



# 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

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## 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 :

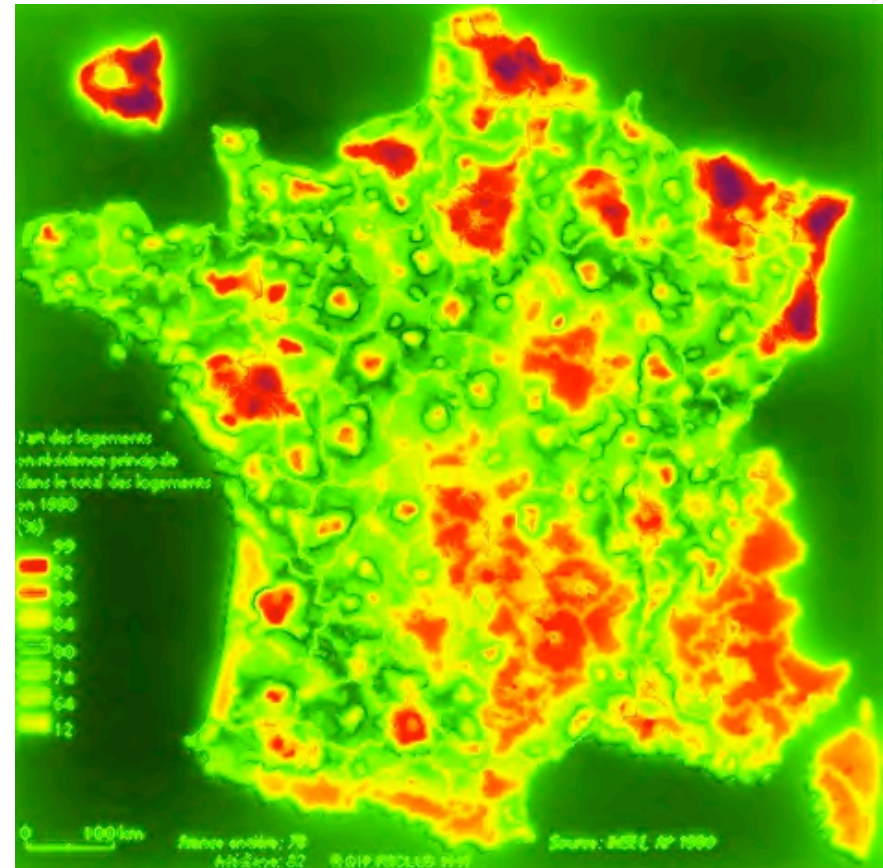
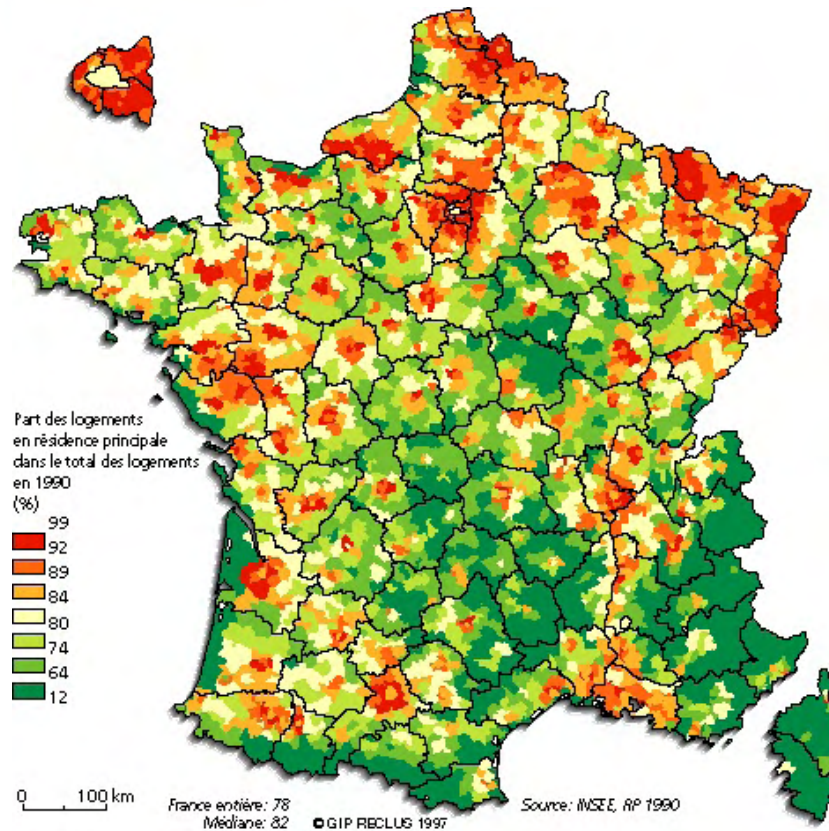
- Estimer la *saillance visuelle* d'une carte.
- Visualiser les relations et proportions de *couleurs* d'une carte choroplèthe.
- Concevoir un *dégradé de couleurs* en réglant précisément ses paramètres.

## 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.

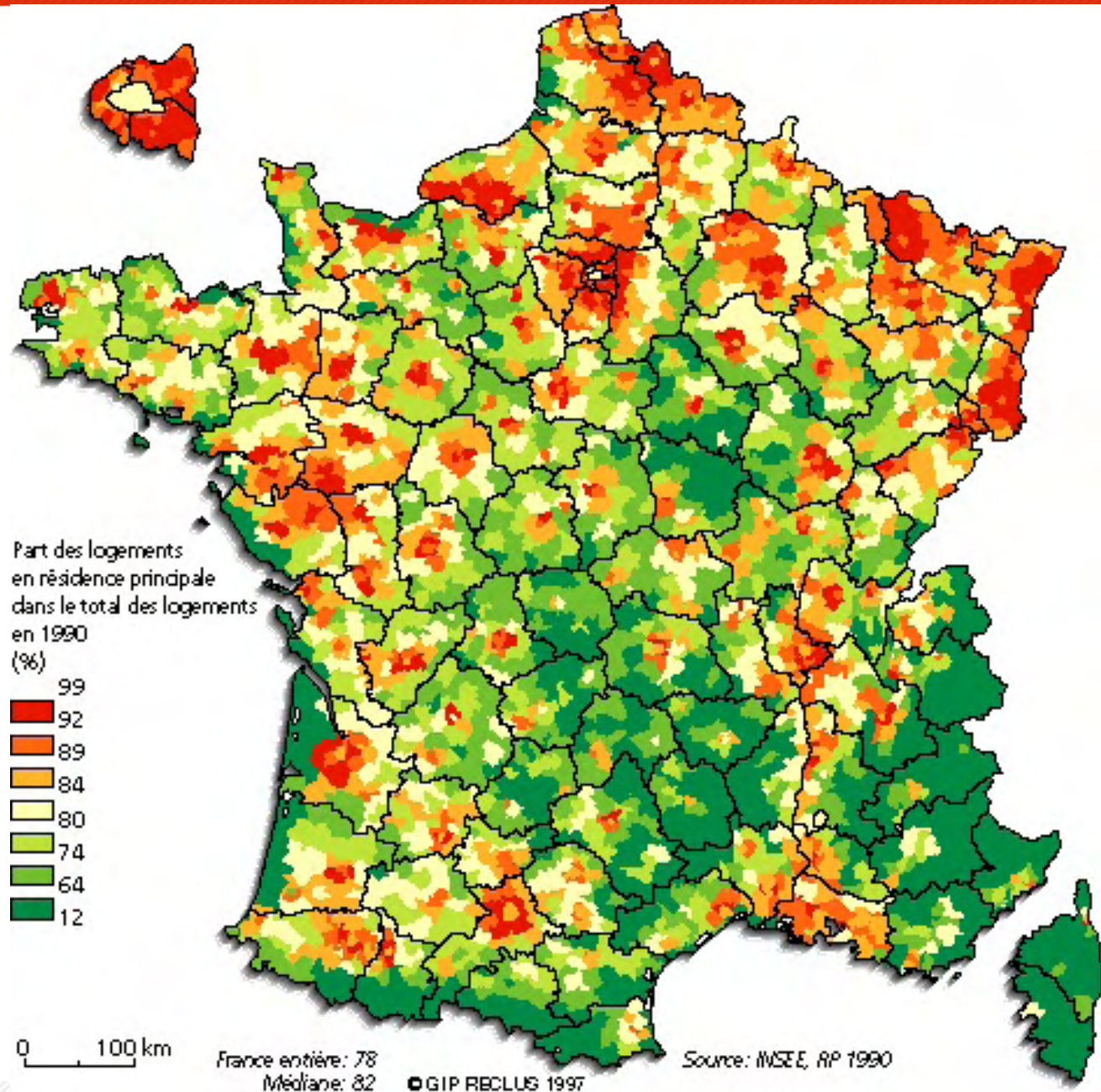
Il existe plusieurs algorithmes d'estimation automatique, beaucoup sont en open-source.

