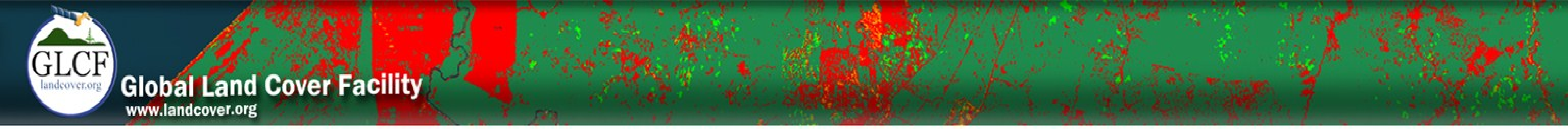

Fine Scale Assessment of Forest Cover Change over South America using Landsat Data

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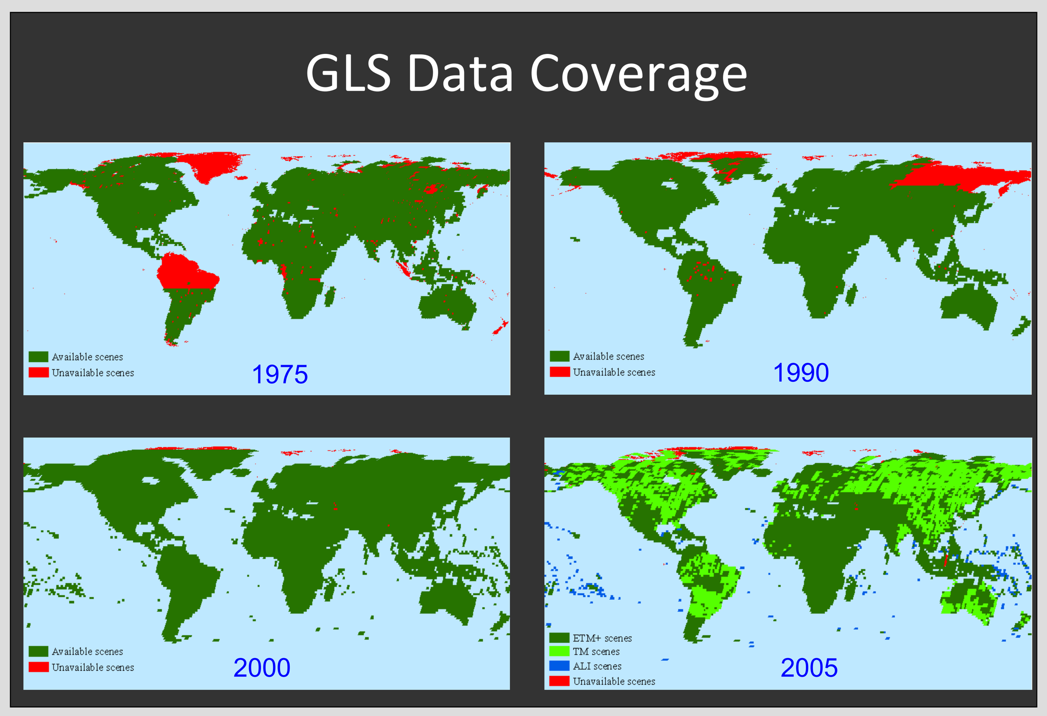
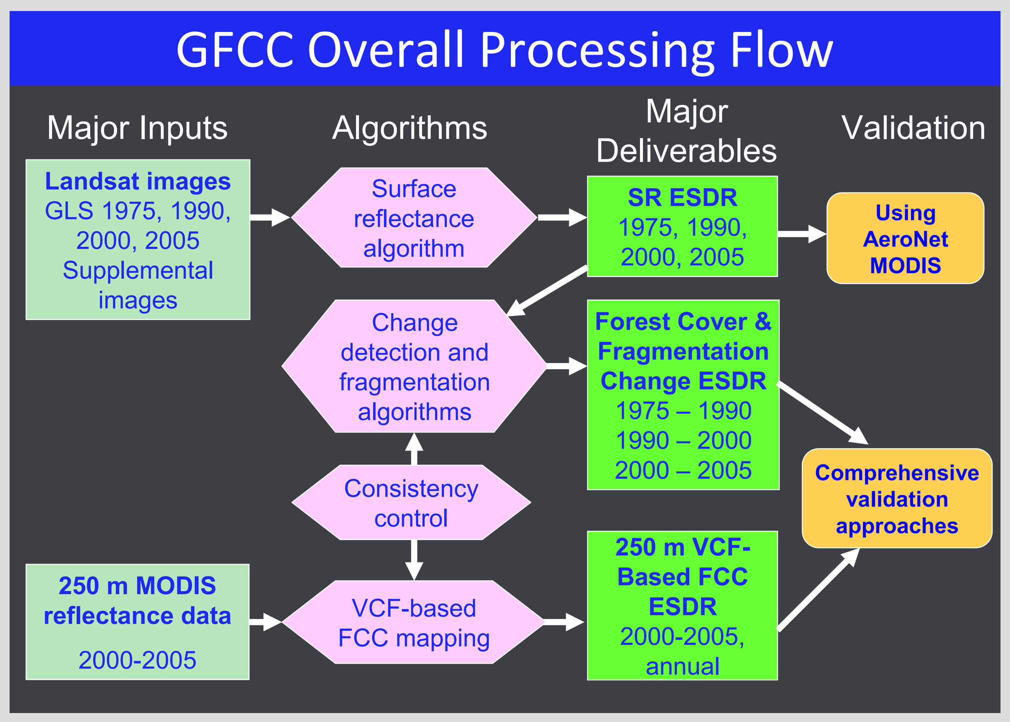
Introduction

