



DÉCRYPTAGÉO

LES RENCONTRES

Le rendez-vous des professionnels de l'information géographique



Les 8, 9 et 10 avril 2014

À l'ENSG à Marne La Vallée

Visualisation de données : quand la carte se réinvente

La visualisation de données
au service du langage cartographique

Laurent Jégou

Université de Toulouse - Jean Jaurès

La visualisation de données au service du langage cartographique

Objectif : utiliser la *dataviz* non pas pour représenter l'information, mais pour assister

→ la *conception* de cartes thématiques

→ *l'analyse* de cartes existantes

La visualisation de données au service du langage cartographique

Développement de quelques exemples :

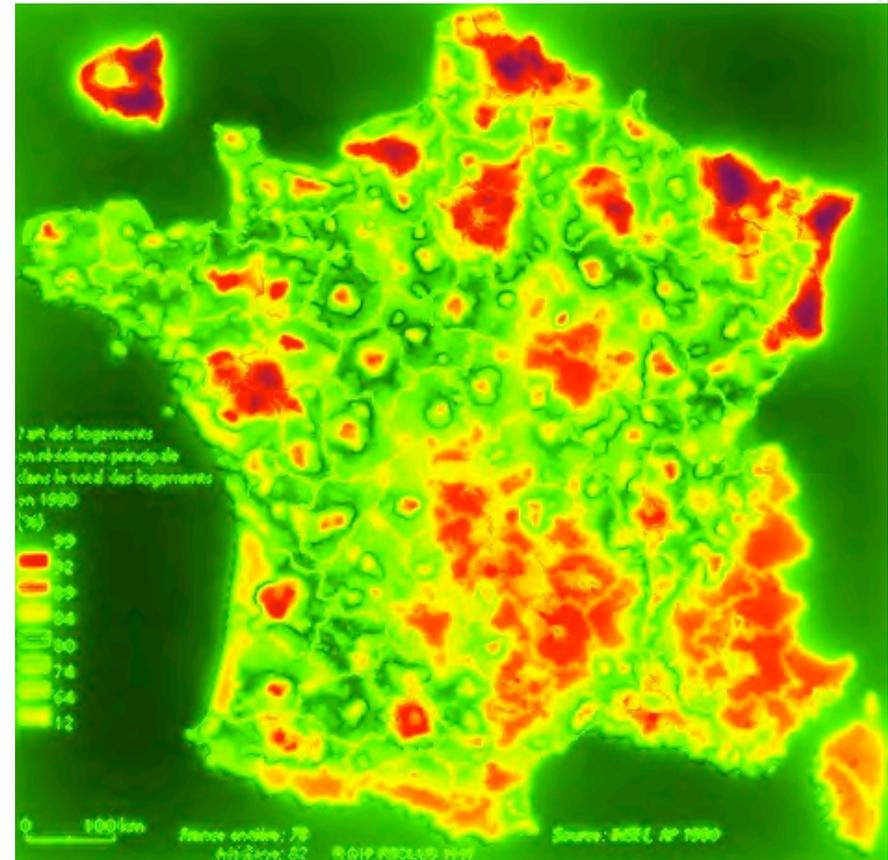
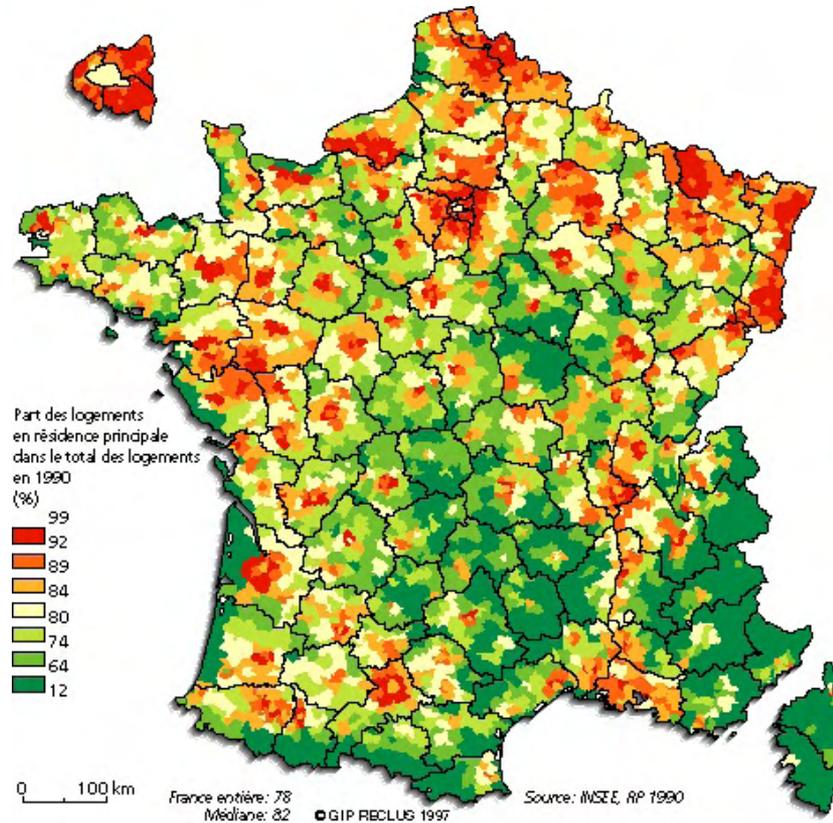
- Estimer la *saillance visuelle* d'une carte.
- Visualiser les relations et proportions de *couleurs* d'une carte choroplèthe.
- Concevoir un *dégradé de couleurs* en réglant précisément ses paramètres.

Évaluer la *saillance visuelle* d'une carte

Concept de saillance : repérage des éléments de l'image qui « sautent aux yeux », qui sont perçus en premier et qui retiennent l'attention.

→ Critère de conception : Les éléments visuellement saillants doivent correspondre aux idées les plus importantes communiquées par la carte.

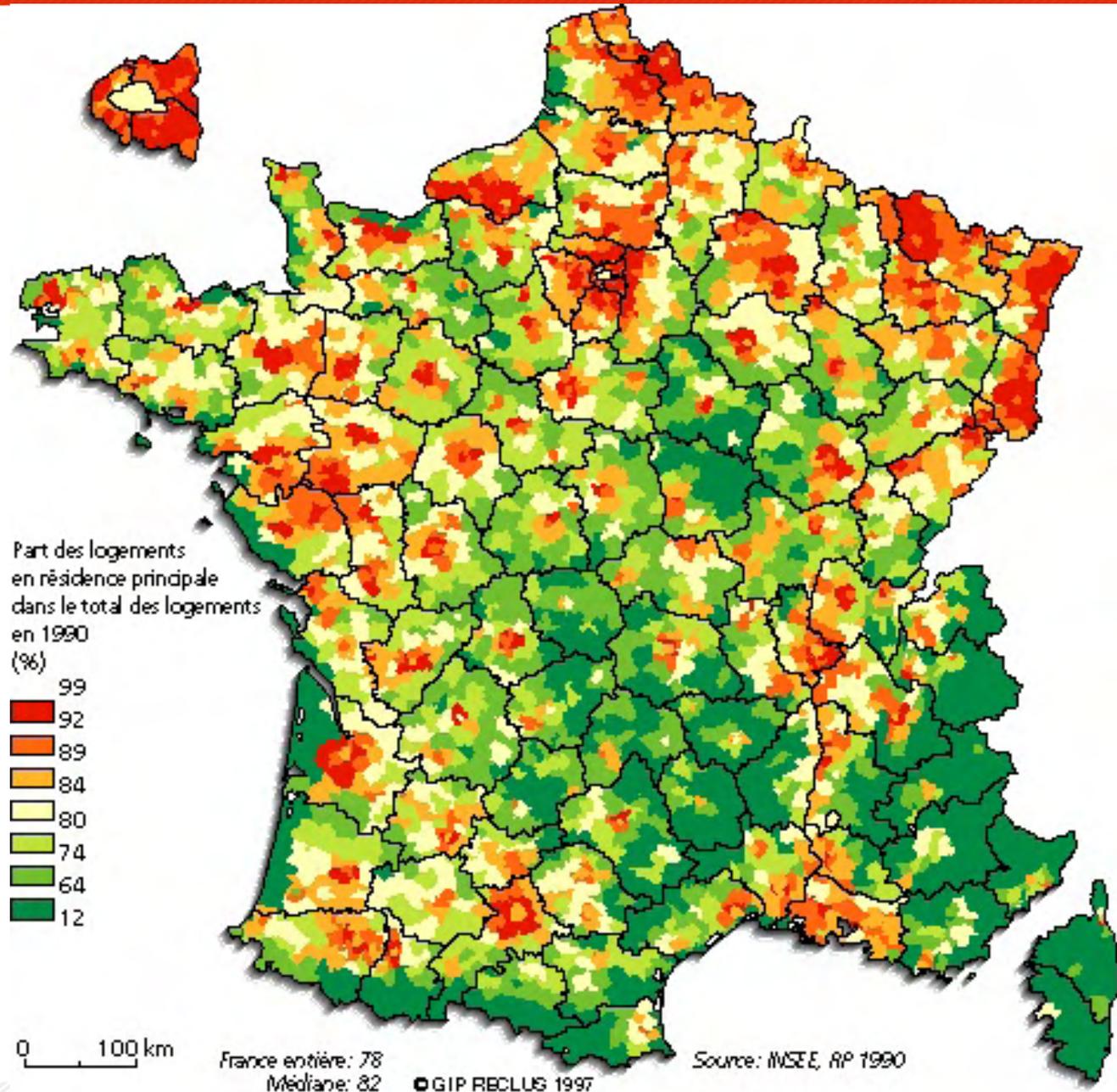
Il existe plusieurs algorithmes d'estimation automatique, beaucoup sont en open-source.



