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GIS and vector cadastral map: a tool to detect and study roman cadastral frames

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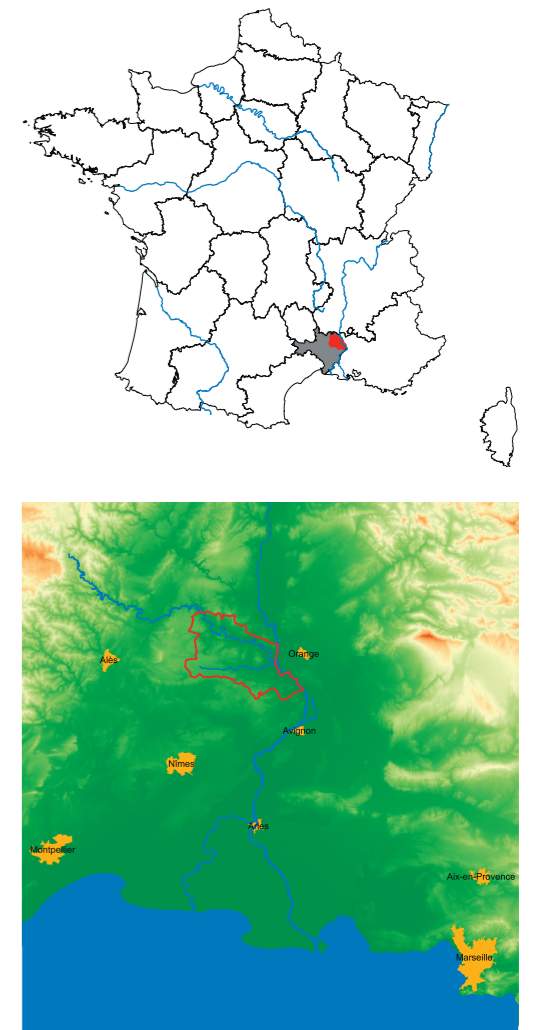
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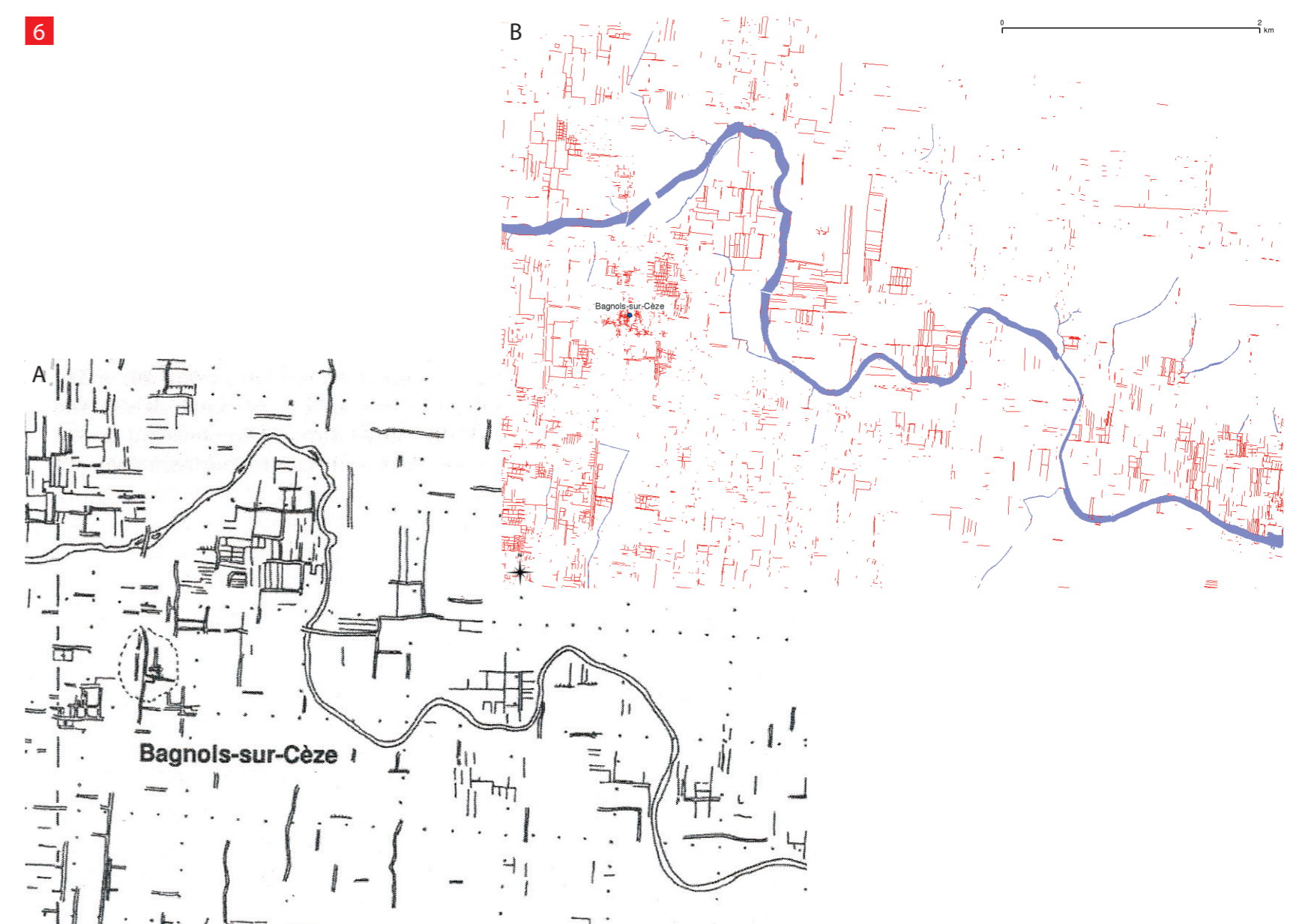
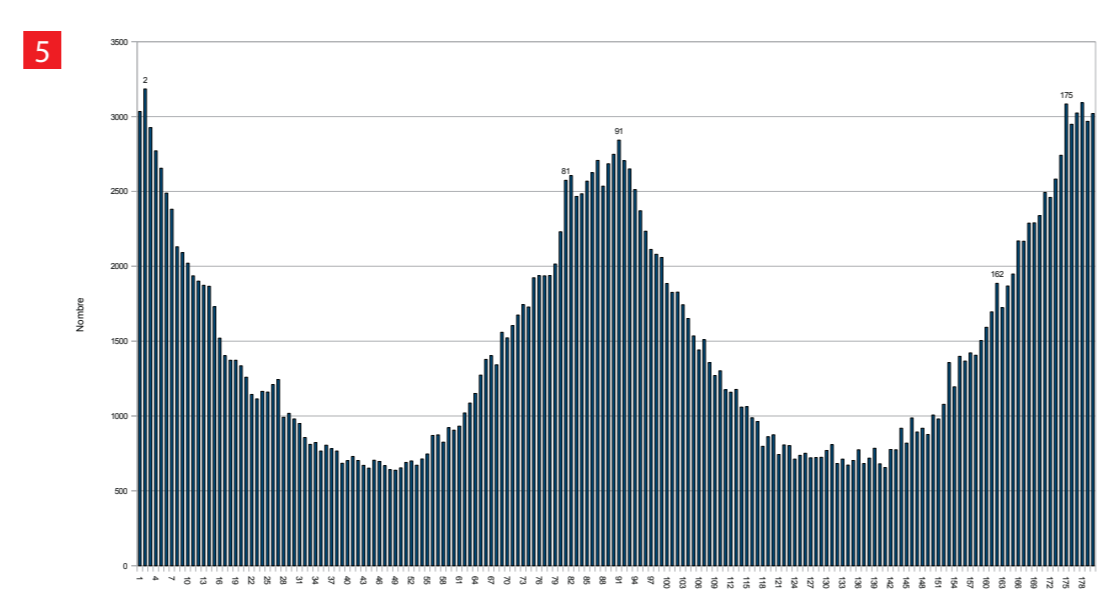
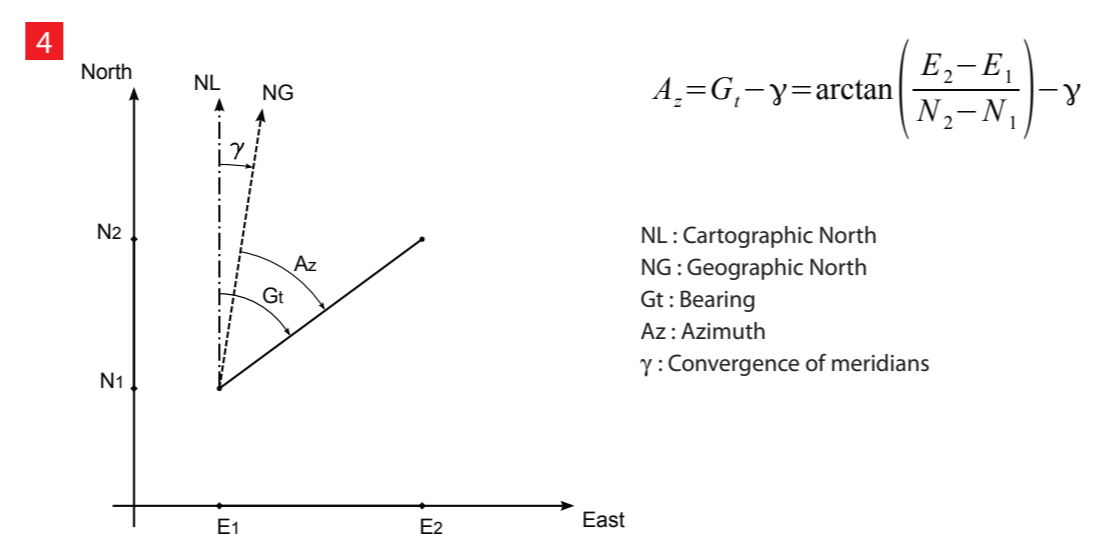
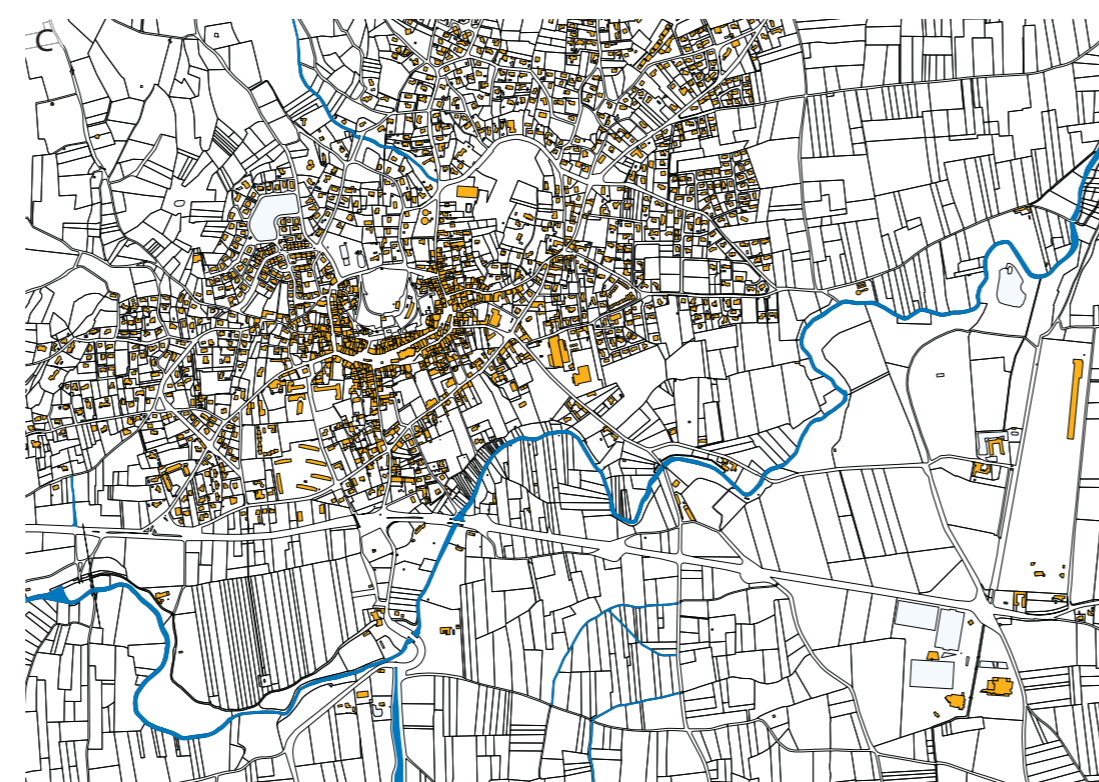
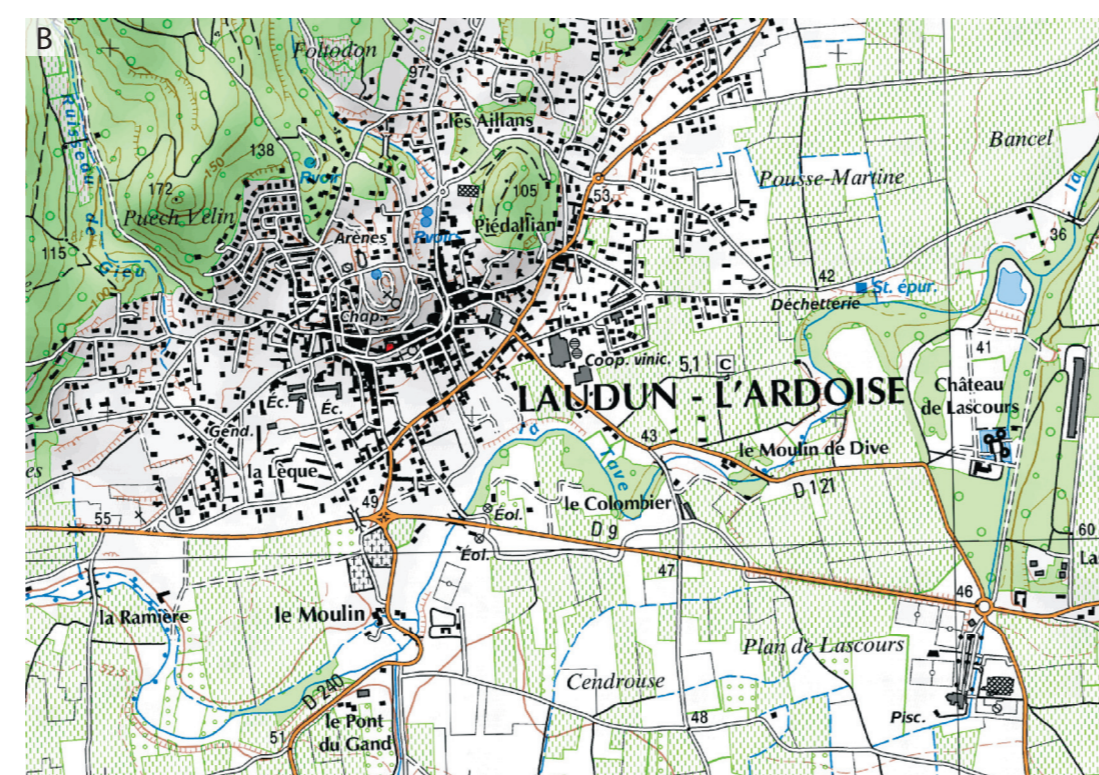
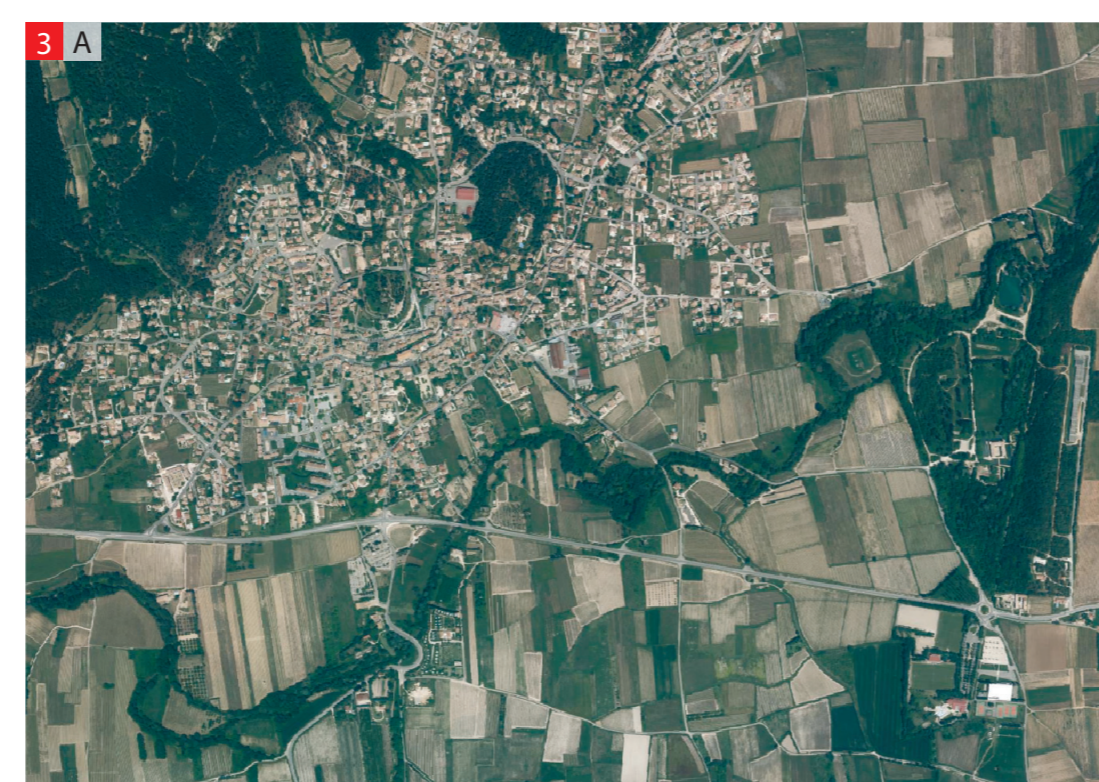