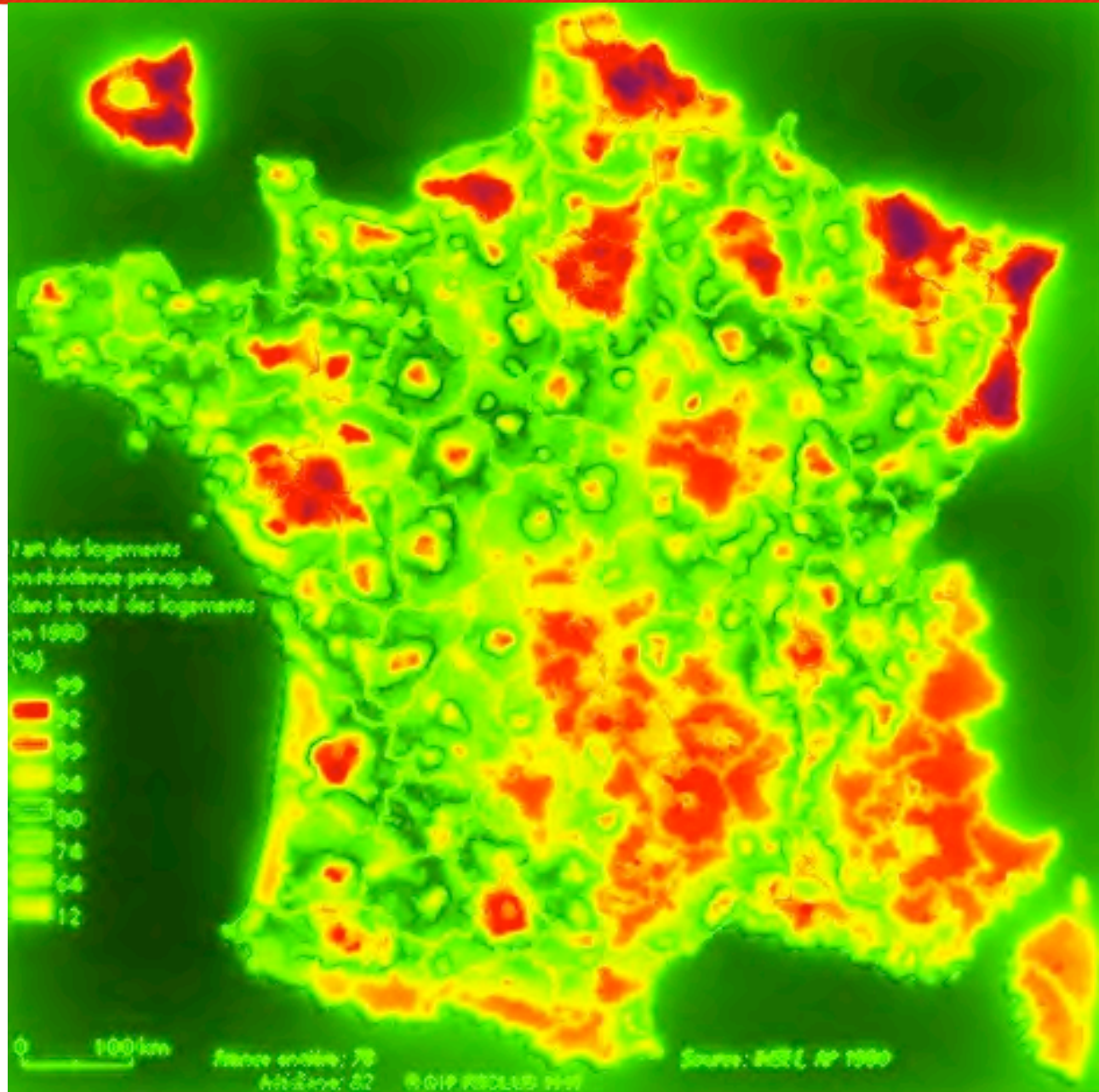


## Exemple d'analyse de saillance visuelle SUN

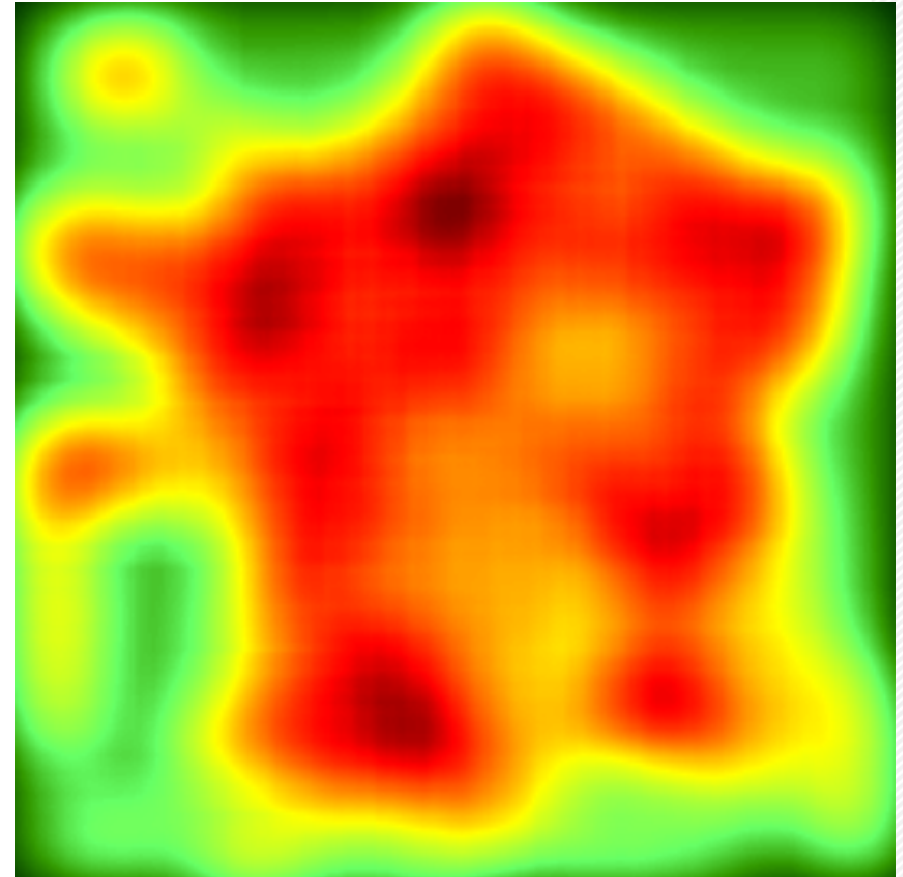
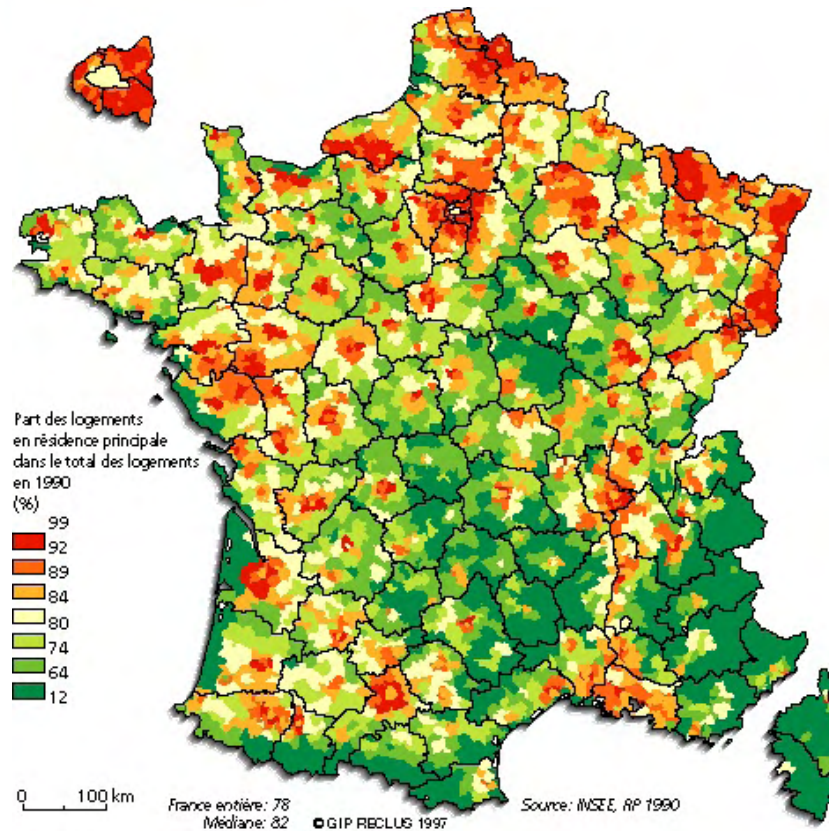
A droite, l'analyse de saillance de la carte de gauche. Les parties les plus saillantes, en rouge et vert, correspondent bien aux valeurs extrêmes de la variable représentée.

Algorithme SUN (Zhang & al., 2008).



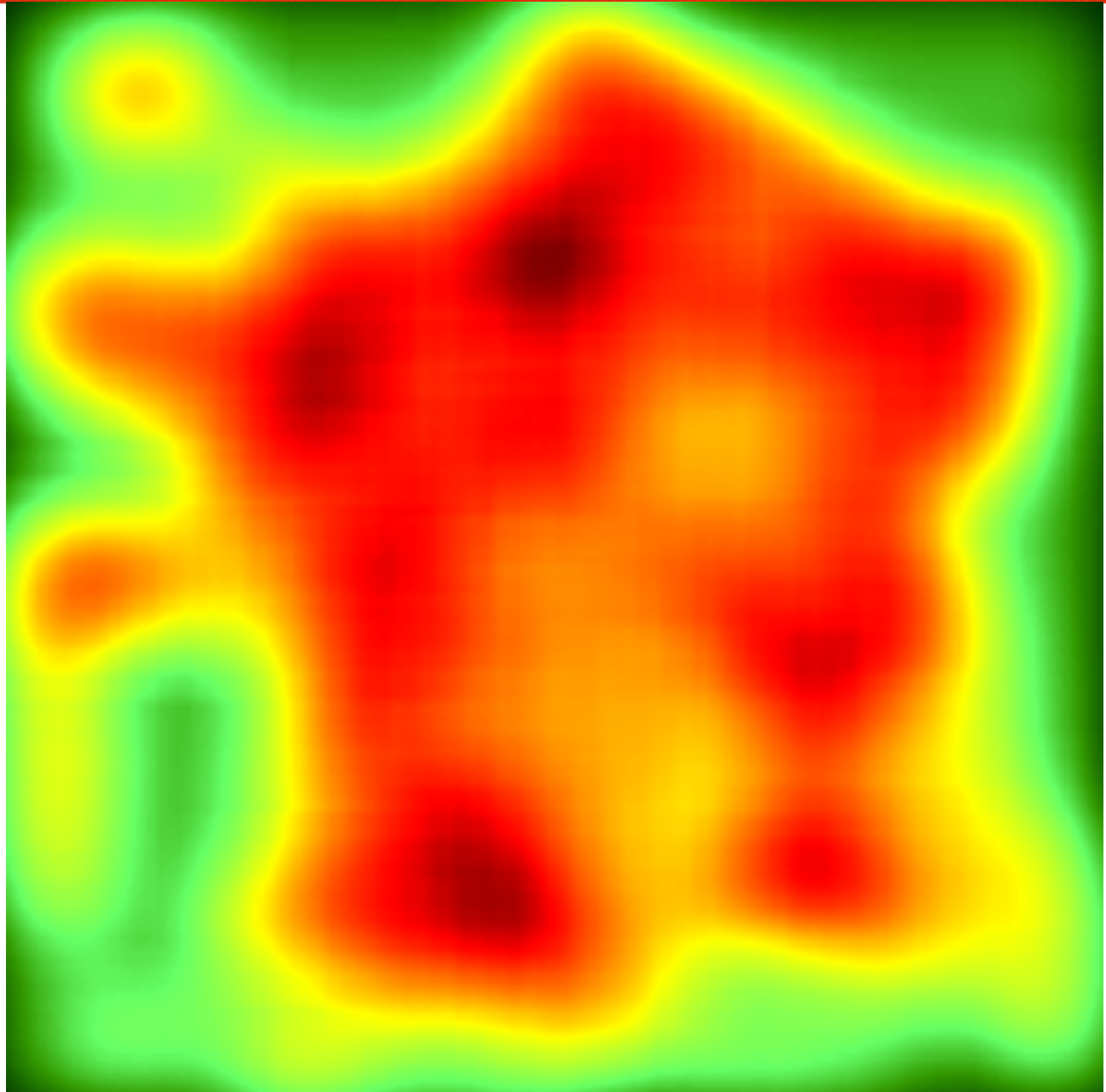






## Exemple d'analyse de saillance visuelle Signature

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



SANFORD AND SELNICK

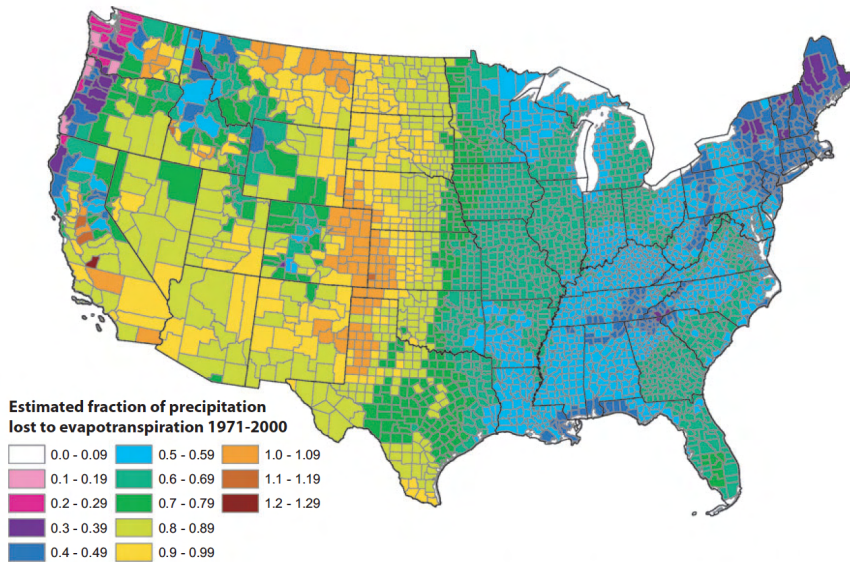


FIGURE 13. Estimated Mean Annual Ratio of Actual Evapotranspiration (ET) to Precipitation (P) for the Conterminous U.S. for the Period 1971-2000. Estimates are based on the regression equation in Table 1 that includes land cover. Calculations of ET/P were made first at the 800-m resolution of the PRISM 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

