Supporting Information 1. Landsat Image Detrending

We removed the across-path radiometric gradient observed by Toivonen *et al*. [1] on a band-by-band basis in three steps. First, we delineated areas of uniform forest type for each study area; these areas were restricted to one of the two vegetation types identified in our manual image interpretation, and excluded floodplain forests or clouds. Second, we generated 5000 randomly-distributed points throughout these areas, and attributed each point with the value of the corresponding pixel in the original Landsat band. Third, using these points and their values, we constructed linear trend surfaces for each band, and subtracted these trend surfaces from the original Landsat band. The product of this process was a new, detrended version of each of the six non-thermal bands for each original landsat image (Figure S1(c); Higgins *et al*. [2]). All detrending operations were performed with ArcGIS v. 10 (ESRI Inc., Redlands, CA, USA).

Figure S1. (**a–c**) Demonstration of image enhancement and detrending for Pastaza-Tigre study area; location indicated by solid lines in Figure 1(a). (a) Bands 4, 5, and 7 of raw Landsat data, with default two standard-deviation stretch. (b) Bands 4, 5, and 7 of enhanced Landsat data. (c) Bands 4, 5, and 7 of enhanced Landsat data following detrending; notice change in tone in northwest and southeast of image relative to panel (b).
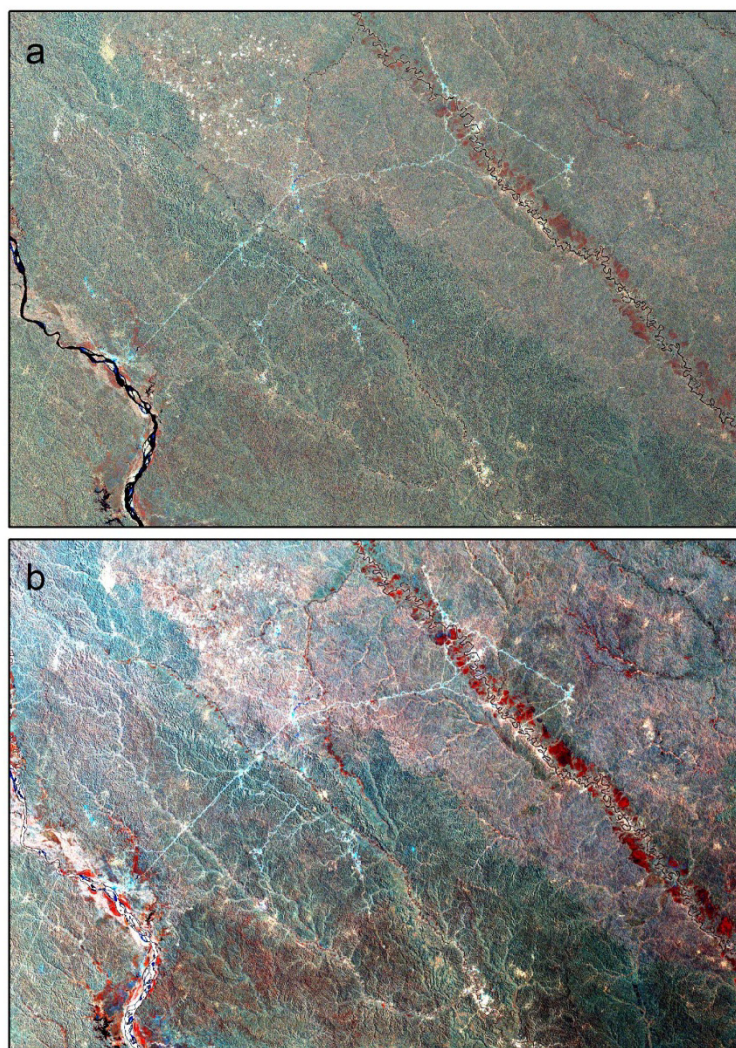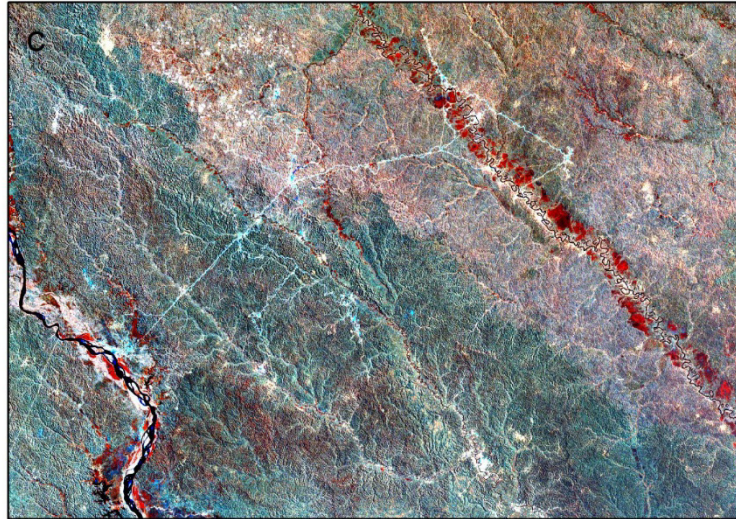
Figure S1. *Cont.*

To prepare NDVI images for these detrended data we used the standard formula for Landsat data of "('Band 4' − 'Band3')/('Band 4' +'Band3')". However, because the detrending operation necessarily yielded negative values, we added a constant to the detrended values for both bands for each study area to restore them to their ranges in the original image. This constant was the difference between the mean reflectance of either band three or four in the raw image versus its mean in the detrended image. As such, NDVI for the three study areas was calculated as:

Pastaza-Tigre:
(('Detrended band 4'+62.02) − ('Detrended band 3'+14.62))/
(('Detrended band 4'+62.02) + ('Detrended band 3'+14.62))

Curaray:
(('Detrended band 4'+78.42) − ('Detrended band 3'+35.24))/
(('Detrended band 4'+78.42) + ('Detrended band 3'+35.24))

Sucusari:
(('Detrended band 4'+81.83) − ('Detrended band 3'+18.01))/
(('Detrended band 4'+81.83)+('Detrended band 3'+18.01))

References

1. Toivonen, T.; Kalliola, R.; Ruokolainen, K.; Malik, R.N. Across-path DN gradient in Landsat TM imagery of Amazonian forests: A challenge for image interpretation and mosaicking. *Remote Sens. Environ.* **2006**, *100*, 550–562.
2. Higgins, M.A.; Ruokolainen, K.; Tuomisto, H.; Llerena, N.; Cardenas, G.; Phillips, O.L.; Vásquez, R.; Räsänen, M. Geological control of floristic composition in Amazonian forests. *J. Biogeogr.* **2011**, *38*, 2136–2149.