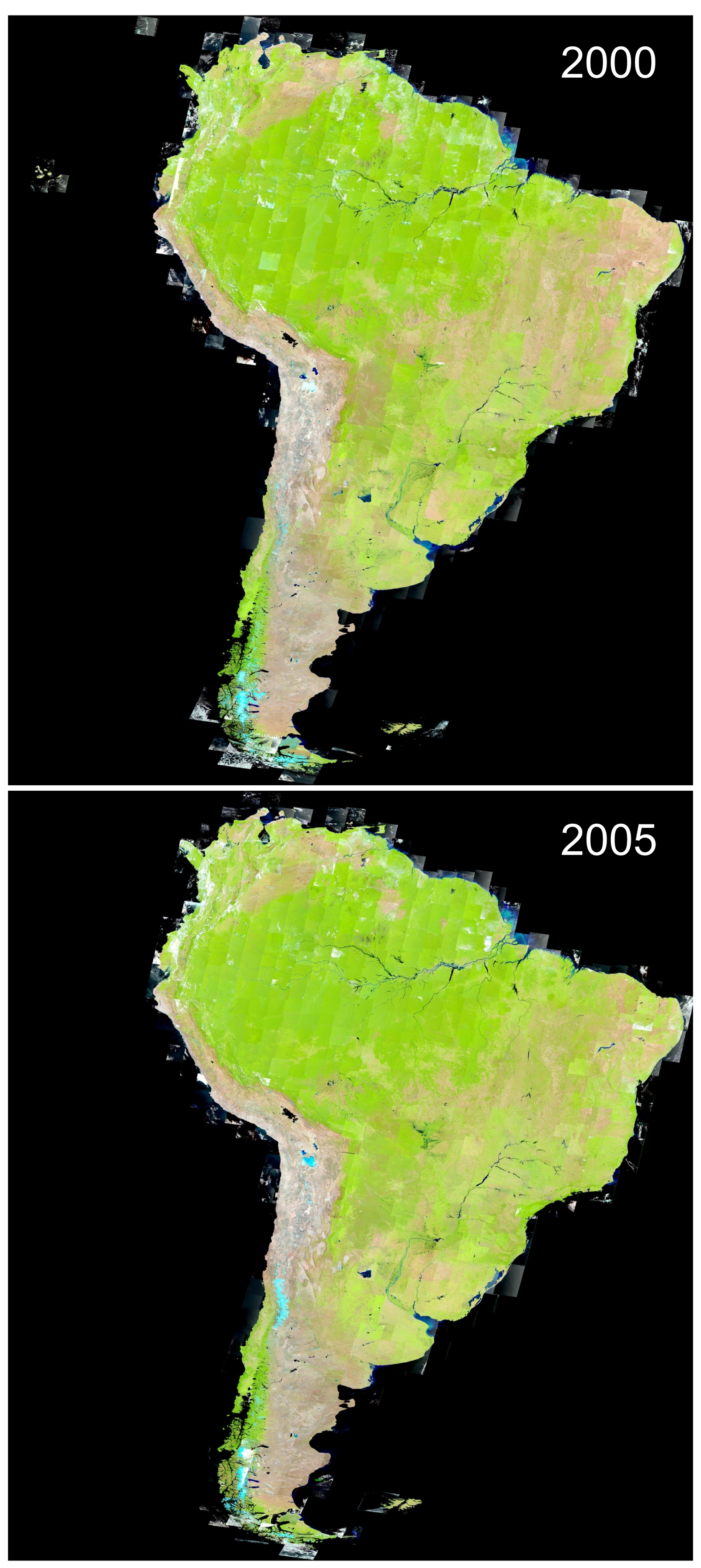
The Global Forest Cover Change (GFCC) project is developed to produce global, fine scale surface reflectance and forest cover change products using the Global Land Survey (GLS) data sets as the primary data source. The GLS provides global or near global coverage of Landsat images for epochs centered around 1975, 1990, 2000, and 2005. We have produced global Landsat surface reflectance products for 2000 and 2005, and have conducted comprehensive validation using near simultaneous MODIS observations (see poster by Sexton et al.). These surface reflectance products are being used to map forest cover change between 2000 and 2005. This poster presents the preliminary results on forest cover change derived in South America, with a focus on change hotspots.

