds”paraoprocessamentodeimagens:
   - Google Earth Engine (EE)
   - SAD EE
   - Global Forest Watch
   - SAD+
3. Monitoramentocolaborativo(*crowdsourcing*)

http://news.mongabay.com/2014/0425-forestinnovation-kimbrough-souza.html

Monitorandoahistóriado pixel...



Souza Jr. et al. (RemoteSens. 2013, 5, 5493-5513;doi:10.3390/rs5115493)

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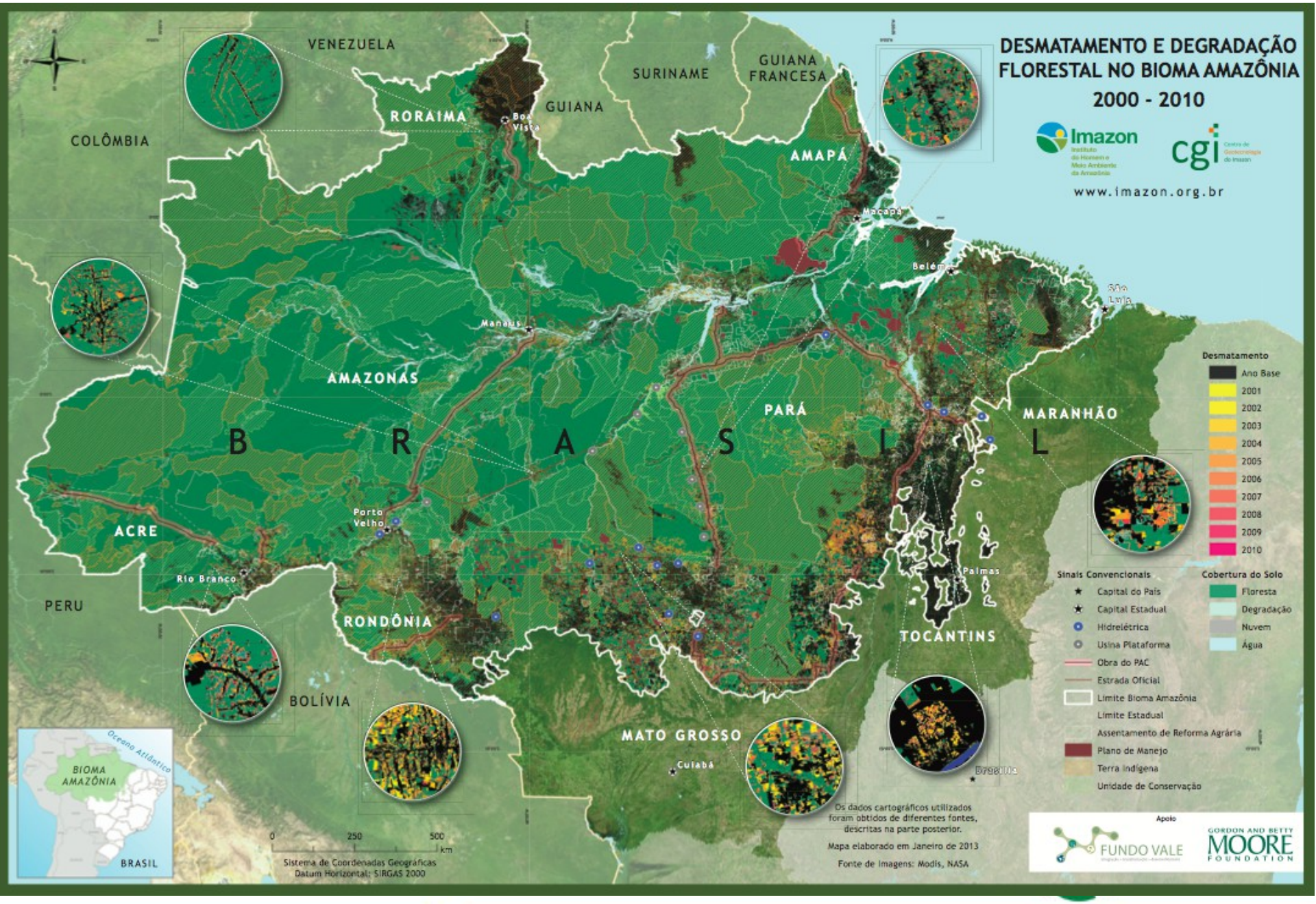
DESMATAMENTO E DEGRADAÇÃO FLORESTAL NO BIOMA AMAZÔNIA
2000 - 2010
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cgi
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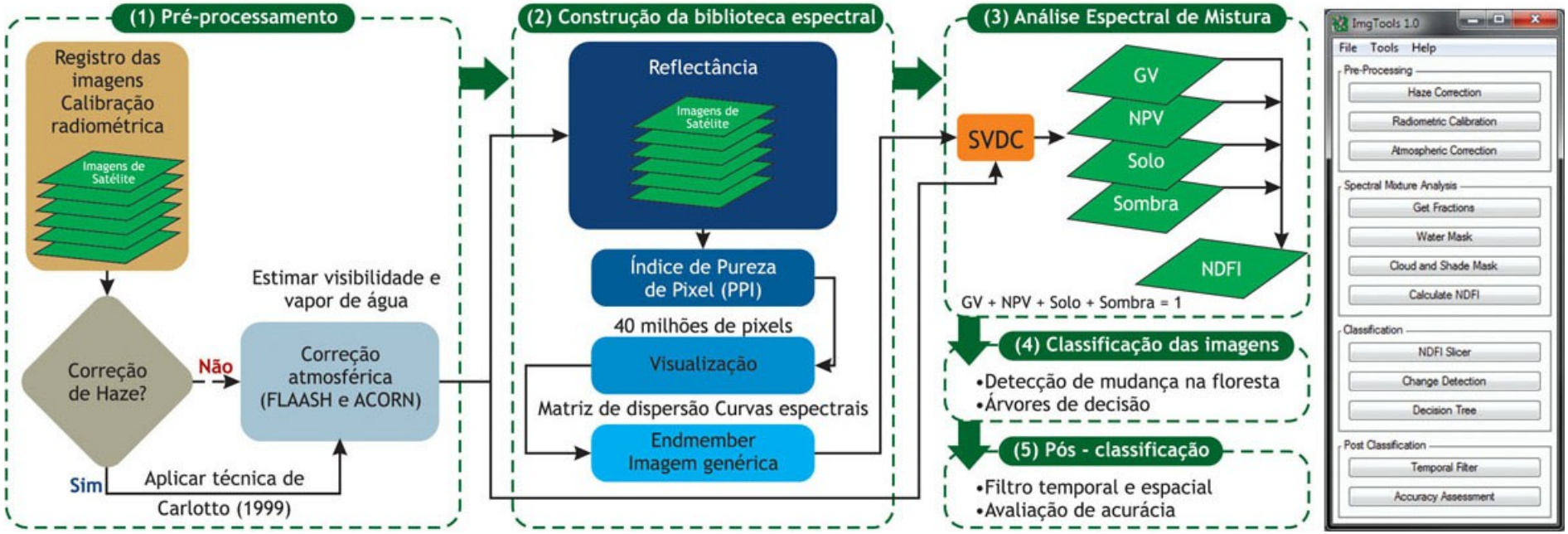
VENEZUELA
COLÔMBIA
PERU
BOLÍVIA
SURINAME
GUIANA FRANCESA
GUIANA
RORAIMA
Boa Vista
AMAPÁ
Macapá
Belém
São Luís
Manaus
AMAZONAS
PARÁ
MARANHÃO
B R A S I L
ACRE
Porto Velho
Rio Branco
RONDÔNIA
TOCANTINS
Palmas
MATO GROSSO
Cuiabá
Brasília
Desmatamento
Ano Base
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Sinais Convencionais
Capital do País
Capital Estadual
Hidrelétrica
Usina Plataforma
Obra do PAC
Estrada Oficial
Limite Bioma Amazônia
Limite Estadual
Assentamento de Reforma Agrária
Plano de Manejo
Terra Indígena
Unidade de Conservação
Cobertura do Solo
Floresta
Degradação
Nuvem
Água
Oceano Atlântico
BIOMA AMAZÔNIA
BRASIL
0 250 500 km
Sistema de Coordenadas Geográficas
Datum Horizontal: SIRGAS 2000
Os dados cartográficos utilizados foram obtidos de diferentes fontes, descritas na parte posterior.
Mapa elaborado em Janeiro de 2013
Fonte de Imagens: Modis, NASA
Apoio
FUNDO VALE
GORDON AND BETTY MOORE FOUNDATION

ImgToolsSoftware



Souza Jr., et al., (2005); Souza Jr. et al., (2013); Souza Jr. eSiqueira(2013)

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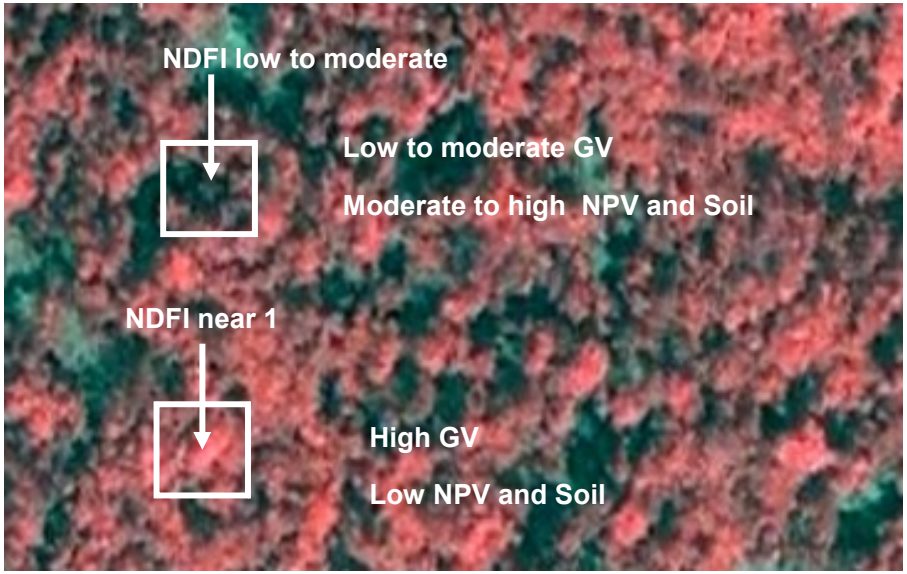
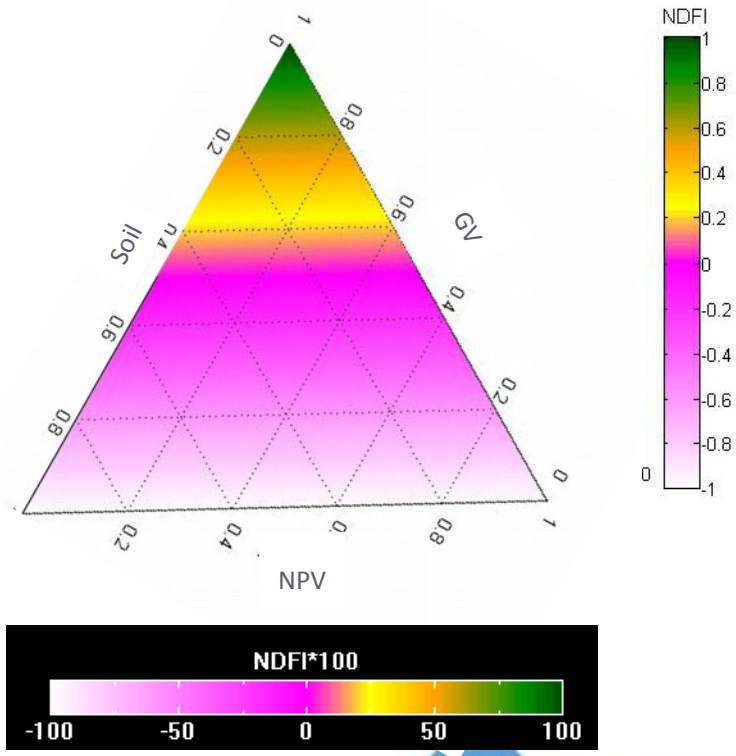
Modelagem Espectral de Mistura e NDFI

