



URBAN GEOmatics for Bulk Information Generation, Data Assessment and Technology Awareness

► Contribution by ISPRA - 22/01/2018

PRIN PROJECT: *URBAN GEOmatics for Bulk Information Generation, Data Assessment and Technology Awareness*



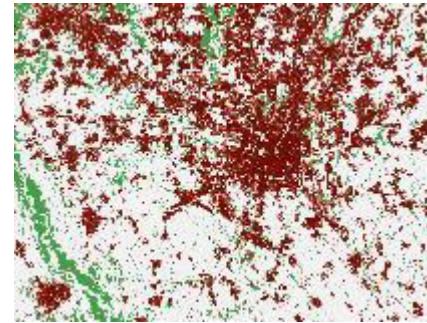
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Data collection

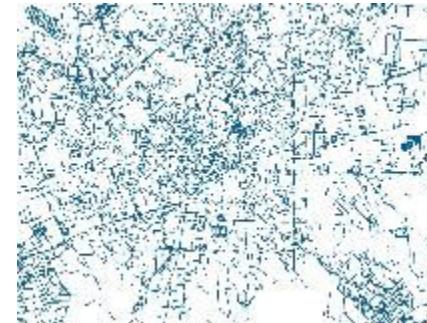
- ▶ Sentinel-2 images
- ▶ Copernicus High Resolution Layers 2012 (Degree of Imperviousness, Forest Type, Wetland, Permanent Water Bodies, Grassland)
- ▶ Copernicus Urban Atlas
- ▶ Regional land cover databases
- ▶ OpenStreetMap
- ▶ ISTAT census