GFCC Data and Methods



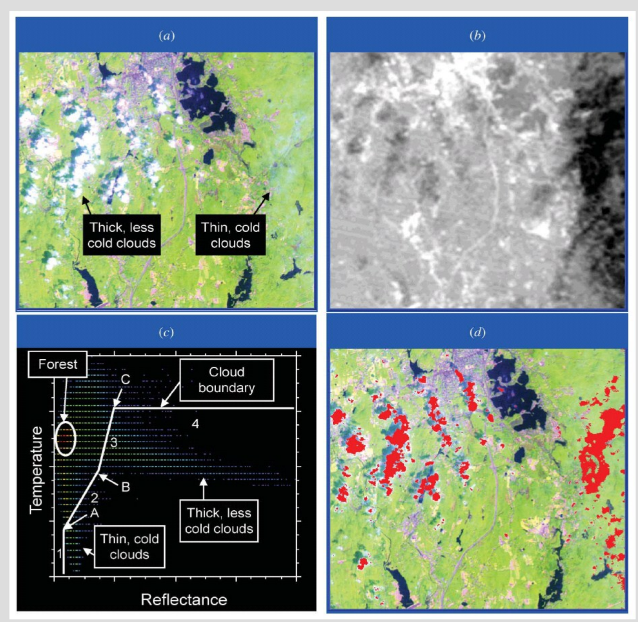


SA Surface Reflectance Products



Cloud/Shadow Masking

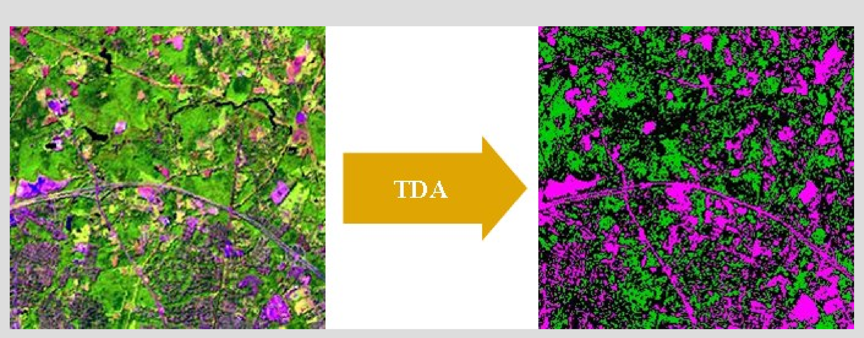
- Clouds are spectrally bright (a) and cold in the thermal band (b);
- A cloud boundary in a reflectance-temperature space (c) is used to identify cloud pixels (d, delineated cloudy pixels in red);
- Dark pixels at or near projected shadow areas projected according to cloud height and illumination geometry are flagged as shadow pixels.