$$NDFI = \frac{GV_{Shade} - (NPV + Soil)}{GV_{Shade} + NPV + Soil}$$

$$GV_{Shade} = \frac{GV}{100 - Shade}$$

$$-1 \leq NDFI \leq 1$$





Souza Jr.et. Al (2005), RSE

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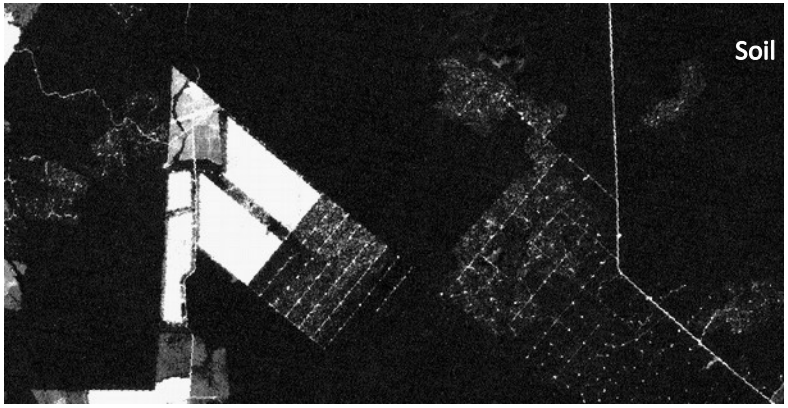
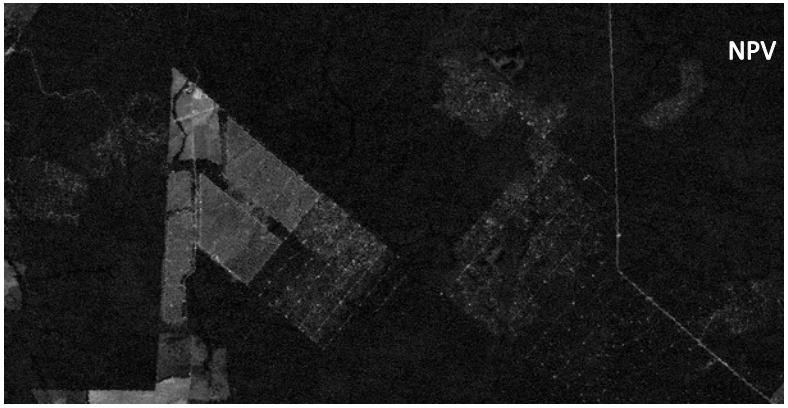
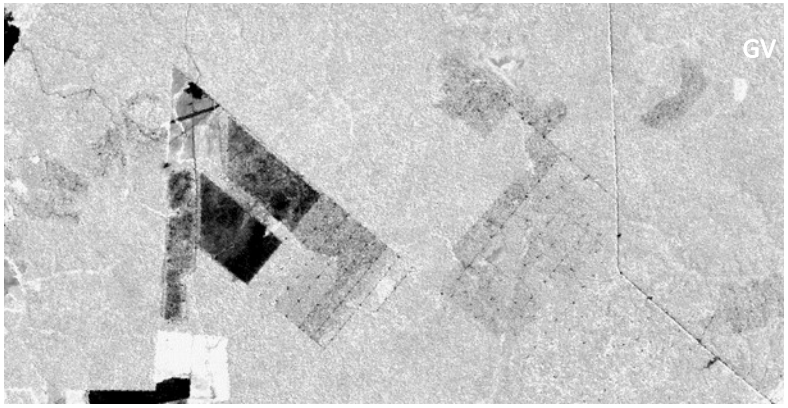
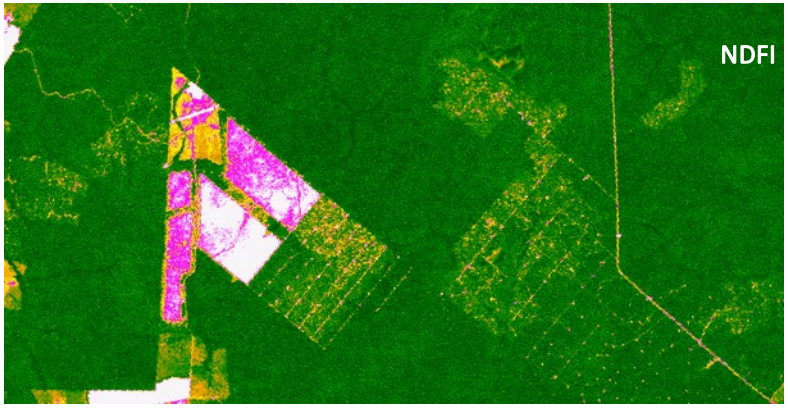
ImagensFraçãoe NDFI

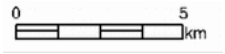
a) Paragominas,Pará State - 223/62

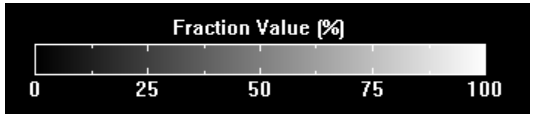


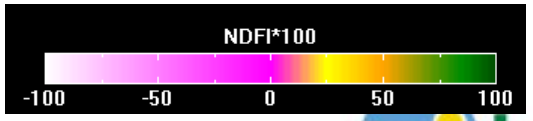












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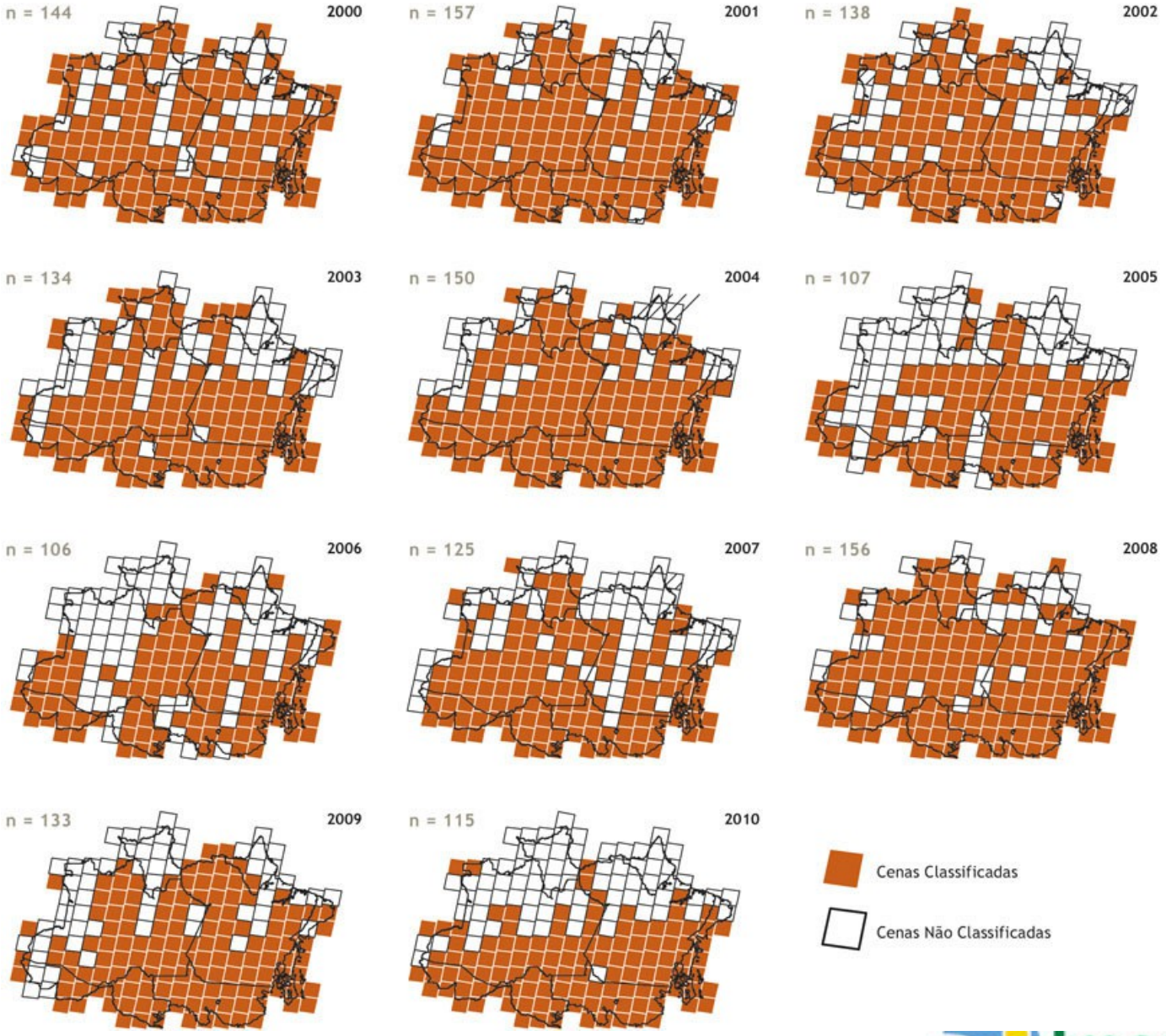
Abrangência doMapeamento



Souza Jr. et al., (2013), Remote Sensing

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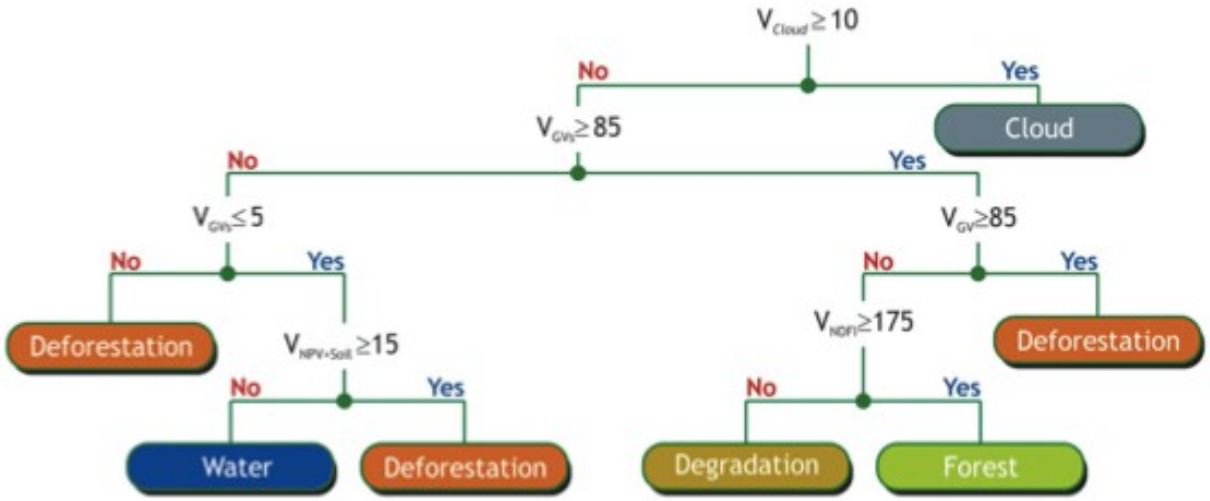
ÁrvoredeDecisão
(*KnowledgebasedDecisionTree)*

Figure 4. Empirical decision tree used for classifying deforestation and forest degradation. NDFI variable was rescaled to 0–200, meaning that $V_{NDFI} \geq 175$ translates to $V_{NDFI} \geq 0.75$.



