[1] INPE - Instituto de Pesquisas Espaciais - São José dos Campos/Brazil
[2] Instituto Agronômico do Estado de São Paulo - Campinas/Brazil
[3] DFVLR / F.R. Germany

ABSTRACT

liminary results of a digital classification of
s data from an agricultural region in São Paulo
te are presented. A comparison is made with the
ults of a digital classification of a Thematic
per scene from the same region.

words: MOMS, Thematic Mapper, digital
ssification, land use, São Paulo State.

1. INTRODUCTION

e MOMS (Modular Optoelectronic Multispectral
anner) experiment was launched as a payload on
pace Shuttle" missions STS-7 (June, 1983) and on
S-11 (Fevruary, 1984) within the NASA/DFVLR
erman Aerospace Establishment) cooperation
ogramme. With this experiment, it was possible to
tain, for the first time, orbital images from a
ush broom" scanner, working with CCD technology.
uring both space missions, with a duration of 14
ys, a total of 3,572,000 km² of the Earth surface
s imaged, according to Bodechtel et al. (1984a).

OMS data has been evaluated for geological (Hiller
Hauck 1984; Jaskolla 1984), hydrological and
artographical (Gierloff-Emden 1984; Hauck et al.
986; Kux et al. 1986) studies. A detailed
escription of MOMS system is found in Bodechtel et
l. (1984 a and b).

The objective of this study is to present the first
results on the applicability of MOMS data to map
land use/land cover at a typical agricultural
region within São Paulo State: the area surrounding
the city of Piracicaba (Figures 1 and 2).
A comparison was made between the results of a
digital classification using both MOMS and Thematic
Mapper scenes from the same area.

Fig. 1 - Location of the Piracicaba region within São Paulo State.

Fig. 2 - Location of São Paulo State within Brazil.

2. BRIEF DESCRIPTION OF THE AREA UNDER STUDY

The area under study consists of a plateau formed by sedimentary sequences (mostly sandstones from Botucatu-Pirambóia Formation) overlaid in some sections by a suite of basic rocks (Grupo São Bento). This plateau, with altitudes varying between 600-660 m around the city of Piracicaba, present two distinct morphological features in this region:

1. gentle rolling relief to the east of Piracicaba, where sugar cane is planted extensively;
2. hilly terrain, to the west and northwest of Piracicaba, with straight to convex slopes, where intensive agriculture predominates.

This region, due to its geological and geomorphological differentiation, presents a variety of soil types. According to Ranzani et al. (1966), the following soil mapping units occur in this region: red yellow podzols, red yellow latosols, regosols and lithosols.

3. METHODOLOGY

Using digital processing techniques, a Thematic Mapper scene (Figure 3) was merged with the corresponding MOMS scene (Figure 4). Only channels TM 2 and TM 4 were used, since these channels approximate spectrally most to the available MOMS data (MOMS: ch.1 575-625 nm, ch.2 825-975 nm). A thematic classification was made using a supervised classifier. In order to permit a comparison of the thematic classification of both MOMS and TM scenes, the same sample areas were considered. Using a deterministics classifier (Single Cell) for the areas defined, the minima and maxima gray level values were determined, showing the separability of classes in a diagram.

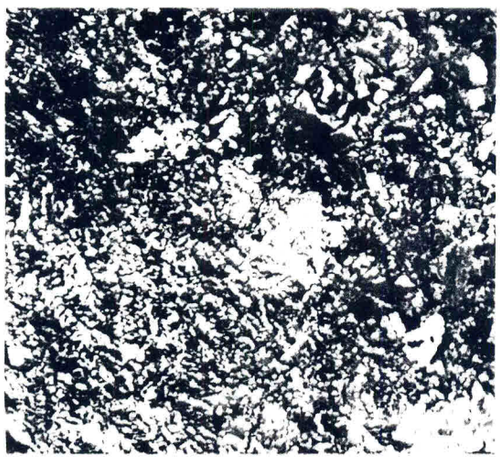

Fig. 3 - TM-scene, channels 2 and 4. Region around Piracicaba, overpass on April 17, 1984

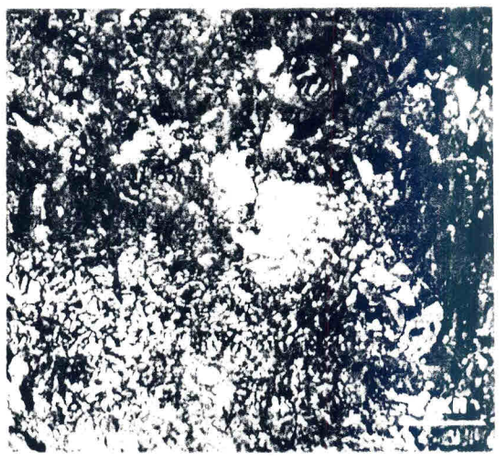

Fig. 4 - MOMS scene, channels 1 and 2. Region around Piracicaba; data take: February 4, 1984.

4. DISCUSSION OF RESULTS

A comparative analysis of both histograms (Figure 5) indicates that the thematic class "tilled soil I" is spectrally best characterized by TM as well as by MOMS. This is probably due to the fact that this class is both visually and digitally very well-defined. On the other hand, class "tilled soil II" is spectrally well-defined in relation to class "tilled soil I", but it presents a certain superposition with classes "urban" and "other cultures" on MOMS and on TM data. The class "sugar cane", the main commercial culture of the area under study, is relatively well-depicted spectrally by MOMS data. Indeed, there is a certain superposition with "pasture" and "dense vegetation", whereas the confusion between this class and other land cover classes is much higher at TM data.

