RESULTS AND COMPARISON BETWEEN CORINE AND SIOSE IN THE LAND OF VALENÇIA (SPAIN)

Joan Carles Membrado
Emilio Iranzo

32nd International Geographical Congress
Cologne 26 - 30 August 2012
The land of València (officially Comunitat Valenciana)

23,000 km²
1 of 17 autonomous communities (Eastern Spain)
5 million

Oranges
Industry
Construction
Tourism
RESULTS AND COMPARISON BETWEEN CORINE AND SIOSE IN VALÈNCIA (SPAIN)

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CORINE has been for many years the reference GIS for land use researches in València and Spain.
Between 1990 and 2006 artificial surfaces almost double.
The class that grows the most: *Discontinuous Urban Fabric*
The class that grows the most: *Discontinuous Urban Fabric*

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<tr>
<th>Land Use (CORINE)</th>
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Discontinuous Urban Fabric

300,000 from Western Europe

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Discontinuous Urban Fabric

43,000 from Germany
31,000 from Benelux
22,000 from Scandinavia
8,000 Switzerland/Austria

almost 150,000 from UK
The class that follows in growth: *Industrial or Commercial Units*

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*32nd International Geographical Congress (Cologne)*
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The class that follows in growth: *Industrial or Commercial Units*
STRONG RISE OF COMMERCIAL AREAS (from 1 shopping centre in 1990 up to 68 in 2008)

Car-friendly malls developed in the Western world (from 1950s). Linked to suburbs (112)

Industrial and Commercial Units:
+11300 Ha
Next class in growth: Continuous Urban Fabric

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Next class in growth: Continuous Urban Fabric
Benidorm resort: High Urban Density

1950

2010

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Continuous Urban Fabric

TALLEST RESIDENCIAL BUILDING IN EUROPE
TALLEST HOTEL BUILDING IN EUROPE
Housing boom/bubble: City of Arts and Sciences
Next class in growth: Construction Sites

8935 corine & 12692 siose

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Next class in growth: *Construction Sites*
Construction of the High Speed tracks between València and Madrid (1 hour and 35')

RESULTS AND COMPARISON BETWEEN CORINE AND SIOSE IN VALÈNCIA (SPAIN)
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PARTIALLY CONSTRUCTED BUILDINGS, WHOSE CONSTRUCTION HAS BEEN INTERRUPTED BECAUSE OF THE CRISIS

RESULTS AND COMPARISON BETWEEN CORINE AND SIOSE IN VALÈNCIA (SPAIN)
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URBANISED STREETS WITH NO BUILDINGS, WHOSE CONSTRUCTION HAS NEVER BEGUN BECAUSE OF THE CRISIS

RESULTS AND COMPARISON BETWEEN CORINE AND SIOSE IN VALÈNCIA (SPAIN)

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The collapse of the Spanish housing bubble put an end to this huge growth of artificial surfaces.
Permanently Irrigated Land (Horta de València)

 Decline in Permanently Irrigated Land


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<td>854,206,501</td>
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<td><strong>212. Permanently Irrigated Land (Horta de València)</strong></td>
<td><strong>9.745</strong></td>
<td><strong>7.459</strong></td>
<td><strong>-23,49</strong></td>
<td><strong>-2,286</strong></td>
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Decline in Permanently Irrigated Land

RESULTS AND COMPARISON BETWEEN CORINE AND SIOSE IN VALÈNCIA (SPAIN)
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City growth threatens the centuries-old vegetable gardens.
City growth threatens the multisecular vegetable gardens

RESULTS AND COMPARISON BETWEEN CORINE AND SIOSE IN VALÈNCIA (SPAIN)
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Before SIOSE, the reference land cover GIS in Spain was CORINE which shows geographical information for almost the whole of Europe.