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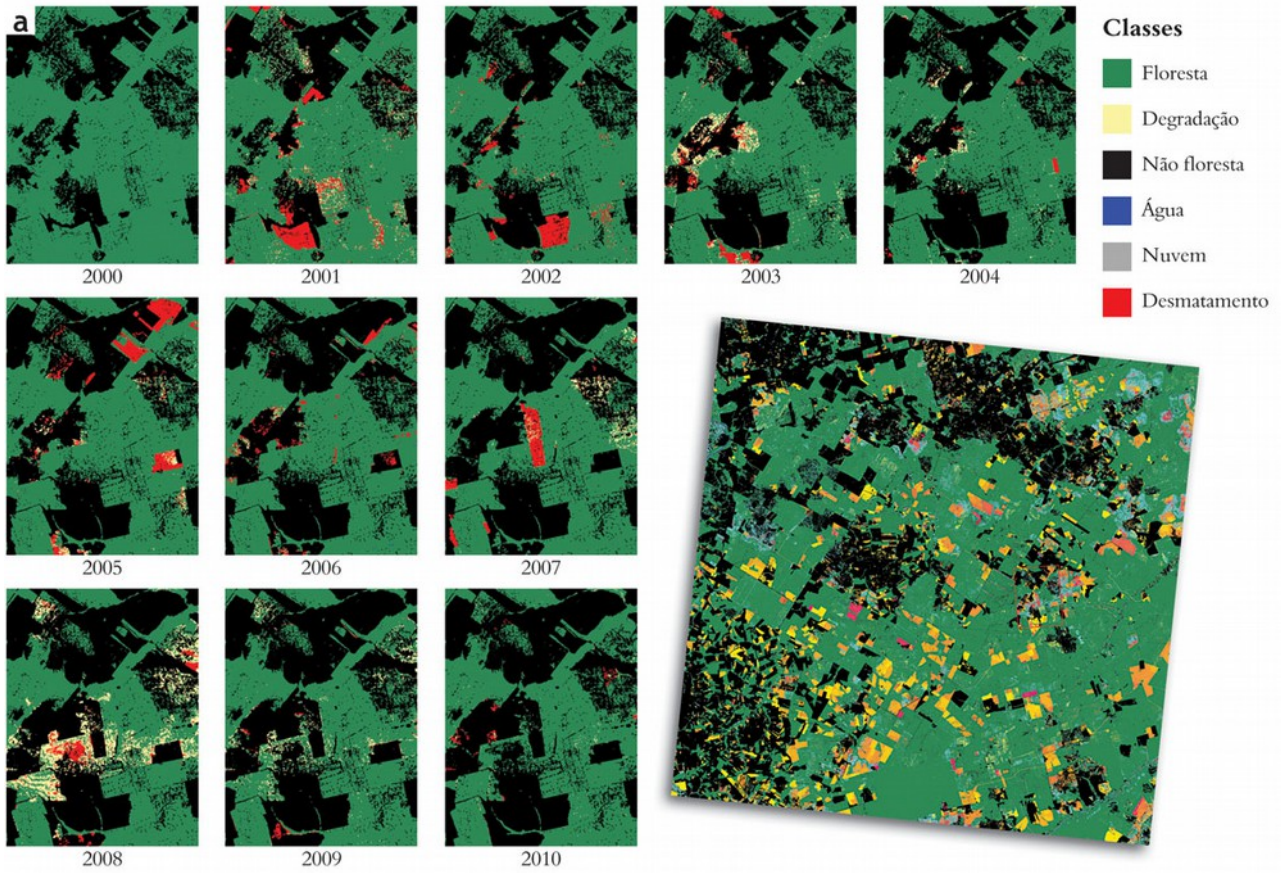
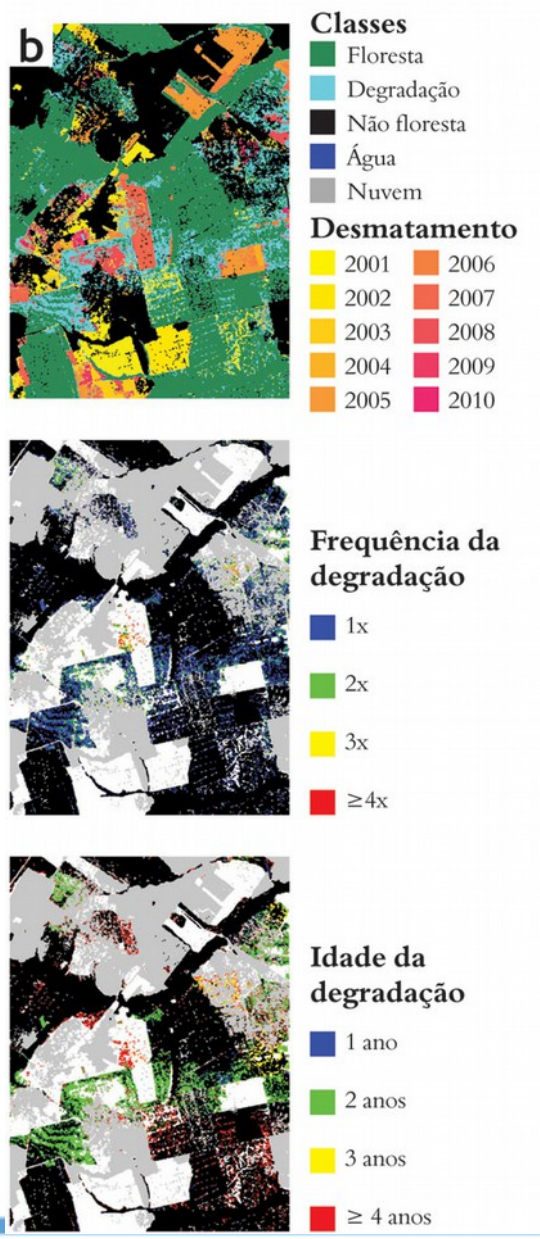
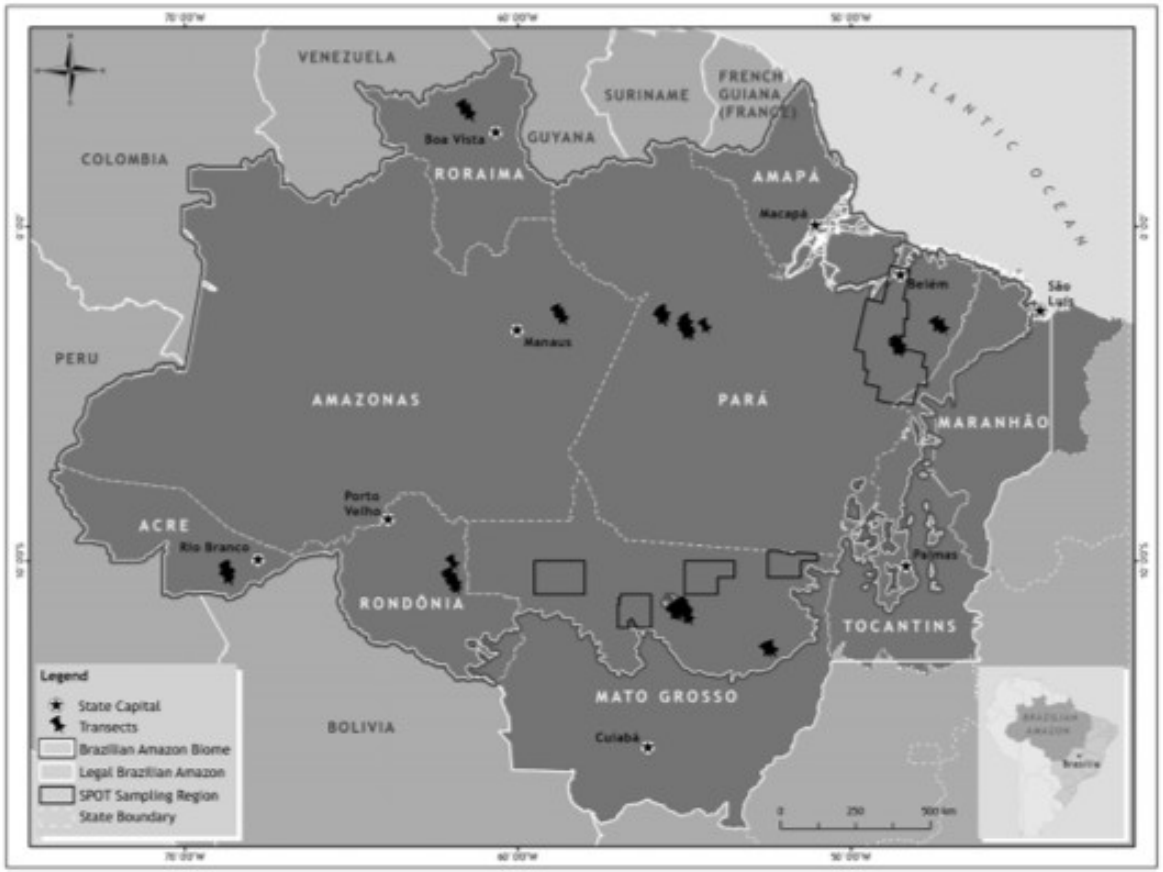
DinâmicadaCoberturaFlorestal





AnálisedeAcurácia

Figure 5. Location of SPOT very high-resolution imagery and forest transects used for accuracy assessment of forest, deforestation and forest degradation classes.



Souza Jr. et al., (2013), Remote Sensing

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Table 1. Accuracy assessment of the classification results using high spatial resolution SPOT data only (**a**), SPOT and forest transects (**b**) and the impact of applying corrections to the SPOT reference data on the accuracy results (**c**).

(a)

Reference Data (SPOT)

Land Cover Class	Forest	Degradation	Deforestation	Row Total	User's Accuracy	User's Standard Deviation
Forest	884	2	22	908	0.97	0.006
Degradation	6	20	14	40	0.50	0.080
Deforestation	60	14	432	506	0.85	0.016
Column Total	950	36	468	1,454	-	-
Producer's Accuracy	0.93	0.56	0.92	-	-	-
Producer's Standard Deviation	0.008	0.084	0.013	-	-	-
Overall Accuracy = 0.92 (0.007)						

(b)

Reference Data (SPOT + Transects)

Land Cover Class	Forest	Degradation	Deforestation	Row Total	User's Accuracy	User's Standard Deviation
Forest	942	11	22	975	0.97	0.005
Degradation	8	102	14	124	0.82	0.035
Deforestation	60	14	432	506	0.85	0.016
Column Total	1,010	127	468	1,605	-	-
Producer's Accuracy	0.93	0.80	0.92	-	-	-
Producer's Standard Deviation	0.008	0.036	0.013	-	-	-
Overall Accuracy = 0.92 (0.007)						

Souza Jr. et al., (2013), Remote Sensing

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(c)

Influence of Reference Data (SPOT) "Corrections" on Map Accuracy

Version	Correction to Reference Data Set	Number of Samples	% Overall Agreement
1	None	1,725	0.79
2	Geocorrection	1,644	0.83
3	Geocorrection; Map edge	1,600	0.86
4	Geocorrection; Mixed pixel; Map edge	1,594	0.86
5	Geocorrection; Change pixel	1,502	0.89
6	Geocorrection; Change pixel; Mixed pixel	1,498	0.89
7	Geocorrection; Change pixel; Mixed pixel; Map edge	1,454	0.92

Excluded Samples

Reason for Exclusion	Number of Samples
No Data	3
Geocorrection	81
Change pixel	142
Mixed pixel	4
Map edge	44
Cloud	21
Water	231