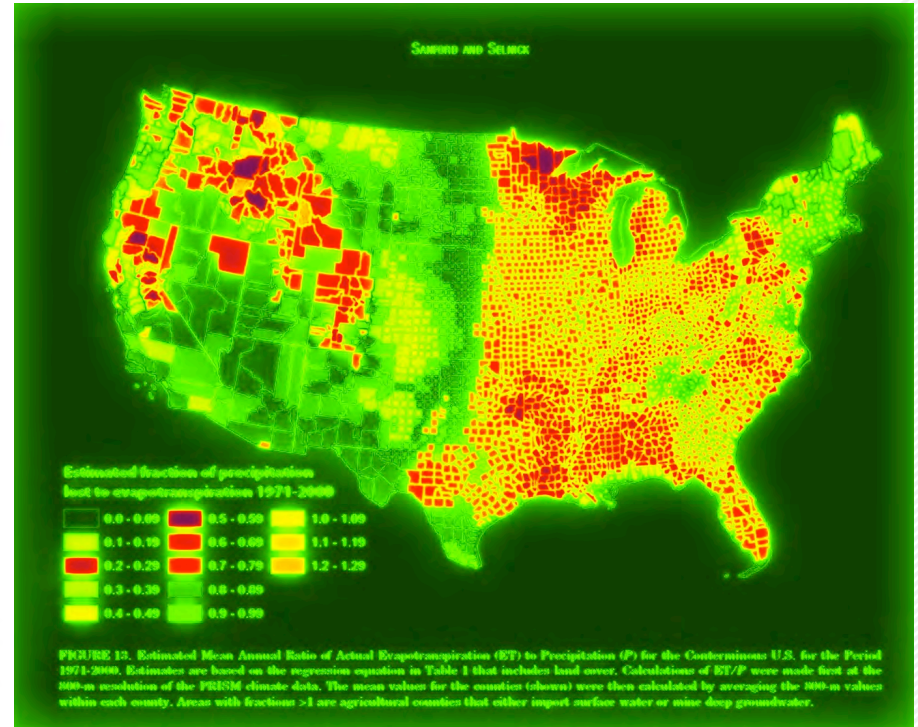


FIGURE 15. Estimated Mean Annual Ratio of Actual Evapotranspiration (ET) to Precipitation (P) for the Conterminous U.S. for the Period 1971-2000. Estimates are based on the regression equation in Table 1 that includes land cover. Calculations of ET/P were made first at the 800-m resolution of the PRISM 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.

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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

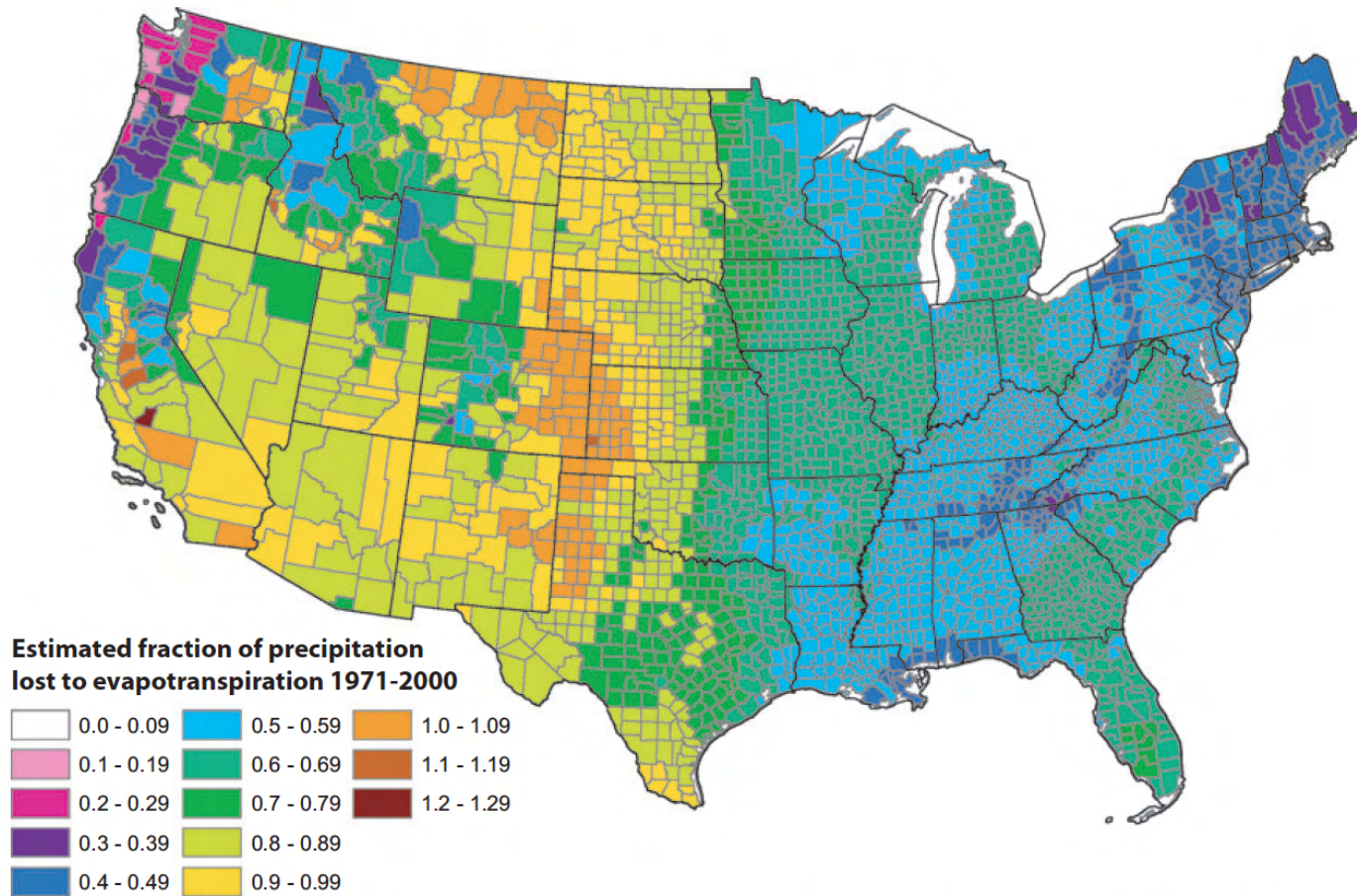
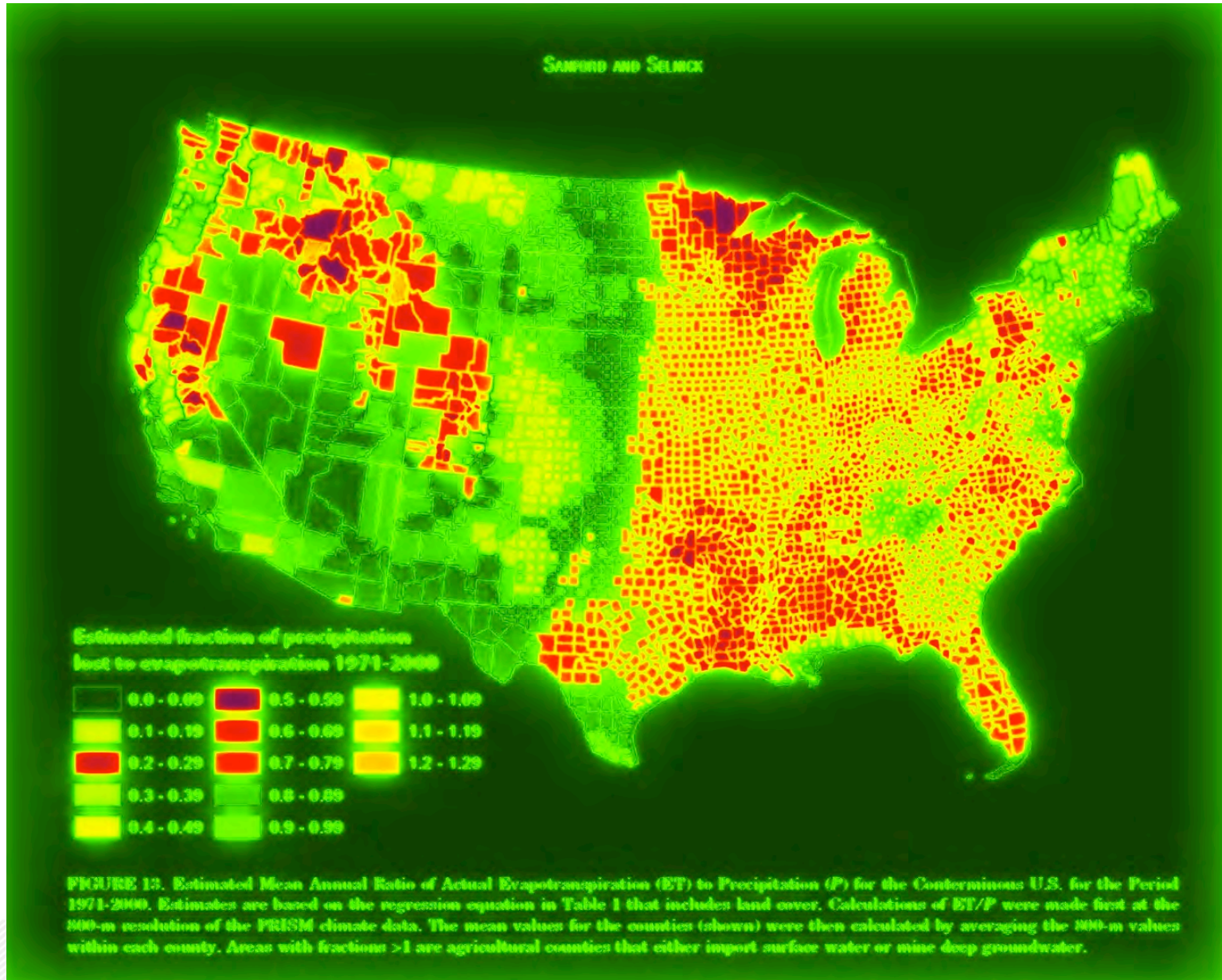