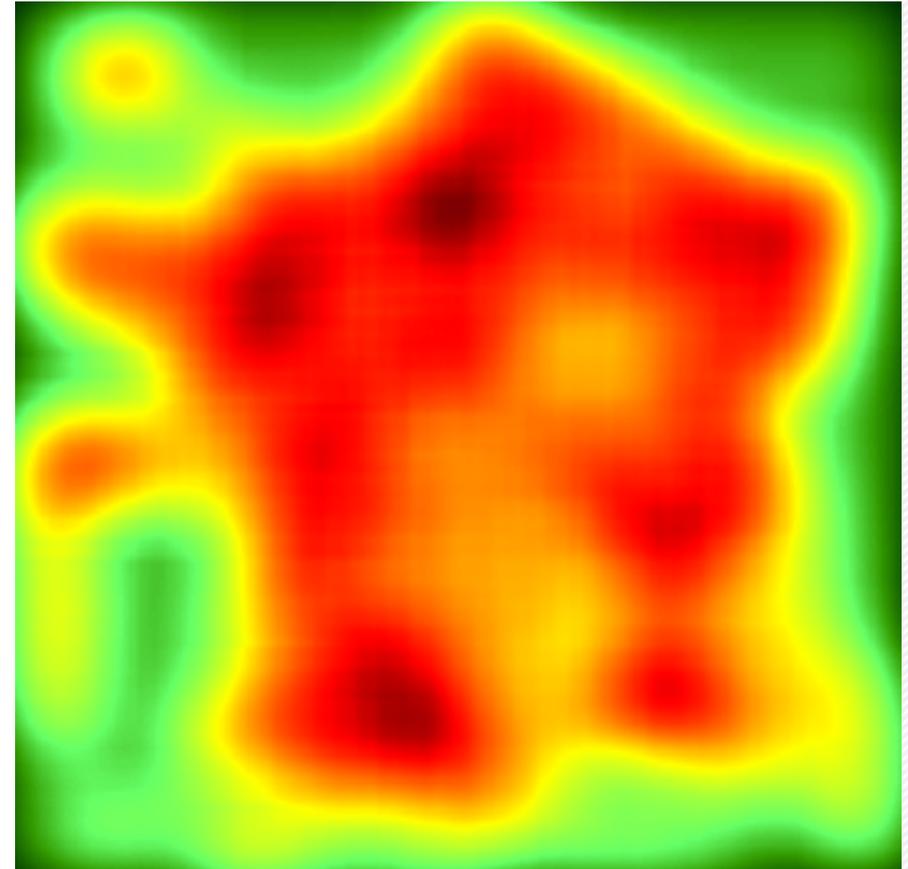
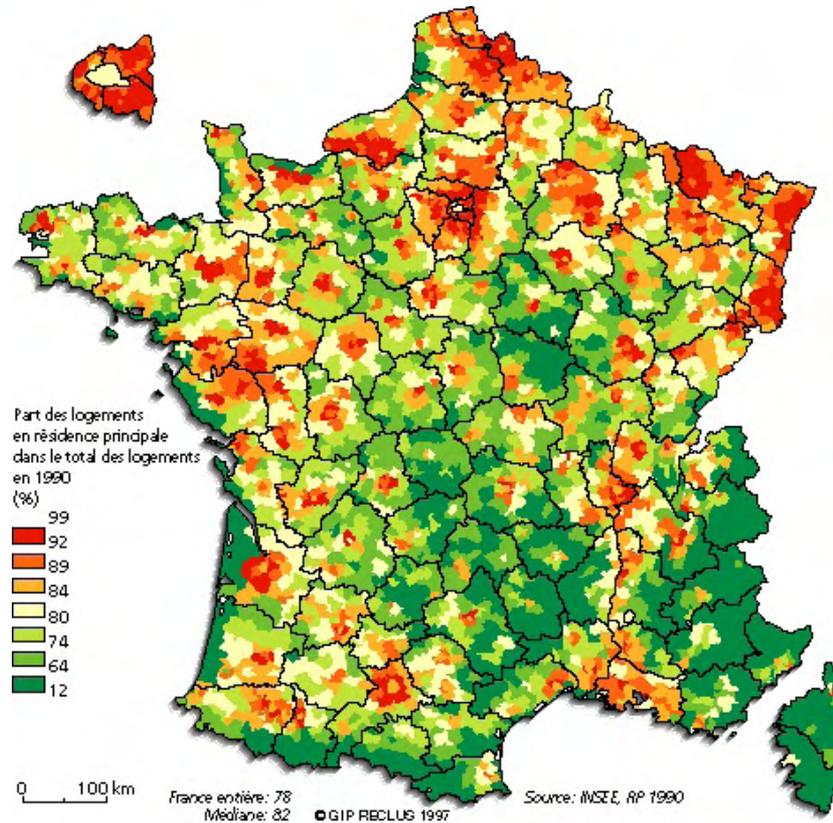
Exemple d'analyse de saillance visuelle SUN

A droite, l'analyse de saillance de la carte de gauche. Les parties les plus saillantes, en rouge et vert, correspondent bien aux valeurs extrêmes de la variable représentée.

Algorithme SUN (Zhang & al., 2008).

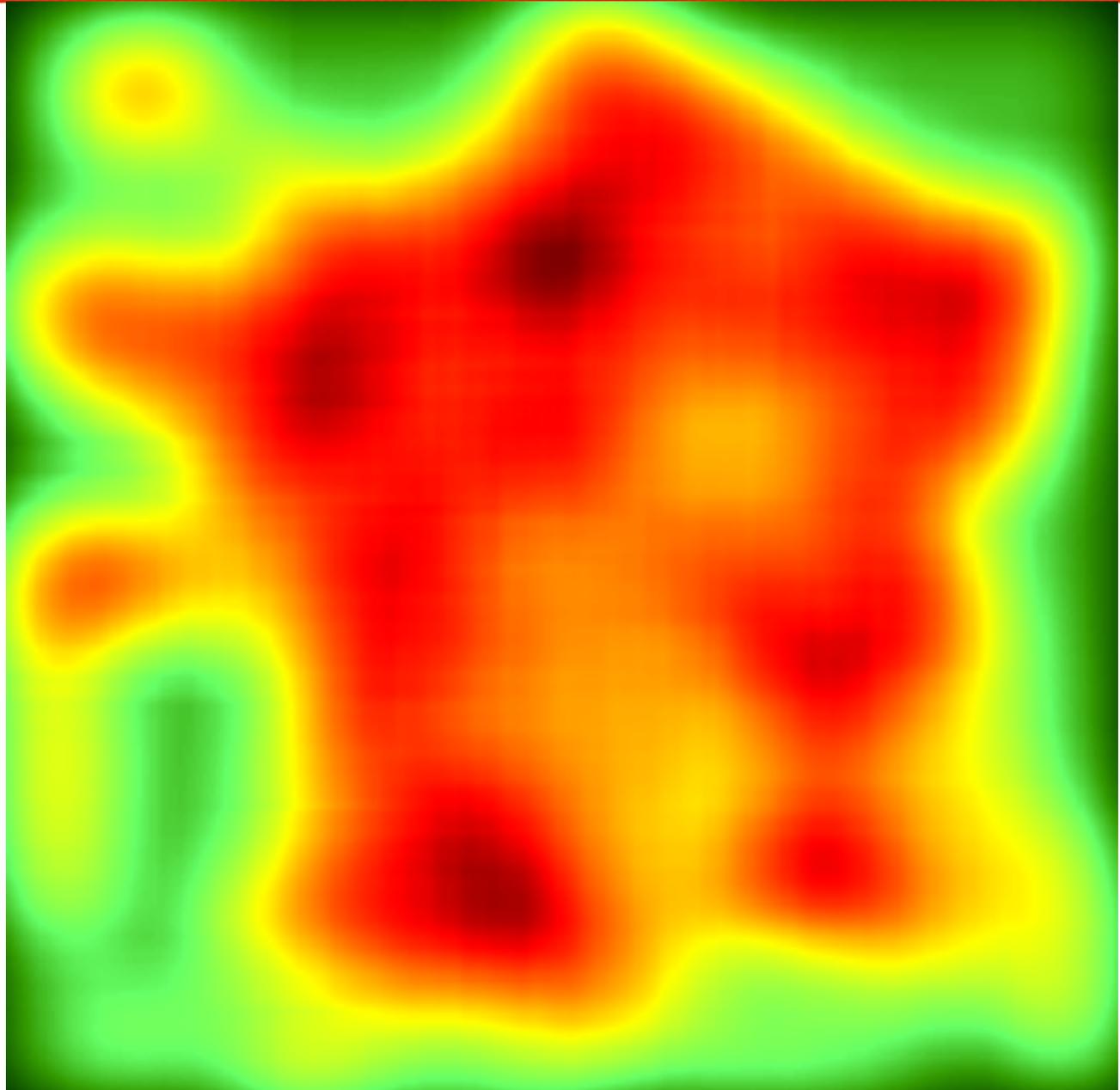






Exemple d'analyse de saillance visuelle Signature

A droite, l'analyse de saillance de la carte de gauche.
Algorithme SignatureSaliency (Hou, Harel, Koch, 2012).



SANFORD AND SELNICK

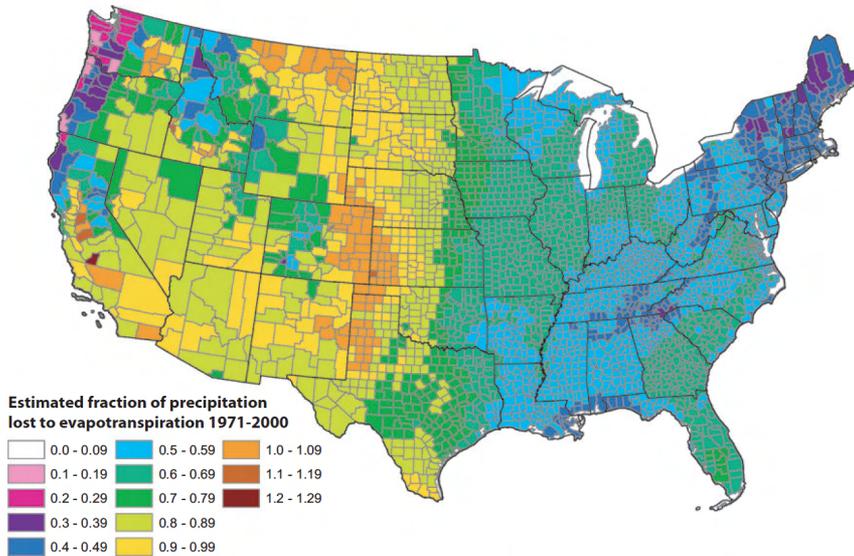


FIGURE 13. Estimated Mean Annual Ratio of Actual Evapotranspiration (ET) to Precipitation (P) for the Conterminous U.S. for the Period 1971-2000. Estimates are based on the regression equation in Table 1 that includes land cover. Calculations of ET/P were made first at the 800-m resolution of the PRISM climate data. The mean values for the counties (shown) were then calculated by averaging the 800-m values within each county. Areas with fractions >1 are agricultural counties that either import surface water or mine deep groundwater.

SANFORD AND SELNICK

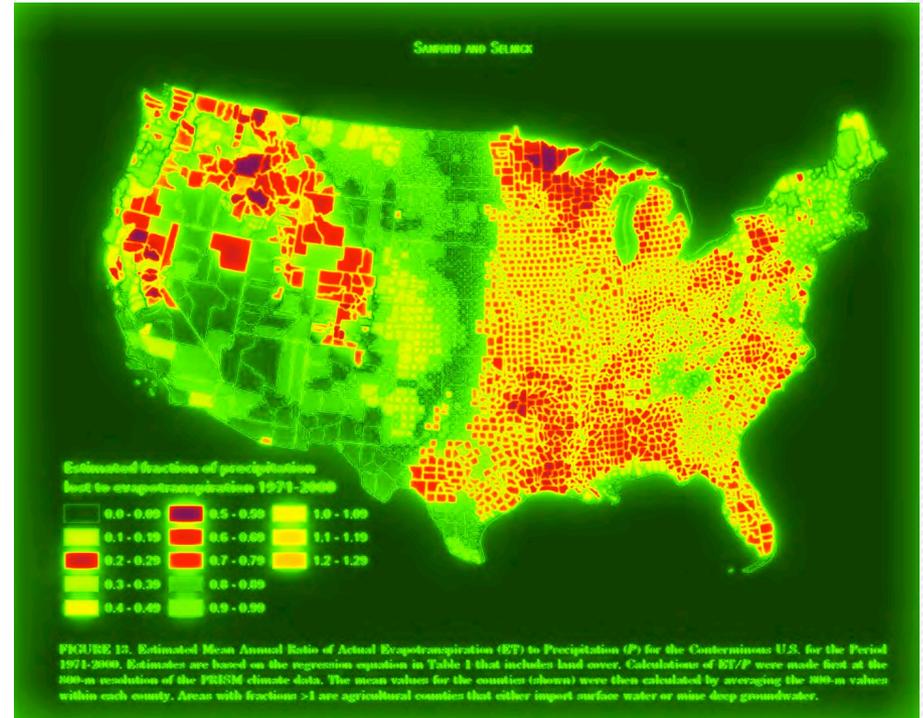


FIGURE 13. Estimated Mean Annual Ratio of Actual Evapotranspiration (ET) to Precipitation (P) for the Conterminous U.S. for the Period 1971-2000. Estimates are based on the regression equation in Table 1 that includes land cover. Calculations of ET/P were made first at the 800-m resolution of the PRISM climate data. The mean values for the counties (shown) were then calculated by averaging the 800-m values within each county. Areas with fractions >1 are agricultural counties that either import surface water or mine deep groundwater.