Souza Jr. et al., (2013), Remote Sensing

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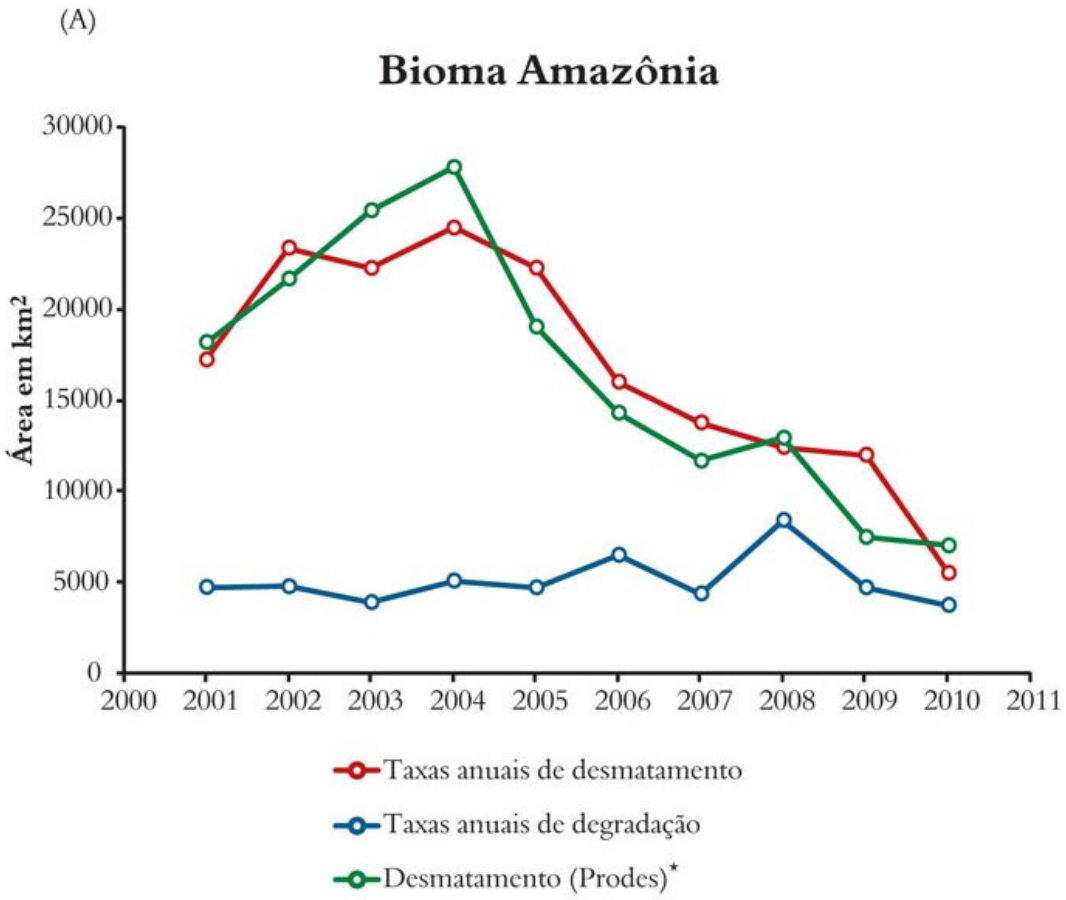
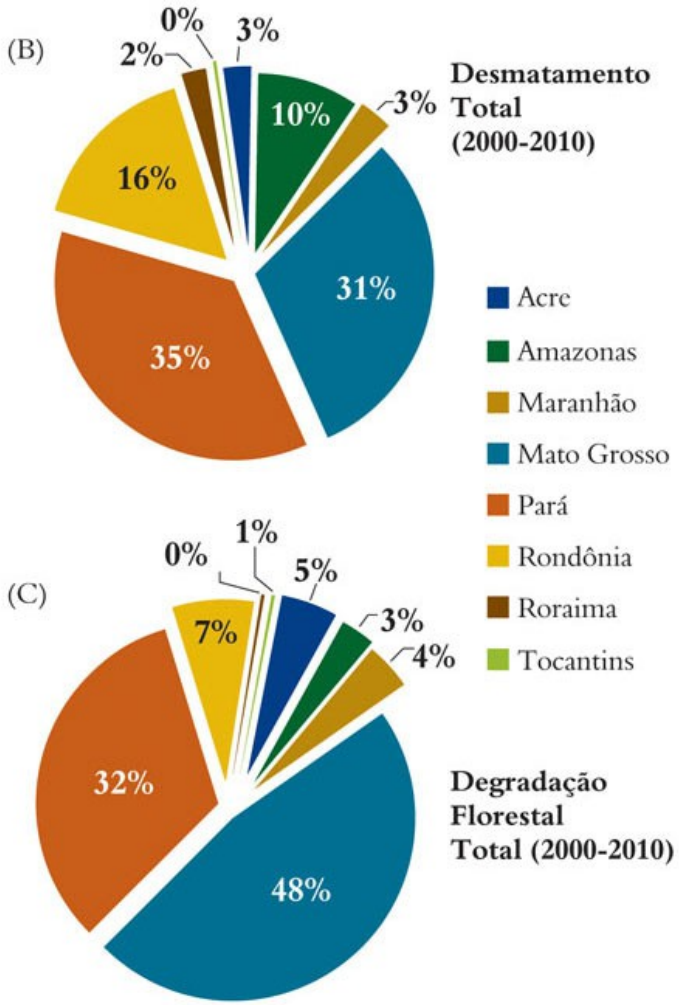
Resultados





* Fonte: Instituto Nacional de Pesquisas Espaciais - INPE (http://www.obt.inpe.br/prodes/prodes_1988_2012.htm)

Souza Jr. et al., (2013), Remote Sensing

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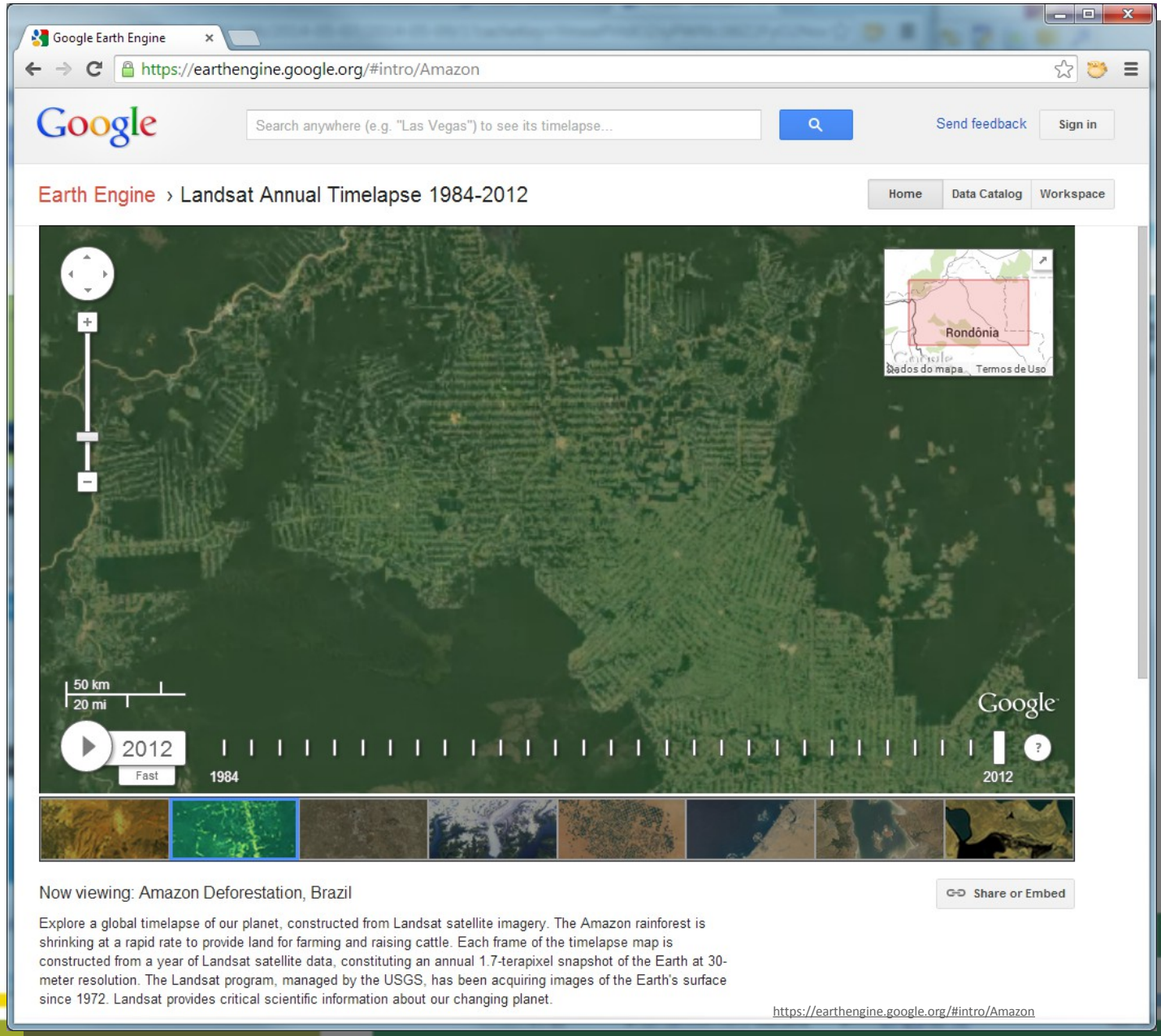
NovasPlataformasdeMonitoramento: Google Earth Engine



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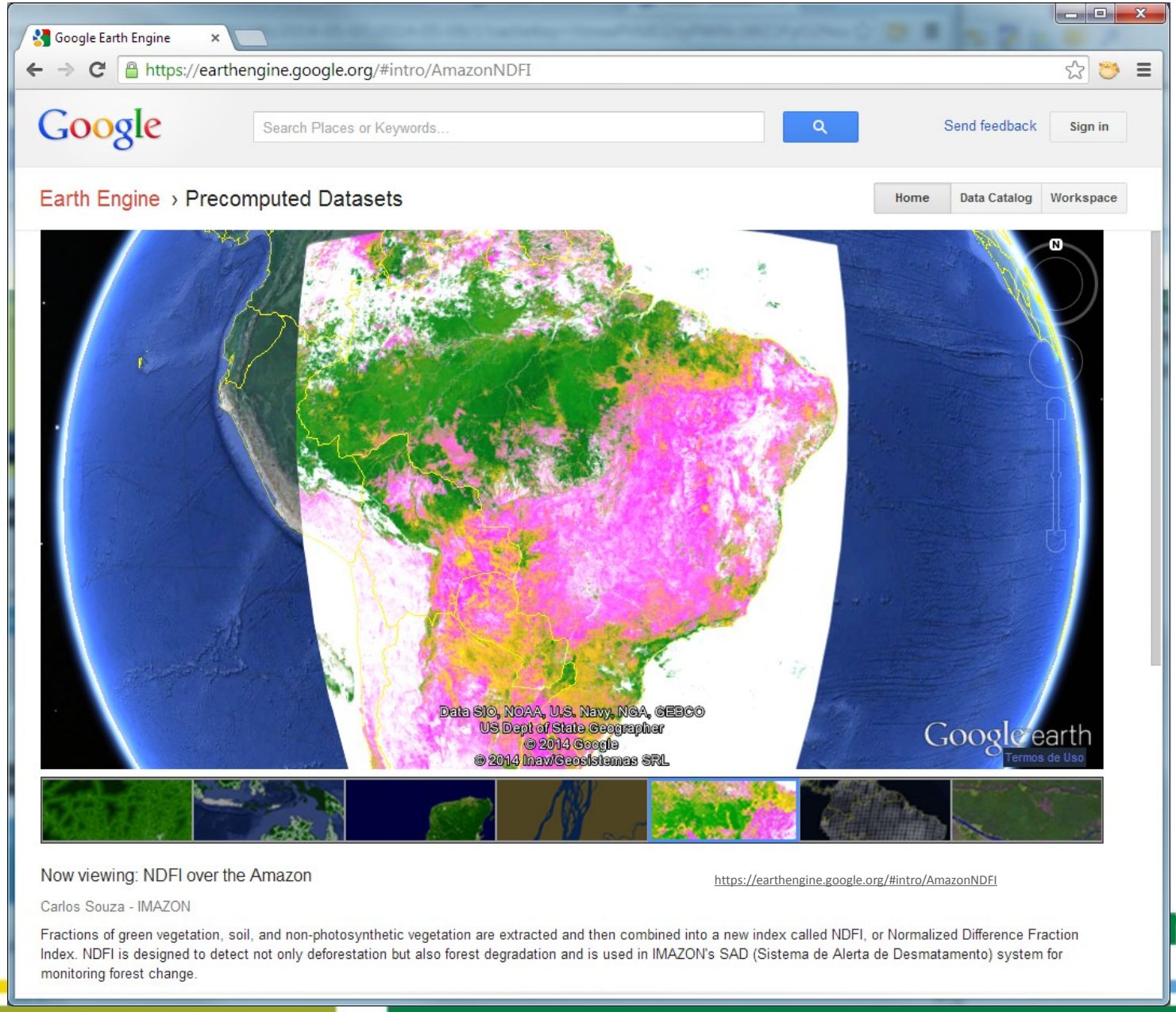
NovasPlataformasdeMonitoramento: Google Earth Engine



