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INTRODUCTION

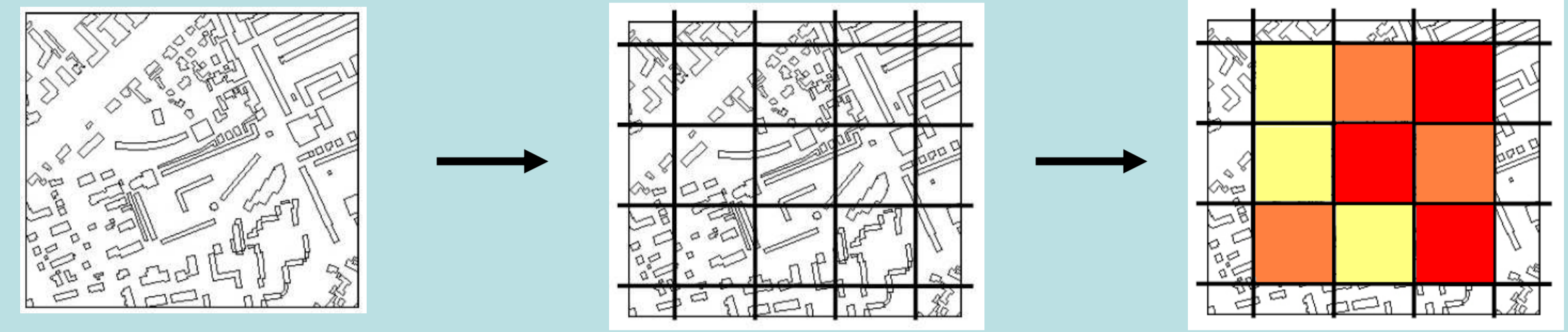
To develop and manage urban territories and to analyze urbanization impact on environment, an accurate knowledge of the city and its urban fabric is necessary. A physical description like building morphology or land cover / land use allows some characterization of the urban terrain. A specific package for a GIS software, OrbisGIS, has been developed for urban analysis: **UrbsAT** (Urban Spatial Analysis Tools). It allows extracting knowledge from various data sources and gives some indicators to real applications like meteorological simulations.

OBJECTIVES

- Test the quality of the urban indicators computed from UrbSAT:
- urban data source quality
 - cell size influence in the vector to grid process
 - grid orientation influence on the indicator quality

URBSAT

UrbSAT: a plug-in of a GIS software, OrbisGIS, to transpose vector information into raster data.



From data source ... to ... urban indicators

TEST 1: Quality and accuracy of urban data bases:

→ This test allows comparing vector data source to satellite image to estimate land cover. On each test area, the density of built and vegetation surface is computed from two data sources

Test areas:



Data sources used:

- French database : BDTopo® (IGN) from Nantes
- Spot image (resolution: 2,5m, May, 2000, Nantes)

Results:

	City center	Collective buildings	Residential buildings
SPOT vegetation density	0,23	0,25	0,13
BDTopo® vegetation density	0,17	0,08	0,15
SPOT built density	0,47	0,37	0,33
BDTopo® built density	0,38	0,18	0,18

- under-estimation of land cover from BDTopo® compare to land cover from satellite image.
- difference is higher in districts where the built density is lower

TEST 2: Grid cell size:

→ This test allows evaluating the impact of the vector to grid process on information quality. The Average Building Height indicator (ABH) is computed for 100m, 200m, 300m and 500m cell sizes and compared to Initial Building Height (IBH), before vector to grid process.

