RGB shade fraction images derived from multitemporal Landsat TM data for studying deforestation in the Brazilian Amazon

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The shade fraction image is related to the forest canopy structure (Shimabukuro and Smith 1991). For tropical forested areas, this image is characterized by having a medium amount of shade while the deforested areas (bare soil, pasture and/or regrowth) have a low proportion of shade. Therefore, shade fraction image is a feasible alternative to map and estimate deforestation areas in the tropical region using digital techniques. Also, the RGB shade fraction images derived from multitemporal Landsat TM data are a very useful tool for monitoring the deforestation areas in the Brazilian Amazon.

Figure 1 (cover image) shows the colour composite of multitemporal shade fraction images from 1990 in red, 1992 in green and 1994 in blue derived from Landsat TM (Path/row—231/067) over Rondônia State located in the Brazilian Amazon. Red colour plots represent deforested areas that remained either as bare soil, pasture and regrowth (low shade proportion) in 1992 and 1994, while yellow plots represent forested areas on both TM scenes, 1990 and 1992 that appeared as deforested areas in 1994. In order to separate the deforestation activities that occurred from 1990 to 1992 and from 1992 to 1994 two other figures were created. Figure 2 highlights areas that were deforested between 1990 and 1992 in red; while figure 3 highlights deforested areas between 1992 and 1994 in red as well.

The shade fraction image shows clearly the difference between forested and deforested areas. Hence, automatic classification of this single image will allow the building of a digital deforestation database for the complex terrain surface characterized by a fishbone deforestation pattern that cannot be built with current available techniques.

References

SHIMABUKURO, Y. E., and SMITH, J. A., 1991, The least-squares mixing models to generate fraction images derived from remote sensing multispectral data. *I.E.E.E. Transactions on Geoscience and Remote Sensing*, **29**, 16–20.

