PARALLEL COORDINATES : *VISUAL* Multidimensional Geometry and its Applications

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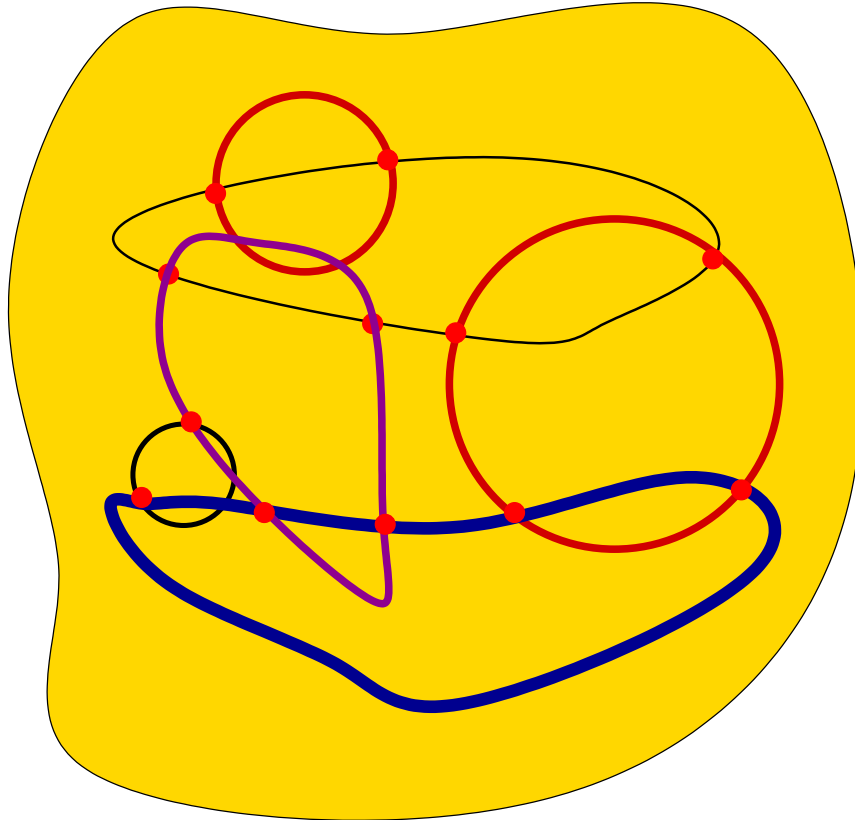aiisreal@post.tau.ac.il
&
Multidimensional Graphs Ltd
Raanana 43556, Israel

VISUALIZATION

Insight   through   Images

$\mathcal{C}$ollection of application dependent Mappings :

Problem Domain $\longrightarrow$ *Visual Range*

<u>Involves :</u> $\mathcal{G}$EOMETRY , $\mathcal{C}$OGNITION , $\mathcal{A}$RT ?

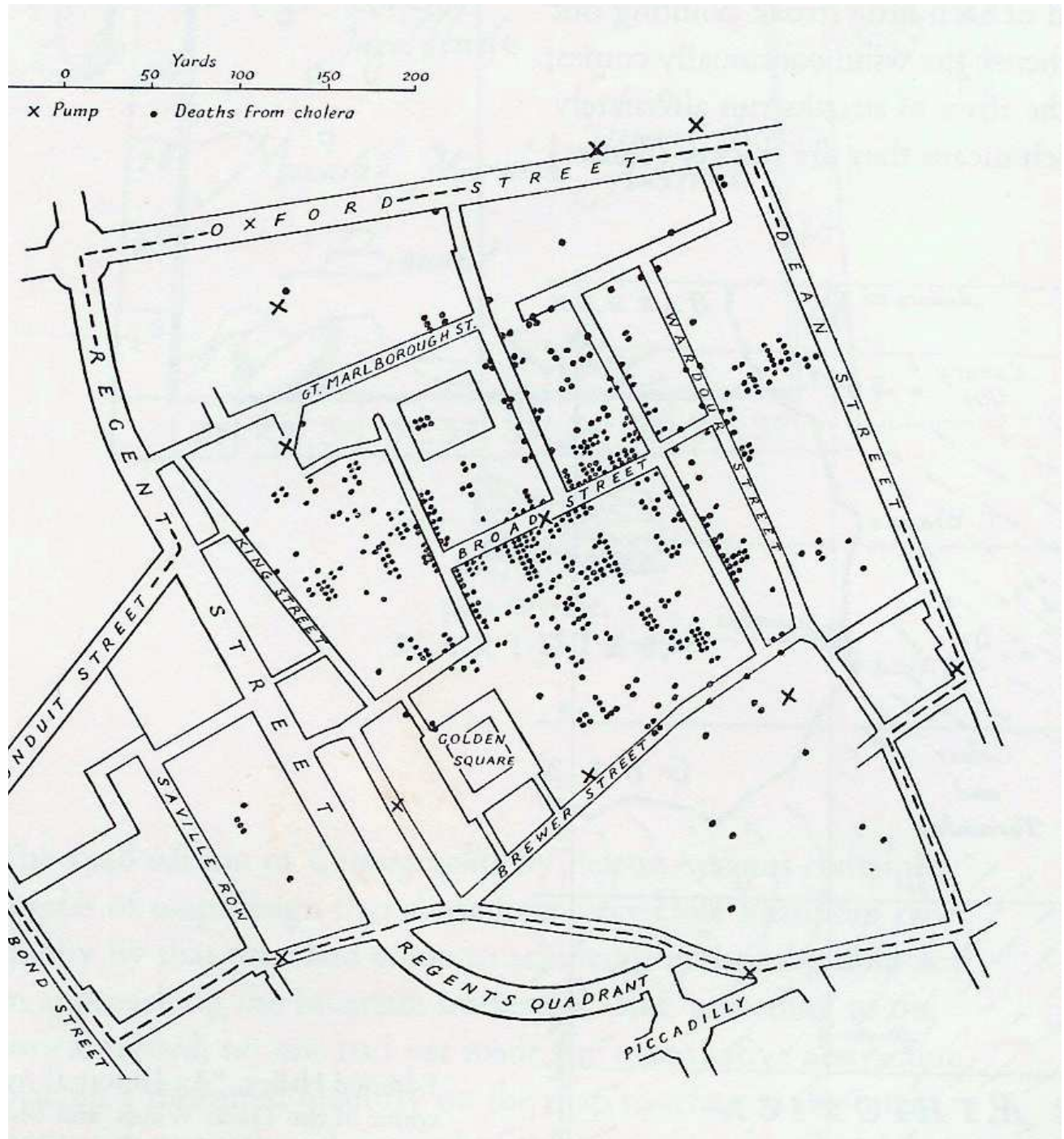<u>Goal :</u> $\mathcal{V}$isual   Model to help our *Intuition*