Forest Change Mapping using TDA-SVM

Training Data Automation (TDA)

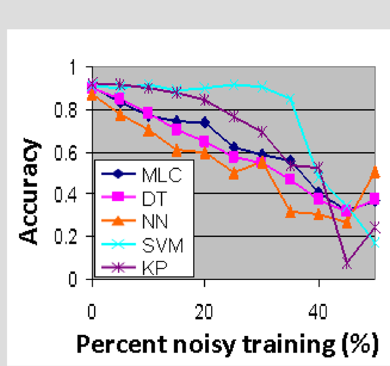
- Dark, densely vegetated pixels identified as forest training samples;
- Nonforest training samples identified based on forest training samples

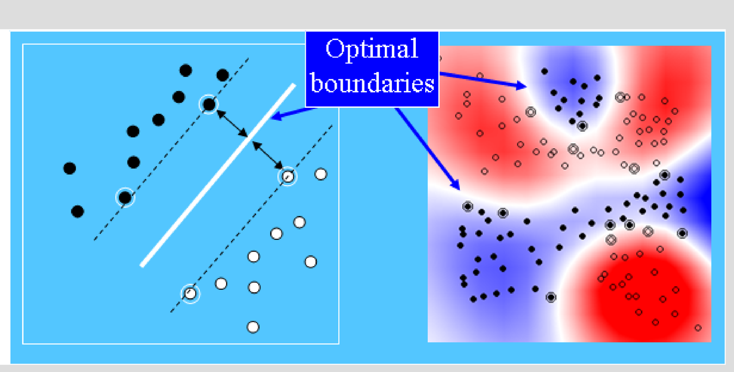


Support Vector Machines (SVM)

SVM is typically more accurate than other commonly used classification algorithms, because:

- It is designed to search optimal class boundaries, and therefore,
- It has been found more resistant to noises in training data