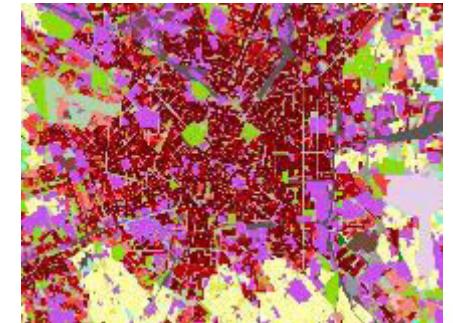
Sentinel-2



Copernicus HRL



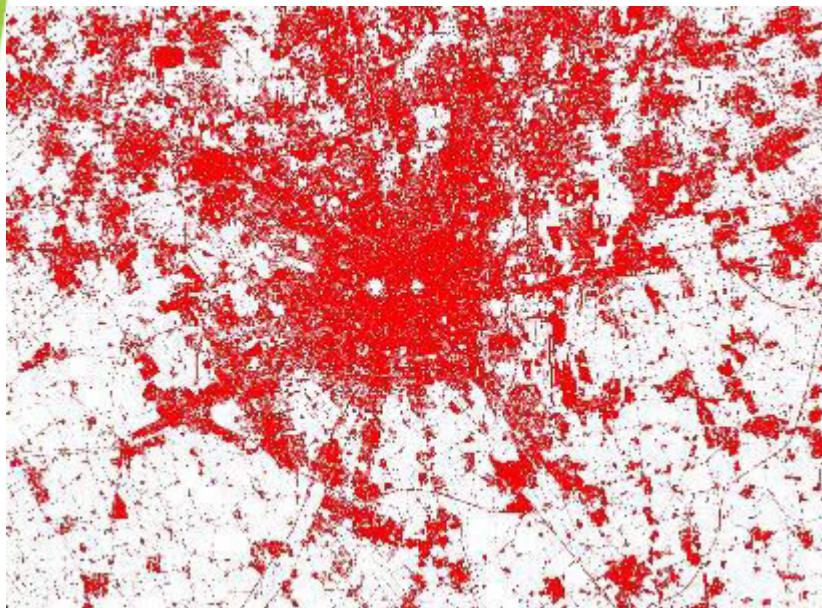
OpenStreetMap



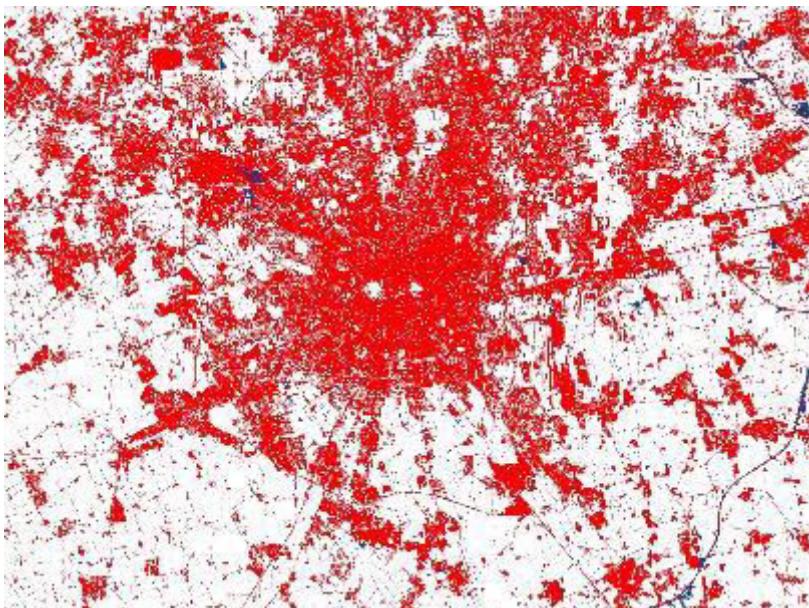
Copernicus Urban Atlas

ISPRA classification of built-up

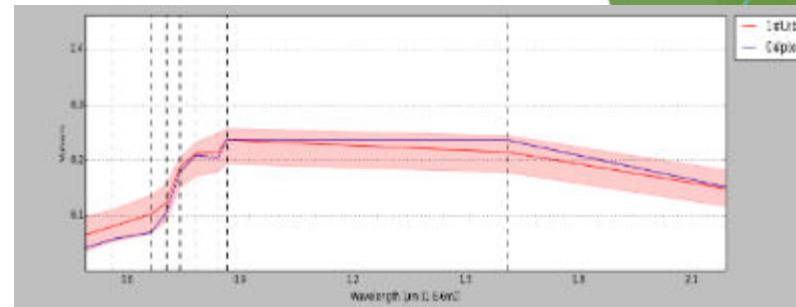
Classification based on the Maximum Likelihood algorithm, comparing the spectral signatures of training area to spectral signatures of pixels



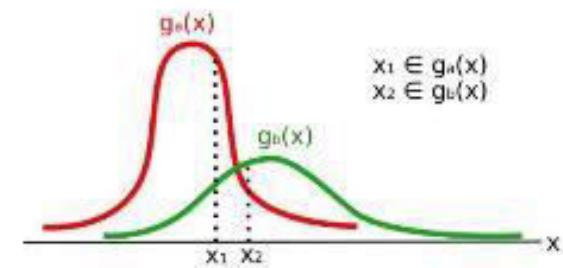
Classification 2012



Classification 2016 (changes in blue)



Comparison of spectral signatures (training area in red)