Exemple d'analyse de saillance visuelle SUN

Le choix d'une palette de couleurs « arc-en-ciel » ne correspond pas à la perception des couleurs.
 Algorithme SUN (Zhang & al., 2008)

SANFORD AND SELNICK

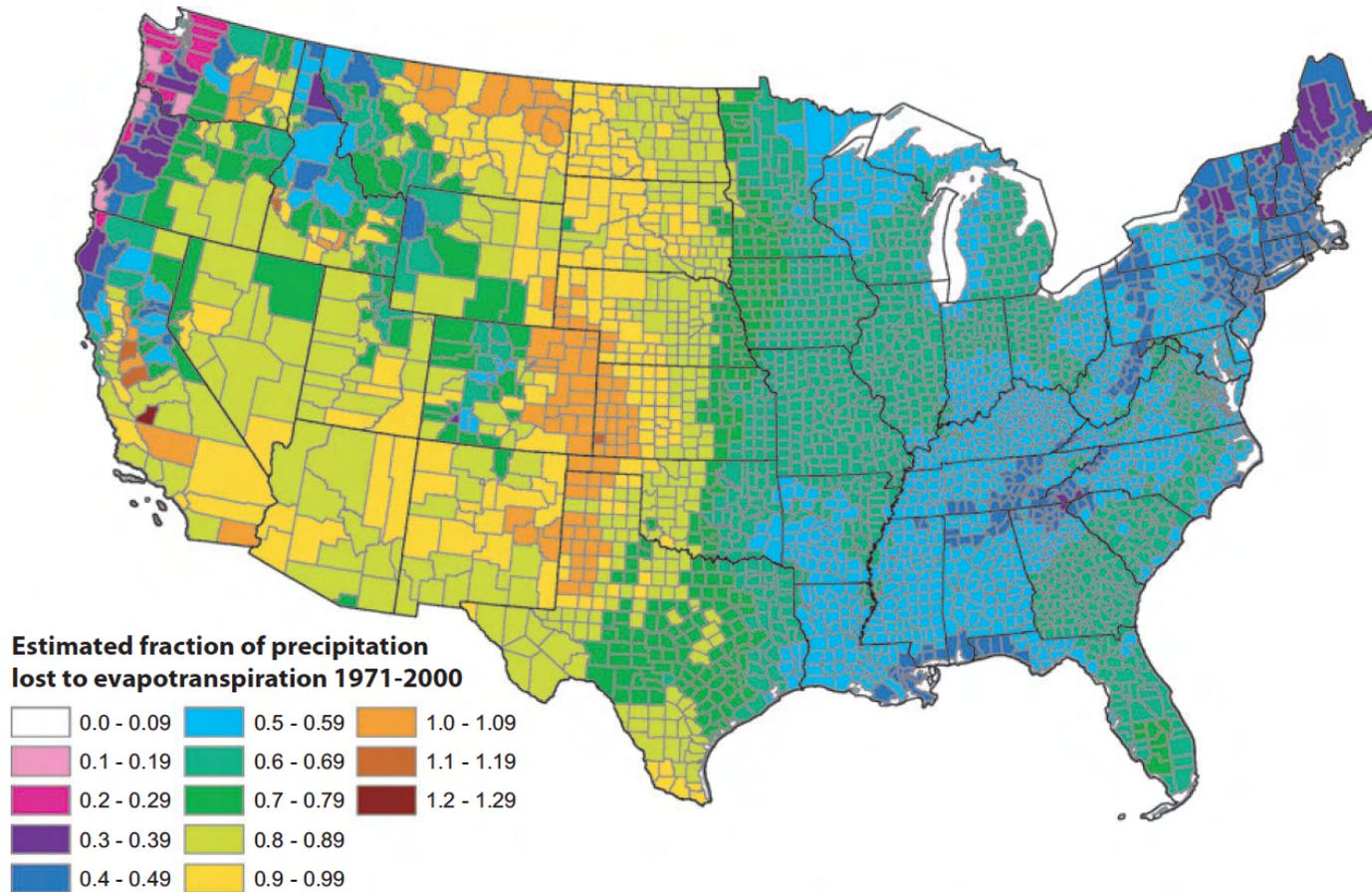
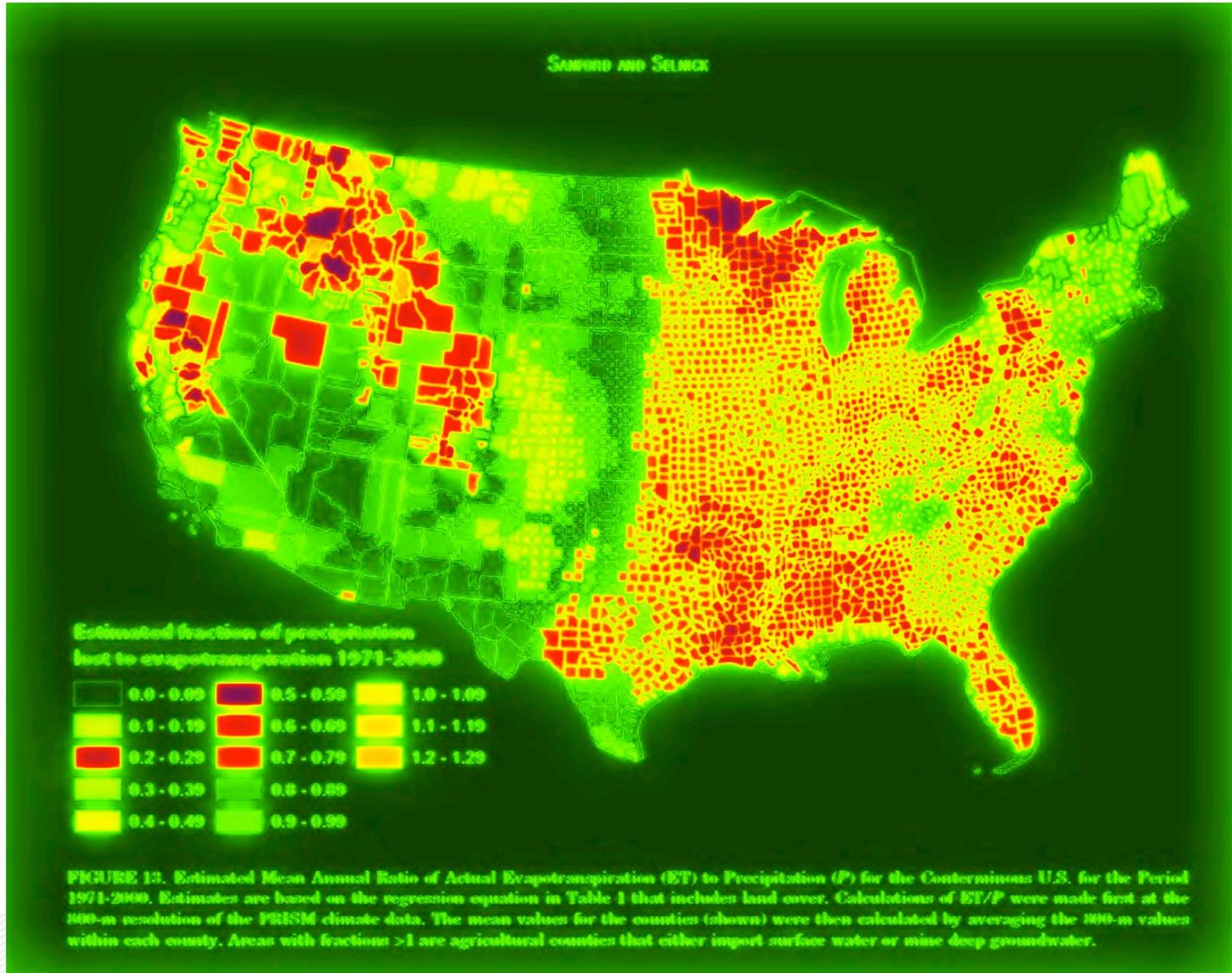


FIGURE 13. Estimated Mean Annual Ratio of Actual Evapotranspiration (ET) to Precipitation (P) for the Conterminous U.S. for the Period 1971-2000. Estimates are based on the regression equation in Table 1 that includes land cover. Calculations of ET/P were made first at the 800-m resolution of the PRISM climate data. The mean values for the counties (shown) were then calculated by averaging the 800-m values within each county. Areas with fractions >1 are agricultural counties that either import surface water or mine deep groundwater.