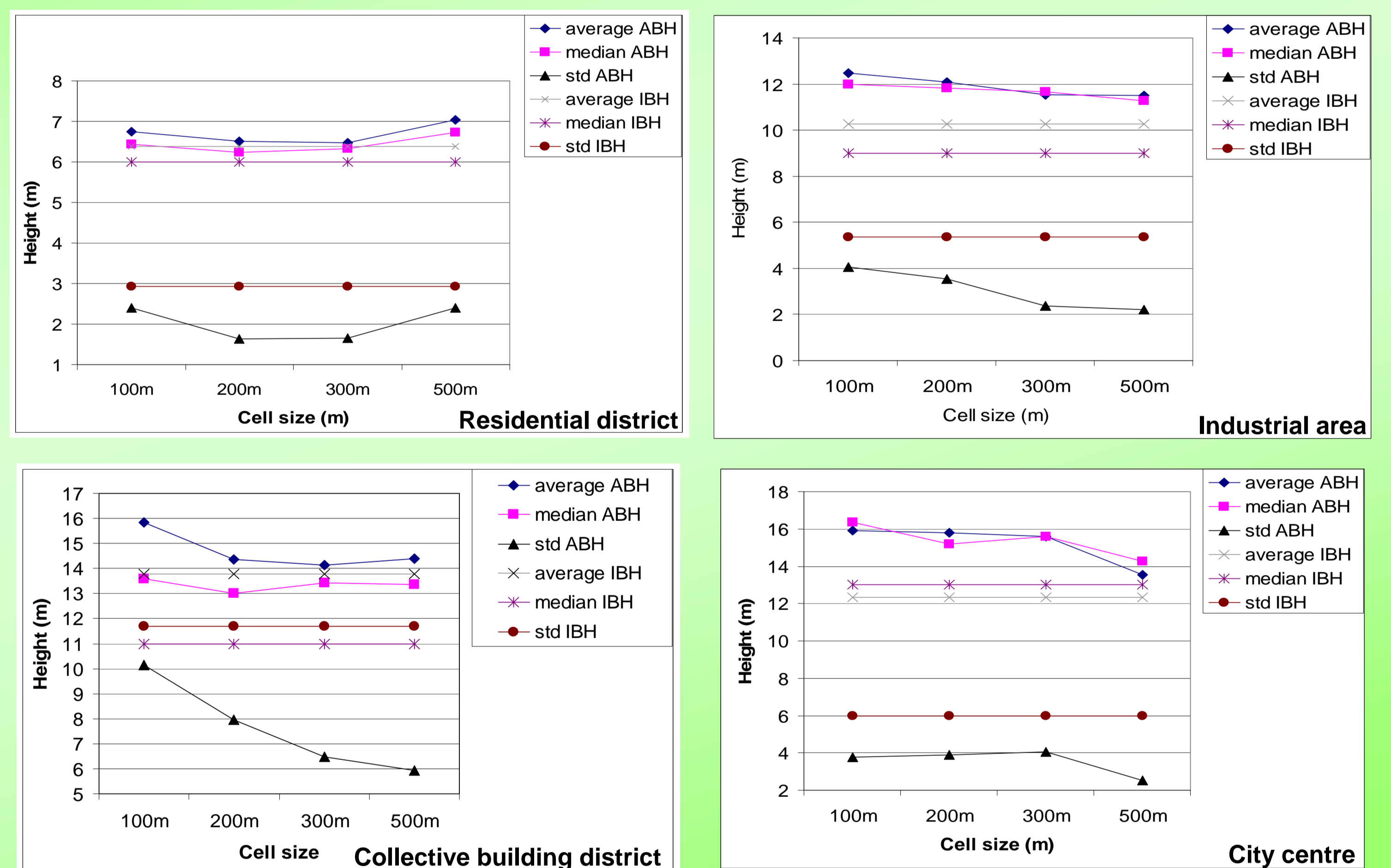
Test areas: districts from LeHavre, see figure below

Data sources used:

- French data base : BDTopo® (IGN) from Le Havre

Results

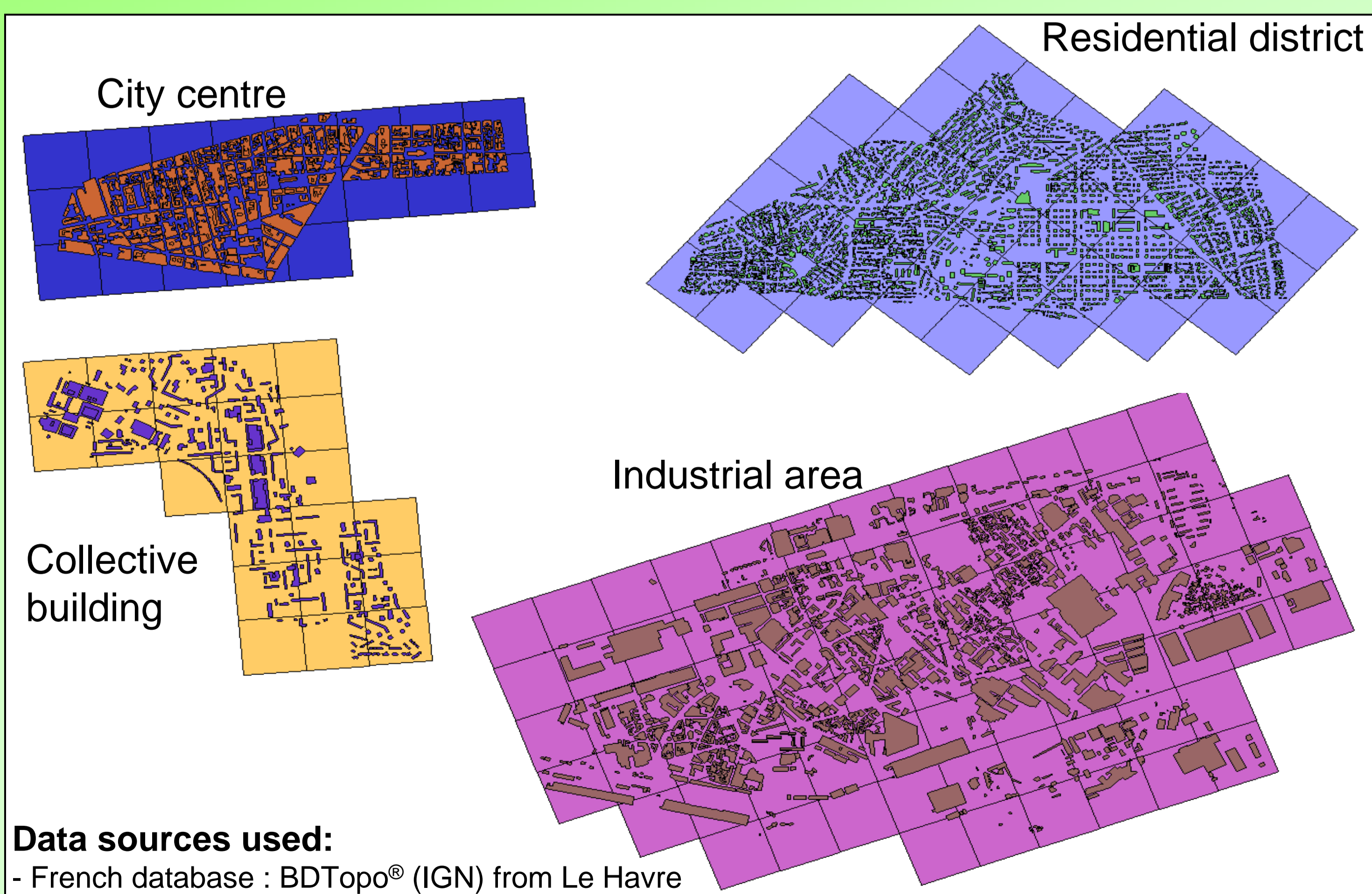
- over-estimation of ABH after the vector to grid process
- difference erased with the cell size increasing: homogenisation of the district



TEST 3: Grid orientation:

→ This test allows evaluating the impact of the grid orientation on the indicator computation. ABH and IBH are computed on a north-south / east-west grid and on a grid oriented according to the main direction of the street network.

Test areas:



Data sources used:

- French database : BDTopo® (IGN) from Le Havre

Results

	Angle	ABH (oriented grid)	ABH (NS / EW grid)	IBH
Collective district	355°	13,63m	14,12m	13,17m
Industrial area	340°	11,38m	11,52m	10,26m
Residential district	40°	6,28m	6,47m	6,38m
City centre	355°	15,14m	15,58m	12,33m

- Improvement of the urban indicator quality when they are computed on an oriented grid adapted to the main direction of the street network.

UrbSAT is freely available (GPL v3) at

<http://orbisgis.cerma.archi.fr>



CONCLUSION AND PERSPECTIVES

The vector to grid process has a strong influence on the data quality. Cell size and grid orientation must be defined with precision. The development and validation of a function defining the main directions of the street network appears essential to complete and automate the process.

Acknowledgements:

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