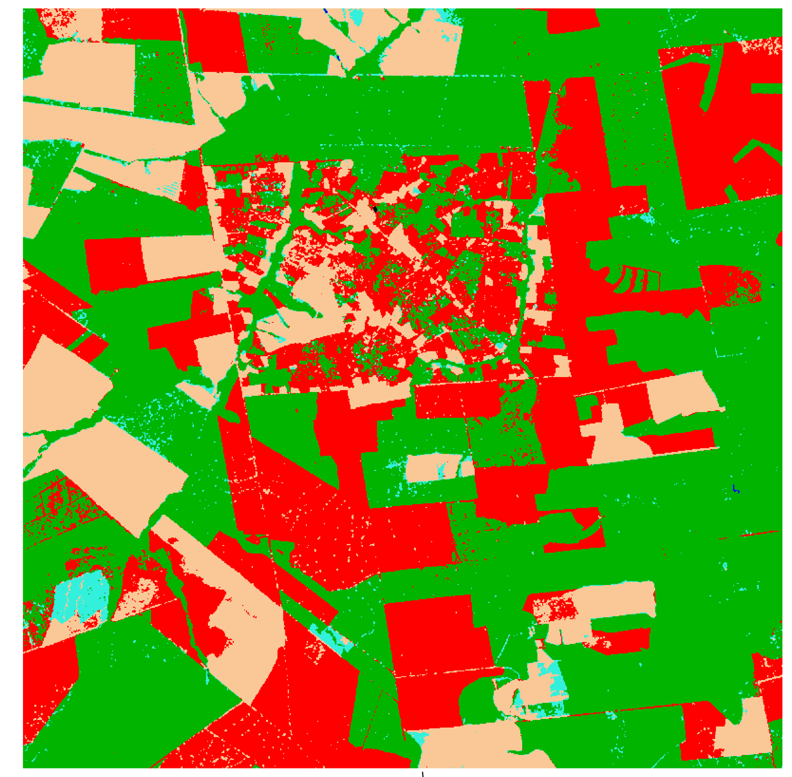




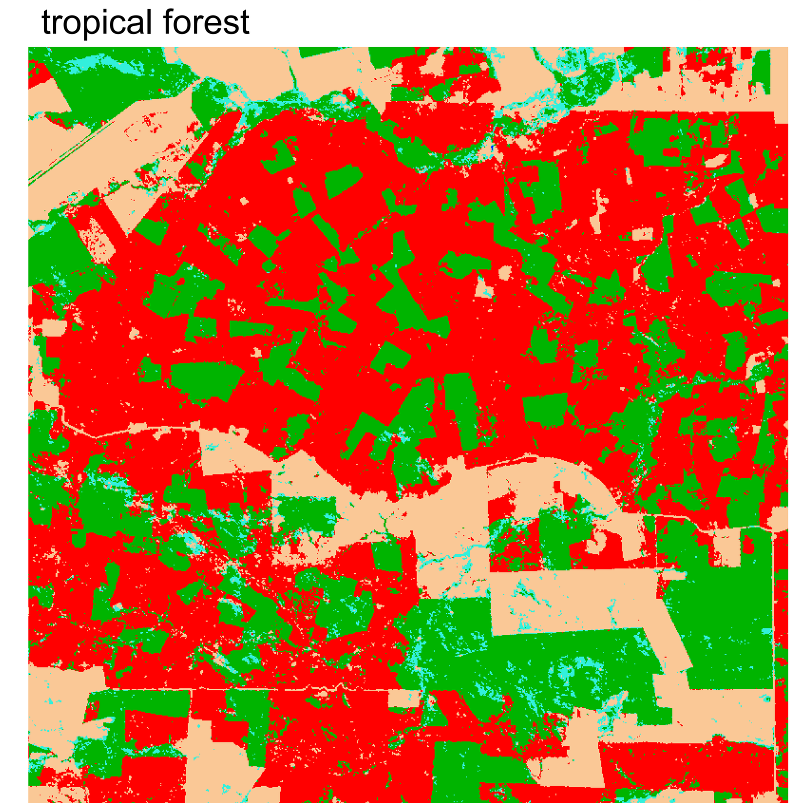
Preliminary Results: Example Forest Change (2000-2005) Hotspots

Porto dos Gauchos, Brazil, 228/68, loss of 161 sq km tropical forest in this window (576 sq km)

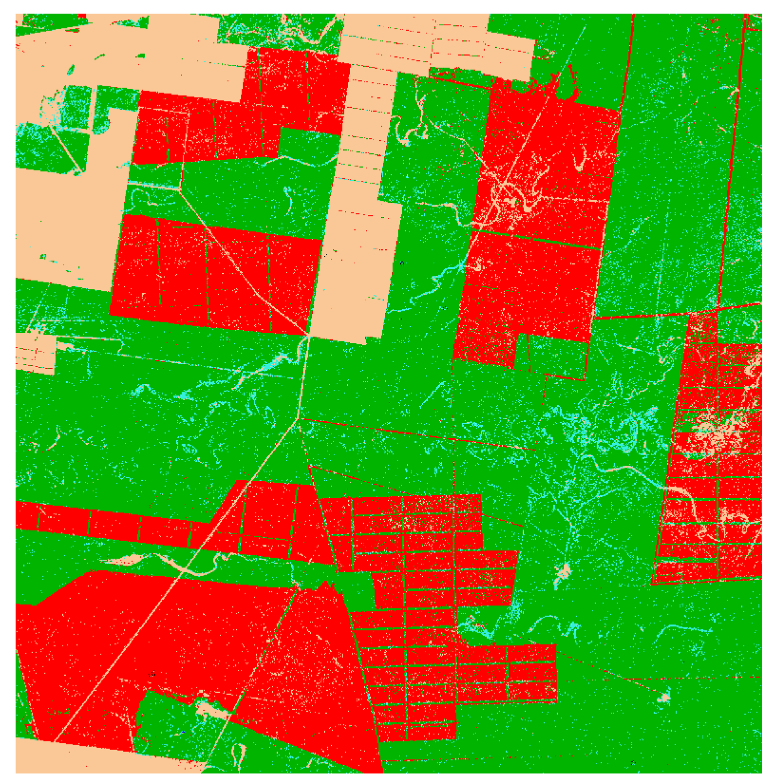
Lucas, Brazil, 226/69, loss of 177 sq km tropical forest