SANFORD AND SELNICK

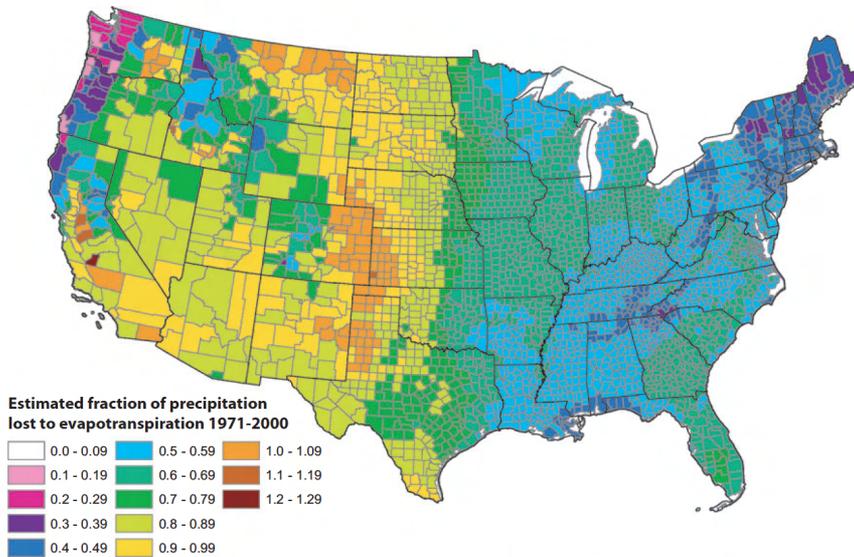
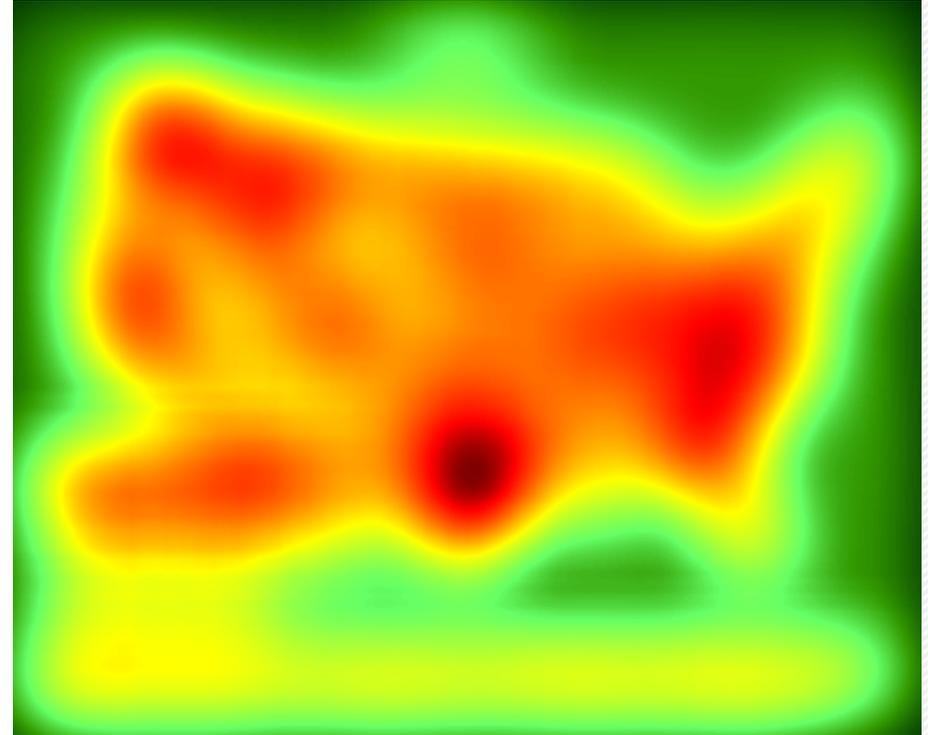
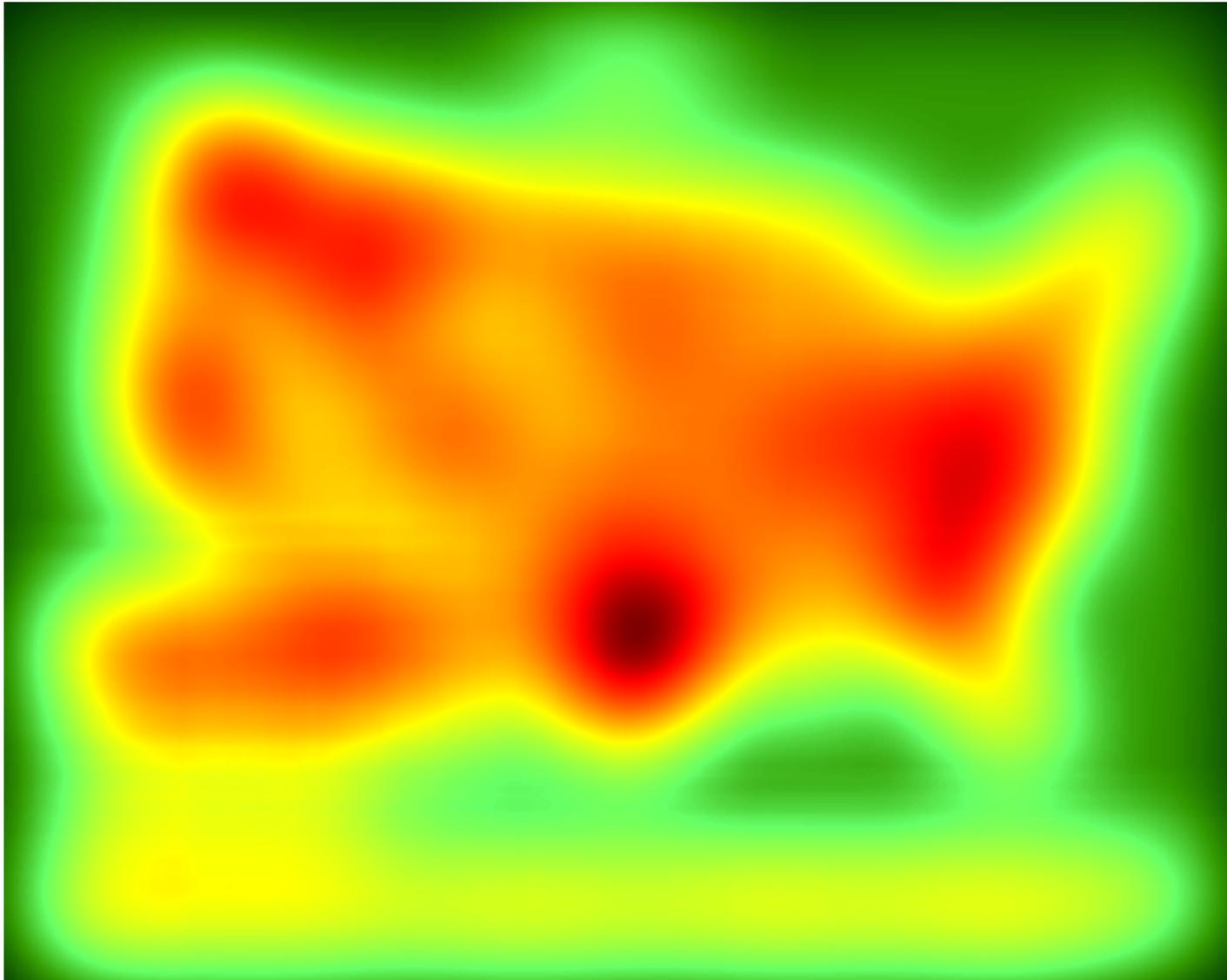


FIGURE 13. Estimated Mean Annual Ratio of Actual Evapotranspiration (ET) to Precipitation (P) for the Conterminous U.S. for the Period 1971-2000. Estimates are based on the regression equation in Table 1 that includes land cover. Calculations of ET/P were made first at the 800-m resolution of the PRISM climate data. The mean values for the counties (shown) were then calculated by averaging the 800-m values within each county. Areas with fractions >1 are agricultural counties that either import surface water or mine deep groundwater.



Exemple d'analyse de saillance visuelle Signature

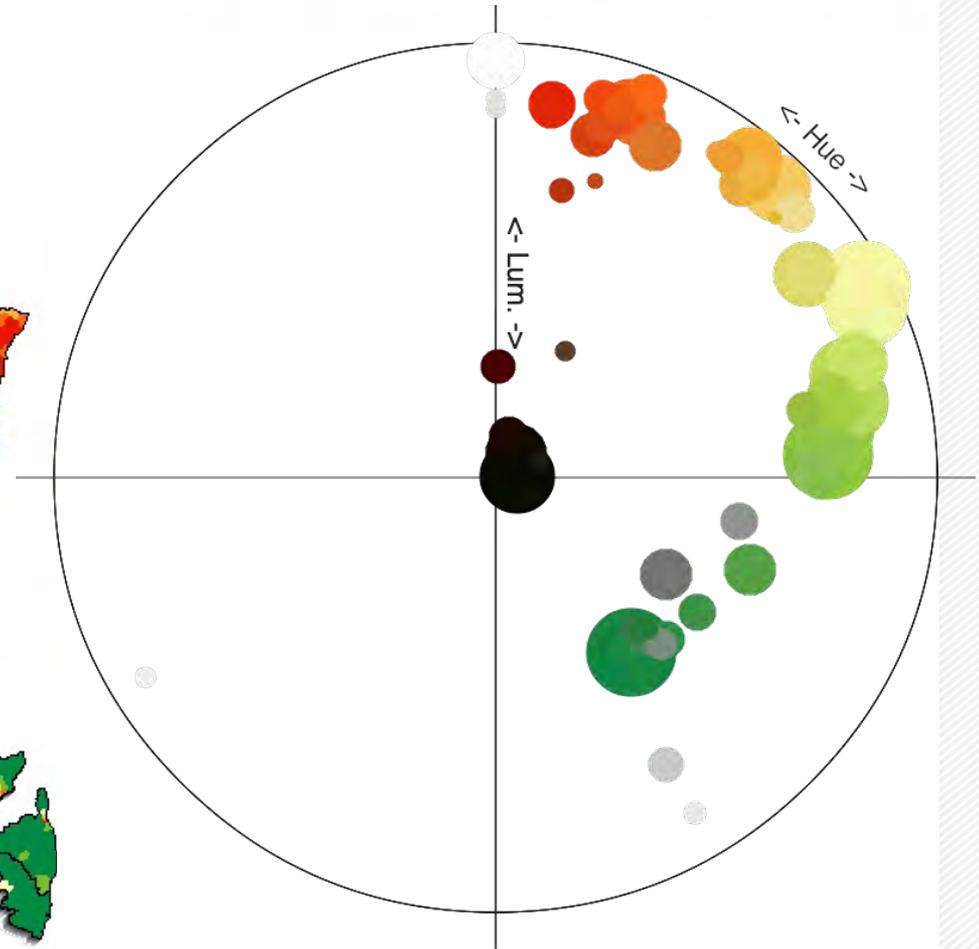
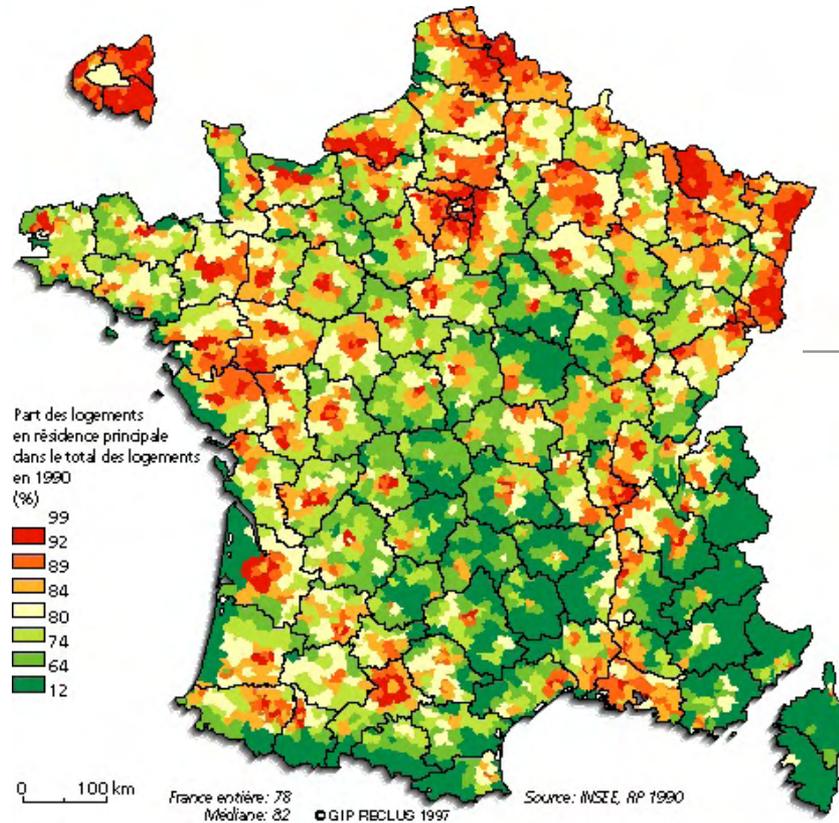
Le choix d'une palette de couleurs « arc-en-ciel » ne correspond pas à la perception des couleurs.
 Algorithme Signature Saliency (Hou, Harel, Koch, 2012)



Visualiser les relations et proportions de couleurs d'une carte choroplèthe

Les couleurs d'une carte choroplèthe constituent le moyen principal pour la communication de ses informations (signe visuel en sémiotique).