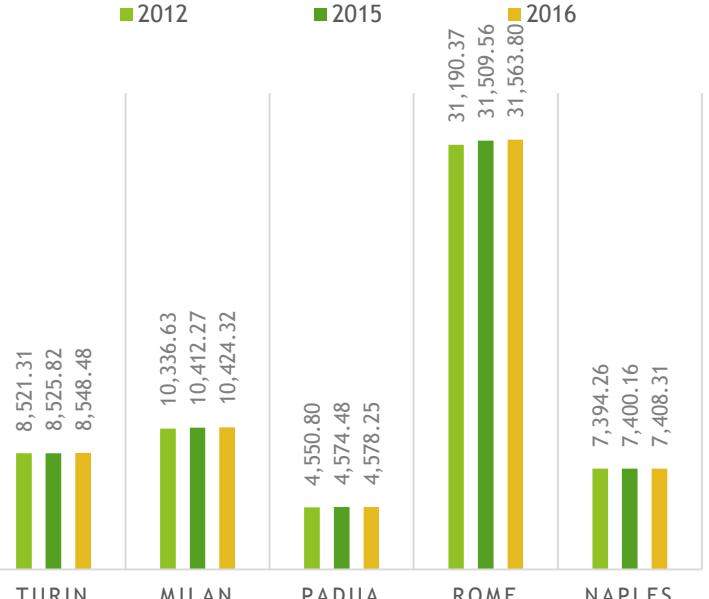
Maximum Likelihood algorithm

Land cover classification results

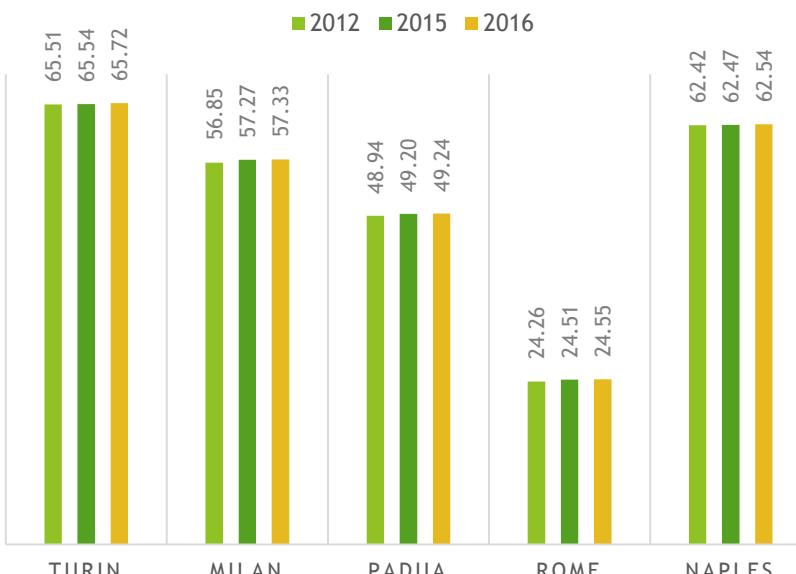
► Evolution of soil consumption from 2012 to 2016

Area	Consumed soil 2012 [ha]	Non consumed soil 2012 [ha]	Consumed soil 2012 [%]	Non consumed soil 2012 [%]	Consumed soil 2015 [ha]	Non consumed soil 2015 [ha]	Consumed soil 2015 [%]	Non consumed soil 2015 [%]	Consumed soil 2016 [ha]	Non consumed soil 2016 [ha]	Consumed soil 2016 [%]	Non consumed soil 2016 [%]
Turin	8.521,31	4.486,38	65,51	34,49	8.525,82	4.481,87	65,54	34,46	8.548,48	4.459,21	65,72	34,28
Milan	10.336,63	7.845,71	56,85	43,15	10.412,27	7.770,07	57,27	42,73	10.424,32	7.758,02	57,33	42,67
Padua	4.550,80	4.747,69	48,94	51,06	4.574,48	4.724,01	49,20	50,80	4.578,25	4.720,24	49,24	50,76
Rome	31.190,37	97.393,17	24,26	75,74	31.509,56	97.073,98	24,51	75,49	31.563,80	97.019,74	24,55	75,45
Naples	7.394,26	4.451,92	62,42	37,58	7.400,16	4.446,02	62,47	37,53	7.408,31	4.437,87	62,54	37,46

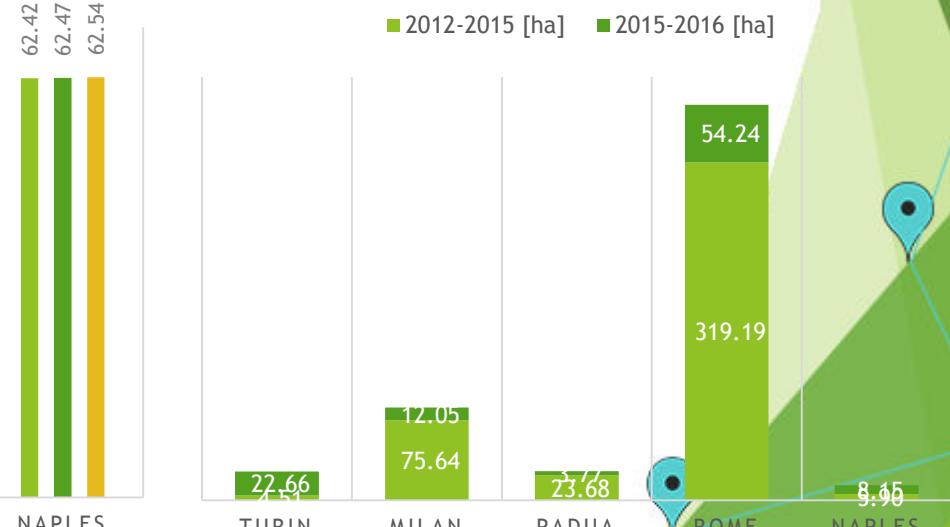
SOIL CONSUMPTION (HA)