Figure 1: Cholera epidemic in London 1854. Dr. Snow placed dots at the addresses of the deceased and saw the concentration of deaths around the Broad street water pump. From E.W.Gilbert, Geog. J. 124] (1958) – By permission from E.R.Tufte " The Visual Display of Quantitative Information", Graphic Press 1983 p. 24
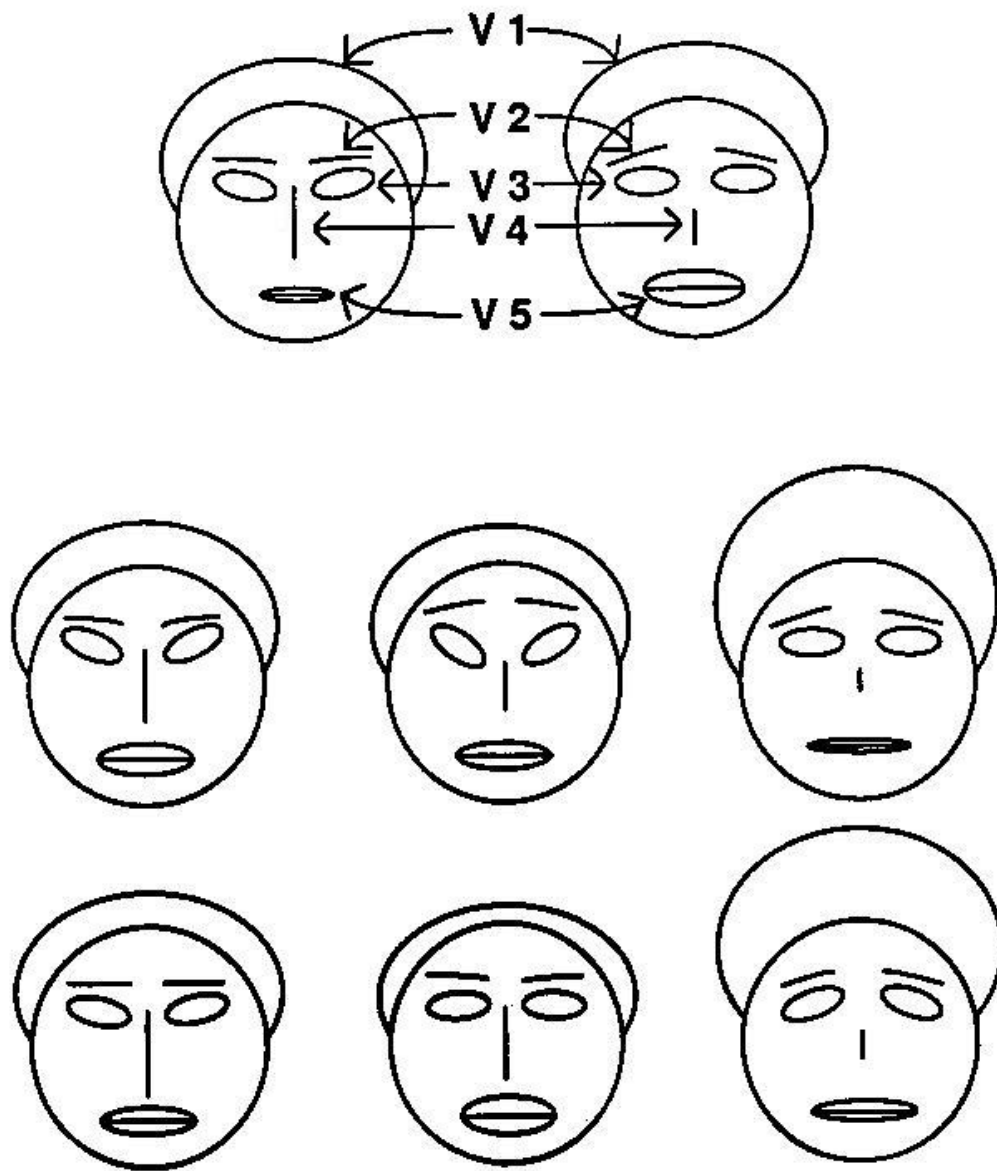
Figure 2: Multivariate data mapped to faces; each parameter corresponds and is measured on a facial feature. H. Chernoff, JASA 68 (1973)
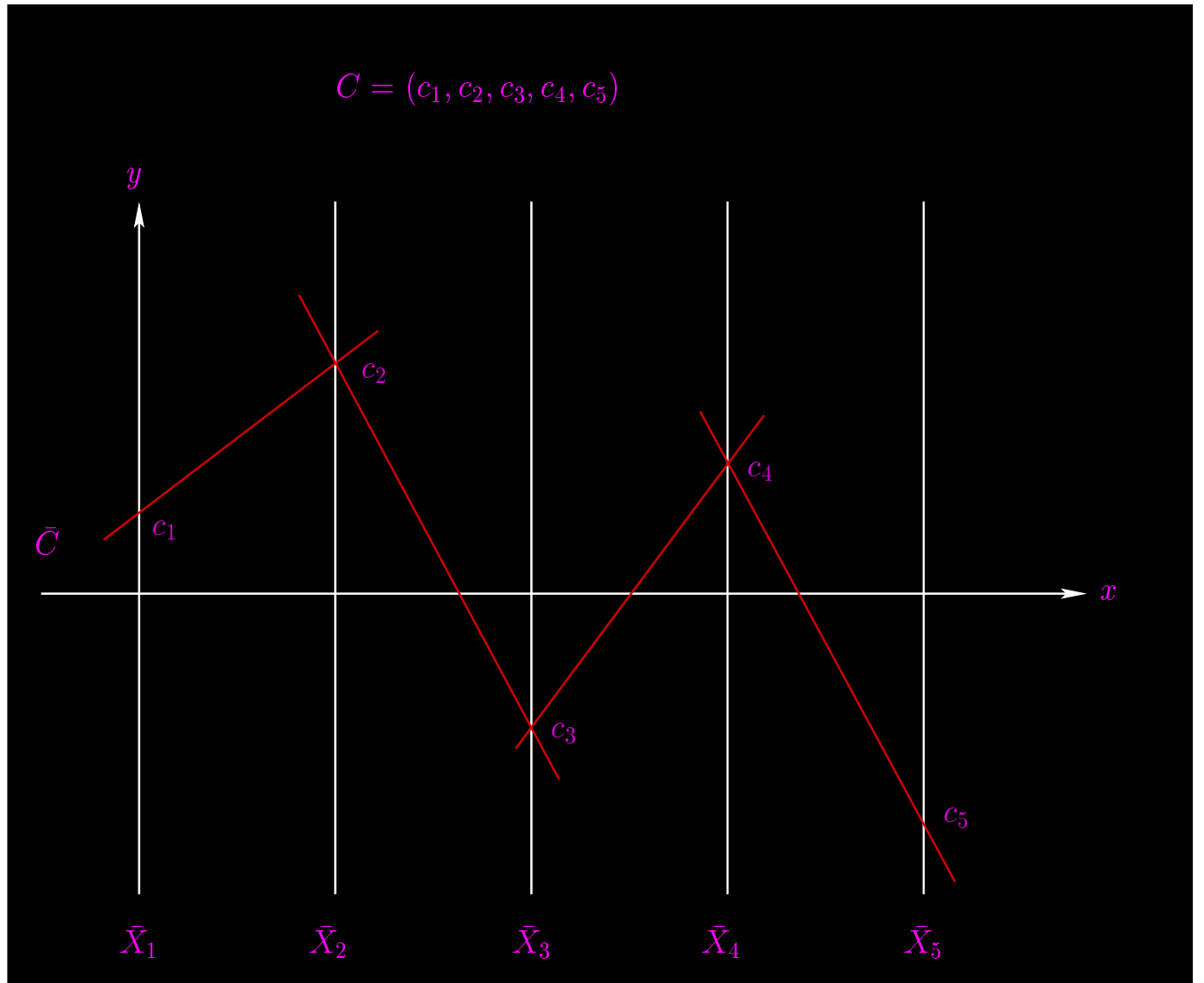
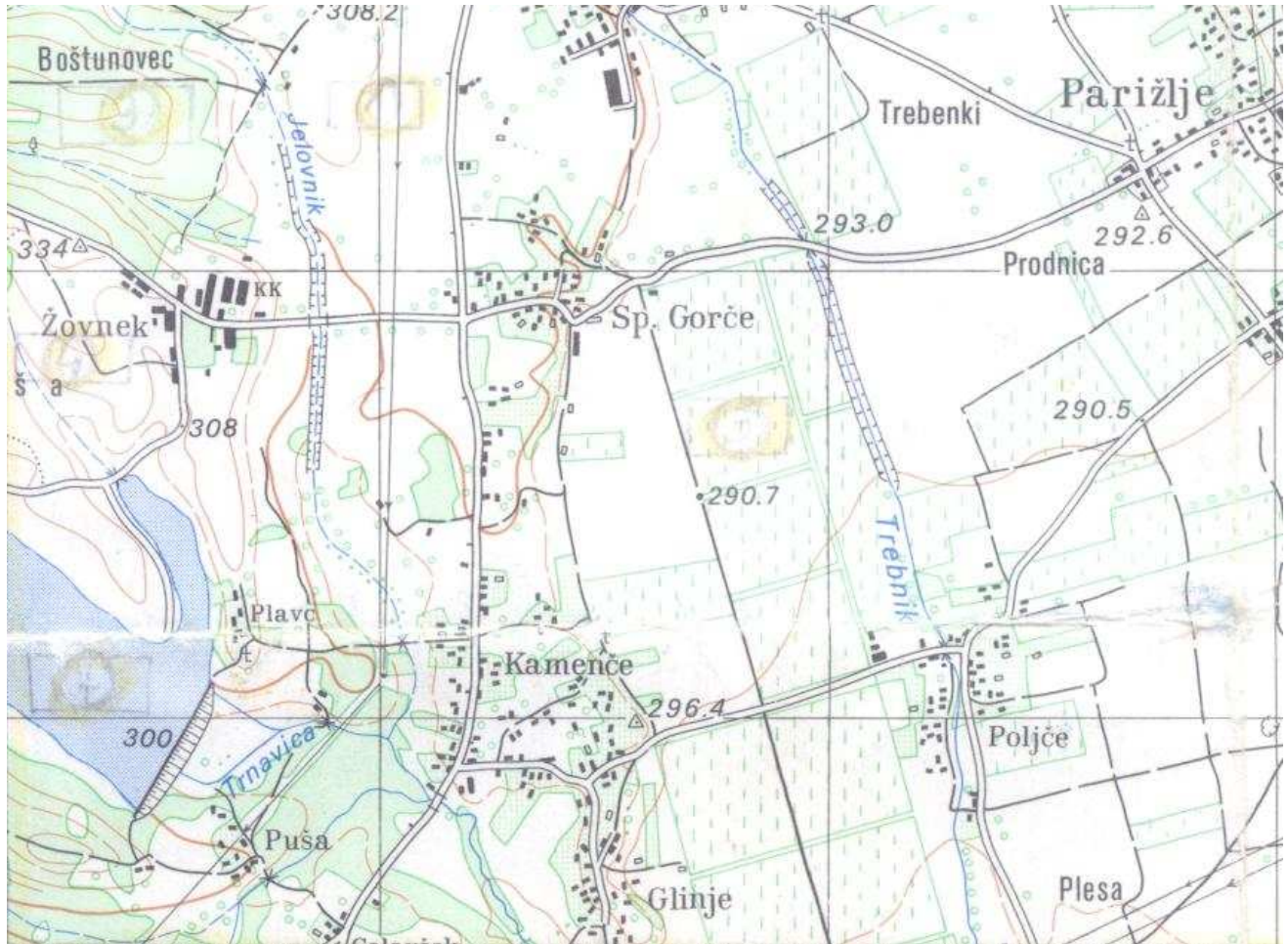Figure 3: Parallel Coordinates – example for 5D.