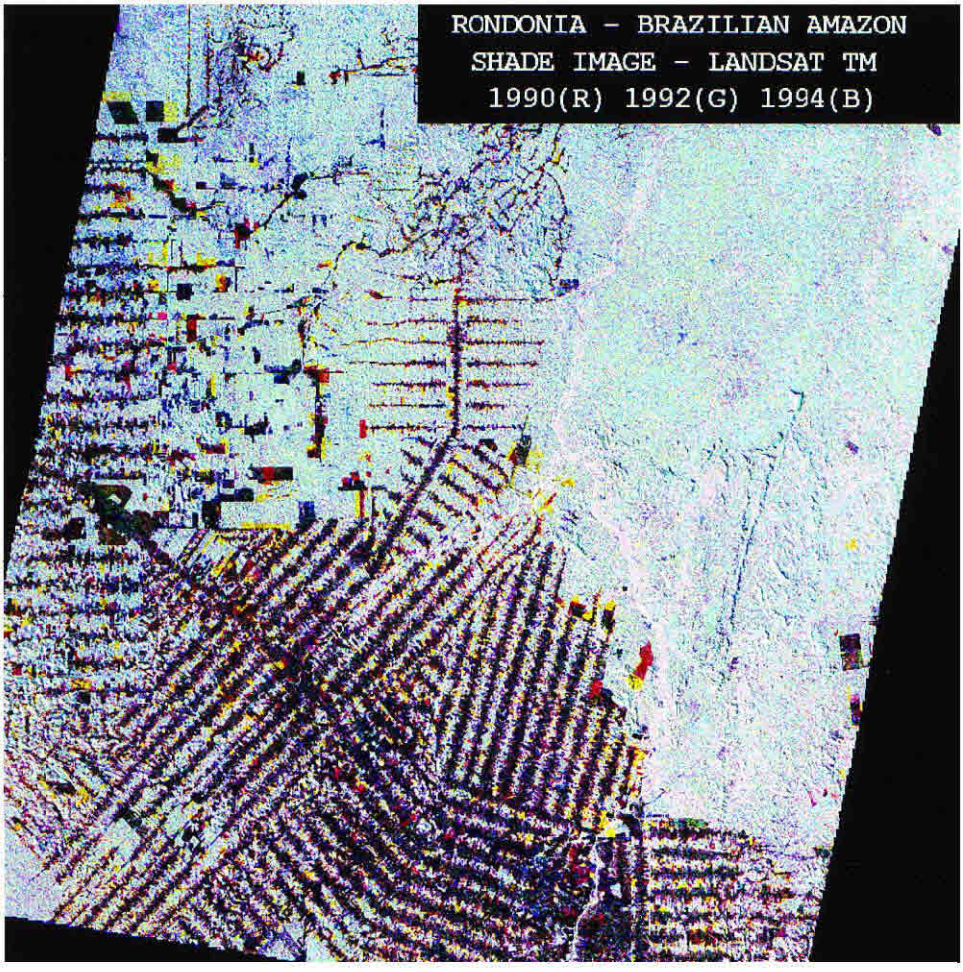

Figure 1. Colour composite of multitemporal shade fraction images (1990 = red, 1992 = green, and 1994 = blue) derived from Landsat TM (Path/row—231/067) data over Rondônia State, Brazilian Amazon.