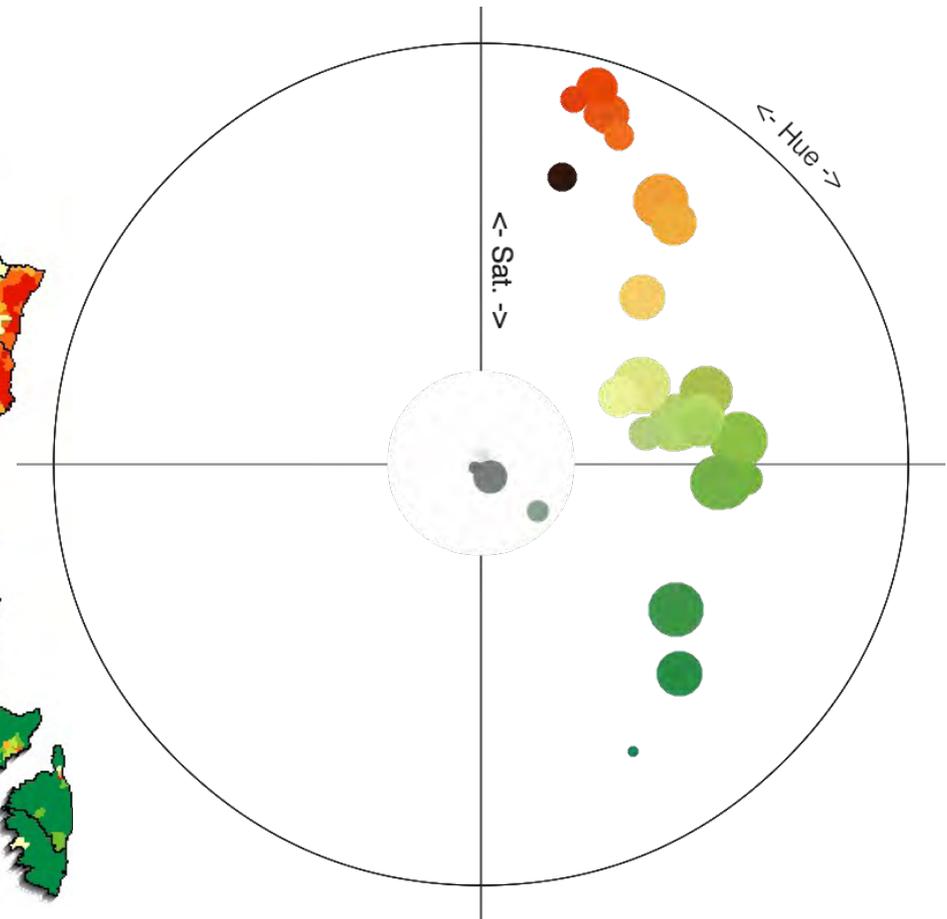
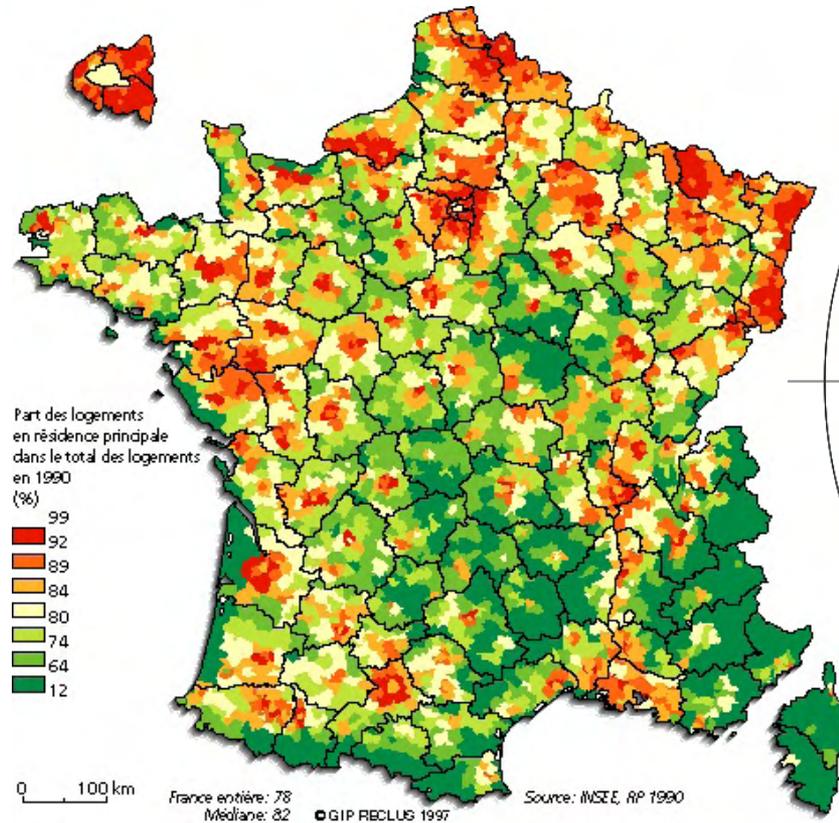
➔ Critère de conception de base : que les relations entre couleurs correspondent aux relations entre classes de la variable.



Exemple d'analyse de relations colorées

Analyse selon un cercle chromatique **HLS** : les teintes de la palettes sont organisées selon une courbe, les verts sont nettement plus sombre que les rouges.

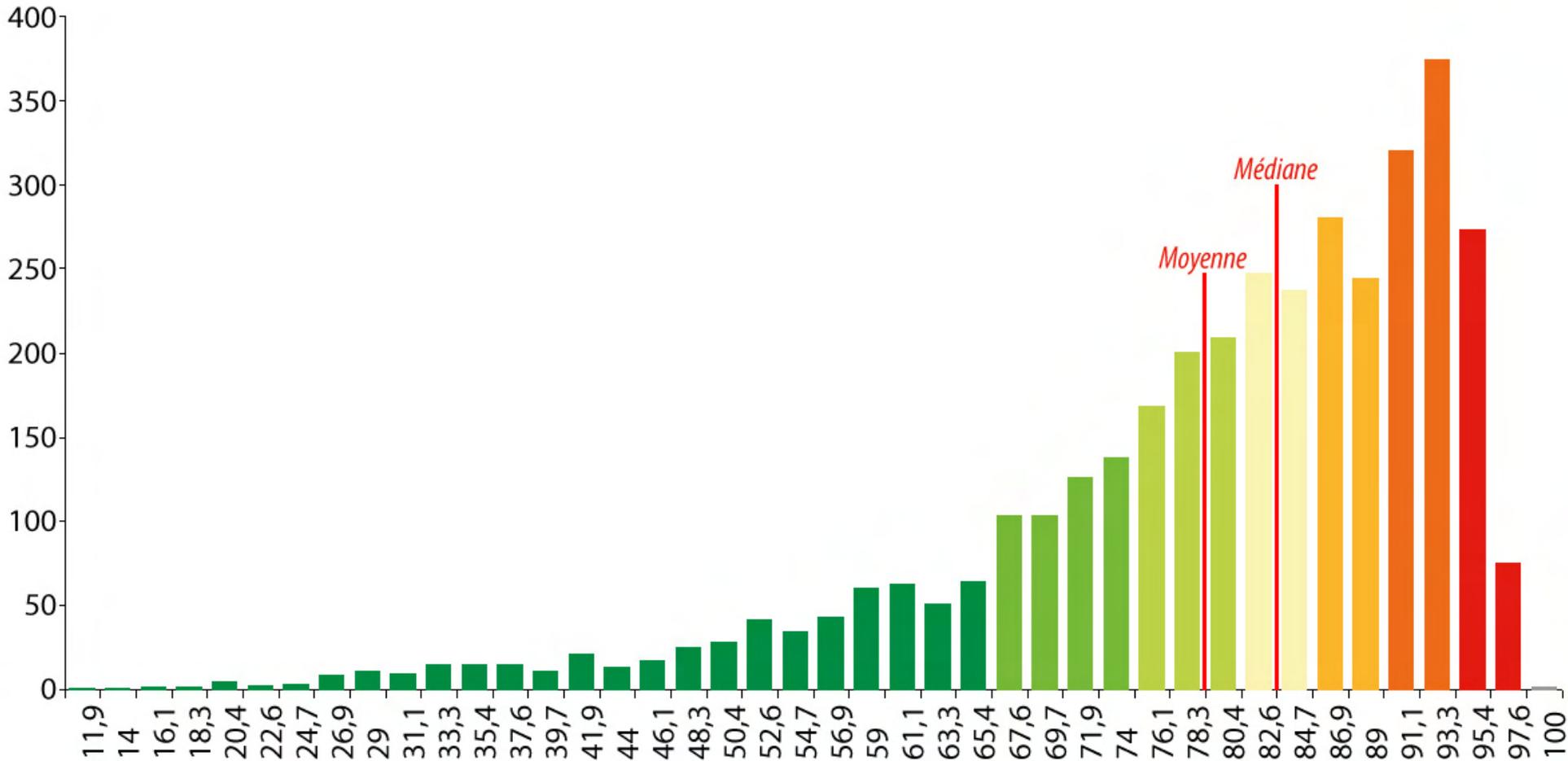
<http://www.geotests.net/couleurs/frejus.html?l=fr>



Exemple d'analyse de relations colorées

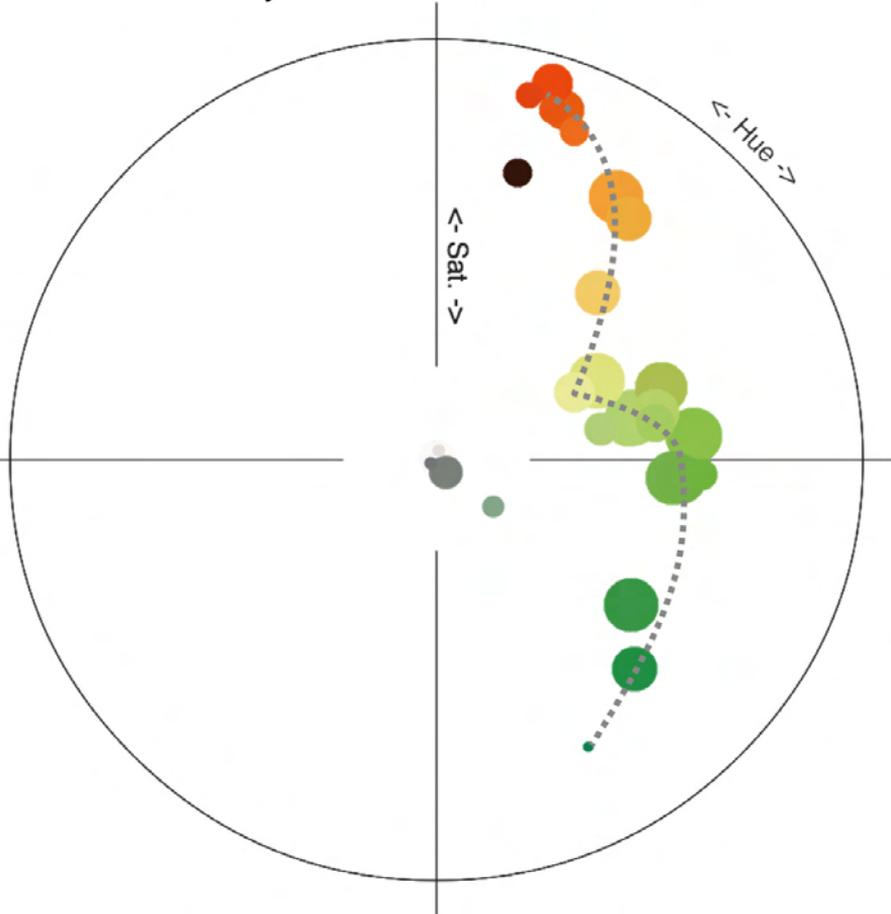
Analyse selon un cercle chromatique **HSL** : le milieu jaune de la palette est nettement moins dense, moins saturé, que les deux extrêmes.

