Monitoring Program for Amazon and Other Biomes

Advances and Perspectives of the Monitoring System of INPE
Guide

1. Monitoring Projects
   1. PRODES
   2. DETER
   3. TERRACLASS

2. Evolution
Monitoring Projects

**DETER**
Alert system for detecting forest removal and degradation
Since 2004, daily

**PRODES**
Monitoring and quantifying primary forest removal in the Amazon
Since 1988, annual

**QUEIMADAS**
Fire Monitoring
Identifying and quantifying burned areas and fire risk
Since 1985, daily

**TerraClass**
Land Use and Land cover in the Amazon
Since 1991, >2 years

**AMAZON Monitoring**
Land Use
Land Cover
Deforestation
Fire
1. Monitoring Projects

1. PRODES
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2. Evoluton
PRODES Project

Annual increase of deforestation using medium resolution (Landsat class ~ 20-30 m), minimum mapping unit 6.25 ha

Visual interpretation by a team with extensive experience

Starting dry season (~July)

Ending dry season (~September to November)
Clear-cut deforestation until 2019 \( \cong 796.000 \text{ km}^2 \) (19.9\%)

http://terrabrasilis.dpi.inpe.br
Guide

1. Monitoring Projects
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2. Evolution
DETER Project

daily increase of deforestation
low resolution (~ 60 m)
minimum mapping unit 3 ha

Visual interpretation
Team with extensive experience

$\Delta T_1$ – Removal of trees

$\Delta T_2$ – Loss of understory

$\Delta T_3$ – Loss of canopy (50%)

$\Delta T_4$ – Loss of canopy (90%)
COMO O INPE DETECTA ALERTAS DE DESMATAMENTO

Coordenação-Geral de Observação da Terra
INPE - Instituto Nacional de Pesquisas Espaciais

DIÁRIO

2018

2019

ANUAL

PRODES - MAPAS ANUAIS
LANDSAT® & OLI

DETER - ALERTAS DIÁRIOS
CBERS-4/WIFI - CLASSE CORTE BASSO

IMAGENS PLANET®
FONTE: WWW.PLANET.COM

HUMAITÁ, AMAZONAS, BRASIL
COORDENADAS: 7.776445° S, 63.480613° W

* Diferença de área acumulada atribuída aos tipos de sensores usados pelo DETER e PRODES.

DETER Project

Day by day monitoring
DETER Project

Data dissemination

Maps

Graphs and Tables

http://terrabrasilis.dpi.inpe.br
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TerraClass Project (INPE + EMBRAPA)

Land Use and Land Cover in Amazon

www.terraclass.gov.br
TerraClass Project (INPE + EMBRAPA)

Landscape Analysis classification at cell scale
Evolution of production systems

2004
Evolution of production systems
2010
Evolution of production systems
2014
TerraClass Project (INPE + EMBRAPA)

Adapting Decision Tree Tocantins

- Natural Domain
- Initial Front
- Coexistence Area
- Dominant Agriculture
- Strict Agriculture
- Intensified Livestock
- Not Intensified Livestock
- Mixed Economy Region
- Mixed Forest Region
- Planted Forest Region

Tocantins Decision Tree

INPE + EMBRAPA

Natural Domain
Initial Front
Coexistence Area
Dominant Agriculture
Strict Agriculture
Intensified Livestock
Not Intensified Livestock
Mixed Economy Region
Mixed Forest Region
Planted Forest Region
Guide

1. Monitoring Projects
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2. Evolution
Evolution

Images

coordinates 3.9106, -51.9559 (Lat, Long) during december/2019

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CBERS-4A + AMAZÔNIA-1
Evolution

methodologies

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Evolution

Technology

Brazilian Data cube

Time series analysis

Big Data
Evaluation of Deep Learning techniques for deforestation detection in the Brazilian Amazon and Cerrado biomes from remote sensing imagery.

Source: Ortega et al. (2020)
Technology

Brazilian Data cube

Source: Camara et al. (2020) and Simoes et al. (2020b)
Technology

Brazilian Data cube

Evolution

K-fold = 0.96

Source: Camara et al. (2020) and Simoes et al. (2020b)
Thank you for your attention!
Questions? Remarks?