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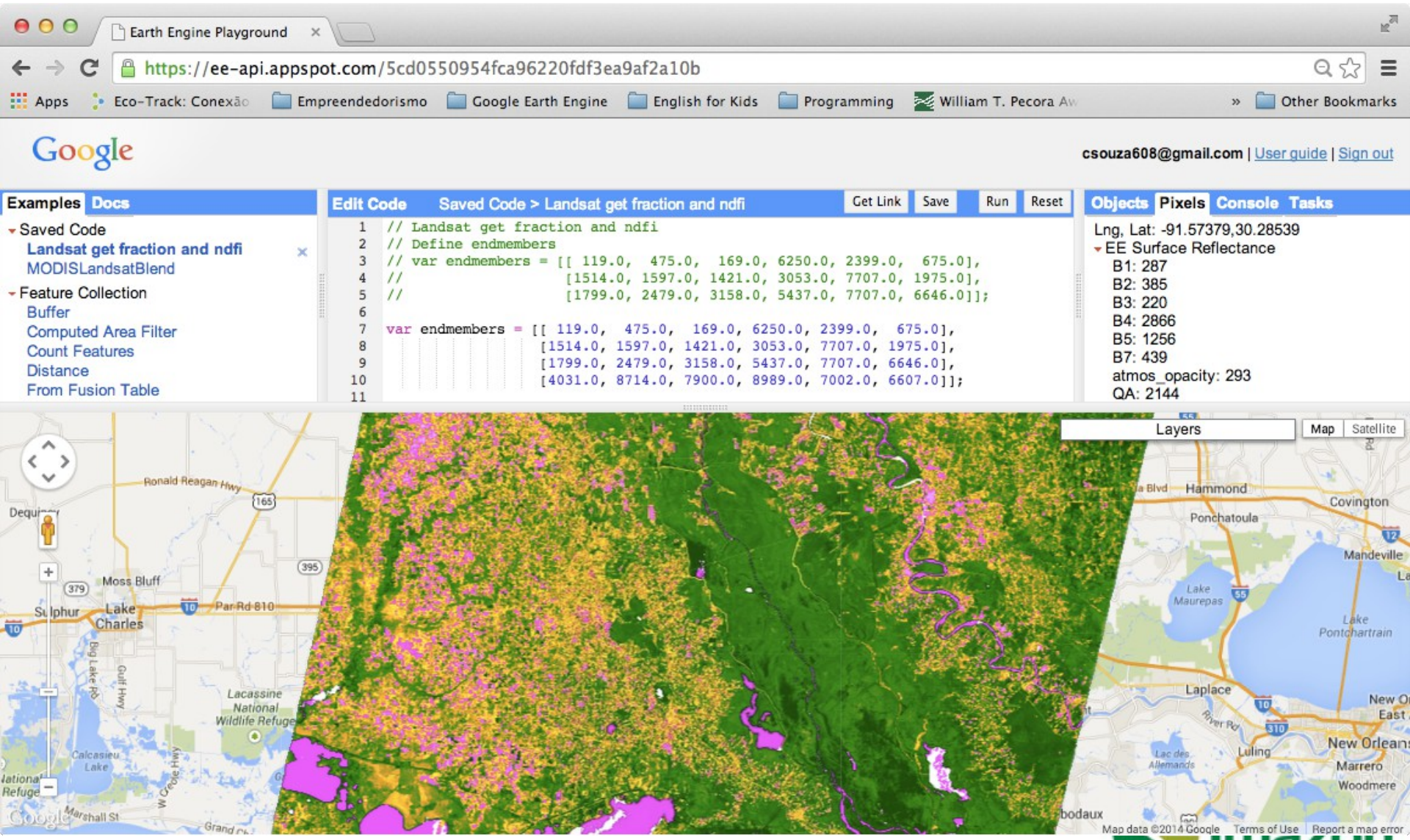
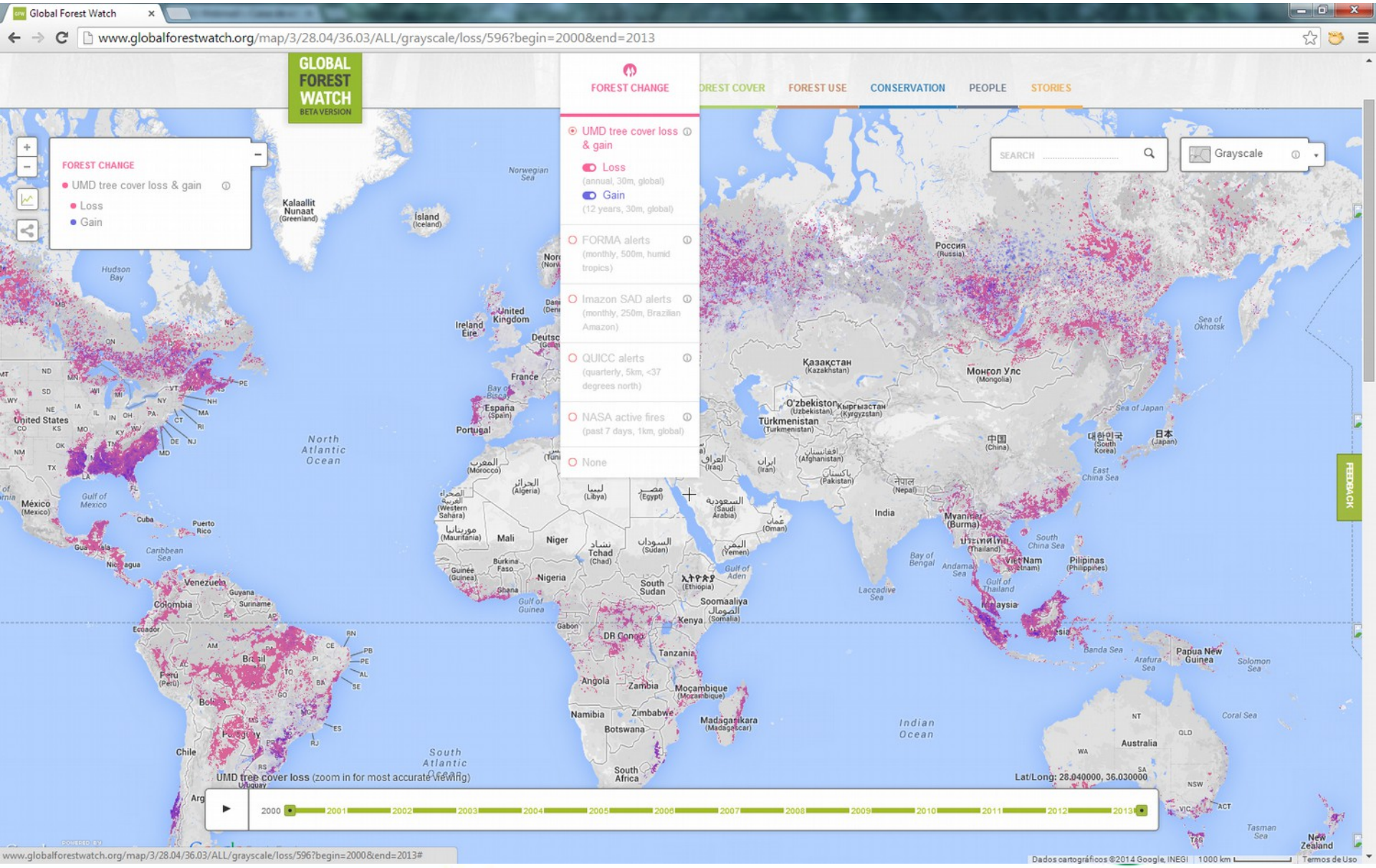
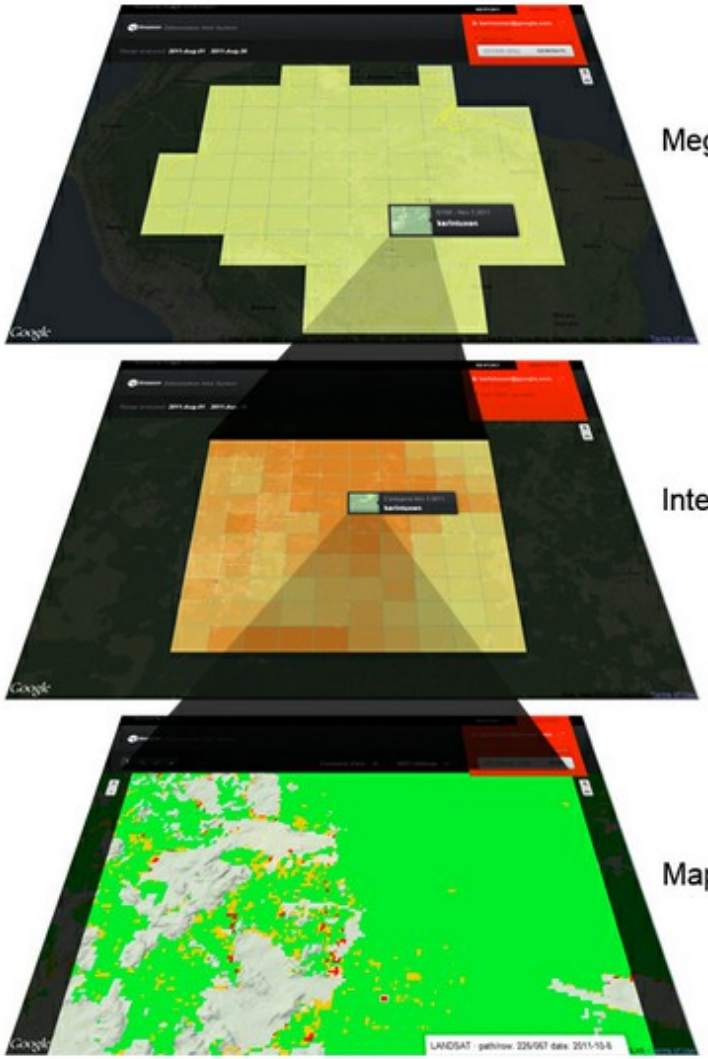
NovasPlataformasdeMonitoramento: Google Earth Engine