5. CONCLUSIONS

Comparing both histograms (Figure 5), one can denote very clearly that the MOMS data used present a better spectral separability for land cover land use classes than the TM channels 2 and 4. As a limitation to the comparison of data from both sensors, one has to say that the timespan of two months between the MOMS and TM data takes could eventually have changed spectral values of classes "tilled soil II", "dense vegetation", "other cultures" and "pasture". The month of February (MOMS data take) is considered in the mid of the rainy season, whereas April (TM data take) is positioned just after the rainy season for this region. The increase of biomass during the rainy season for this region. The increase of biomass

ing the rainy season seems to affect the spectral arability of land use/land cover classes.

continuation of this study will be the entation of the data sets from both sensors to d out whether MOMS or TM data are spectrally erior to study small fields with different ps.

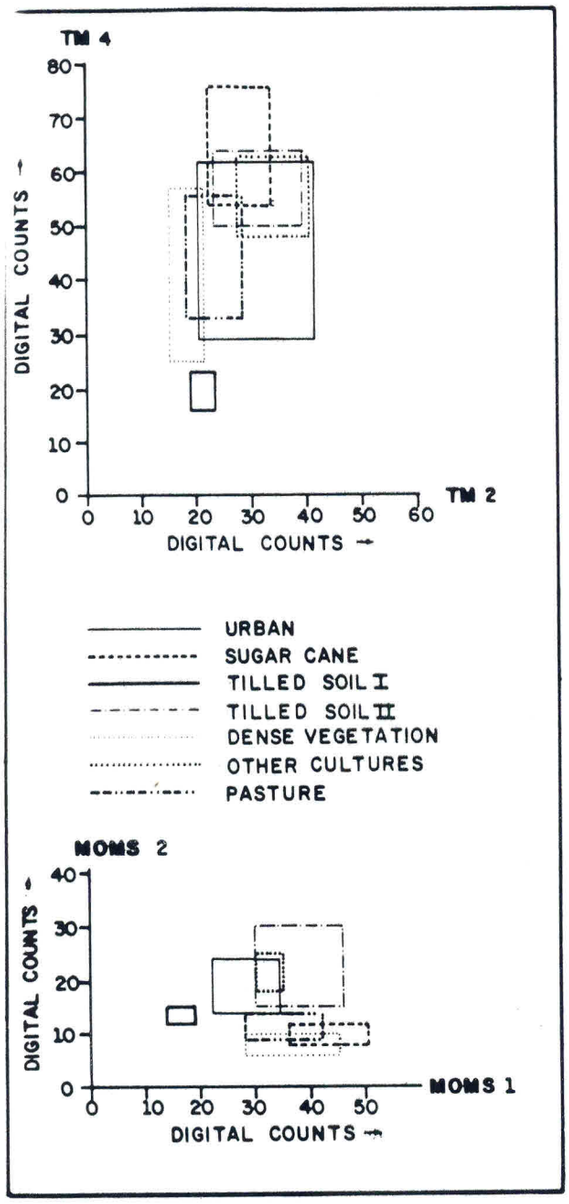

Fig. 5 - Gray level values for different thematic classes, comparing TM and MOMS data.

6. REFERENCES

Bodechtel, J., Hiller, K., Landauer, G., Seige, P., Yamani, A. & Zilger, J. The information network for a real-time controlled data acquisition of MOMS. Proceed. IGARSS'84 Symposium, ESA SP-215, Strasbourg 27-30 August 1984a, 33-36.

Bodechtel, J., Meissner, D., Seige. P., Haydn, R. & Winkenbach, H. MOMS-01 on STS-7 and STS-11 - Missions and Results. Proceed. IGARSS'84 Symp., ESA SP-215, Strasbourg 27-30 August 1984b, 29-32.

Gierloff-Emden, H.G. MOMS, interpretation and evaluation of the MOMS-image Arica, west coast of South America. Proceed. IGARSS'84 Symposium. ESA SP-215. Strasbourg 27-30 August 1984, 49-57

Hauck, M., Hiller, K. & Kux, H.J.H. Southern Pantanal Matogrossense: interpretation of MOMS data; preliminary results. Proceed. IGARSS'86 Symp. ESA SP-254, Zurich/Switzerland 8-11 September 1986, 1451-1456.

Hiller, K. & Hauck, M. MOMS-01 data of Bolivia: comparison with Landsat-MSS and geological interpretation. Proceed. IGARSS'84 Symp., ESA SP-215, Strasbourg 27-30 August 1984, 45-48.

Jaskolla, F. The Pilbara District in Northwestern Australia - a case study for the geological application of MOMS and Landsat data. Proceed. IGARSS'84 Symp, ESA SP-215, Strasbourg 27-30 Aug. 1984, 59-62.

Kux, H.J.H., Hauck M. & Hiller, K. Utilização de dados do MOMS para estudos de hidrologia e vegetação. Área teste Pantanal Matogrossense; resultados preliminares. IV Simp. Bras. de Sensoriamento Remoto/VI Reunión Plenária SELPER, Gramado 10-15 agosto 1986, vol. 1, p. 63.

Ranzani, G., Freire O & Kinjo, T. Carta de solos do município de Piracicaba. 1966. Centro de Estudos de Solos, Escola Superior de Agricultura "Luiz de Queiroz" USP, Piracicaba.