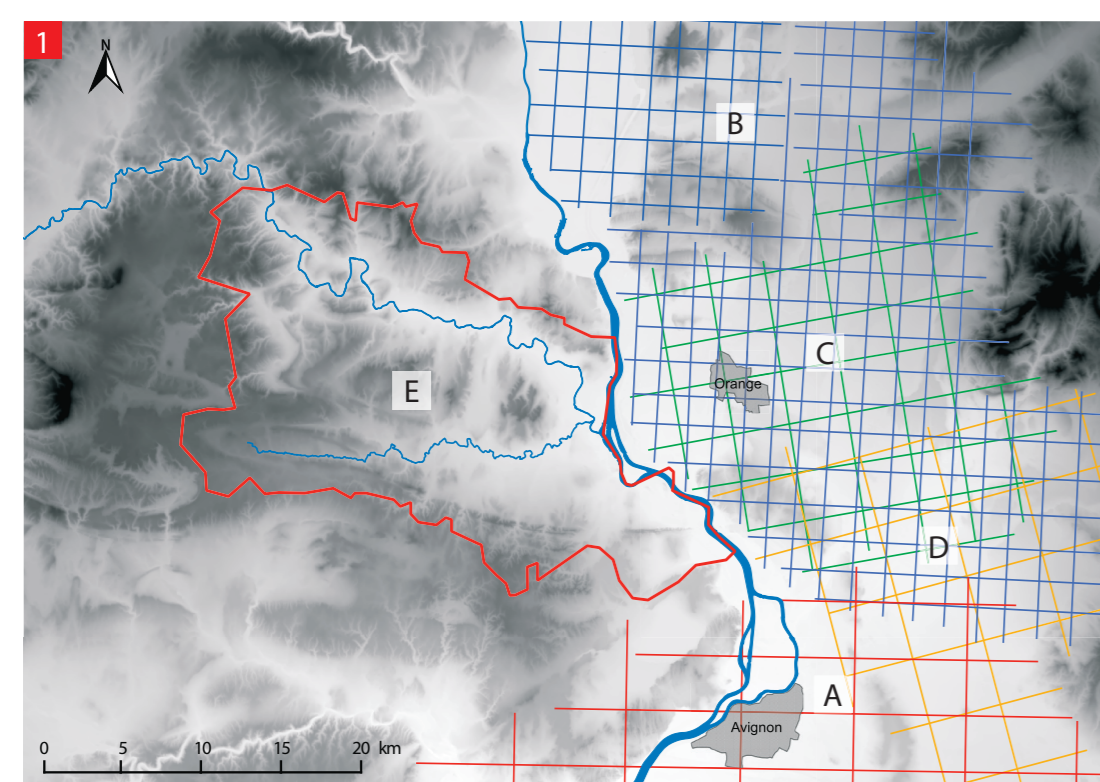
The french Rhône valley has traces of ancient roman parcels, testified by antique land registers 1ABCD called "Orange cadastre". This organization was highlighted on the left bank of the river. It seems to extend to the other side, in the Tave and Cèze valleys 1E. All these researches were conducted in the 80's from IGN (French National Institute of Cartography) aerial missions, with the method of optical filtering 2. In this study, we intend to use a GIS and the cadastral map in vector