<http://www.geotests.net/couleurs/frejus.html?l=fr>

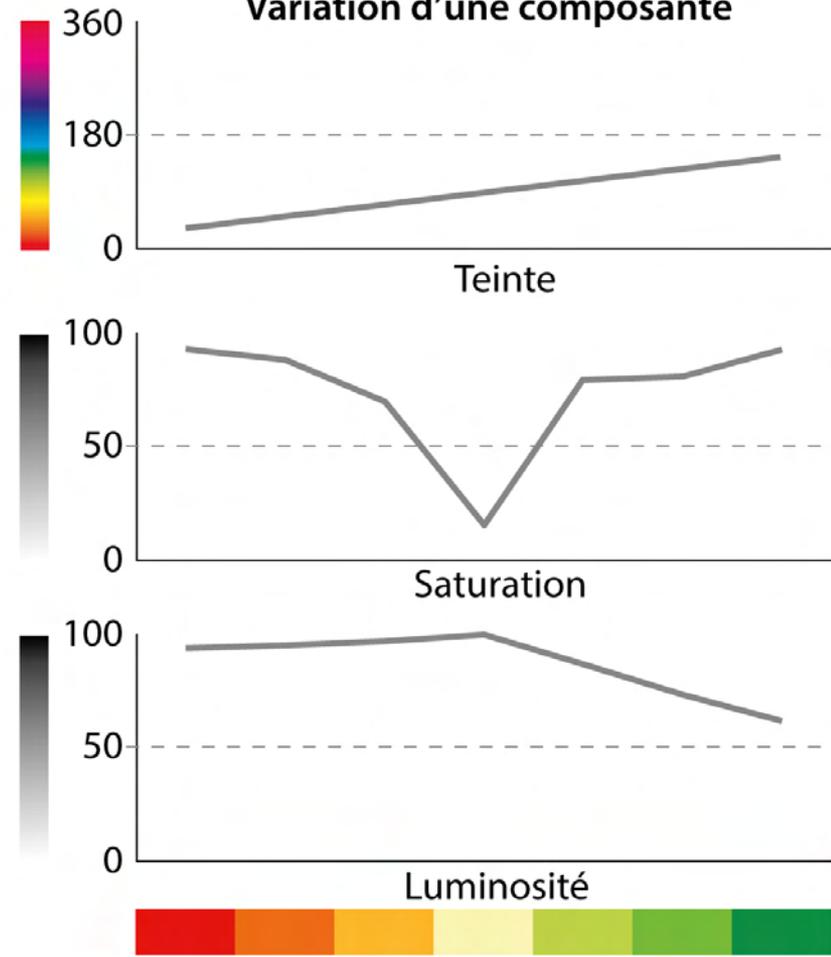


Part des logements en résidence principale : fréquences

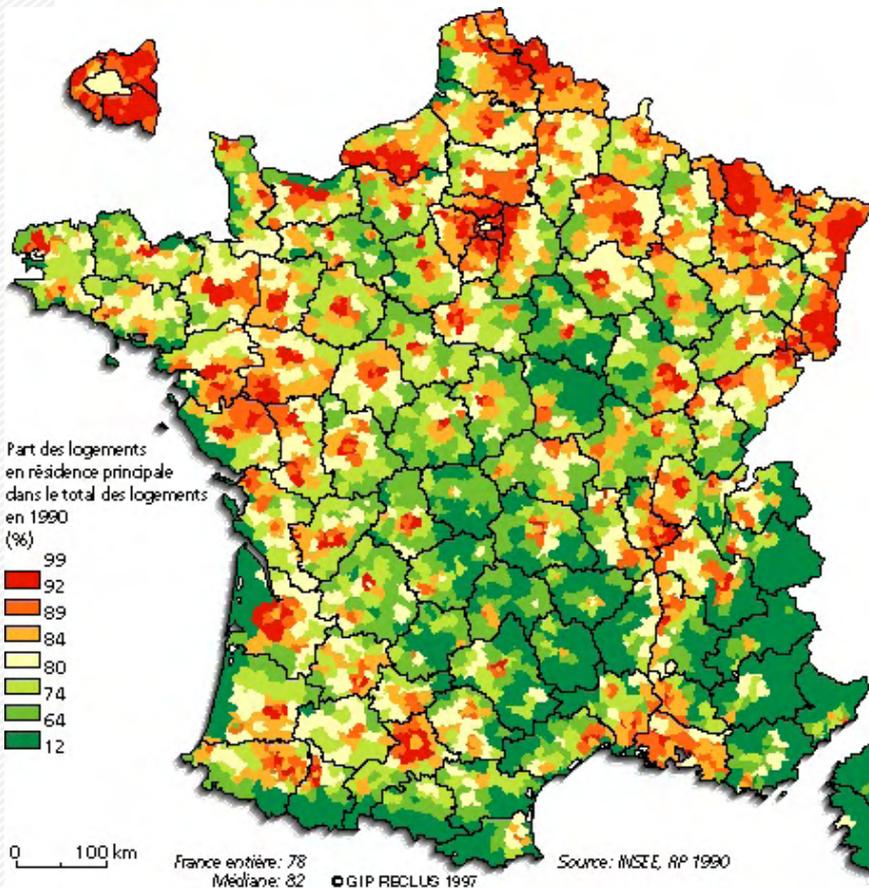
Analyse de relations colorées



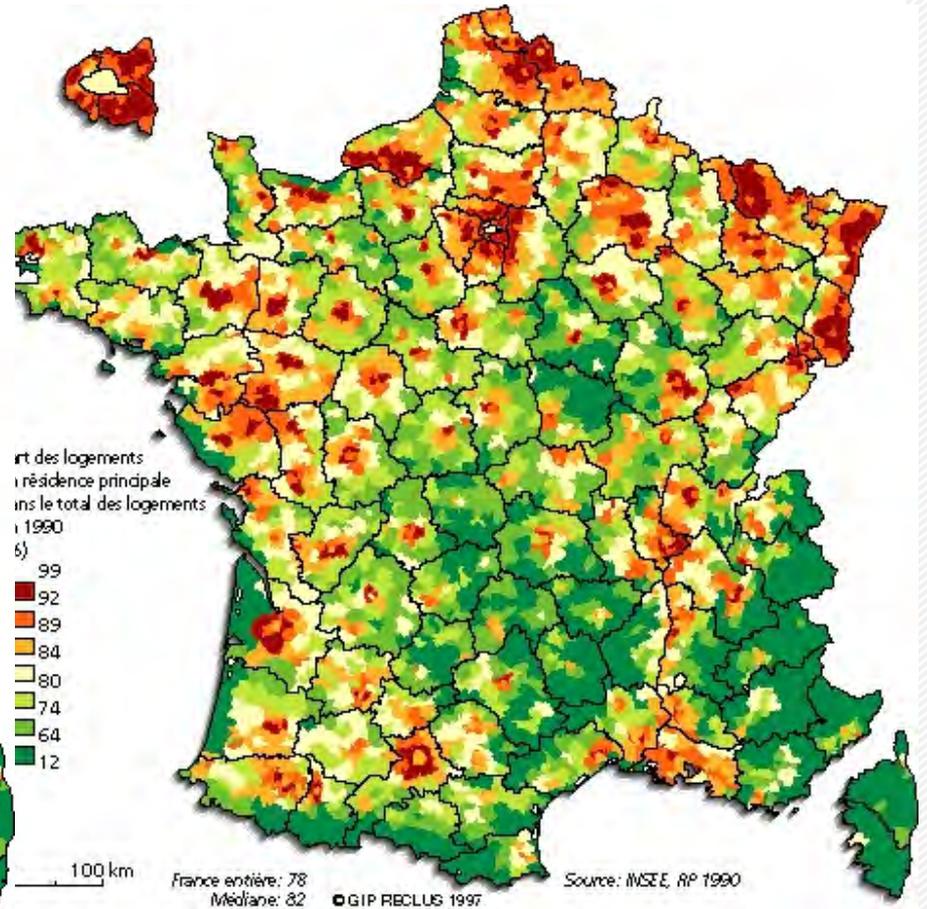
Variation d'une composante



<http://www.geotests.net/couleurs/trequs.html>



Carte d'origine



Carte recolorée

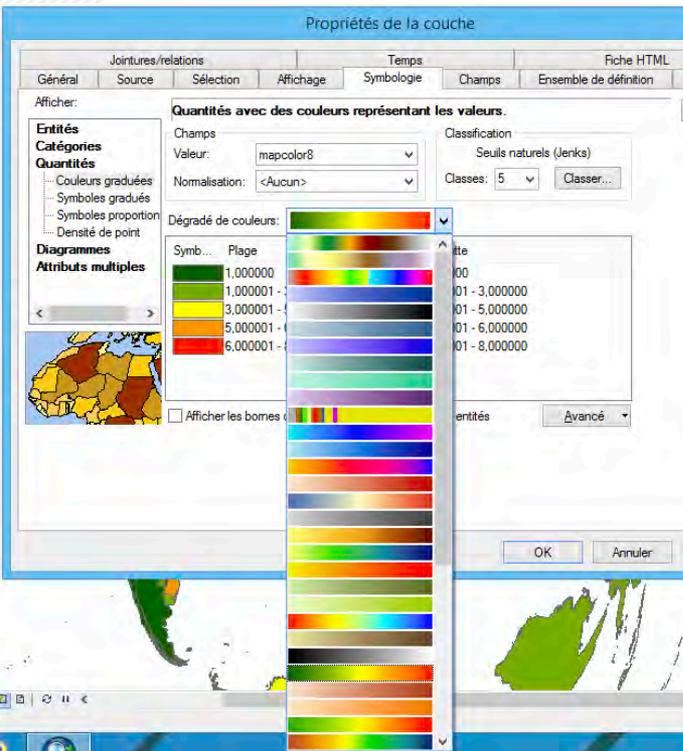
Concevoir un dégradé de couleurs en réglant précisément ses paramètres.

Adapter précisément le dégradé de couleurs à la variation des valeurs de la variable représentée.

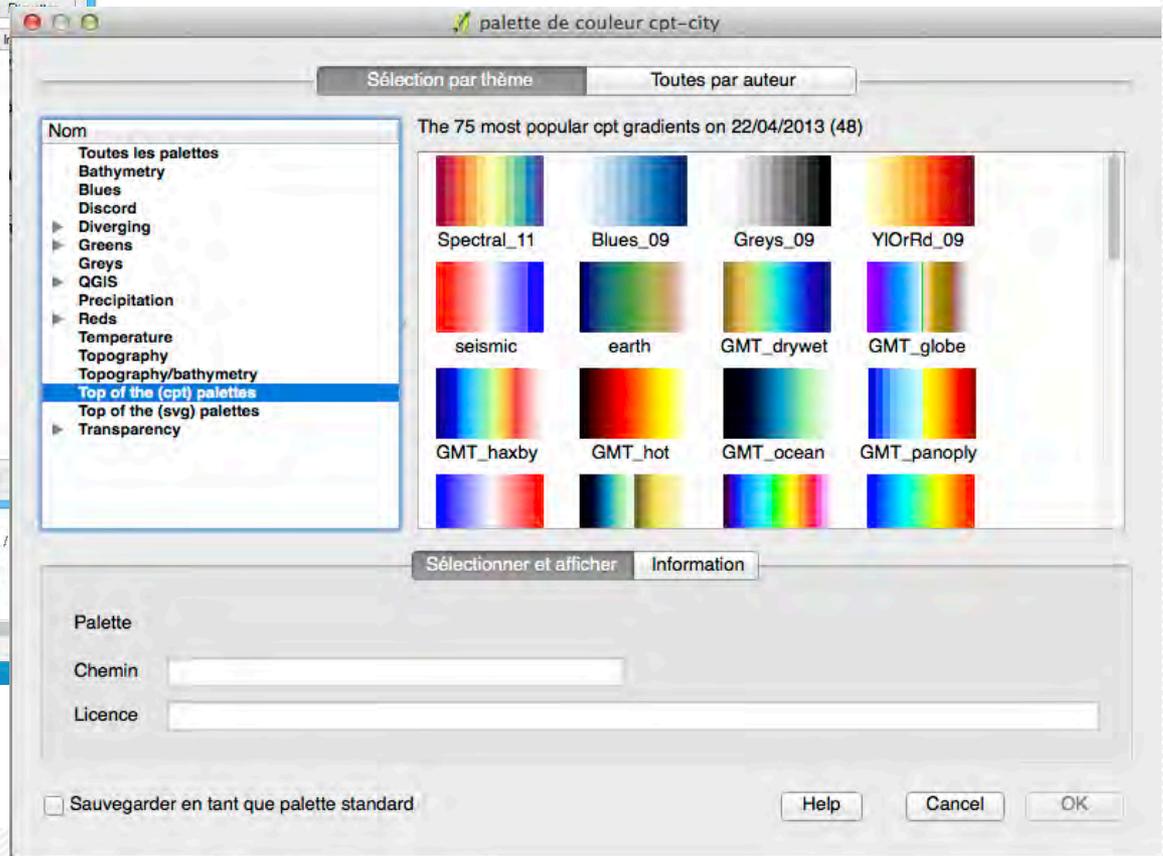
➔ Régler visuellement la variation des composantes de teinte, saturation et luminosité.