On a **regional or a national level**, it is still better to use CORINE land cover than SIOSE, because of the **excessive** detail of SIOSE.
Rice in València

Rice in Lombardia/Piemonte

Milan

València

Olive groves in Peloponese

Kalamata

Bari

Olive groves in Andalucía (largest producer)

Córdoba

Granada

Olive groves in Puglia

Sparta

Kalamata
Spanish acronym standing for ‘Sistema de Información de Ocupación del Suelo en España’ (Spain’s Land Cover Information System)

a GIS promoted and coordinated by the Spanish Instituto Geográfico Nacional

a GIS with the highest level of territorial disaggregation ever carried out in Spain

An optimal tool for:
Strategies of sustainable regional development
Planning and management of environmental resources
Dynamic studies on land cover

RESULTS AND COMPARISON BETWEEN CORINE AND SIOSE IN VALÈNCIA (SPAIN)
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Thanks to its level of detail a lot of researches can be derived from SIOSE (especially on a local level)
MINIMUM MAPPING UNIT

Territory is divided into many polygons, each associated with its land use, and with the only restriction of representing a minimum size, which for SIOSE is:

• 2 hectares for natural (forest, shrub, etc.) and agricultural areas;
• 1 hectare for artificial areas (urban fabric, road network, etc.);
• 0.5 hectare for water bodies, wetlands, beaches, greenhouses and riverside vegetation

• minimum width 15 m for linear elements (no minimum width for water bodies, wetlands, beaches, greenhouses and riverside vegetation)

And for CORINE is:

• minimum mapping unit 25 hectares

• minimum width 100 m for linear elements
IMAGERY RESOLUTION

SIOSE

Its reference imagery is **SPOT5**
Resolution: 2.5 m
Reference scale: 1:25.000

Other support reference imagery is Spanish **PNOA**
Resolution: 0.5 m
Reference scale: 1:5.000

CORINE

Its reference imagery is **Landsat**
Resolution: 30 m
Reference scale: 1:100.000
SIOSE: the most detailed GIS ever created in Spain on land use
In València: CORINE 8,541 different polygons and SIOSE > than 157,000
The reason for such a wide gap: the minimum mapping unit (CORINE = 25 ha and SIOSE = 2, 1 or 0.5 ha)

Two images from the same territory.
CORINE = more generalized // SIOSE = bigger level of detail

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NOMENCLATURE

• SIOSE 40 simple covers
  A lot of complex covers, consisting of
  regular (layout) mosaic
  irregular (layout) mosaic
  associations (anarchic layout)
  42 artificial predefined associations

• CORINE 44 simple covers (3rd level of CORINE)

• Conceived for different purposes
  • SIOSE (big scale)  CORINE (small scale)

But their nomeclature have some similarities:
Both GIS’s aim to create a land cover classification

National Spanish Geographical Institute intends to automatically create
CORINE 2012 from SIOSE 2012 data, whose photo interpretation is
currently finishing.
SIOSE covers can be simple or complex.

**Simple Covers** cannot be divided into simpler ones:

100% of the polygon is homogeneous and bigger than the minimum size required.

There are eight big types of simple land covers:

- Crops
- Grassland
- Scrub
- Trees
- Bare soils
- Wetlands
- Water bodies
- Artificial areas
Simple land covers of crops (orange groves)
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Simple cover of trees (conifers)
Complex Covers consist of the sum of simple covers that do not satisfy the minimum size required, and they need to be aggregated into larger and complex covers.

A complex cover can be distributed as a:

- **a Regular Mosaic** if it has a more or less regular layout (as in crops)

A regular mosaic, consisting of:
- 60% of orange groves
- 30% of arable crops
- 10% of grassland (from abandoned crops).
Complex covers can also be distributed as an **Irregular Mosaic** if its layout is not uniformly distributed (as in forest areas)

An **irregular mosaic**, consisting of: conifer trees (80%) grassland (20%)
Complex covers can also be distributed as a an **Association** if its layout is anarchically mixed.