Figure 4: Portion of Slovenia where the satellite measurements shown in the subsequent figures were made.
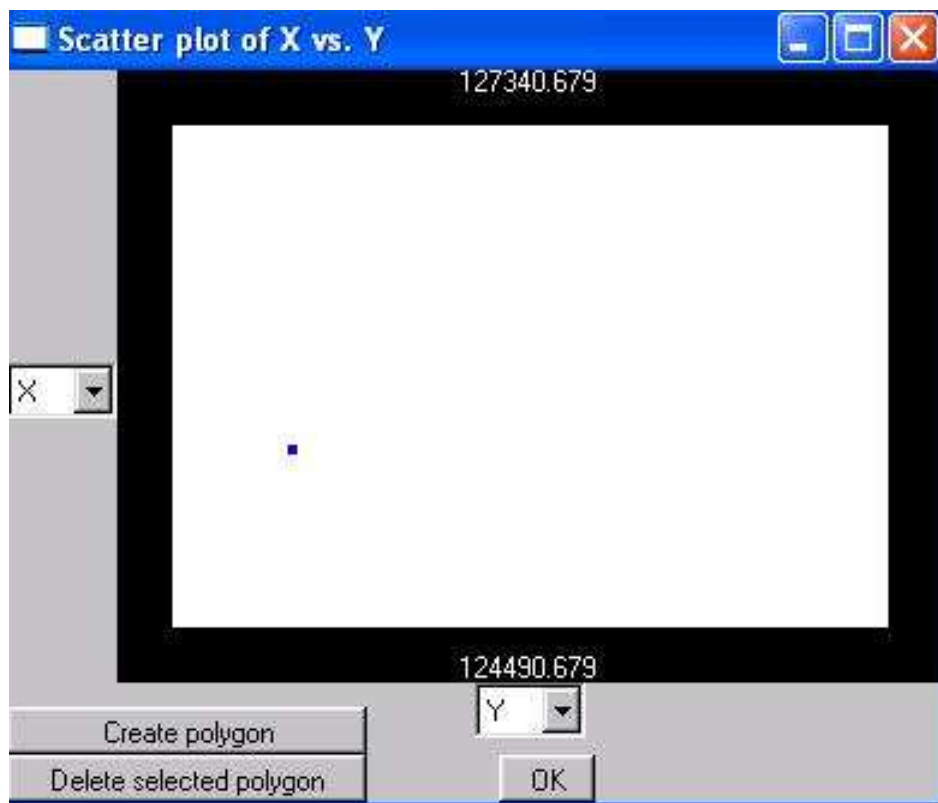
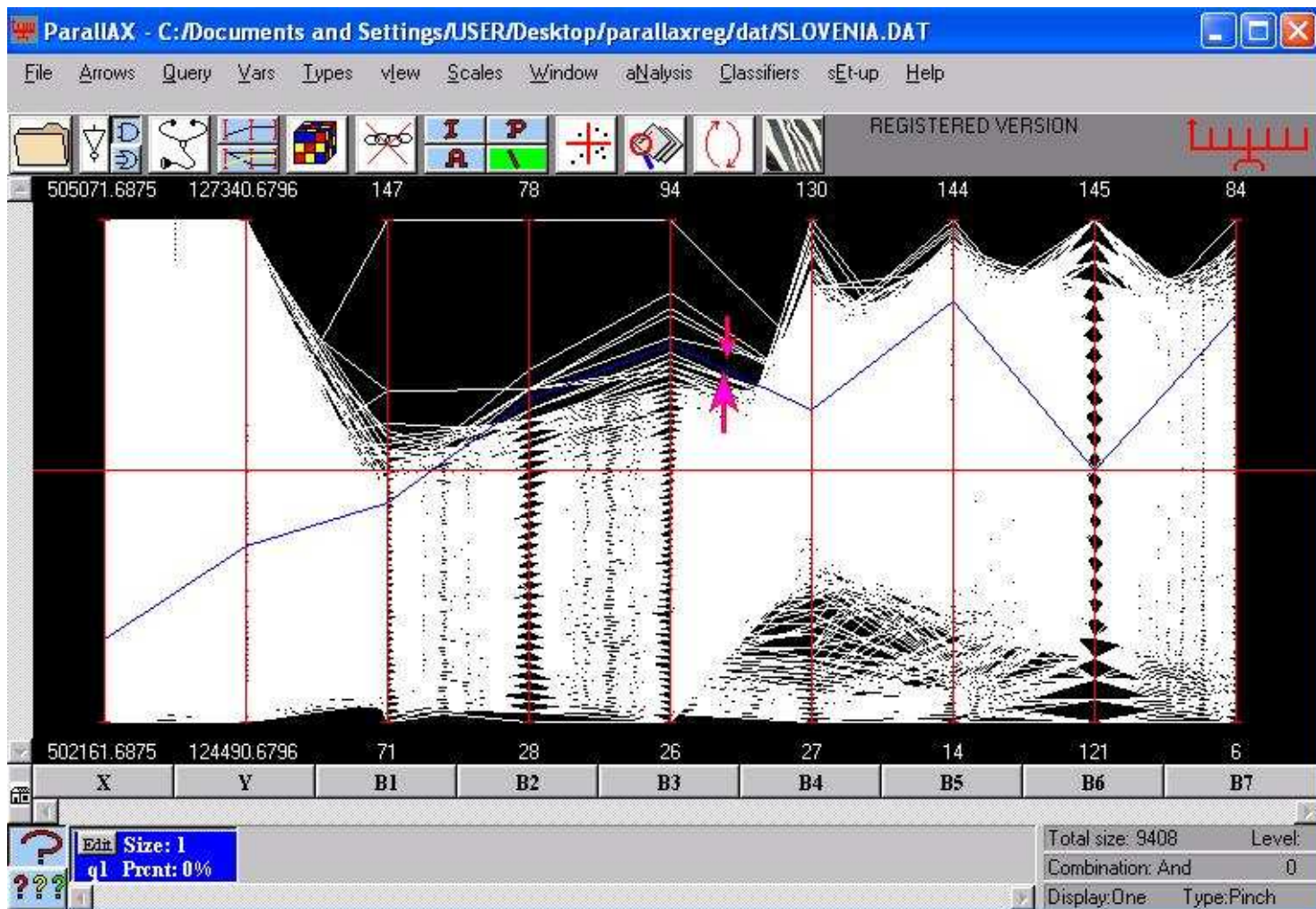Figure 5: Position where the 7-tuple shown in the next figure is measured.