Comment sont choisies les couleurs dans les logiciels courants ?

QGIS 2



ArcMAP 10



COLORBREWER 2.0

color advice for cartography

[how to use](#) [updates](#) [downloads](#) [credits](#)

Number of data classes:

Nature of your data:
 sequential diverging qualitative

Pick a color scheme:



Only show:
 colorblind safe
 print friendly
 photocopy safe

Context:
 roads
 cities
 borders

Background:
 solid color
 terrain

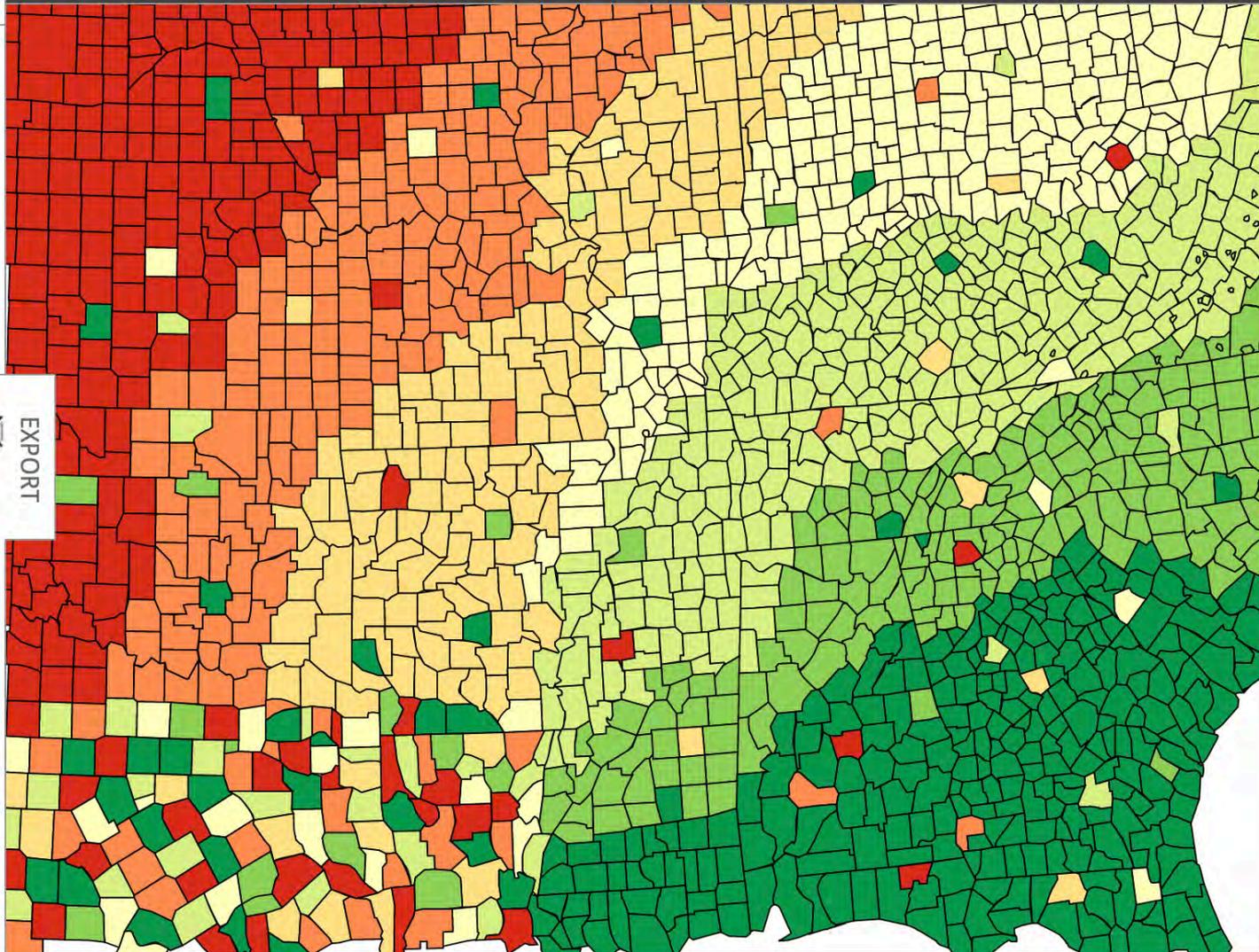
color transparency

7-class RdYlGn

EXPORT

HEX

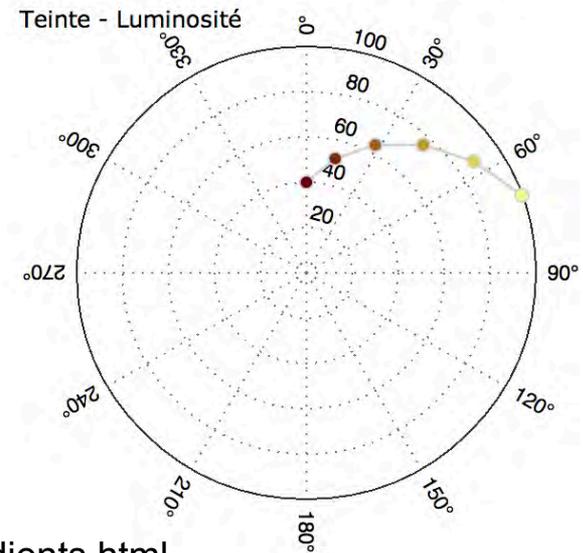
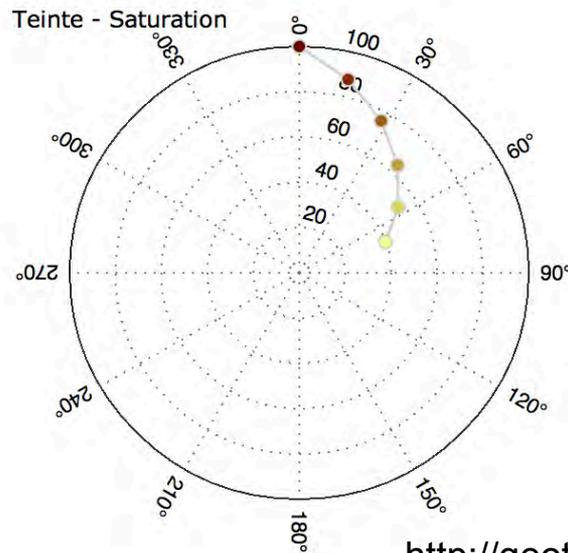
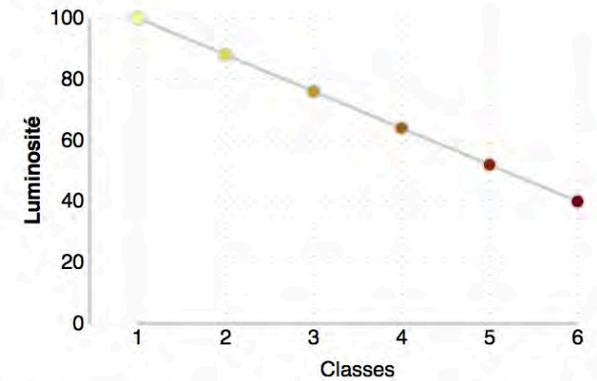
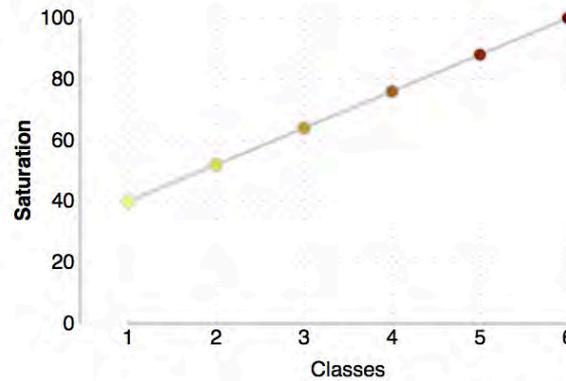
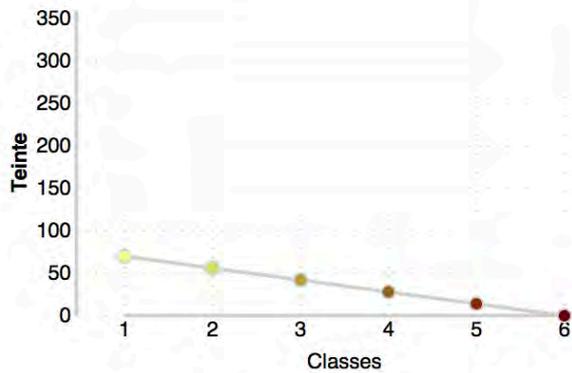
	#d73027
	#fc8d59
	#fee08b
	#ffffbf
	#d9ef8b
	#91cf60
	#1a9850