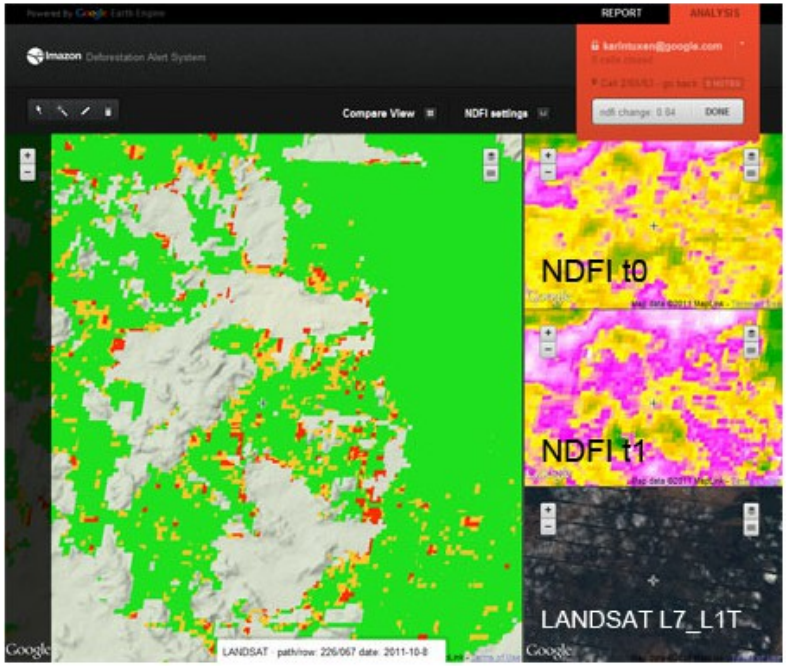


NovasPlataformasdeMonitoramento: Global Forest Watch

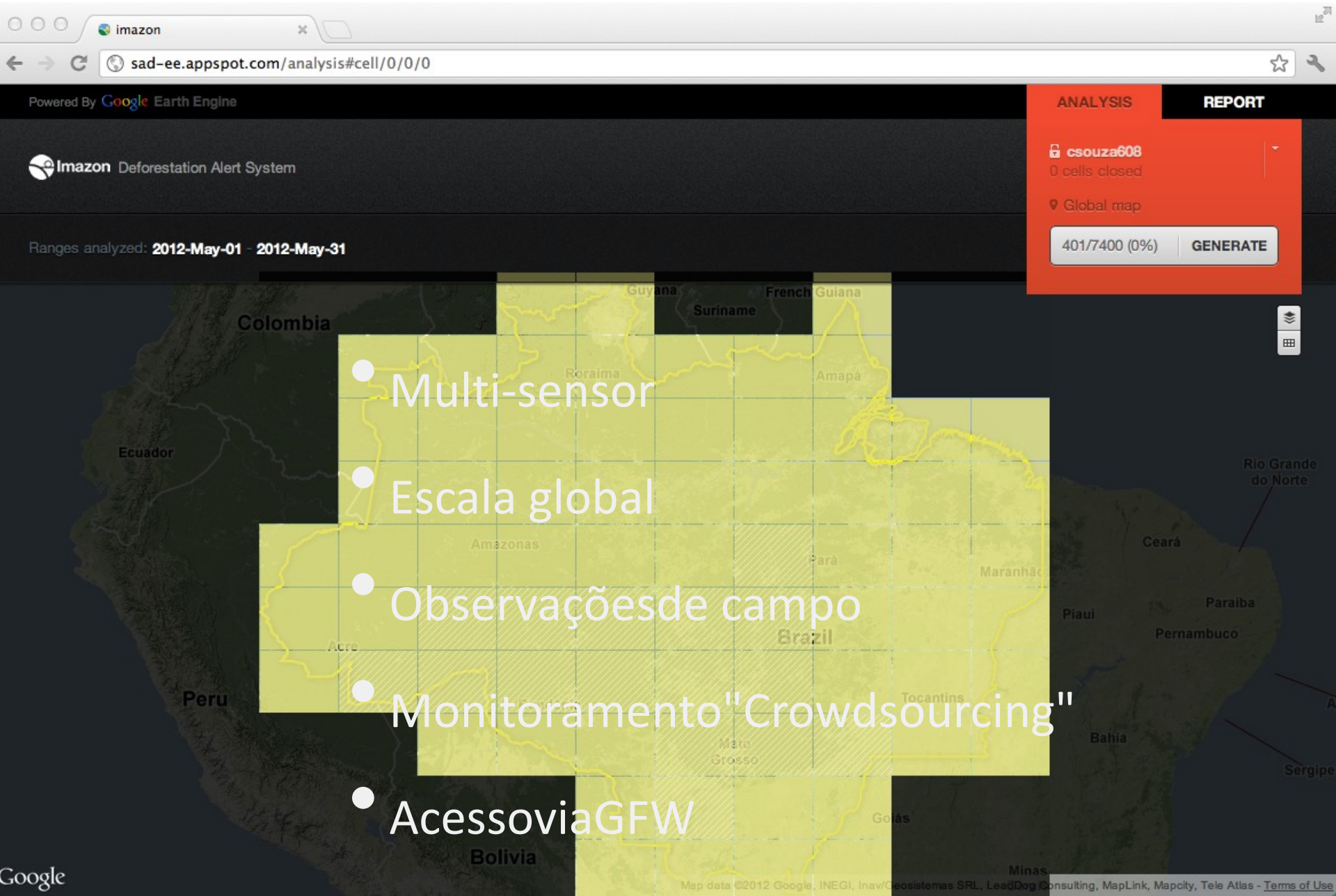


NovasPlataformasdeMonitoramento: SAD EE



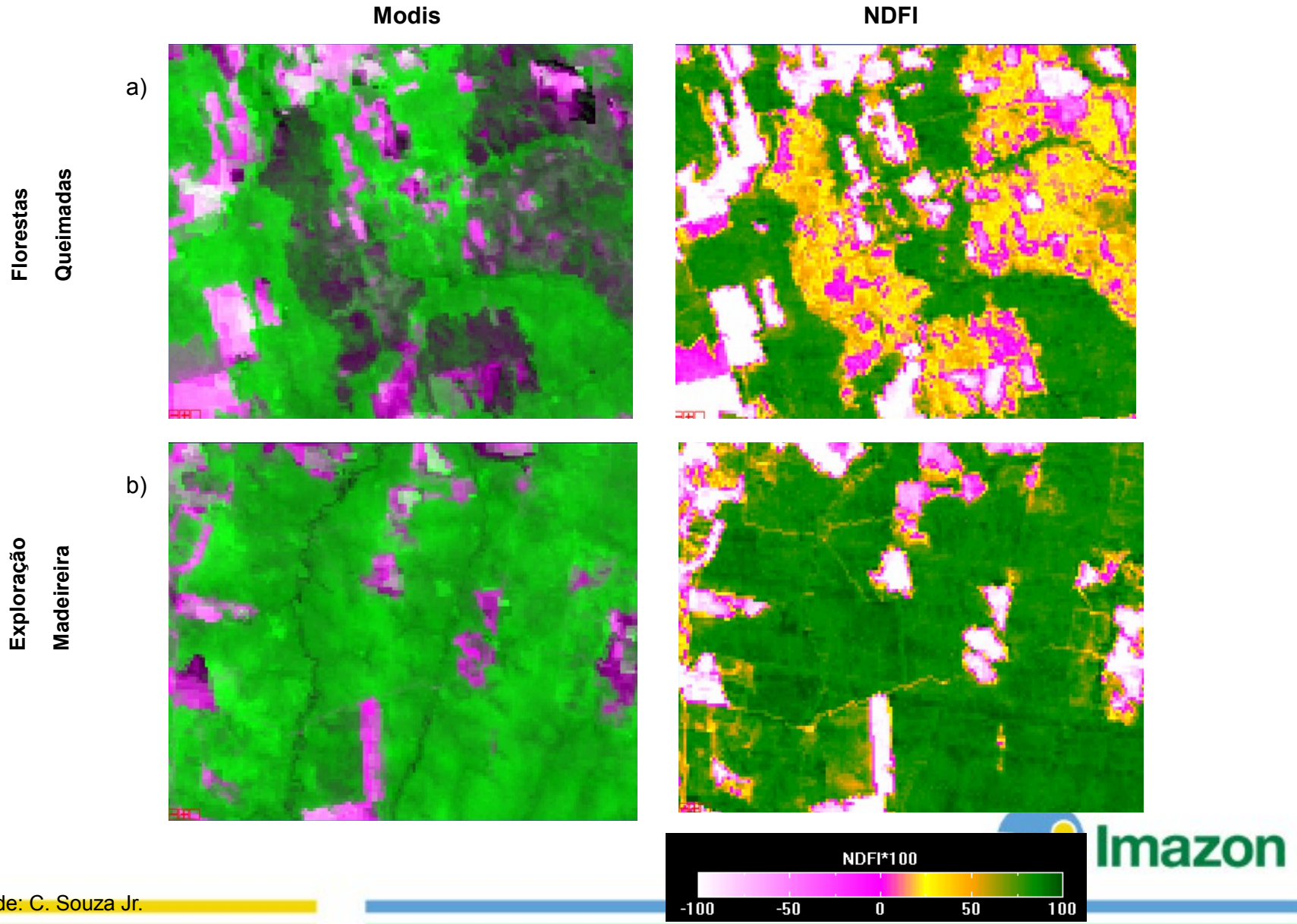


NovasPlataformasdeMonitoramento: SAD+



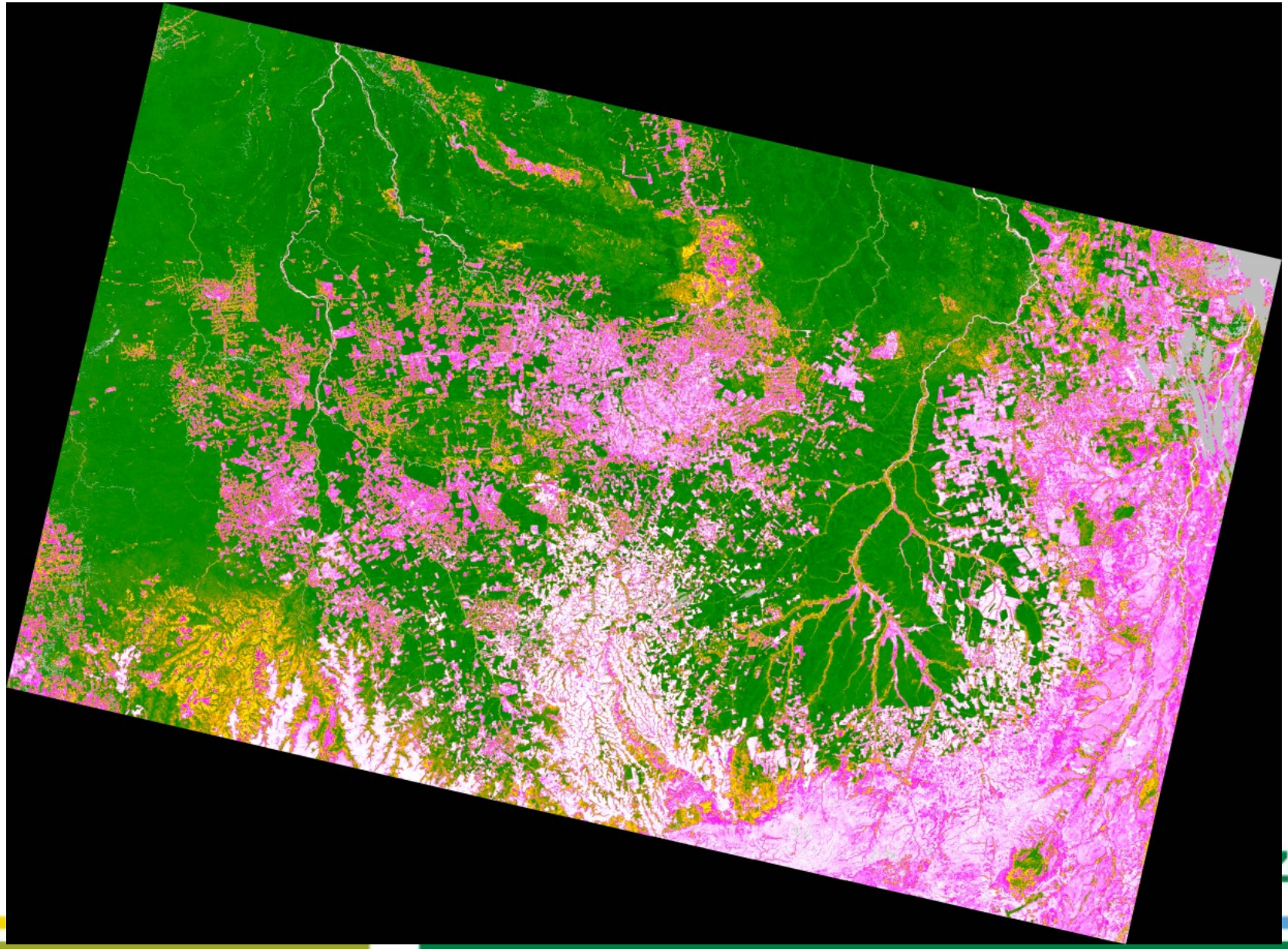
- Multi-sensor
- Escala global
- Observaçõesde campo
- Monitoramento"Crowdsourcing"
- AcessoviaGFW