Figure 6: Landsat satellite measurements: intensity of reflected electromagnetic wavelengths except in band 6 ($B6$), which is the intensity of emitted thermal IR from objects. Courtesy of EURIMAGE with special thanks to Dr. Ana Tretjak and Dr. Niko Niko Schlamberger – Directorate Statistical Office of Slovenia. Query on Parallax showing a single data item as a polygonal line: the XY position (also shown in previous figure) and the values of the 7-tuple ($B1, B2, B3, B4, B5, B6, B7$) at that location.

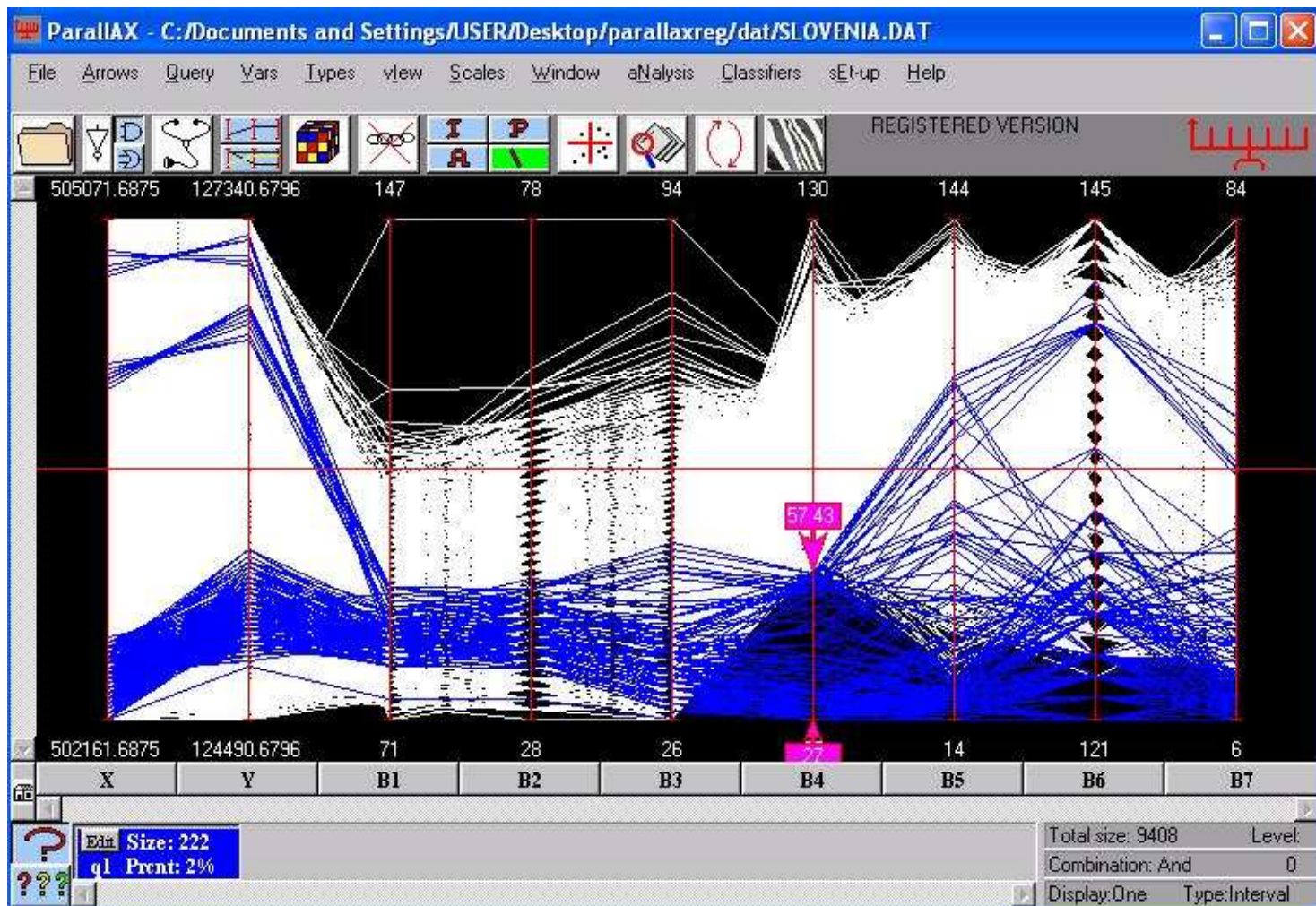Figure 7: Resut of query (next figure) finding the water regions – compare with the map in Fig. 4.

