

SATELLITE REMOTE SENSING OF TURBIDITY AND SEDIMENT CONCENTRATION IN  
LAGOA DOS PATOS

John Taylor, Vipul Patel and Alan Belward  
Silsoe College, Cranfield Institute of Technology, England.

Lawson Beltrame and Marley Goncalves  
Instituto de Pesquisas Hidraulicas, Rio Grande do Sul, Brasil.

The use of Landsat Multispectral Scanner digital imagery for mapping water turbidity and suspended sediment in Lagoa dos Patos, Rio Grande do Sul was investigated. Field measurements were taken from vessels in a test area, Saco De Tapes, between 9:00 a.m. and 11:00 a.m. local time on Sept 21 1983 when there was a satellite overpass.

Sample site locations were determined from shore-based fixes on the boats at the time of each reading. The satellite image was geometrically corrected and the sampling sites were located on it.

Regression models were developed between Landsat digital data and field measurements. The results indicated that turbidity was linearly related to the spectral responses in MSS bands 1 (0.5-0.6 micro-meters) and 2 (0.6-0.7 micro-meters). The best relationship for the available data was with band 2.

Suspended sediment concentration and turbidity were also linearly related using data from additional sampling dates.

Land and water features on the image were separated by masking. Band 2 of the satellite image of water surfaces was digitally smoothed to remove noise and then interactively density sliced. The slice limits were chosen interpretively so as to enhance natural boundaries between areas of water with different reflectance levels. The regression equations were then applied to determine the turbidity and suspended sediment levels for each slice. The calibrated density slice showing turbidity levels was then recombined with the false colour composite of land features and a thematic map was produced.

The results encourage us to believe that satellite images can be used to quantitatively map the spatial distribution of turbidity and suspended sediment in Lagoa dos Patos. It was possible to identify as sources of clear or turbid water all of the streams flowing into the test area. Further work is required to improve and test the stability of the calibration procedure.