SOIL CONSUMPTION (%)



INCREASE OF SOIL CONSUMPTION



Landscape metrics

POP: Population (ISTAT)

LCPI: Largest Class Patch Index in %

Edclass: Edge density [m/ha]

RMPS: Residual Mean Patch Size [ha]

DENSITY: Population density [ab/ha]

Dispersion_index: Ratio of low density urban area on urban area in %

Metrics Results

Area	POP_2012	POP_2015	POP_2016
Turin	869.312	896.773	890.529
Milan	1.240.173	1.337.155	1.345.851
Padua	205.631	211.210	210.401
Rome	2.614.263	2.872.021	2.864.731
Naples	961.106	978.399	974.074

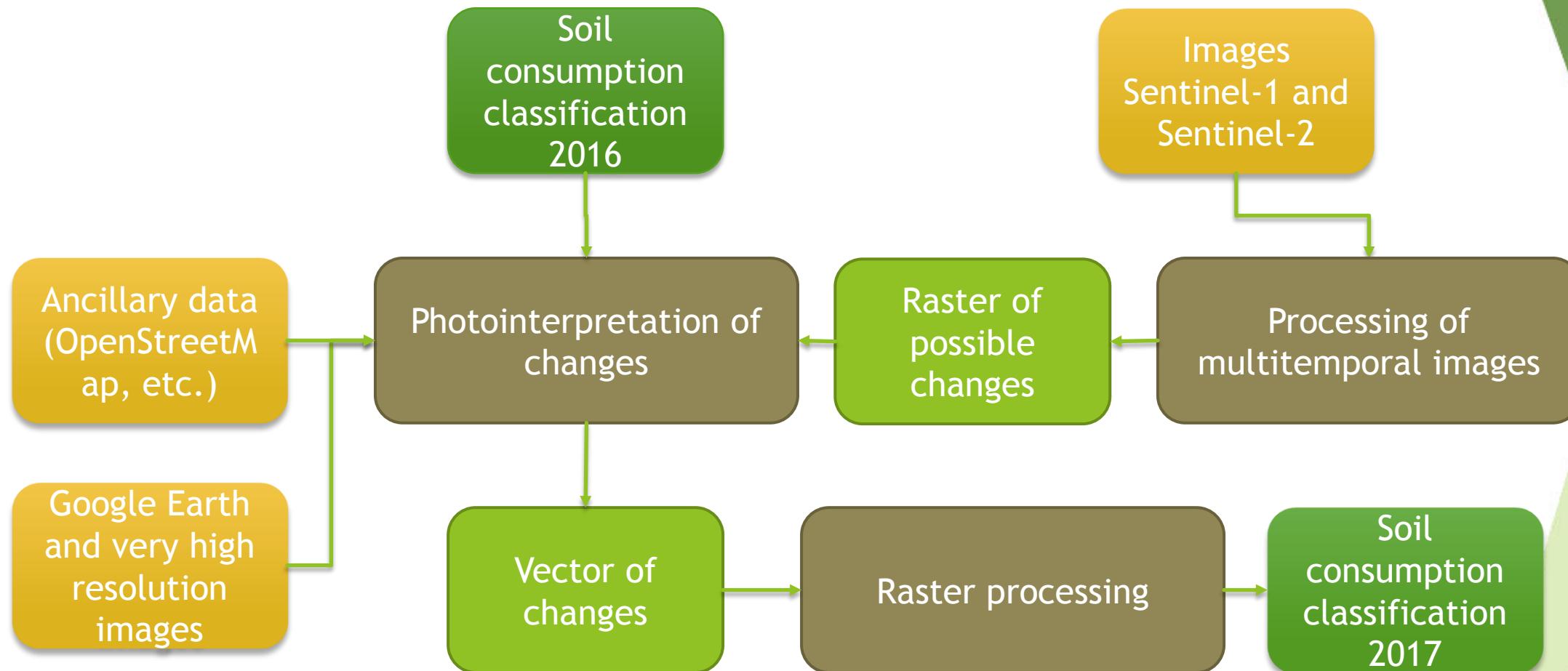
Area	Edclass_2015	Edclass_2016
Turin	182,85	181,95
Milan	467,10	466,84
Padua	502,17	501,94
Rome	759,22	758,64
Naples	366,71	366,50