format 3C. Indeed, the cadastre enables the study of limits that have no materialization in the current landscape. The aerial photographs 3A or topographical maps 3B

only give incomplete information, i.e. the perennial human forms: roads, paths, fences, channels, ditches. These documents are selective. The tool used in this study is the histogram of directions. It consists in calculating the azimuth of each parcel boundary 4 and drawing a histogram : the number of boundaries or their total length are shown as a function of azimuth 5. The interests of working with the cadastre are all information contained in these documents, whose precision allows a detailed study of cadastral frames. This method was first validated on previously studied areas 6 and then extended to the Cèze and Tave

lower valleys 7. This helped to detect the presence of "Orange cadastre" in these two valleys 8, where the method by optical filtering had not delivered convincing results. The use of these vector data for the detection of ancient cadastral frames remains to this day unique in France. However its implementation is simple and permits a detailed study of the boundaries structure. The results are encouraging and allow considering new approaches. It would be interesting to combine elevation and topographic data as well as ancient "Napoleonic cadastre", in the aim to eliminate 19th and 20th century boundaries. This will be the next step of this work.



- 1 Location map**
Antique land registers and the study area.
A - «Orange A» land register (red),
B - «Orange B» and «Orange B extended» land registers (blue),
C - «Orange C» land register (green),
D - «Orange D» land register (yellow),
E - Cèze and Tave valleys.
- 2 Optical filtering**
«Orange B» orientations filtering from aerial photographs between Orange (Vaucluse) and Donzère (Drôme).
A - Aerial photographs (IGN 1970 3040, n° 1 and 3; 1970, 3039, n° 13 and 16),
B - Filtered images with roads and paths resulting.
- 3 Documentation**
A - Aerial photographs (BDOrtho®, © IGN),
B - Topographical maps (Scan25®, © IGN),
C - Cadastral maps (BDParcellaire®, © IGN).