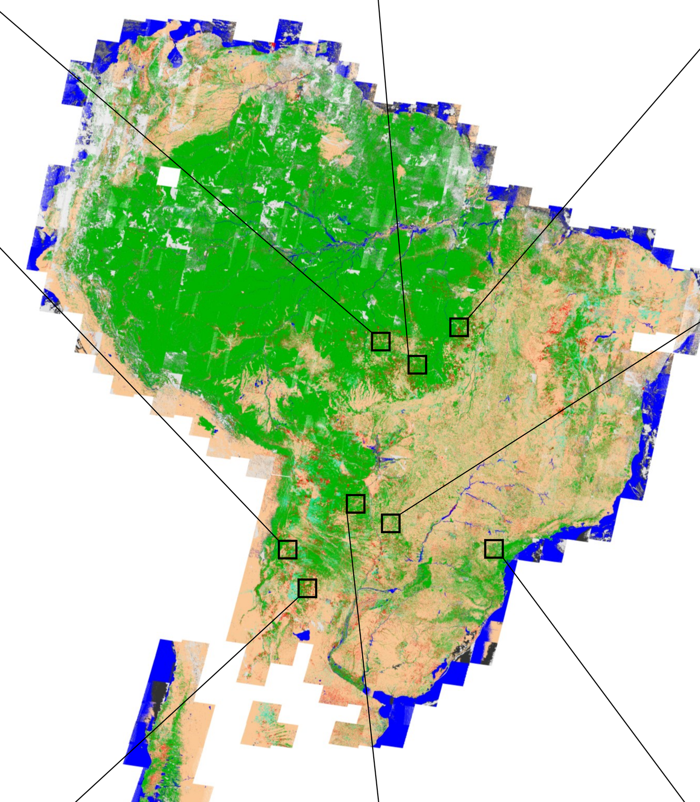


Lucio da Luz, Brazil, 224/67, loss of 272 sq km tropical forest

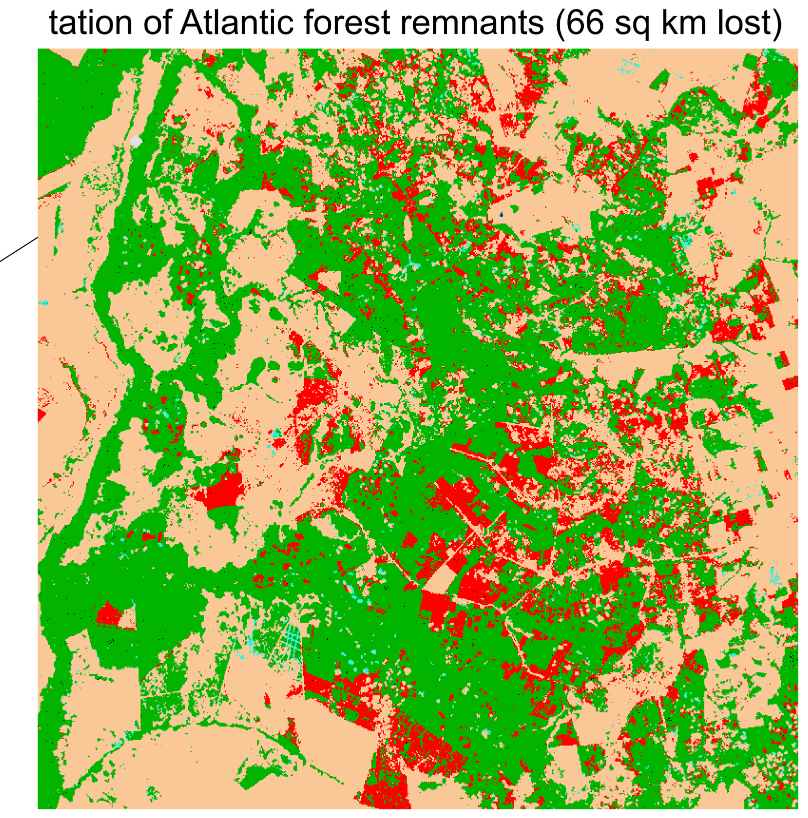


Sapo Quemado, Argentina, 230/77, 177 sq km Chaco forest converted to farmland