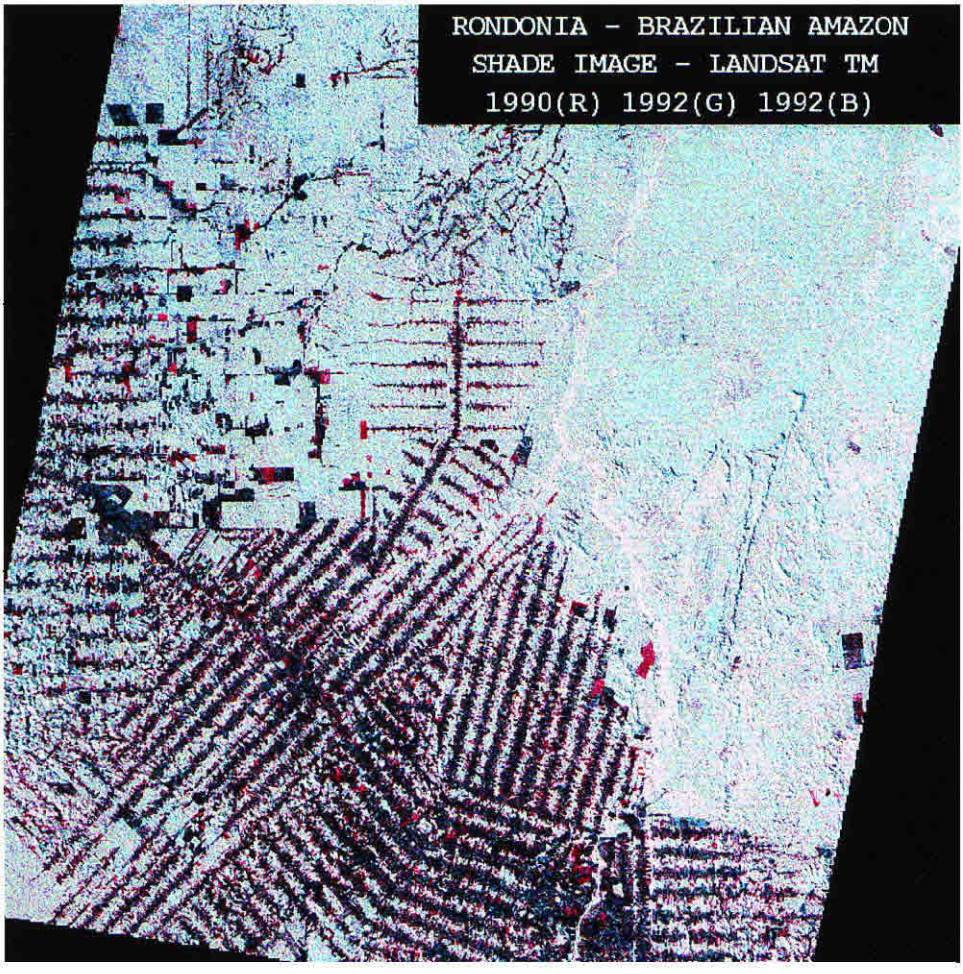

Figure 2. Colour composite of multitemporal shade fraction images (1990 = red and 1992 = green and blue) highlights the deforested areas (in red colour) occurred during the period covered by 1990 and 1992 Landsat TM images.

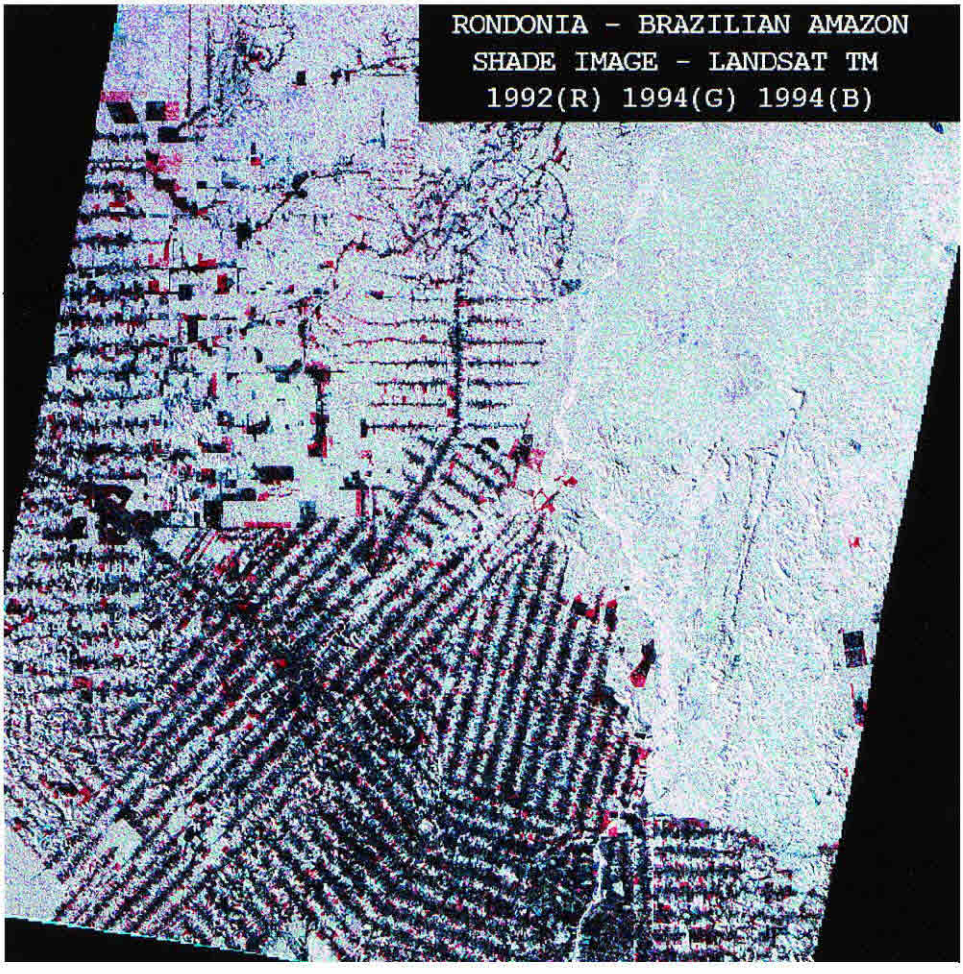

Figure 3. Colour composite of multitemporal shade fraction images (1992 = red and 1994 = green and blue) highlights the deforested areas (in red colour) occurred during the period covered by 1992 and 1994 Landsat TM images.