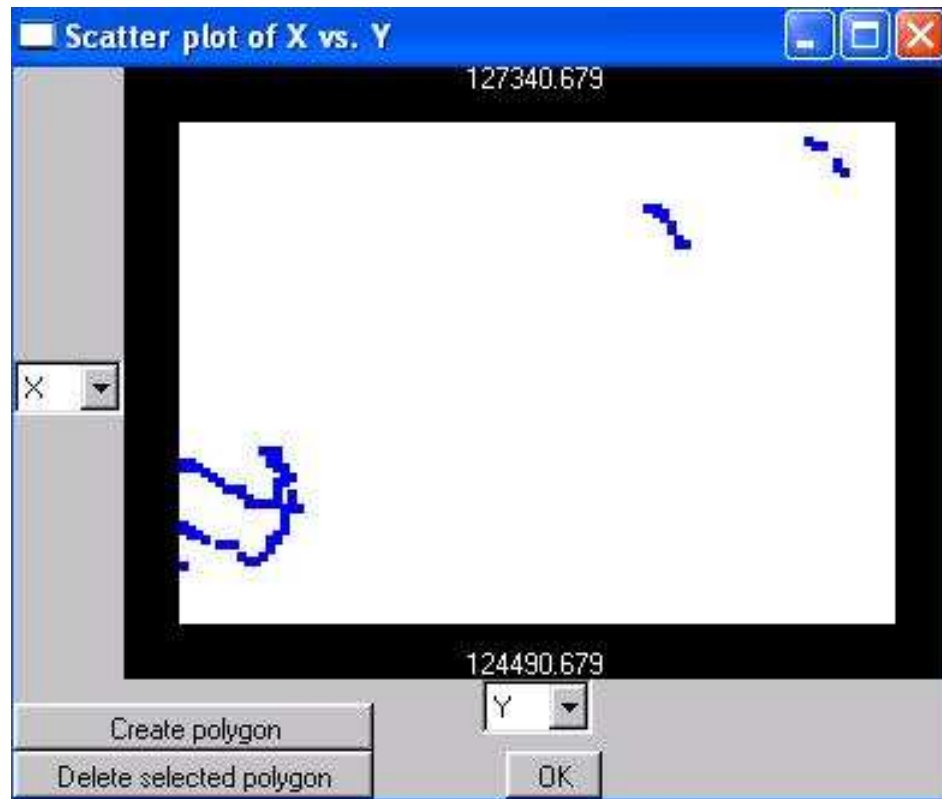Figure 8: Finding water regions. Notice the unusual pattern in the lower values of $B4$.

