

0979574

**CONFERENCE ON  
ENVIRONMETRICS  
IN BRAZIL**



**SÃO PAULO, SP**  
**July 22 - 26, 1996**

**DEDALUS - Acervo - IGC**



30900014187

**SÃO PAULO - BRAZIL**

Almeida, T. I. R.

# REMOTE SENSING DATA APPLIED TO THE STUDY OF INNER SHELF SURFACE WATERS

**BONETTI FILHO, J.\*; RIBEIRO DE ALMEIDA, T. I.\*\*;  
BRANCO, F. C.\*\* & FURTADO, V. V.\***

\* Instituto Oceanográfico-USP; \*\* Instituto de Geociências-USP  
P.O.Box 9075 - São Paulo-SP - Email: bonetti@usp.br

Many authors have already applied digital image processing techniques in water quality analysis. Nevertheless, the use of the sensor Thematic Mapper is not common in studies of inner continental shelf surface waters due to its relatively narrow sampling width. In this work, a methodological approach is suggested for the quantitative analysis of temperatures and suspended sediment concentrations distribution.

The study site extends along a 120 Km coastline. Since no large river reaches the sea in the area, longshore currents are the main agents of sediment transport. Beyond the contribution of the regular water masses, the intrusion of cold waters from Malvinas Current during winter, close to the coastline, has already been detected.

An image acquired in the winter of 1992 was processed in a dedicated computer system following the methodology proposed by Bonetti Filho *et al.* (1). Suspended sediment qualitative distribution was analyzed from a pseudo-color transformation on bands TM-1 (blue/green) and TM-3 (red) while brightness temperatures distribution were determined from the application of a radiometric transfer model on TM-6 (thermal infrared). The average digital numbers for areas with differences in their spectral responses was established from 75 readings for each class. After the quantitative sampling, the pixels were recalculated to 123 x 123 m in order to allow a synoptic view of the whole quadrant (approximately 95 x 95 Km, equivalent to 4.228 Km<sup>2</sup> of water).

TM-1 was the best band for suspended sediment distribution analysis. A strong longshore current occurred from SSW and was associated to the resuspension of sediments. A possible rip current seems to be present close to Itanhaém beach. High concentrations were also found in the west side of Baía de Santos. These results corroborate the area's sedimentation model of Ponçano & Fúlfaro (2). As a general pattern, lower temperatures were detected close to the coastline where three thermal fronts could be identified. Brightness temperatures ranged from 19,4°C to 20,8°C in the scene and oceanic waters were 0.5-1.0°C warmer than coastal waters. The results agree with the winter measurements of Matsuura (3). The head of these thermal fronts were associated to lower suspended sediment concentrations, possibly because of their oceanic origin.

In oceanography, remote sensing can be applied to three different purposes (which may be combined): discovering of new features, planning of field trips and spatial interpolation of simultaneously sampled data. This work demonstrated the fast application of first and second approaches by using digital image processing.

(1) BONETTI FILHO, J.; ALMEIDA, T. I. R.; CONTI, L. A. & FURTADO, V. V. 1994. Landsat-TM and Digital Terrain Model applications in the study of abiotic parameters as a proposal to coastal monitoring. *Revista Técnica de Integración Iberoamericana y Mundial - SELPER*, 10(3-4):94-98.

(2) PONÇANO, W. L. & FULFARO, V. J. 1976. Sedimentação atual nas adjacências da Ponta de Itaipu, e Baía de Santos: implicações na escolha de locais de lançamento de material dragado. *In: Anais do Congresso Brasileiro de Geologia de Engenharia*, Rio de Janeiro, Vol.1, p. 91-110.

(3) MATSUURA, Y. 1986. Contribuição ao estudo da estrutura oceanográfica da região sudeste entre Cabo Frio (RJ) e Cabo de Santa Marta Grande (SC). *Ciência e Cultura*, 38(8):1439-1450.