Multi-Sensor: NDFI – MODIS

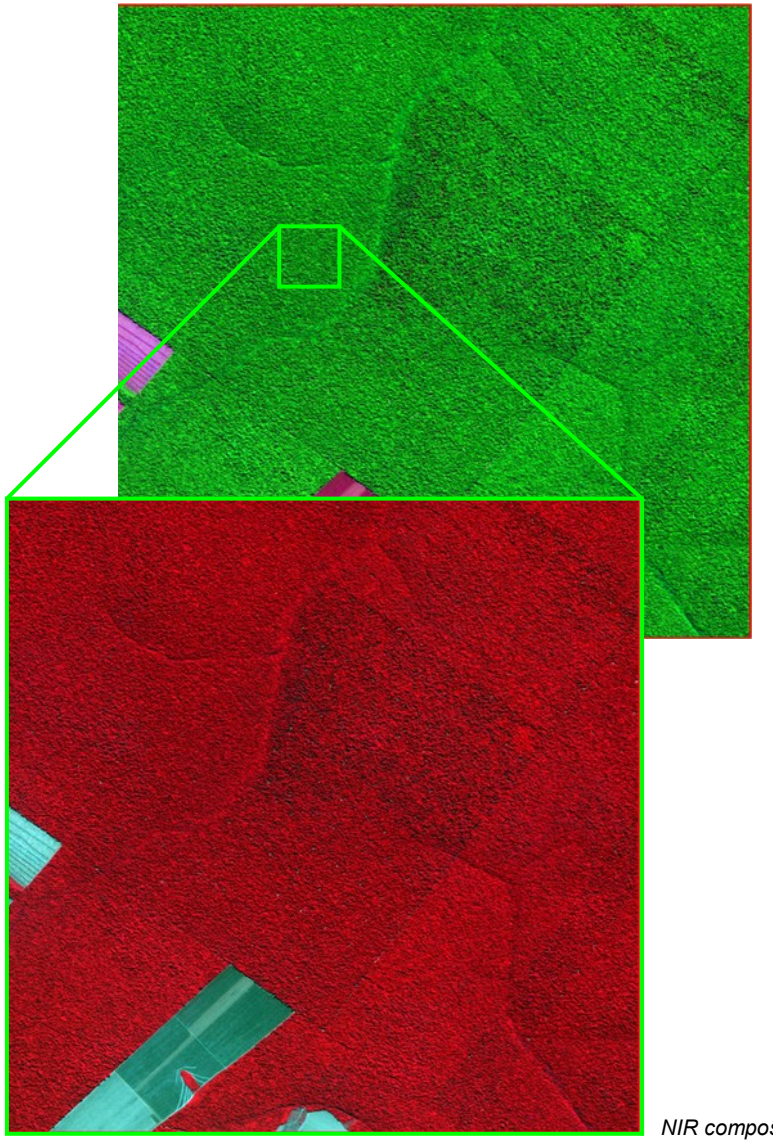


Slide: C. Souza Jr.

Multi-Sensor: NDFI–MERIS

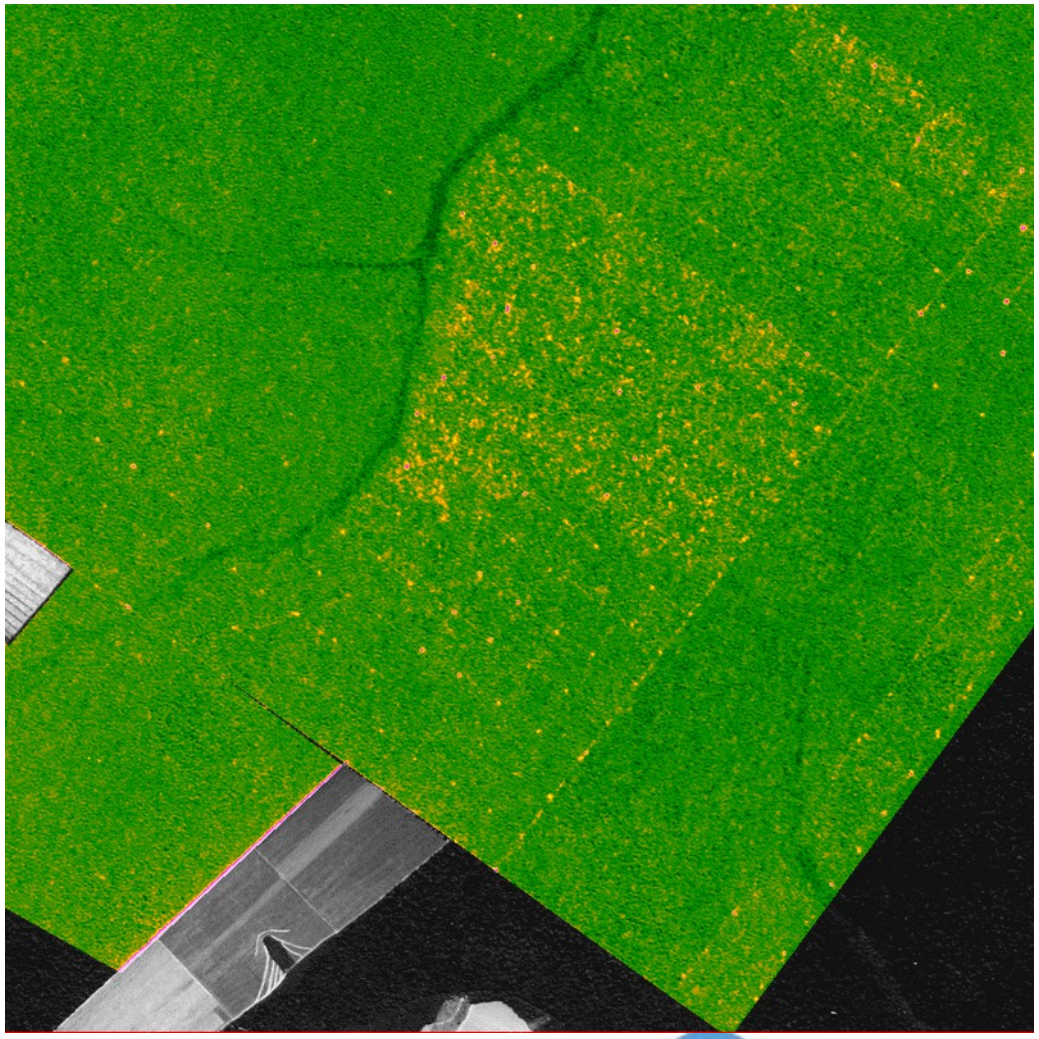


Multi-Sensor: NDFI–SPOTImage



NIR composite image

NDFI map



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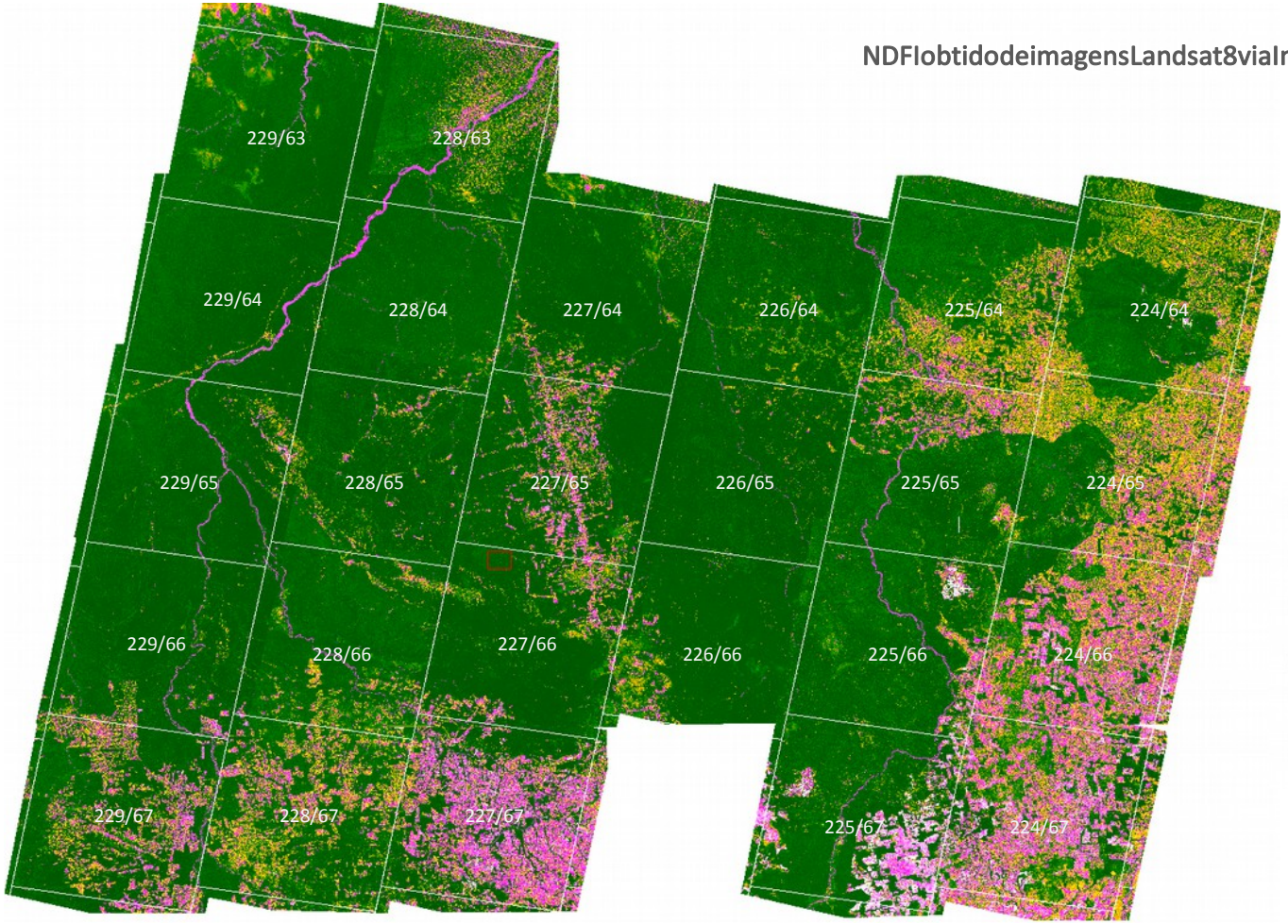
Multi-Sensor:Landsat8

