The Amazon River Mainstem Mapping

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The Amazon River is the world's largest river and it discharges an average of about 200.000 m³/s of water to the Atlantic Ocean. It has 1100 major tributaries and its basin comprises an area exceeding 7 million km² within seven South American countries. The Amazon River and its tributaries have an extensive floodplain subjected to seasonal inundation, which has a key role in the earth system biodiversity, carbon dynamic and global climate. Information on the open water surface of rivers and lakes and its seasonal changes in response to flooding are crucial to understand and model the hydrological and biogeochemical fluxes in the fluvial system. Furthermore, it also helps the comprehension of habitat biodiversity for better conservation practices as well as for an effective management of Amazon fisheries. Remote sensing images are an effective tool for mapping and delineating the extent of open water and sand banks of vast river basins. This work presents a methodology used to map the Amazon River mainstem based on a Landsat Thematic Mapper (TM) digital mosaic composed of Forty-seven almost cloud-free TM Landsat scenes covering a period from 1985 to 1995 acquired from July to September, at the beginning of high water and ending of receding water. Radiometric normalization was applied to the images to reduce variability of environmental conditions during image acquisition, allowing the production of an almost uniform dataset for the entire Amazon River mainstem. A Linear Spectral Mixture Model was then applied in bands 3, 4 and 5 to produce soil, water and vegetation images. The water and vegetation images were then classified to obtain an open water map that was visually edited to correct some misclassified pixels. The result was a thematic map of the Amazon River mainstem and its tributaries and lakes larger than 90 x 90 meters resolution, from the Andes to its mouth at Pará covering an area 84081 km², which includes open water and sand banks in the rivers. Hence this product is essential for ecological and biogeochemical studies of the Amazon floodplain and for an effective management of várzea ecosystem.

OBJECTIVE

• Map the Amazon River mainstem based on a Landsat Thematic Mapper (TM) digital mosaic, composed of Forty-seven almost cloud-free TM Landsat scenes covering a period from 1985 to 1995 acquired from July to September, at the beginning of high water and ending of receding water.
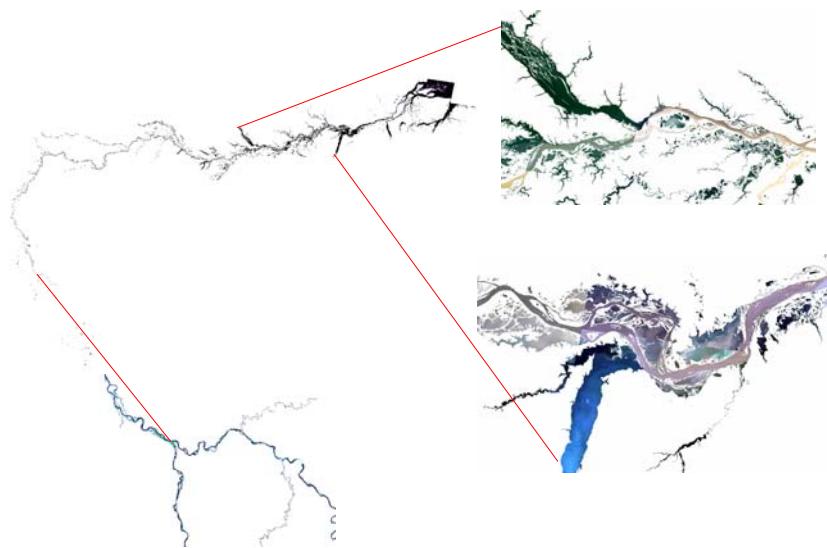
METHODOLOGY

• 47 almost cloud-free TM Landsat scenes from 1985 to 1995 acquired from July to September, at the beginning of high water and ending of receding water (Shimabukuro et al., 2002)

• Radiometric normalization - reduce variability of environmental conditions during image acquisition - production of an almost uniform dataset for the entire Amazon River mainstem.
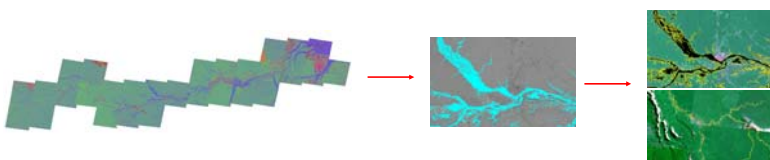
• Linear Spectral Mixture Model - bands 3, 4 and 5 to produce soil, water and vegetation images.

• The water and vegetation images were then classified to obtain an open water map that was visually edited to correct some misclassified pixels.

RESULTS

• Thematic map of the Amazon River mainstem and its tributaries and lakes larger than 90 x 90 meters resolution, from the Andes to its mouth at Pará covering an area 84081 km², which includes open water and sand banks in the rivers.

• Hence this product is essential for ecological and biogeochemical studies of the Amazon floodplain and for an effective management of várzea ecosystem.

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