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SANFORD AND SELNICK

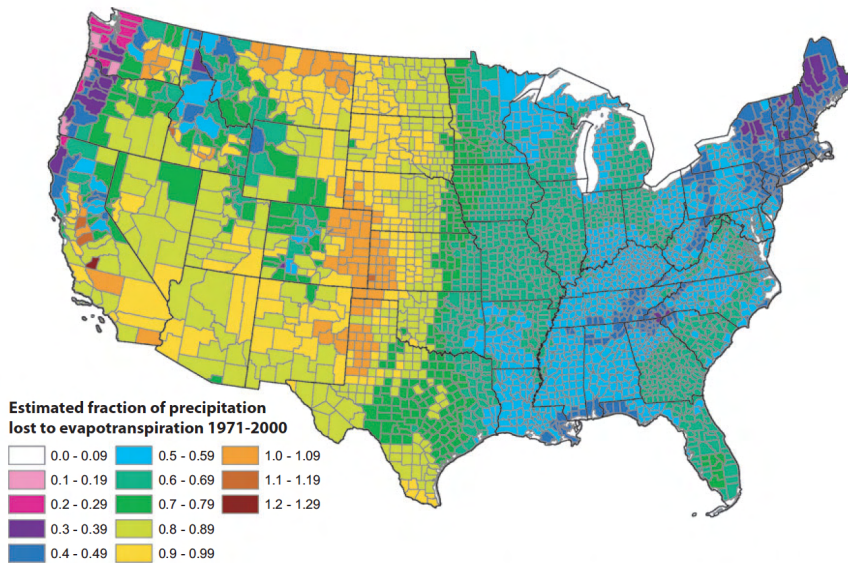
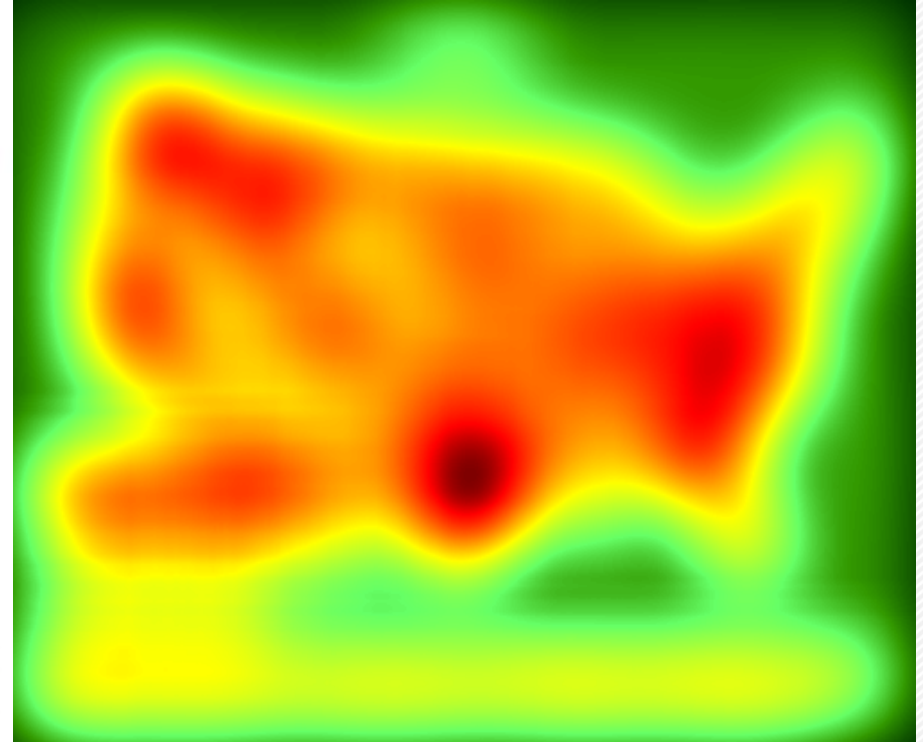
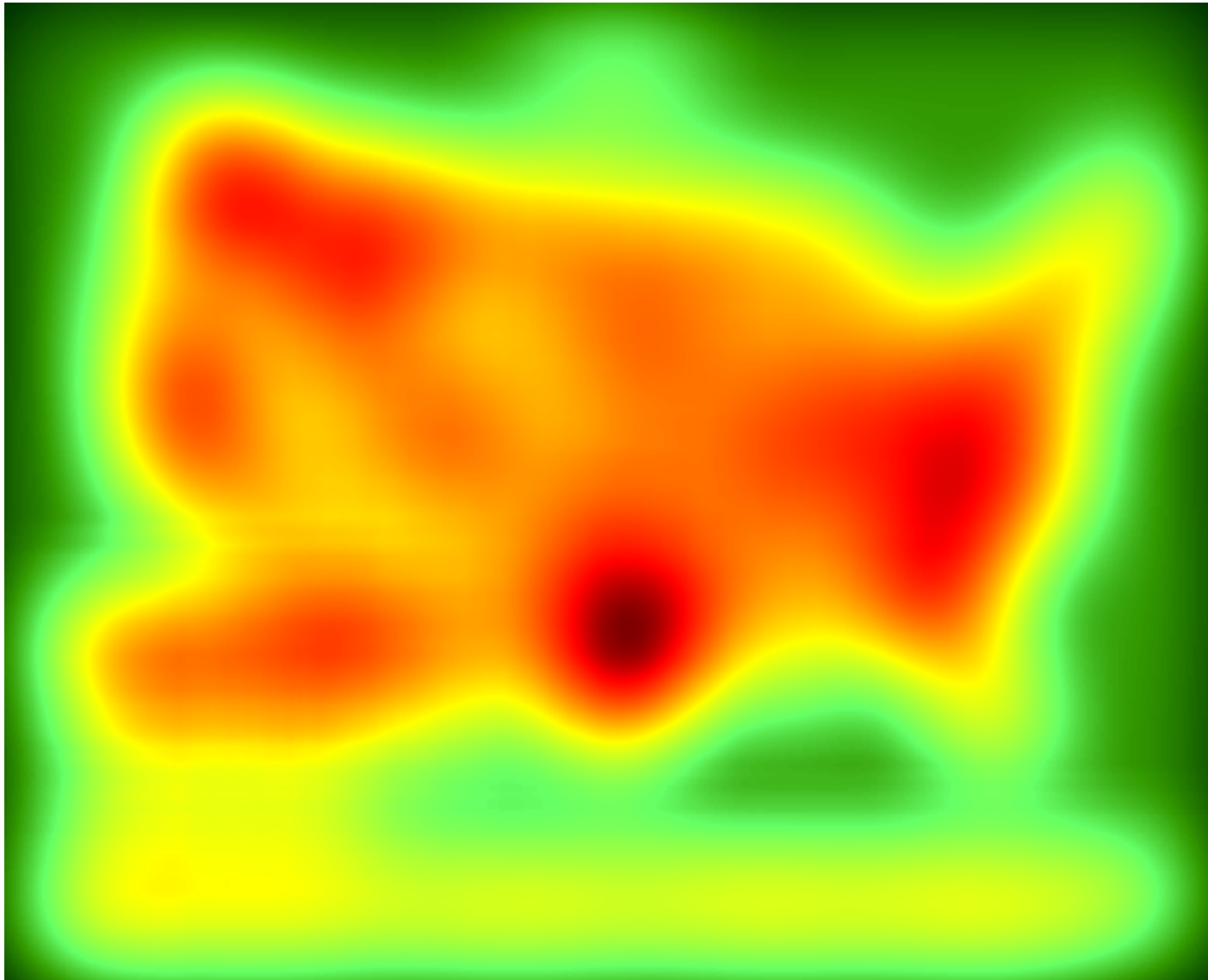


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## Exemple d'analyse de saillance visuelle Signature

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)

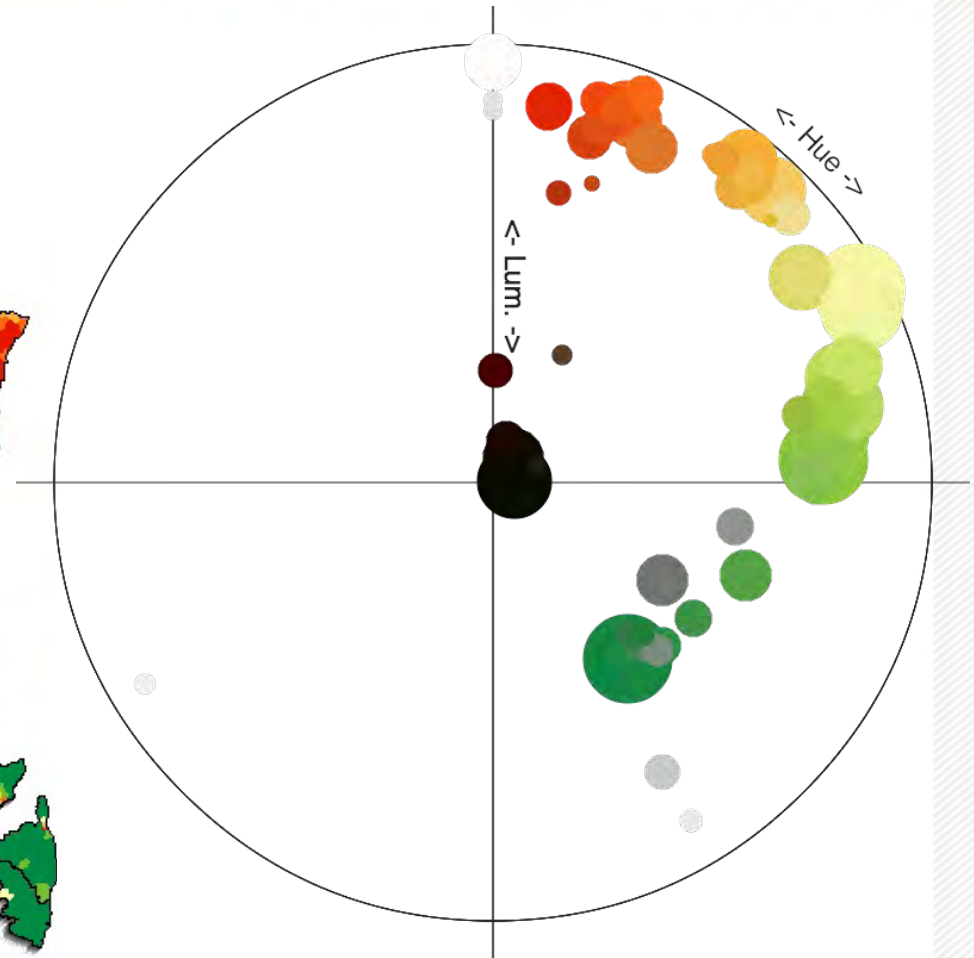
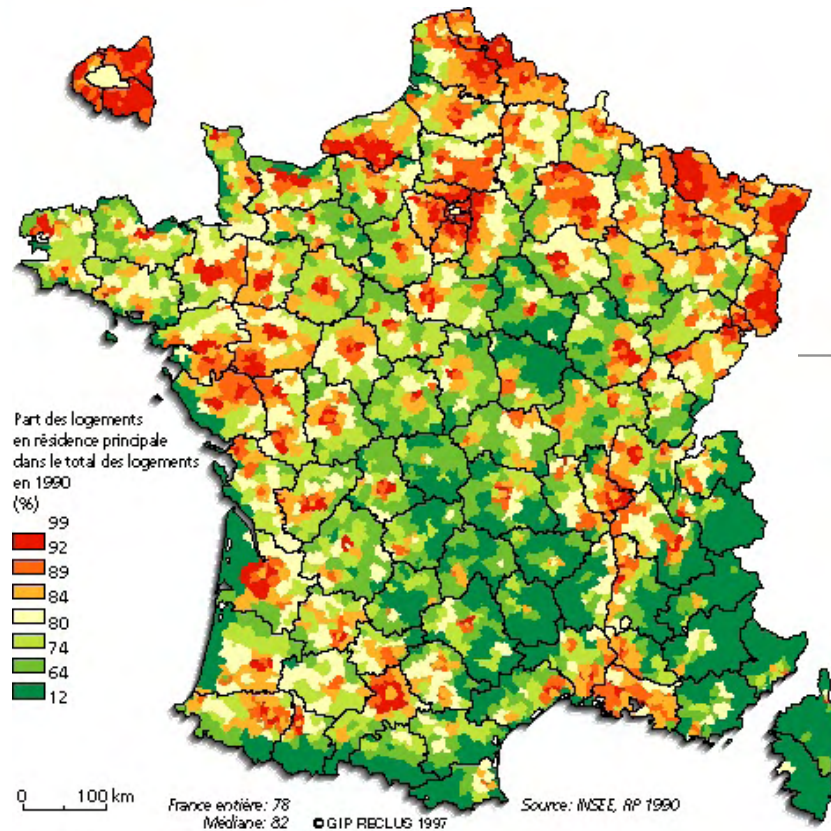


## Visualiser les relations et proportions de couleurs d'une carte choroplèthe

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.