Figure 9: Finding depth variations in the water and showing the edges of water regions (shallow water) – Query in next figure.
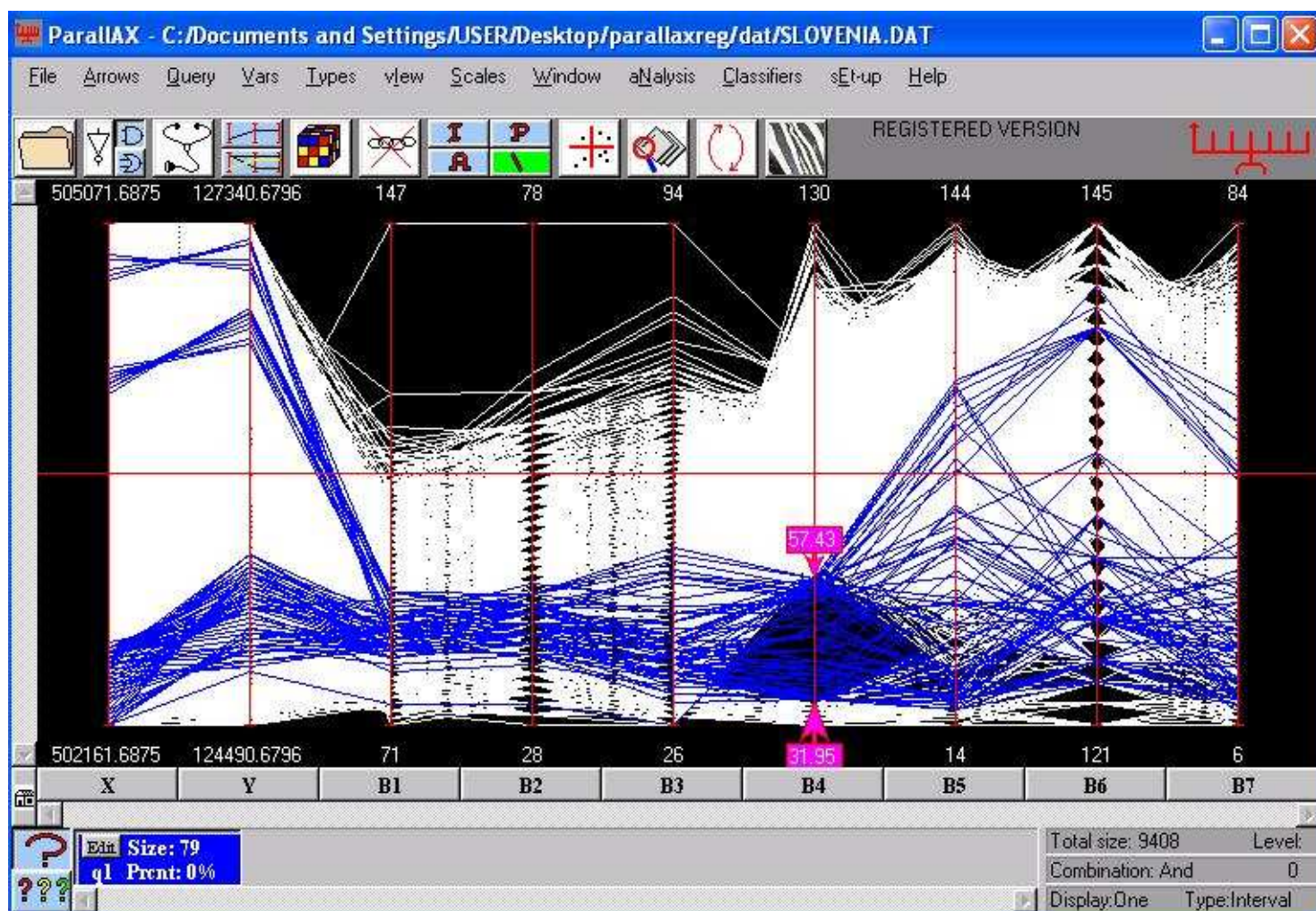
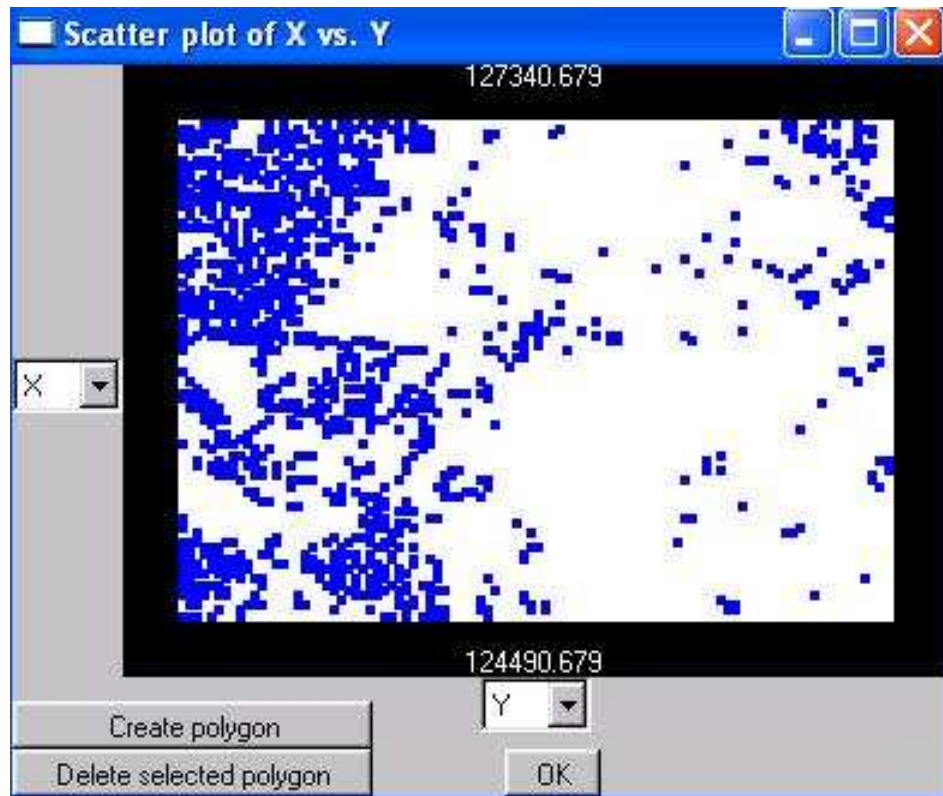Figure 10: Query finding shalow water regions.