There are 42 predefined artificial **associations**. This one is a *discontinuous mixed urban* association consisting of: 50% of buildings, 35% of streets, parking lots and pedestrian area without green areas; 10% of green areas; 3% of unbuilt land; 2% of artificial water surface.
Different imagery, minimum mapping and nomenclature means different results

<table>
<thead>
<tr>
<th>Category</th>
<th>CORINE (%)</th>
<th>SIOSE (%)</th>
</tr>
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<tbody>
<tr>
<td>artificial land</td>
<td>4,8</td>
<td>6,9</td>
</tr>
<tr>
<td>crops</td>
<td>44,7</td>
<td>30,0</td>
</tr>
<tr>
<td>trees</td>
<td>14,1</td>
<td>16,3</td>
</tr>
<tr>
<td>shrub-grassland</td>
<td>34,9</td>
<td>43,4</td>
</tr>
<tr>
<td>no vegetation</td>
<td>0,7</td>
<td>2,6</td>
</tr>
<tr>
<td>water bodies</td>
<td>0,4 0,5</td>
<td>0,3 0,3</td>
</tr>
<tr>
<td>wetlands</td>
<td>0,0 5,0</td>
<td>10,0 15,0</td>
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According to SIOSE: almost 194,000 ha are abandoned crops. For SIOSE they are grassland, but for CORINE, most of them are still crops (because of generalization)

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32nd IGC (Cologne)
From an economic and ecological point of view: main difference is the artificial land. Generalization of covers (CORINE) distorts —reduces— the statistics of artificial lands.

### artificial land

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CORINE only maps polygons > 25 ha
DIFFERENCES in ARTIFICIAL LANDS  between

CORINE: 11 artificial classes
111. continuous urban fabric  112. discontinuous urban fabric
121. industrial or commercial units  122. road and rail networks
123. port areas  124. airports
131. mineral extraction sites  132. dump sites  133. construction sites
141. green urban areas  142. sport and leisure facilities

and SIOSE: 42 predefined artificial associations
• mixed urban which can present three layouts:
  old area (old city)  expansion area (new city)  discontinuous area (suburbs)
• primary sector (farms, forestry facilities, mineral extraction sites, fish farms)
• industrial buildings (planned or unplanned industrial areas, isolated factory)
• tertiary buildings (business & commercial area, recreational park, hotel complex, camping)
• different facilities (government, health, education & justice facilities, cemeteries, churches, prisons, monuments, cultural sites, sport facilities, golf courses, green areas)
Infrastructures (road networks, rail networks, port areas, airports)
• power plants (nuclear, hydroelectric, thermal, wind & solar farms)
• water (sewage treatment plant, desalination plant, irrigation canal)
• Telecommunication repeater
• waste (dump sites, waste treatment plant)

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CORINE distinguishes 3 classes & polygons (111, 122 & 141)
SIOSE distinguishes up to 100 polygons, all of them consisting of *predefined artificial associations* (old city, new city, green areas, sports facilities, etc.)
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Pre defined

Artificial

Associations

some examples

old area (old city)

expansion area (new city)

discontinuous area (suburbs)
Predefined Artificial Associations some examples

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Predefined Artificial Associations some examples

Educational areas

Health areas
Predefined Artificial Associations some examples

Port areas

Nuclear power plant

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Select by attributes: Citrus (code 222)

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RESULTS AND COMPARISON BETWEEN CORINE AND SIOSE IN VALÈNCIA (SPAIN)

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Some simple covers can or cannot have an attribute.
CONCLUSIONS

• CORINE: Dynamic studies on land cover
  • Growth of artificial surfaces
  • Discontinuous urban fabric & commercial units
  • Model of extensive urbanization
  • Best land cover GIS to compare (small scales)

• SIOSE: highest level of detail GIS in Spain
  • Best land cover GIS to compare (big scales)
  • Different imagery (more resolution in SIOSE)
  • Different nomenclature (more complex in SIOSE)
  • Different minimum mapping size (more restrictive in CORINE)
  • Different results between SIOSE & CORINE
    • SIOSE more accurate (more artificial surface, more grassland from crops, less crops)
Thank you

Results and comparison between CORINE and SIOSE in the Land of València (Spain)

Joan Carles Membrado
Emilio Iranzo

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