- 4 Azimuth formula**
- 5 Histogram of directions**
Number of boundaries function of azimuth in the Cèze and Tave valleys
- 6 Assessment**
A - Peterson's results (around Bagnols-sur-Cèze),
B - Cadastral map after filtering.
- 7 Results**
Numerical results for B, C and D directions
- 8 Summary of results**



Valleys	Communes	number of boundaries	cumulative length (m)	number of boundaries isoclines B	cumulative length of boundaries isoclines B (m)	% boundaries isoclines B	% cumulative length isoclines B
Cèze	Bagnols-sur-Cèze	65293	1117219	10927	203706	17	18
	Orsan	8221	254246	557	19243	7	8
	Chusclan	21036	452874	2686	64860	13	14
	Codolet	7519	231573	428	7639	6	3
Tave	Laudun-L'Ardoise	57797	1090217	7517	157795	13	14
	Saint-Victor-le-Coste	26634	586336	4739	110735	18	19
	Saint-Laurent-des-Arbres	26761	635161	3300	77300	12	12
	Saint-Genès-de-Comolas	12663	379182	1331	39158	13	10
	Montfaucon	6142	138347	241	5890	4	4
Cèze et Tave		267705	5822371	35201	78856	13	14
Cèze		102069	2055912	14598	295448	14	14
Tave		165636	3766459	20603	493408	12	13

Valleys	Communes	number of boundaries	cumulative length (m)	number of boundaries isoclines C	cumulative length of boundaries isoclines C (m)	% boundaries isoclines C	% cumulative length isoclines C
Cèze	Bagnols-sur-Cèze	65293	1117219	5158	91500	8	8
	Orsan	8221	254246	1209	34774	15	14
	Chusclan	21036	452874	2475	65524	12	14
	Codolet	7519	231573	1789	70468	24	30
Tave	Laudun-L'Ardoise	57797	1090217	8974	193999	16	18
	Saint-Victor-le-Coste	26634	586336	3507	79287	13	14
	Saint-Laurent-des-Arbres	26761	635161	3489	104065	13	16
	Saint-Genès-de-Comolas	12663	379182	1591	50092	13	13
	Montfaucon	6142	138347	614	14139	10	10
Cèze et Tave		267705	5822371	6125	159720	17	17
Cèze		102069	2055912	34931	863668	13	15
Tave		165636	3766459	10631	262266	10	13

Valleys	Communes	number of boundaries	cumulative length (m)	number of boundaries isoclines D	cumulative length of boundaries isoclines D (m)	% boundaries isoclines D	% cumulative length isoclines D
Cèze	Bagnols-sur-Cèze	65293	1117219	3248	52559	5	5
	Orsan	8221	254246	1182	35343	14	14
	Chusclan	21036	452874	1898	45026	9	10
	Codolet	7519	231573	878	32889	12	14
Tave	Laudun-L'Ardoise	57797	1090217	5368	97167	9	9
	Saint-Victor-le-Coste	26634	586336	1708	43109	6	7
	Saint-Laurent-des-Arbres	26761	635161	2344	61525	9	10
	Saint-Genès-de-Comolas	12663	379182	1819	60210	14	16
	Montfaucon	6142	138347	1418	29792	23	22
Cèze et Tave		267705	5822371	34931	863668	13	15
Cèze		102069	2055912	7206	165818	7	8
Tave		165636	3766459	17807	434527	11	12

Valleys	Communes	Cadastre B	Cadastre C	Cadastre D
Cèze	Bagnols-sur-Cèze	✓	✓	✓
	Orsan	✓	✓	✓
	Chusclan	✓	✓	✓
	Codolet	✓	✓	✓
Tave	Laudun-L'Ardoise	✓	✓	✓
	Saint-Victor-le-Coste	✓	✓	✓
	Saint-Laurent-des-Arbres	✓	✓	✓
	Saint-Genès-de-Comolas	✓	✓	✓
	Montfaucon	✓	✓	✓

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