Area	DENSITY_2012	DENSITY_2015	DENSITY_2016
Turin	66,83	68,94	68,46
Milan	68,21	73,54	74,02
Padua	22,11	22,71	22,63
Rome	20,33	22,34	22,28
Naples	81,13	82,59	82,23

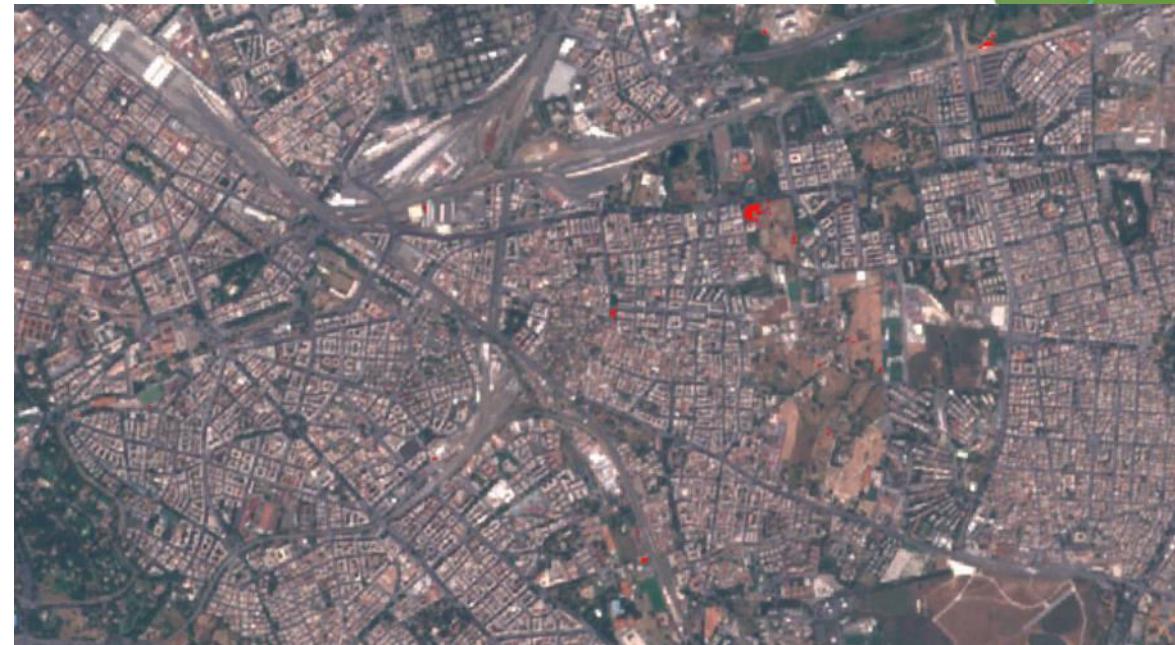
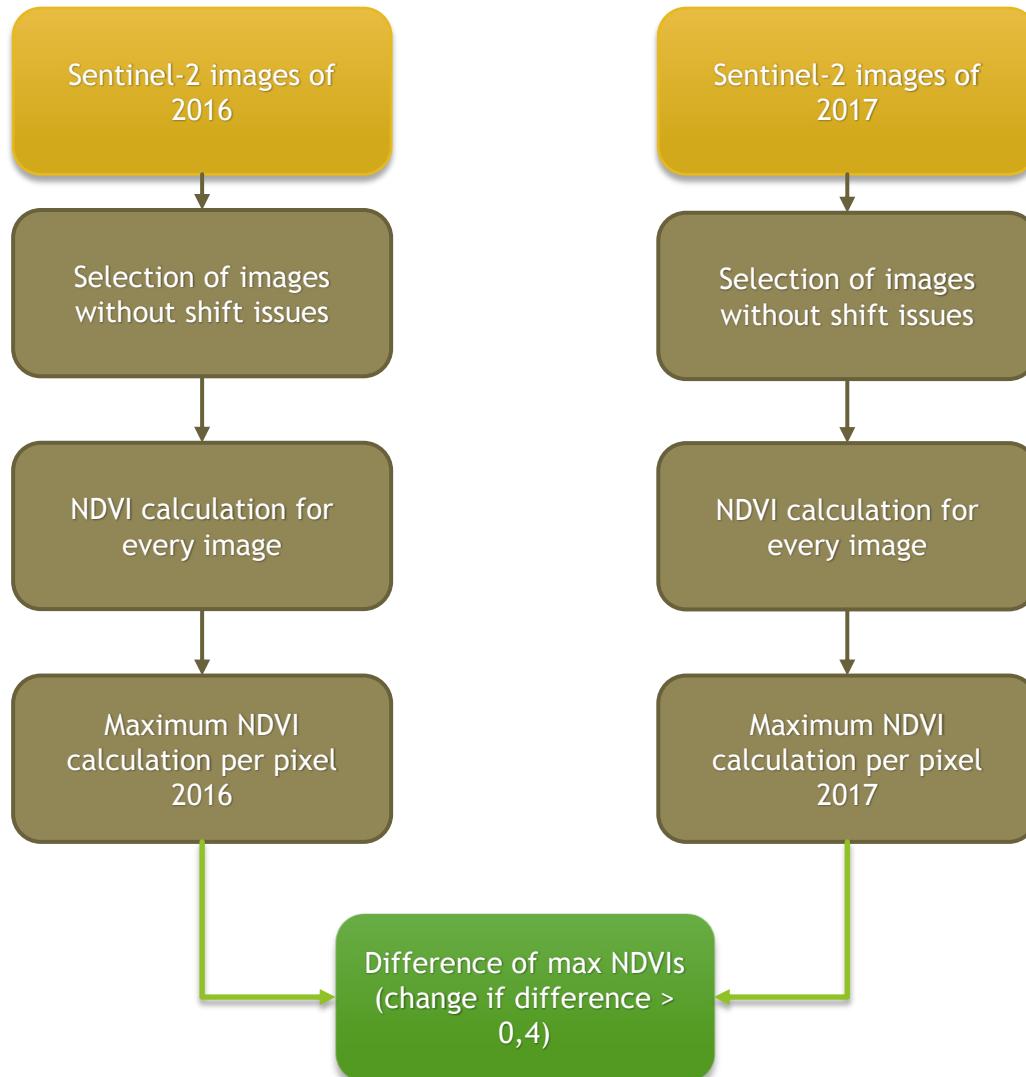
Area	LCPI_2012	LCPI_2015	LCPI_2016
Turin	-	52,76	52,97
Milan	-	57,38	57,39
Padua	-	39,79	39,82
Rome	-	11,92	11,94
Naples	-	57,67	57,73

Area	RMPS_2015	RMPS_2016	Area	Dispersion_index_2015	Dispersion_index_2012	Dispersion_index_2016
Turin	15,31	15,40	Turin	28,42	28,46	28,24
Milan	12,75	12,90	Milan	31,43	31,87	31,43
Padua	7,82	7,80	Padua	51,36	51,60	51,25
Rome	7,65	7,68	Rome	64,66	65,19	64,58
Naples	10,33	10,50	Naples	30,99	31,01	30,91

Processing and update of soil consumption map



Mapping possible changes using Sentinel-2



Mapping possible changes using Sentinel-1