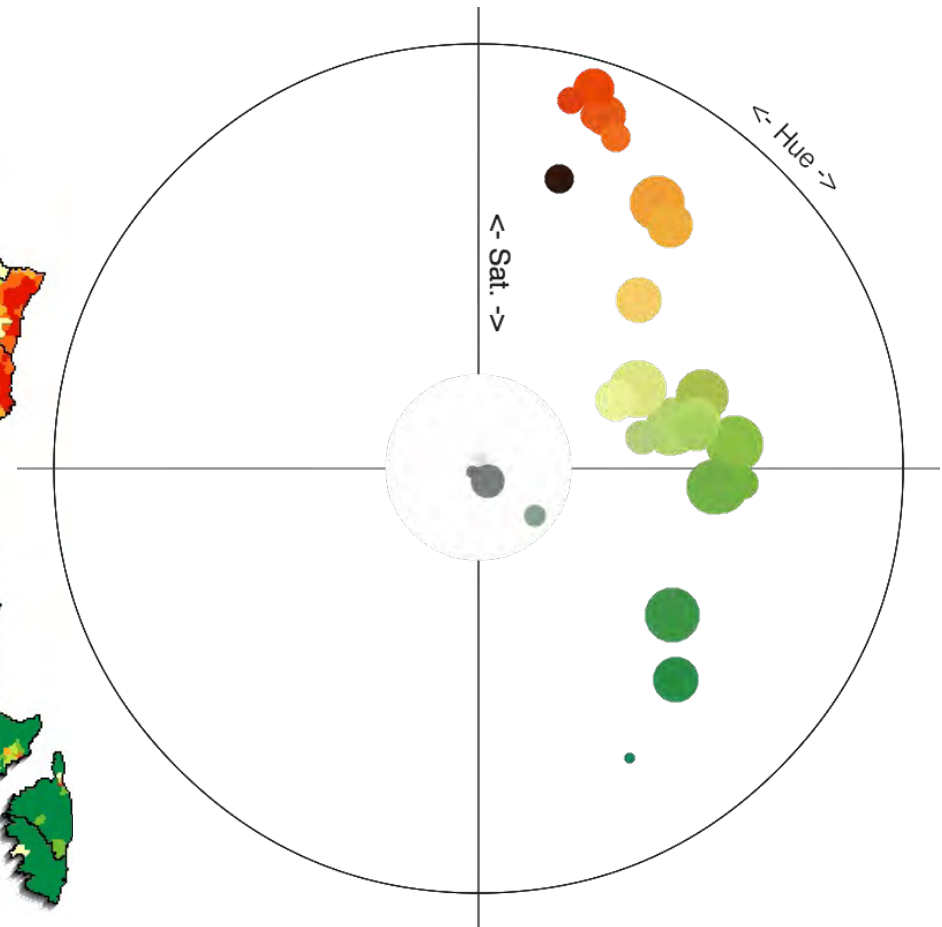
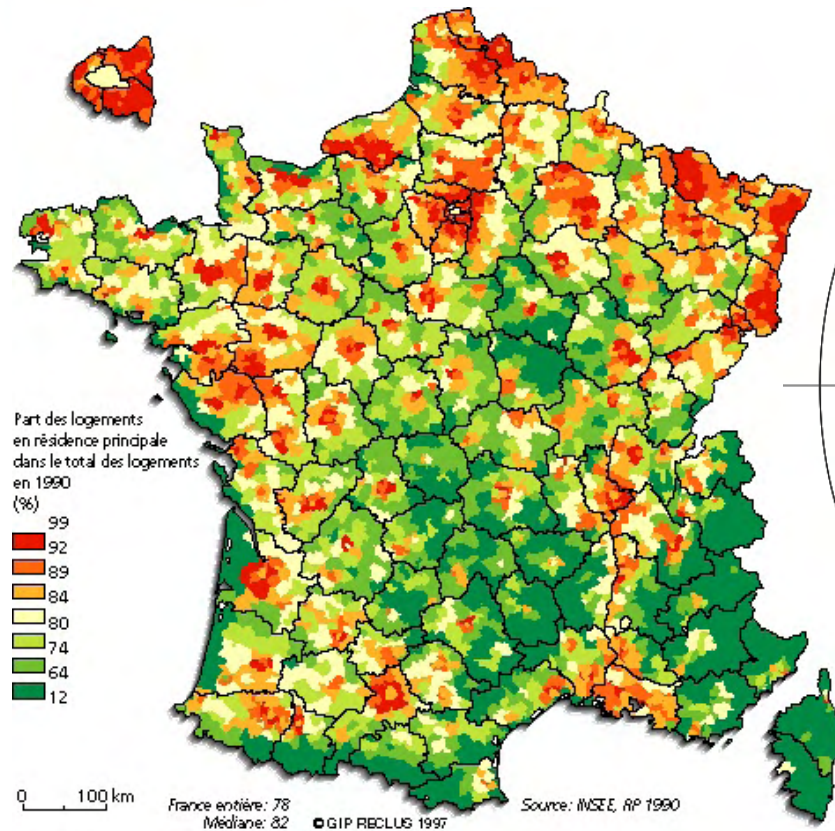




## Exemple d'analyse de relations colorées

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.

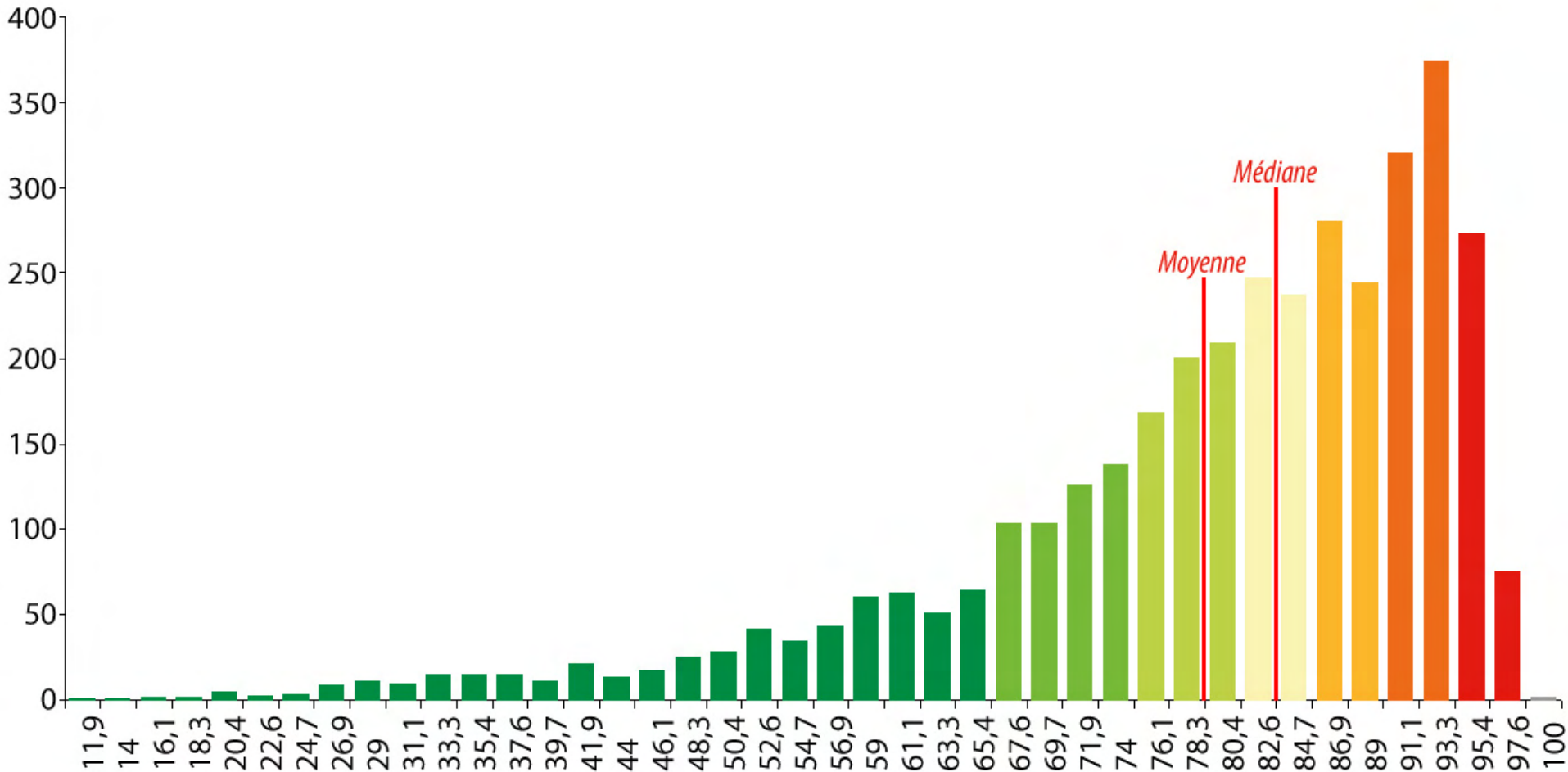
<http://www.geotests.net/couleurs/frejus.html?l=fr>



## Exemple d'analyse de relations colorées

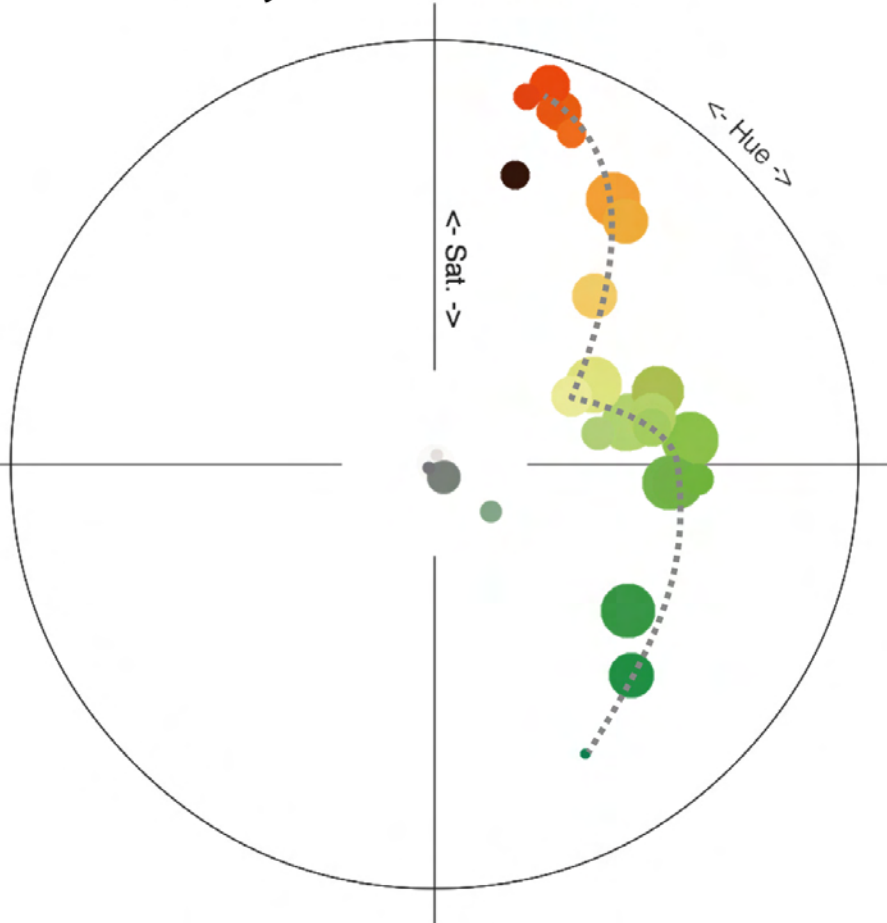
Analyse selon un cercle chromatique **HSL** : le milieu jaune de la palette est nettement moins dense, moins saturé, que les deux extrêmes.