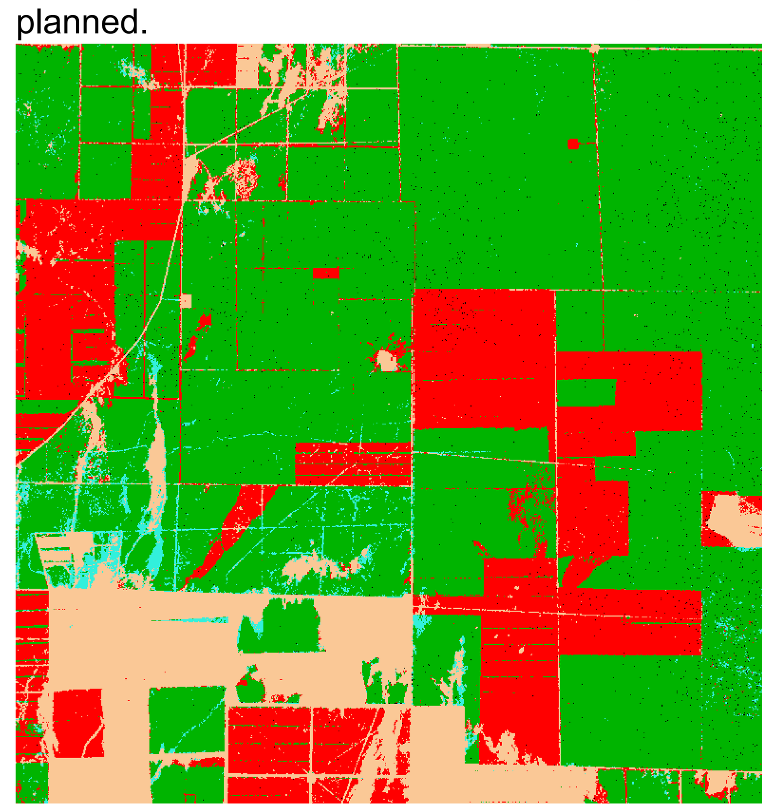




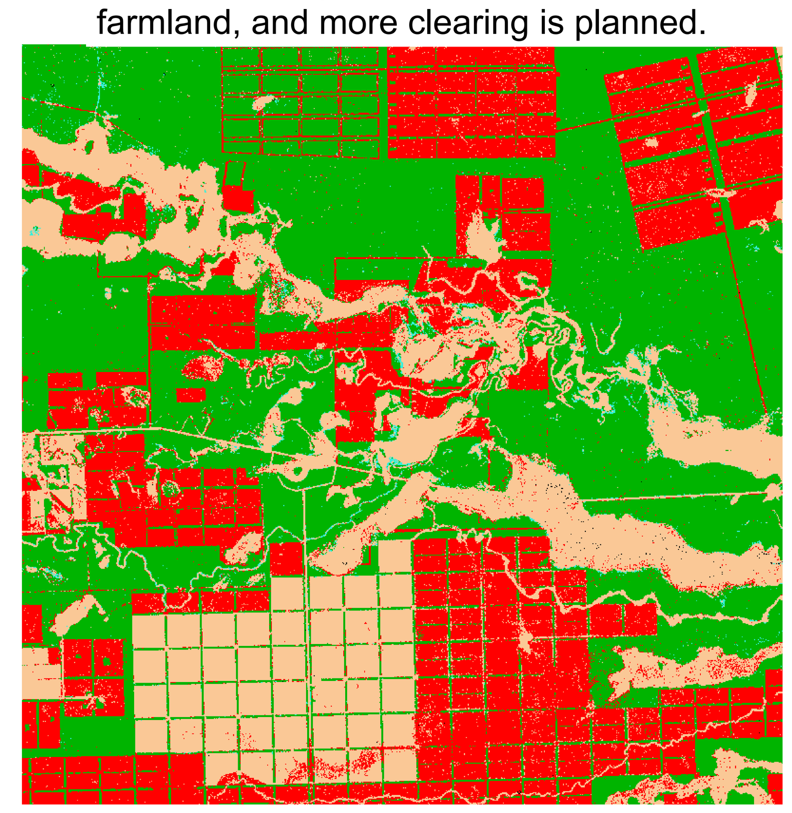
Yhy Yau, Paraguay, 225/76, further fragmentation of Atlantic forest remnants (66 sq km lost)