NDFIobtidodeimagensLandsat8viaImgTools



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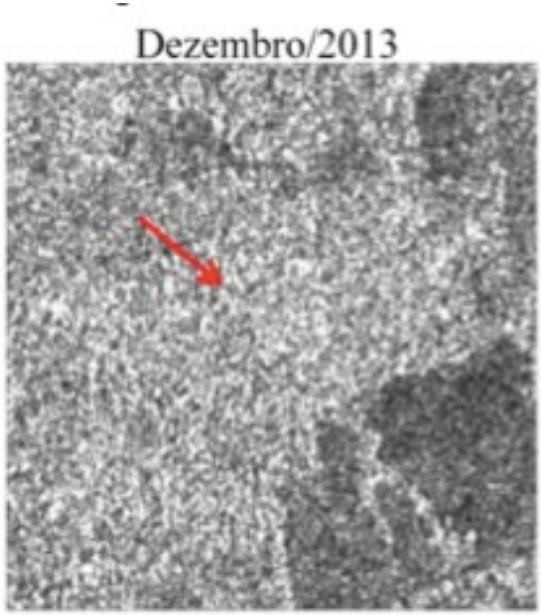
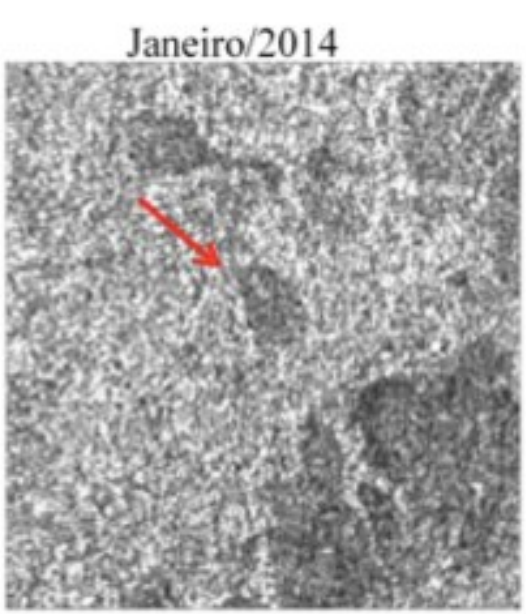
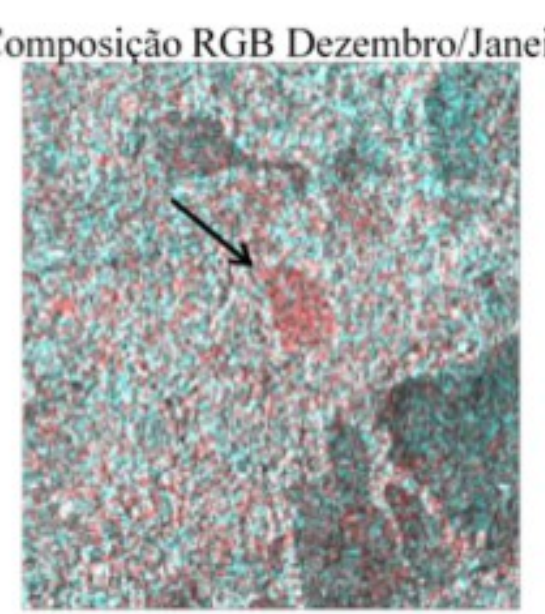
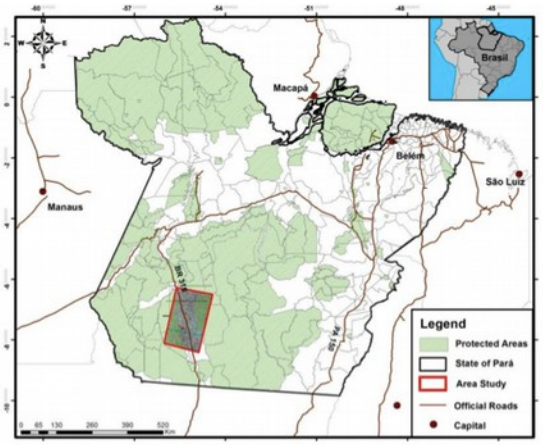
Multi-Sensor:**ImagensCosmo-SkyMed**









Scansar–wideregion: 100km x 100km; pixel 30m

Coberturamensal:novembro2013 ajulho2014

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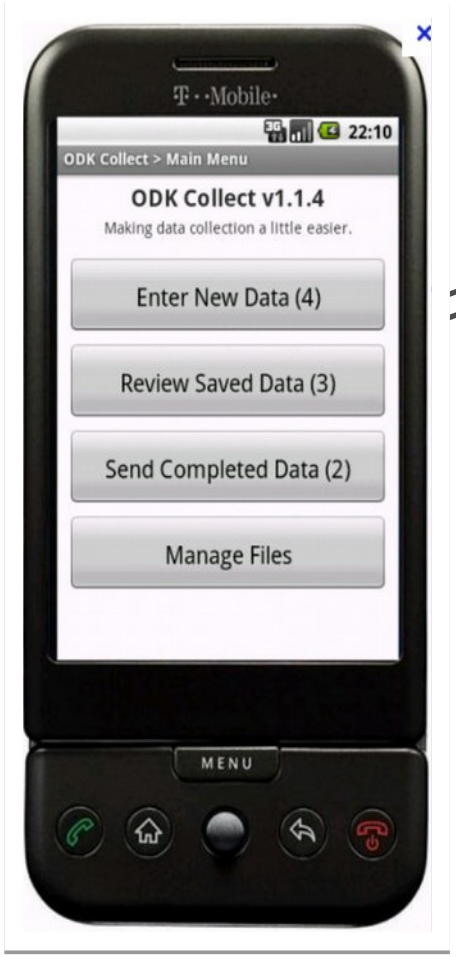
Observaçõesde Campo

IntegraçãoSatéliteeCampo

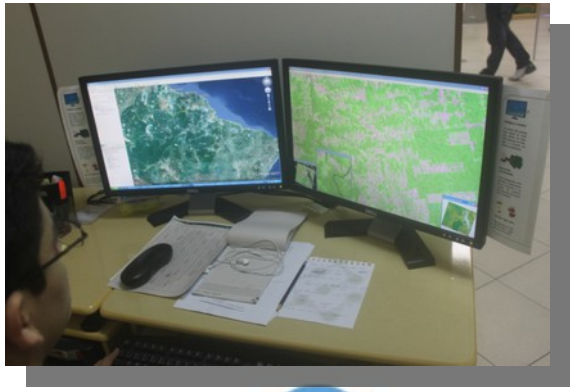
Open Data Kit (ODK)

Cloud

Verificação no campo



Análise e relatórios...



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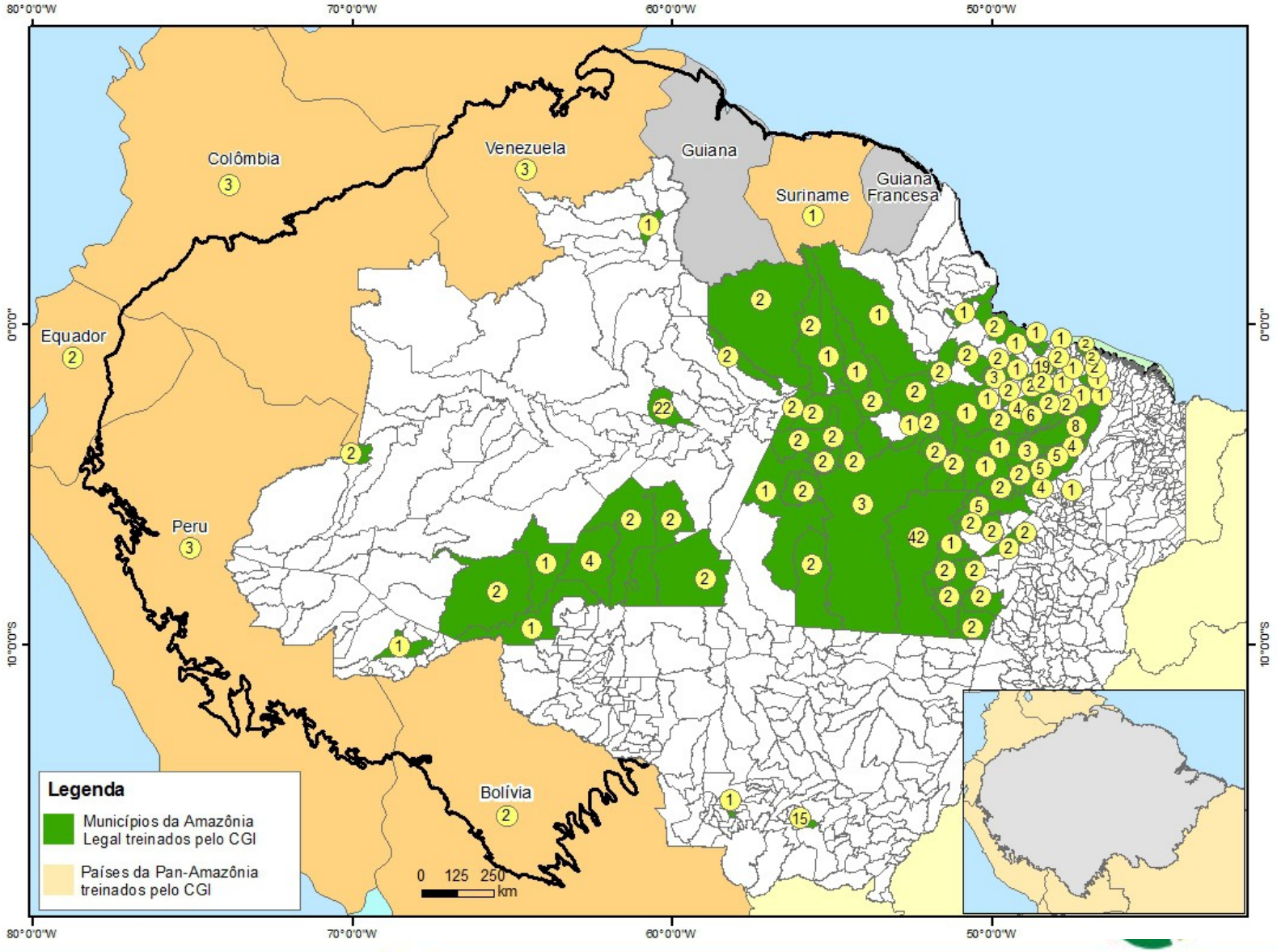
MonitoramentoCrowdsourcing



MonitoramentoCrowdsourcing

- Processamentona“cloud”…
- Multi-sensor…
- Cubo deimagensvs.cenas…
- Muitasfontesde mapas…
- Integraçãocomdados de campo…
- Protocolos devalidaçãode mapas…
- Acessorápidoàinformação…

Foto:RBDesign

Geo*crowdsourcing*…

Equipe:

Antônio Victor Fonseca

Marcelo Justino

Heron Martins

João Victor Siqueira

WildsonQueiroz

Colaboradores:

Beto Veríssimo

Marcio Sales

Júlia Ribeiro

Victor Lins

Rodney Salomão

Bruno Oliveira

Denis Conrado

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Instituto do Homem e Meio Ambiente da Amazônia

cgi Centro de Geotecnologia do Imazon

Google earth engine
a google.org project

Google earth outreach

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