Concevoir un dégradé de couleurs



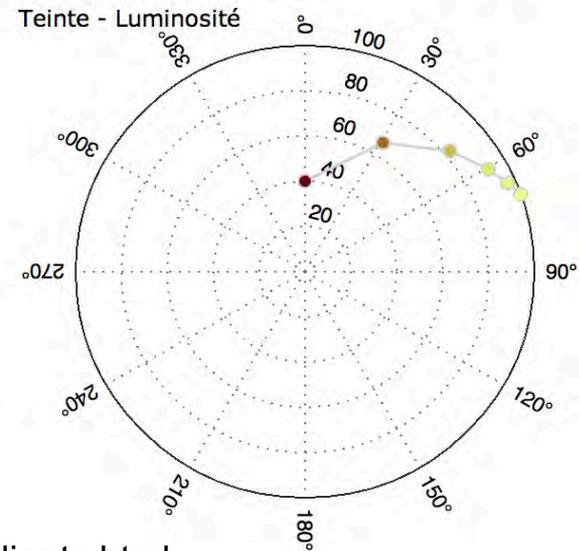
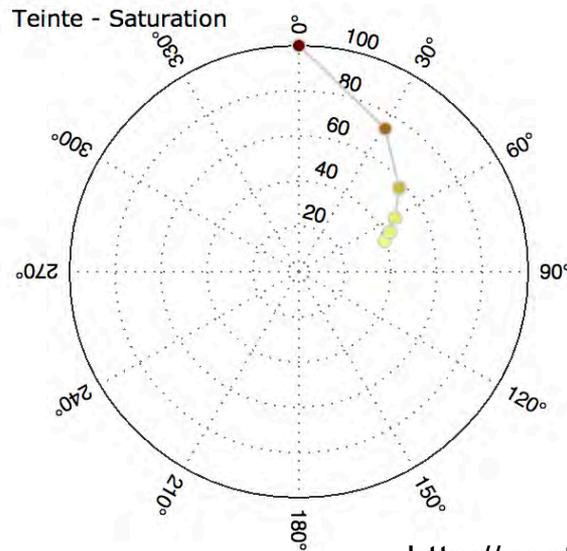
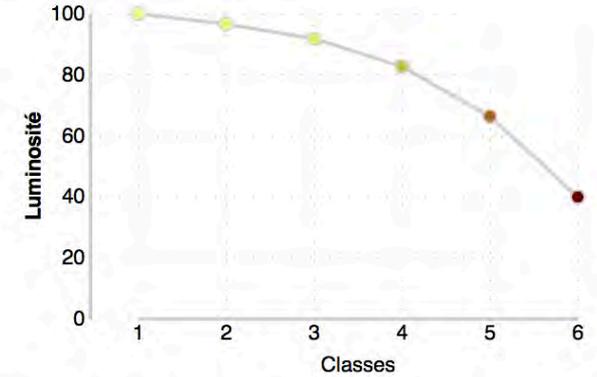
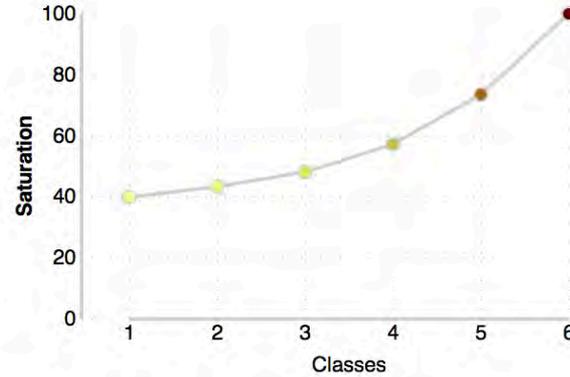
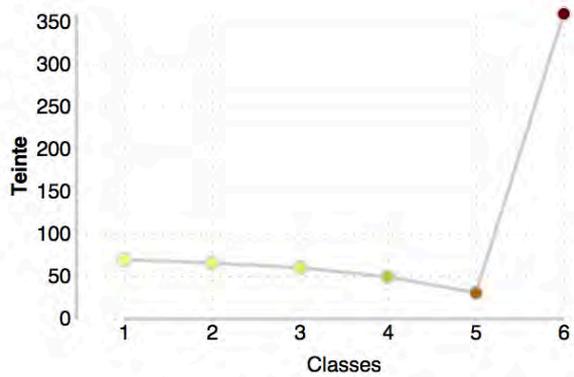
Dégradé selon une progression linéaire



Concevoir un dégradé de couleurs

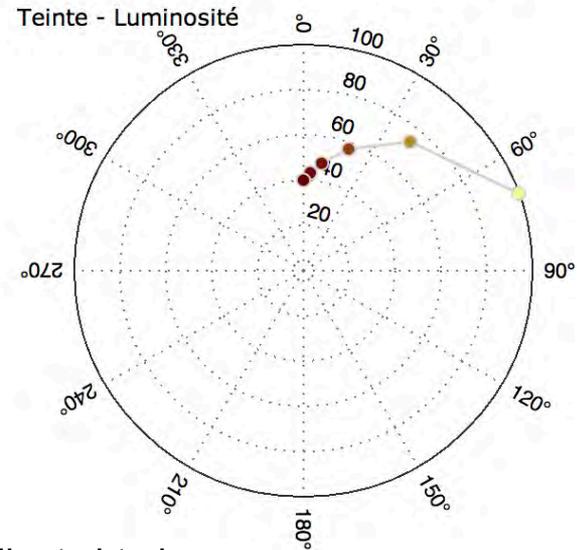
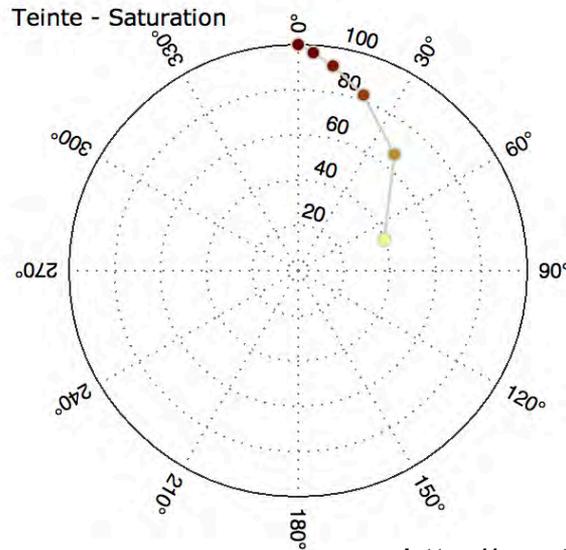
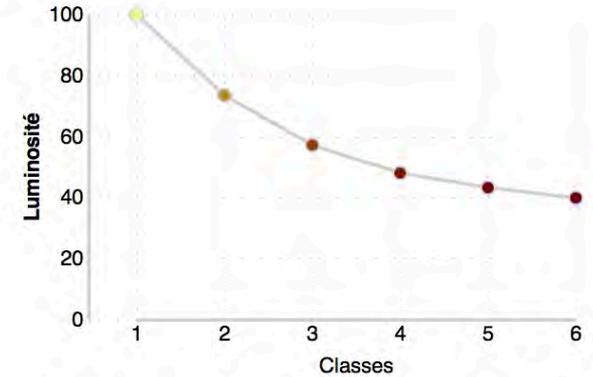
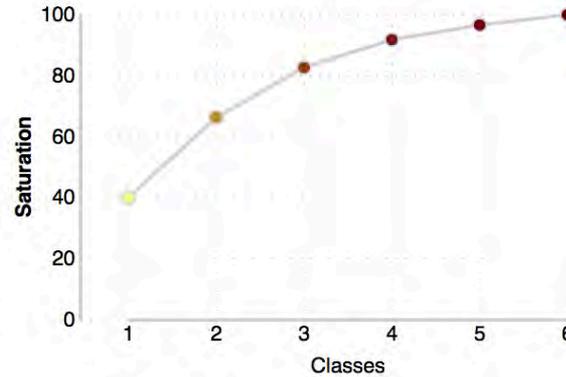
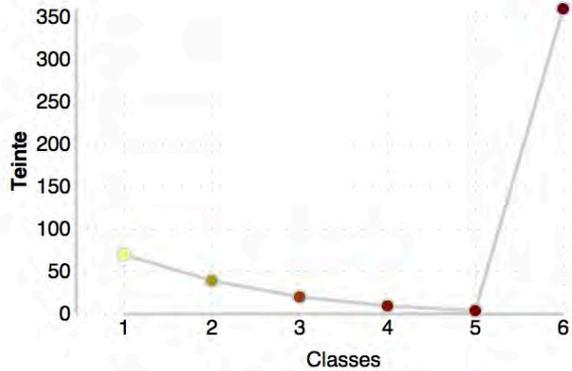


Dégradé selon une progression courbe



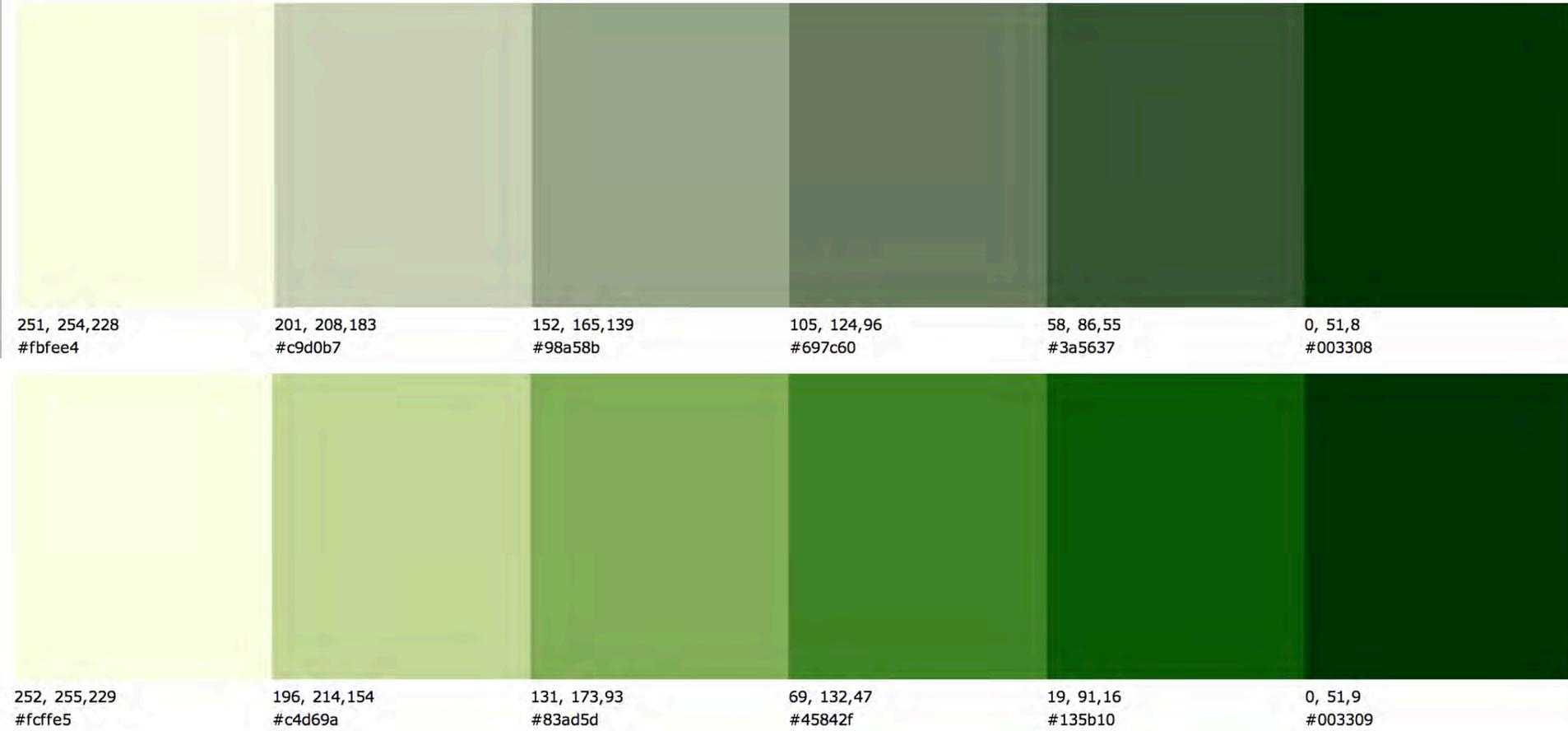
Concevoir un dégradé de couleurs

Dégradé selon une progression courbe



Concevoir un dégradé de couleurs

Espace colorimétrique de calcul : CIE-Luv (perceptif) vs. RGB



<http://geotests.net/couleurs/gradients.html>

Bibliographie

Saillance visuelle :

- **Hou X., Harel J., Koch C., 2012,**
“Image Signature: Highlighting Sparse Salient Regions,”
IEEE Trans. on Pattern Analysis and Machine Intelligence
34/1: 194
- **Zhang L., Tong M. H., Marks T. K., Shan H., Cottrell G. W., 2008,**
“Sun: A Bayesian Framework for Saliency Using Natural Statistics,”
Journal of Vision 8/7: 1-20

Analyses colorées :

- Carnet de recherche Hypothèses.org « Harmonies colorées »
<http://couleurs.hypotheses.org>