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

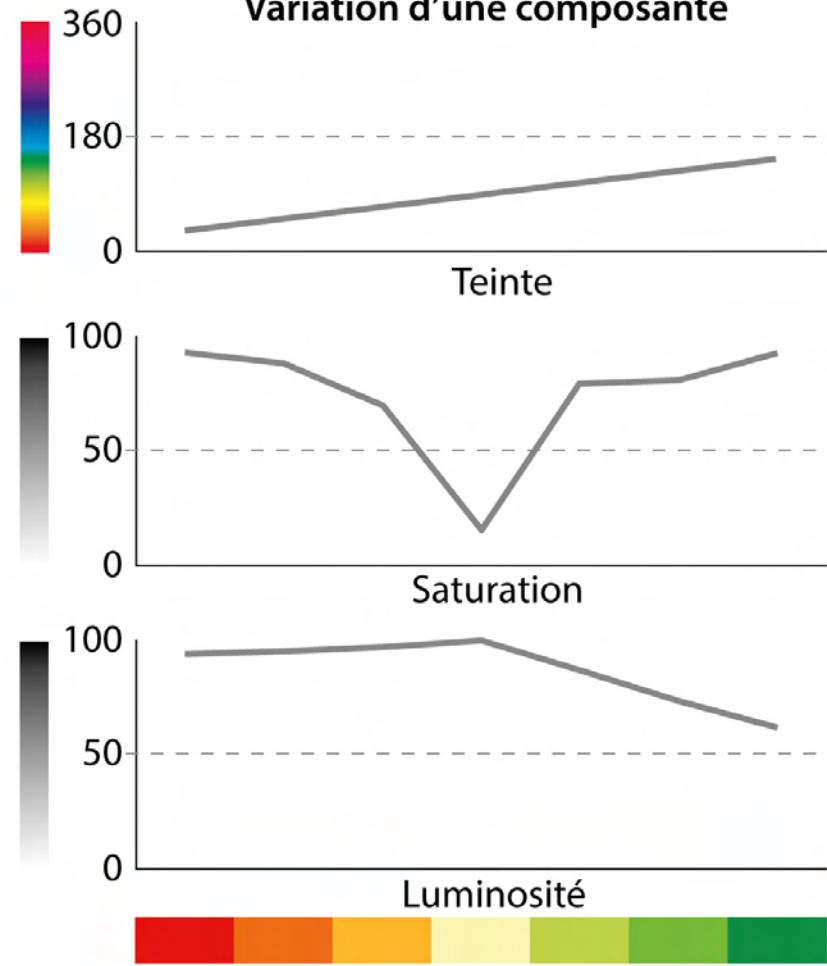


Part des logements en résidence principale : fréquences

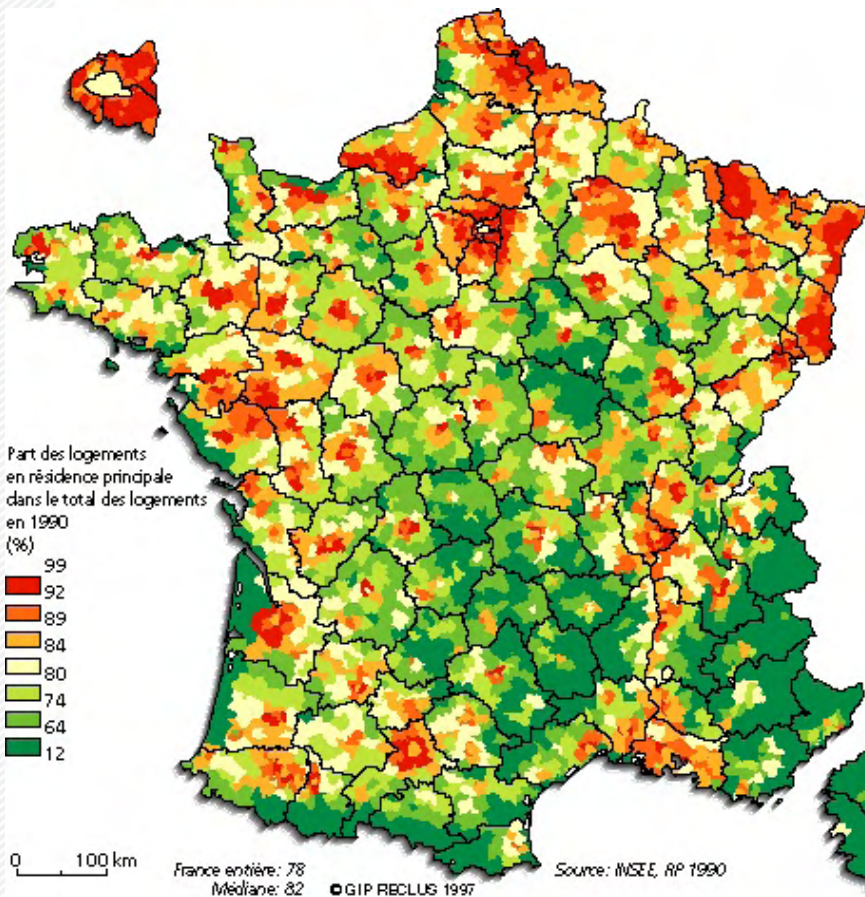
### Analyse de relations colorées



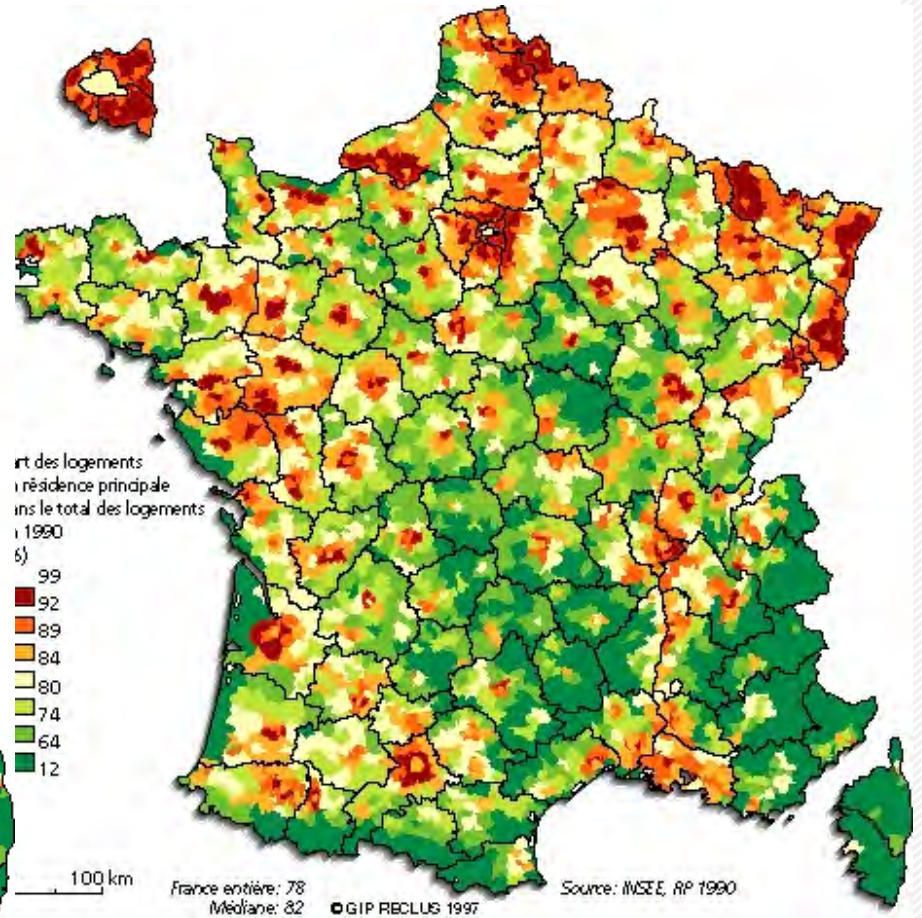
### Variation d'une composante



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



Carte d'origine



Carte recolorée

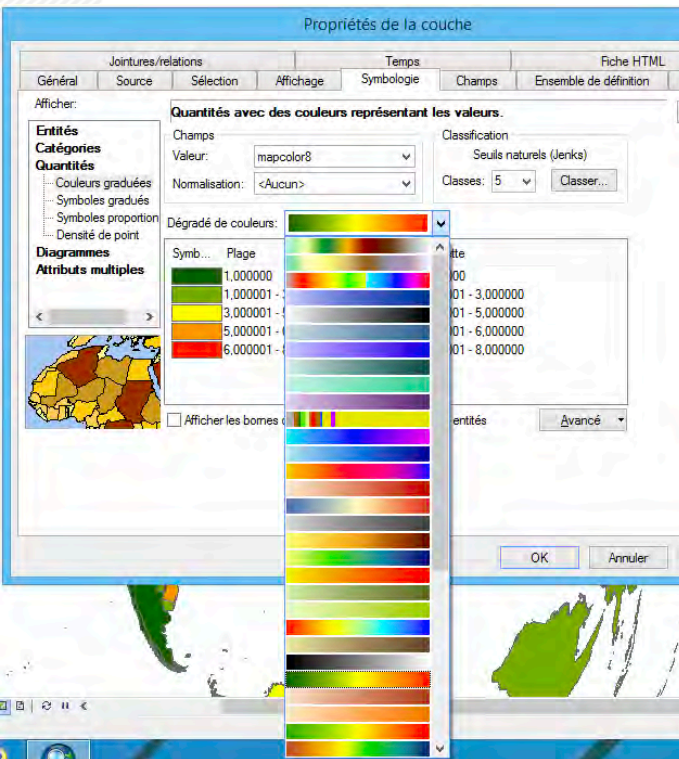
## Concevoir un dégradé de couleurs en réglant précisément ses paramètres.