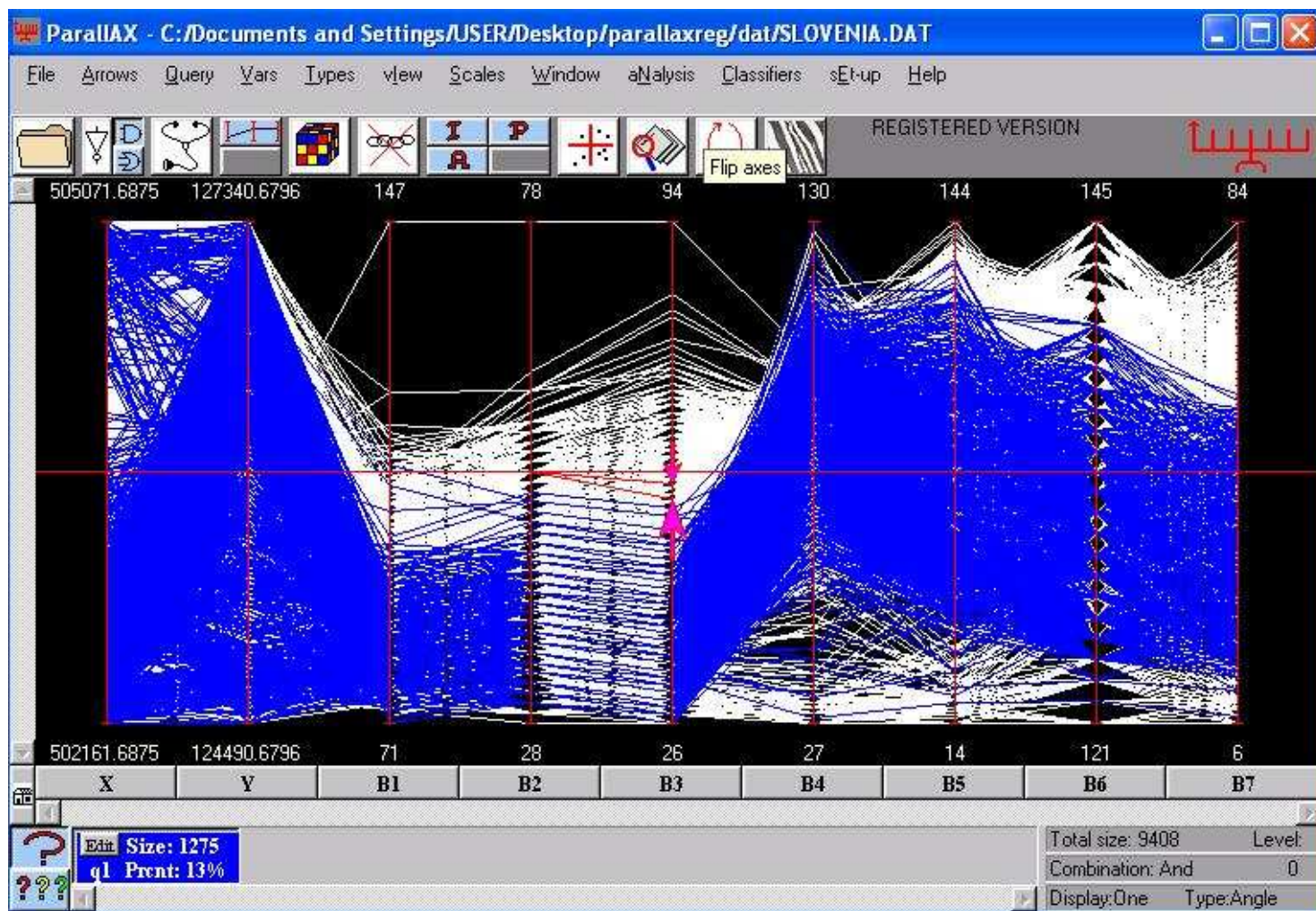Figure 11: Results of query (next figure) showing the green regions (vegetation and forests) – compare with the map Fig. 4.

Figure 12: Query showing the green regions of Slovenia.