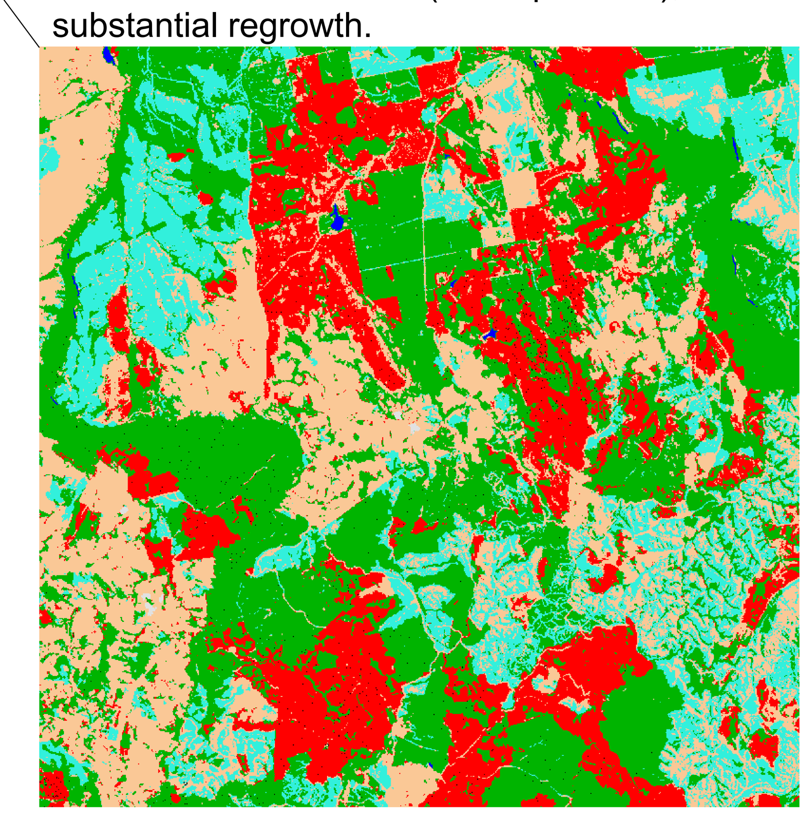
Puna, Argentina, 229/79, 132 sq km Chaco forest converted to farmland, and more clearing is planned.



East Fortin Tenienio Montania, Paraguay, 227/75, 179 sq km Chaco forest converted to farmland, and more clearing is planned.



Arapoti, Brazil, 221/77, further fragmentation of Atlantic forest remnants (112 sq km lost), with substantial regrowth.



Summary and Future Work

- Rates of forest loss between 2000 and 2005 are high in hotspots areas in SA, which are found in two major areas – the SE edge of the remaining Amazonian tropical forests, and the dry Chaco forest;
- Farmland converted from Chaco forests may not be ecologically sustainable, because most of the land in the Chaco region is marginal land that may not be suitable for large scale farming;
- Spurious changes are found in some regions, which are linked to data quality problems with the GLS data sets, including residual SLC-off related data gaps, cloud and shadow contamination, and less ideal vegetation phenology. Replacement images are needed in order to produce reliable, spatially contiguous forest cover change products.

References

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