NEW APPROACHES IN MAPPING AND ATLAS DESIGN:
AN EXAMPLE ON CASTELLÓN PROVINCE (Spain)

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ABSTRACT

Some important Atlas and catalogues of satellite images have been published for the last years. Most of them are focused in a good selection of the images, because they are the main object of the book, and not the geographical landscapes.

We have just finished the first atlas of satellite images performed in Spain. The new approach of this work concerns the criteria to select the images and the inclusion of TM images. A temporal and pedagogical consideration is also included in the book, in order a better display and understanding the geographical features of the region.

INTRODUCTION

As a part of the Applied Geographic Institute and the Department of Geography of the University of Alcalá de Henares, a work group has been laboring for the last years on geographical applications of remote sensing. Until the present day, they have been focused on land use mapping and didactical employ of Landsat images, received from both sensors MSS and TM.

A research grant sponsored by a private financial entity, Caja de Ahorros de Castellón, gave us the opportunity to do the assignment on the most outstanding geographical features of the province of Castellón, taken from different platforms and sensors. This approach also aimed at joining a multitemporal perspective to clarify the continuous changes registered on the surface through the last decades.

The result of this team-work is the book "Castellón desde el espacio" (Castellón from space) (Sancho and Chuvieco, 1986), published recently. This is the first atlas of satellite imagery performed in Spain, although there are some papers concern an analysis of regional areas using Landsat and Skylab images (López Bermúdez, 1976; Lizárraga and Creus, 1981; Sancho, 1982).

GEOGRAPHICAL FEATURES OF CASTELLÓN

Castellón de la Plana faces the East in the Mediterranean coast. Its area is 6,679 km² and is a part of the Autonomous Community of Valencia.

The province offers the typical mediterranean landscapes: clear differences are between the coastal lowlands with well irrigated citrus fruit orchards, and the interior uplands, cold and without macrothermic crops. Just in between, olive trees, almond trees, carob and vineyards, predominate.
The province has undergone drastic changes for the last 30 years; hamlets and villages have disappeared while towns have increased their population. Castellon and other important towns nearby have doubled their inhabitants. In 1984, about 70% of its 446,367 inhabitants lived in a very small area -La Plana, 500 km²- where the capital lies. Towns have spread their built up zones, and radical changes have even suffered internally. Factory works cover nowadays their outskirts.

Tourism is the other main feature to deal with. Its importance is outstanding in economy, and morphological changes because of this are evident. Bécanicasim, Oropesa, Peñiscocla and Alcocebre are enclaves absorbing above 80% of tourism. The sun and the beach are, till now, the only appeals.

Agriculture has an important role too in the province, although its importance has been dwindling since 1950 against the two sources: industry and welfare work.

Contrasts, as in every Mediterranean country, are blatant. Irrigated fields and dry land, intensive and commercial agriculture facing to extensive and quasiduring one, rich soil against impoverished. These contrasts have worsened in the recent years. Irrigated fields for citrus have conquered new zones while dired and unleveled zones have been left uncultivated. Big money has beens invested to improve market crops, while uncommercial products have been totally ignored.

Summarising, we could say that the province of Castellon is a dynamic area, but rural zones move well behind; the urban areas command economy. Industry heads ranks; tourism comes next, attracting great number of visitors, and agriculture is, at present, undergoing a hard change to compete in marketing products.

SELECTING AND CLASIFYING THE IMAGES

A mindful study of the geographical features has shown us the three most outstanding: urban areas and industry, tourism and rural areas; to those three Castellon geography is focused. It seems logical to follow this scheme for choosing and treatment of the images.

Although ours is not the first attempt to collect space images in Atlas and Catalogues, we think this approach is new and well different from the ones we know. The original point of view has been the selection of the images in order to improve the display of the landscapes and not the opposite. In other words, the common use is to pick up the best images transmitted by a particular sensor, not being assigned a specific area. Excellent works of this kind are the ones of Sheffield (1981 and 1983), NASA (1976) and Francis and Jones (1984).

In other cases the purpose is to cover a whole country, helped by the basic cartography (Westerman, 1981) or by sketches made from the image (Bullard and Divon-Gough, 1985). This approach is more alike ours, although here most of the images has been processed with the same criteria, as it is more a catalogue of images than the result of displaying specific landscapes.