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

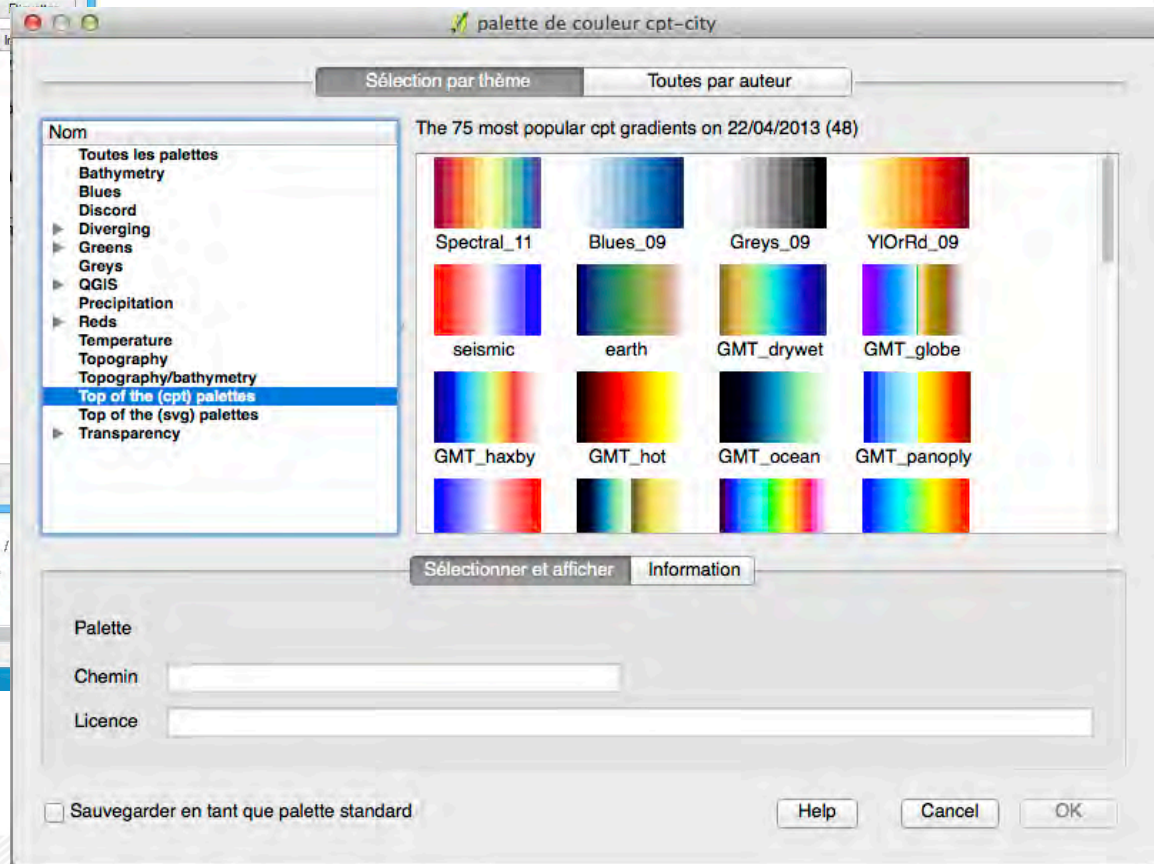
→ Régler visuellement la variation des composantes de teinte, saturation et luminosité.

# Comment sont choisies les couleurs dans les logiciels courants ?

QGIS 2



ArcMAP 10



# COLORBREWER 2.0

color advice for cartography

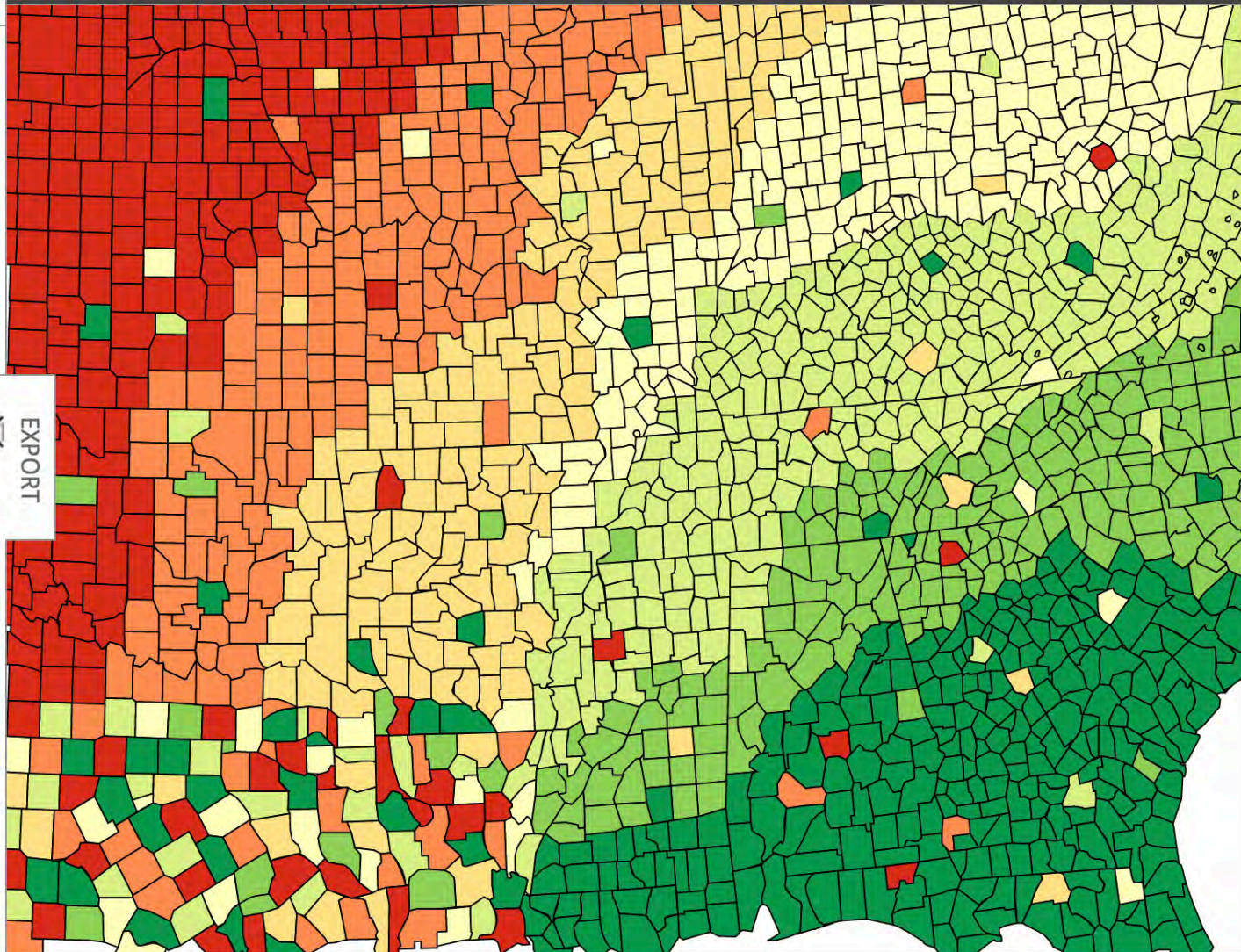
[how to use](#) [updates](#) [downloads](#) [credits](#)

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

7-class RdYlGn



EXPORT

HEX

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

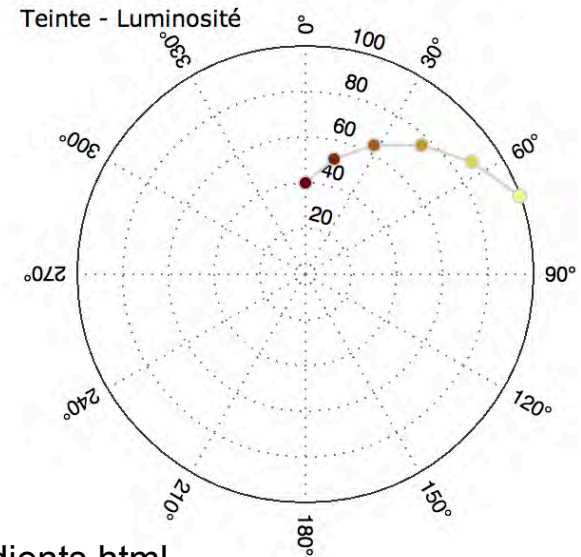
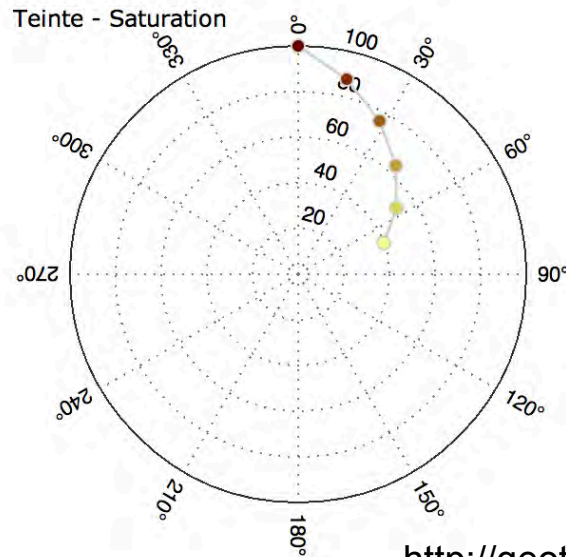
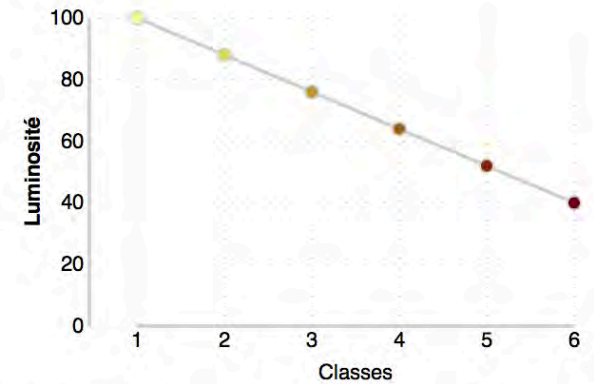
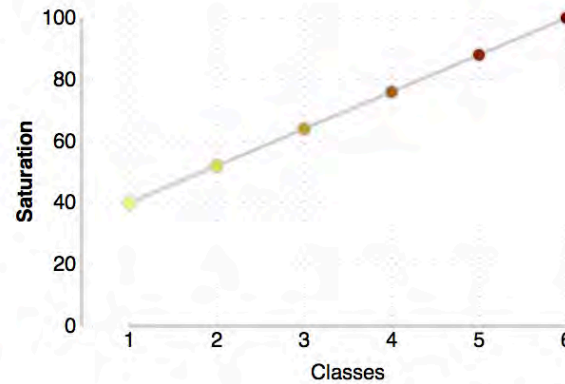
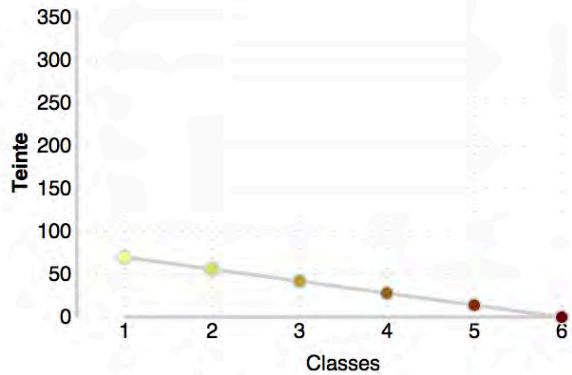
color transparency