That is the purpose of our work, actually: to show geographical features through selected images to give the real sight-seeing of the landscape even though these images lack homogeneity.
The idea has obliged us to use—in the case of TM images—a varied enhancement techniques, as well as many colour compositions, most of them unconventional. For example, in order to a best display of the urban structure in La Plana region—the most populated of the province—, it was necessary the use of high pass filters; the unable us to underline lineal aspects: roads, highways, streets of the image. But the false colour composite (4,3,2 TM) even with filtered bands, did not provide a good display due to the poor contrast of band 2. Because of that we decided to include in the display only a filter band, the four, because it gave a clearer contrast between roads and citrus field zones. Finally, we chose a coloured combination formed by the bands 4,4filtered and 3 (red, green and blue), showing neatly the effect that we intended, and giving a prominent view of urban structure even on the smallest villages of the area (below 50,000 inhabitants).

Other examples would be the combination of bands 5,4,1 to show a vaste marshy zone of the province, or the 6,4filtered, 1 to underline contrasts between cereal and fruit tree zones no irrigated.

The traditional false colour composite 4,3,2 (RGB) was employed for an overview of the whole area of La Plana, to underline the hard contrast between irrigated citrus zones and the surrounded mountains covered by scrub and evergreen woods.

TIME FACTOR

One of the most interesting features in the geography of Castellon—in no way different from other mediterranean countries—is the fast development undergone through the last 30 years due mainly to industrial transformation affecting directly to Economy.

This features cannot be represented with Landsat images, as changes go back to the sixties. So we go in for a comparative analysis with aerial photographs of 1956/57 and 1983. We have chosen items showing the intense and real transformation of Castellon province focused in towns, tourism and rural areas, already mentioned.

Urban changes are evident when comparing photographs of different dates. We have chosen eight of these: Grao de Castellon, Castellon de la Plana, Almazor-A Villareal, Vall de Uxó, Onda, Alcora, Vinaroz, and Benicarlo. The expanded built-up area, the morphological change inside the towns, the new factory works, are well appreciated.

Most of the photographs have their sketches showing clearly the land cover changes of the pilot areas. Could be convenient to remember than Industry shared a 28.2 % GNP of the province in 1960; in 1981 is 40.4 %. Labor employment in industries grows up 50 % between 1960 and 1981. Castellon de la Plana itself doubles its population (62,493 and 124,487), but the built-up surface does not grow at the same rate. It is clear the morphological change inside the urban site: the town grows up in height.

Glazed-tile industry has sprung spectacularly in the past 20 years. The figures will clear the matter: in 1982, 35 % of the province labor force works here, with 65 % of industrial exports, and 40 % of the agro-industrial compound. Onda, Alcora and Villarreal-Almanzora concentrate most of the tile factories
As a consequence, entire industrial neighbourhoods have appeared around, as images of 1983 clearly show.

A PEDAGOGICAL DIMENSION

Didactic and informative purposes are not the only ones we go in for with this work. We aim at giving it as a model for other enterprises, regional or national, and as a guide-book for readers unacquainted with remote sensing.

Both purposes have been accomplished, we think, in the introductory chapter which gathers the basic principles of this technique; we have included images from the most varied sensors to complete our work and to show the geographical situation of the province. Images of AVHRR (NOAA-7), CZCS (Nimbus-7), Meteosat, HCMMR (HCMM), and MSS (Landsat-2) have been selected. So, we have included, in the same scheme, a series of varied remote sensing systems, showing clearly the multiple possibilities of these techniques. The first chapter has primarily a didactic objective, but through the whole book we have tried to give easy comments about the images and their geographical features, avoiding commentaries about the process to obtain or to process the images.

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BIBLIOGRAPHY


.NASA (1976): Mission to Earth. Landsat views the world, Greenbelt, NASA SP-360,


. SANCHO, J. y CHUVIECO, E. (1986): Castellón desde el espacio Castellón, Caja de Ahorros y Monte de Piedad.


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Fig. 1 - LOCATION MAP

- Community of Valencia
- Province of Castellón

a) Autonomic regions in Spain

1. Morella
2. Vinaroz
3. Benicarló
4. Peñíscola
5. Oropesa
6. Benicasim
7. Castellon de la Plana
8. Villarreal
9. Burriana
10. Segorbe
11. Onda

b) Province of Castellón

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