# Concevoir un dégradé de couleurs



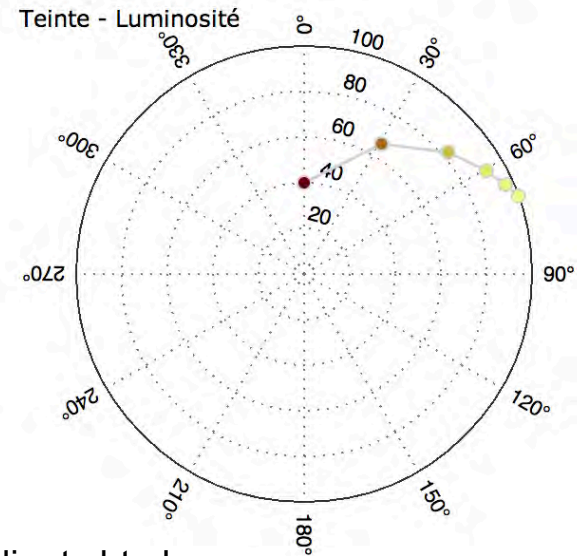
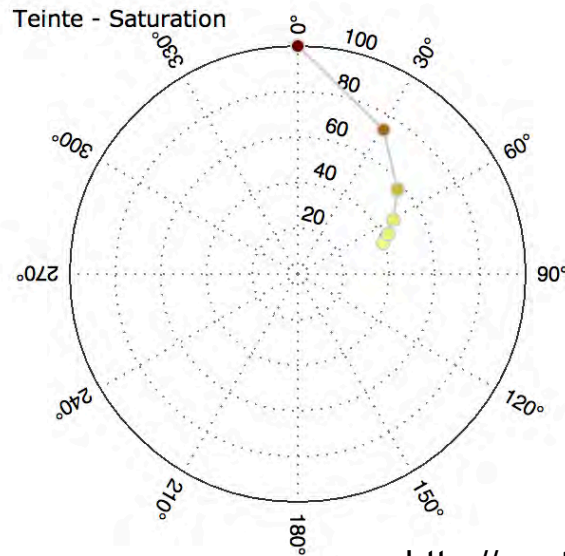
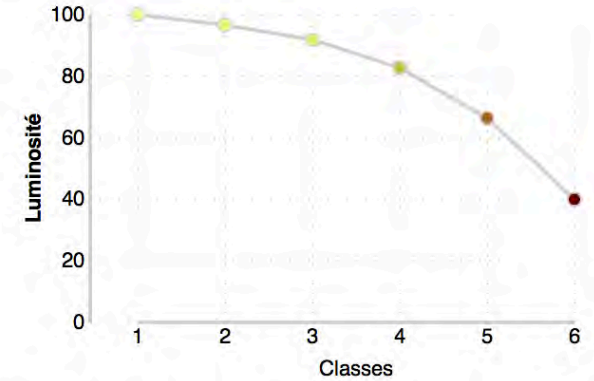
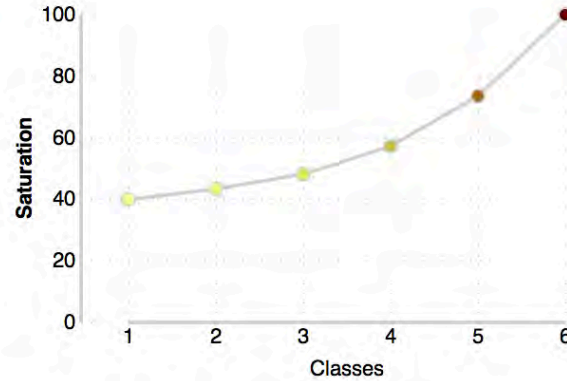
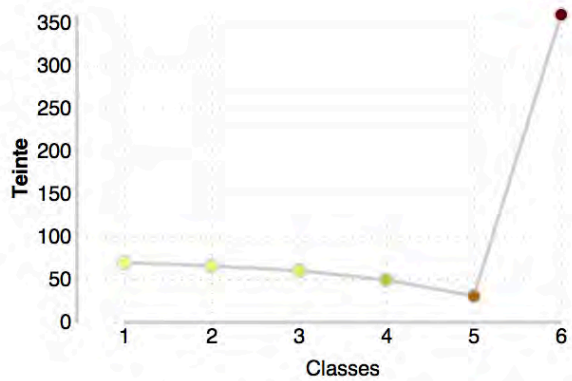
## Dégradé selon une progression linéaire



# Concevoir un dégradé de couleurs

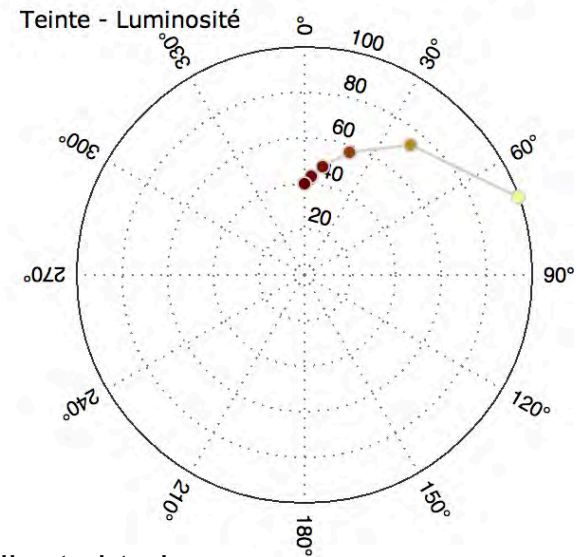
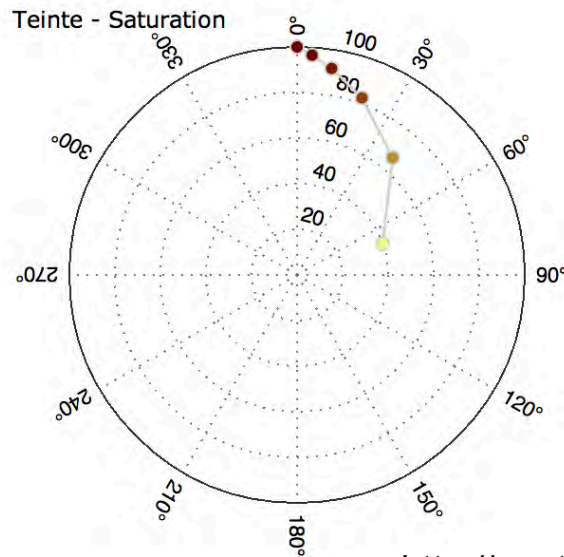
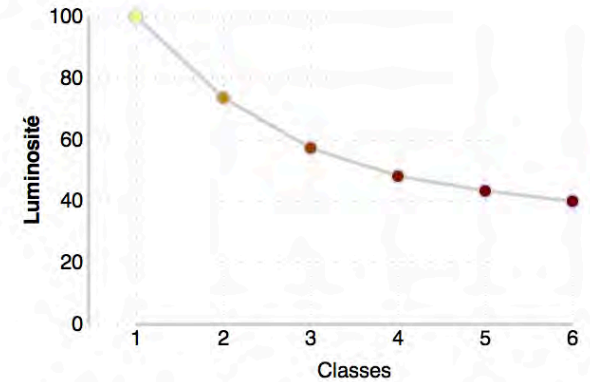
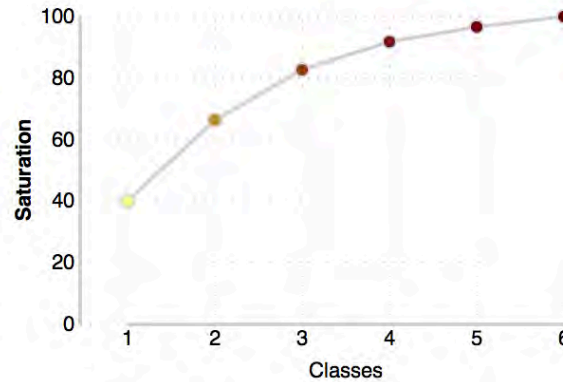
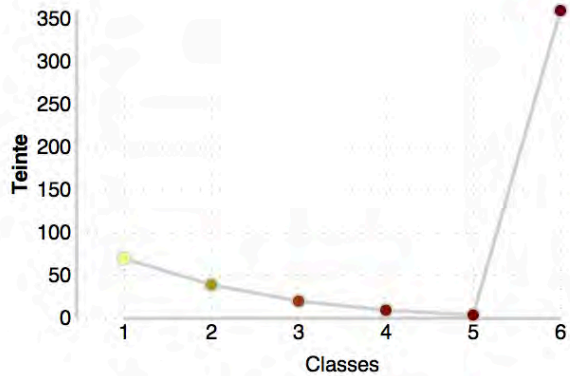


## Dégradé selon une progression courbe



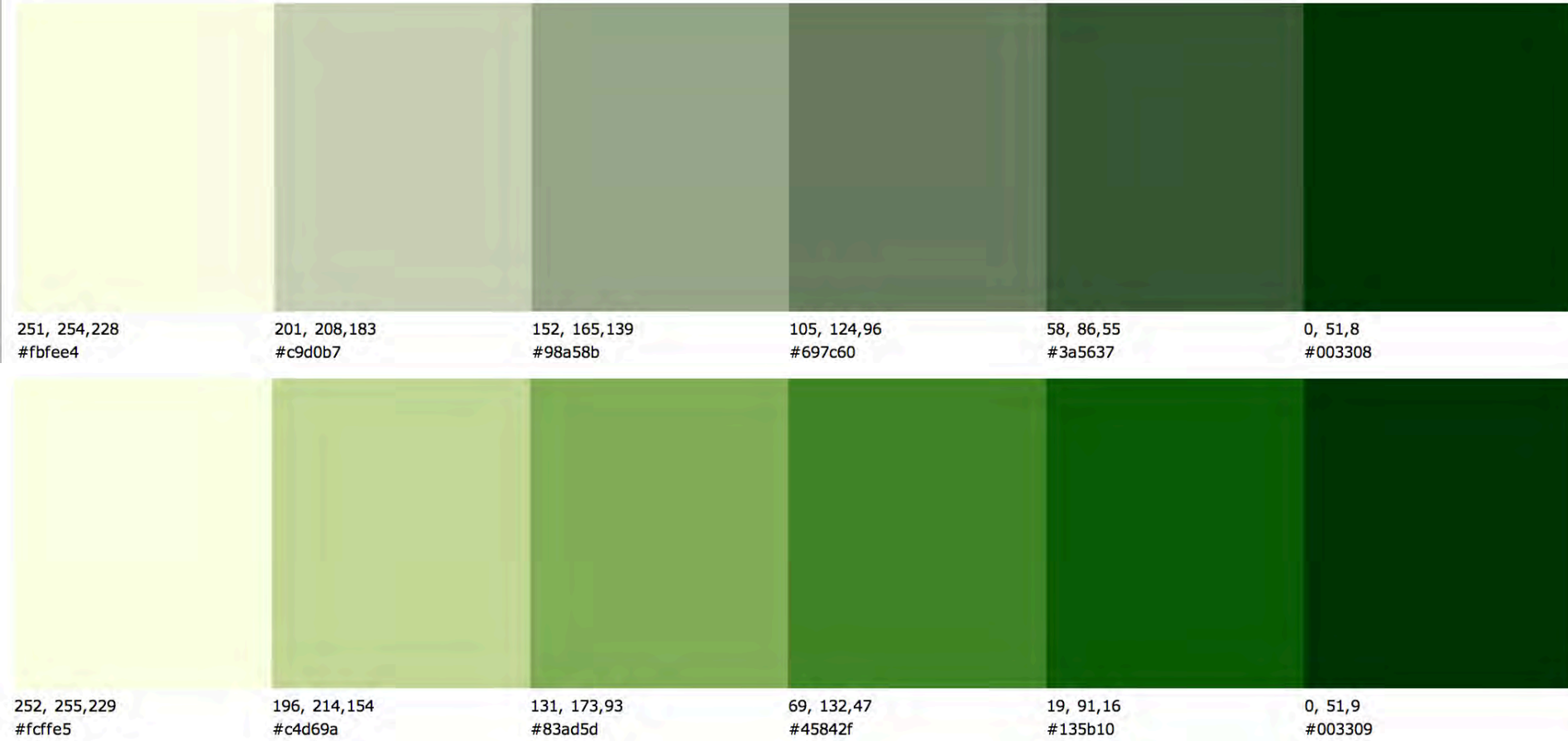
# Concevoir un dégradé de couleurs

## 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>