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## Cartographes du cerveau

Camille Maumet

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Submitted on 25 Mar 2019

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EN EUROPE ET DANS PLUS DE  
120 VILLES EN FRANCE

11 ————— 17 MARS



Le cerveau numérique : explorons-le !

# Cartographes du cerveau

Camille Maumet – Chercheuse

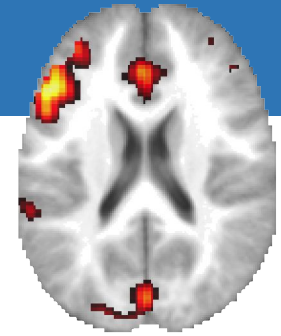


*camille.maumet@inria.fr*  
*Inria, Univ Rennes, CNRS, Inserm*



# Camille Maumet

Chercheuse — Neuroinformaticienne

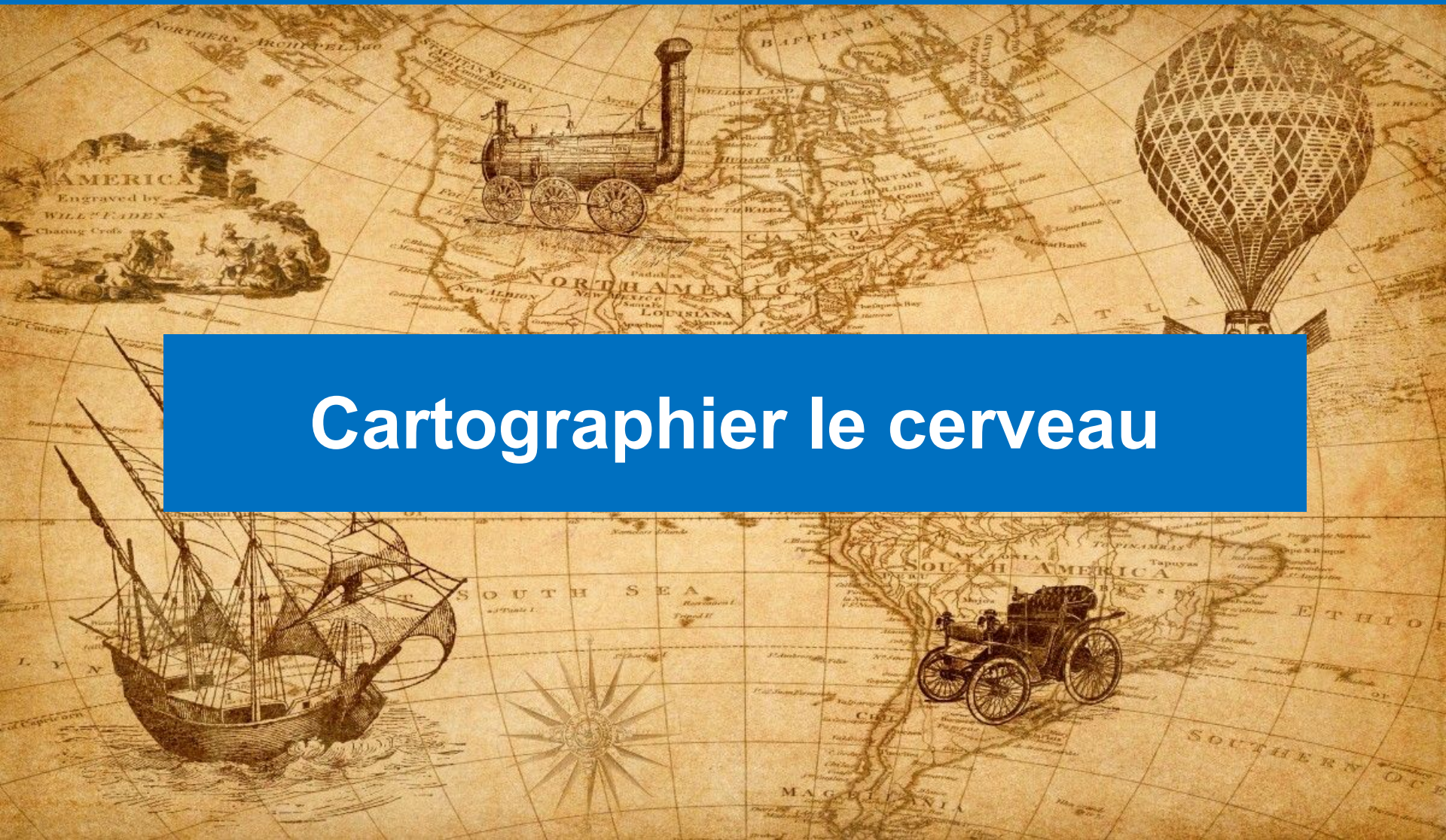


Ingénieur en informatique



# L'équipe de recherche Empenn





# Cartographe le cerveau

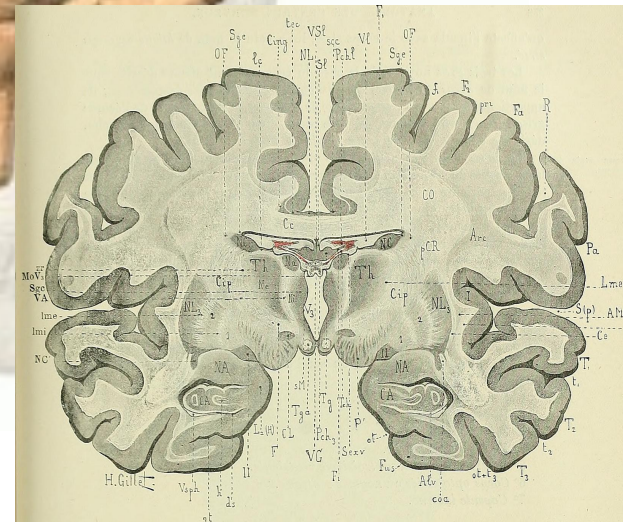
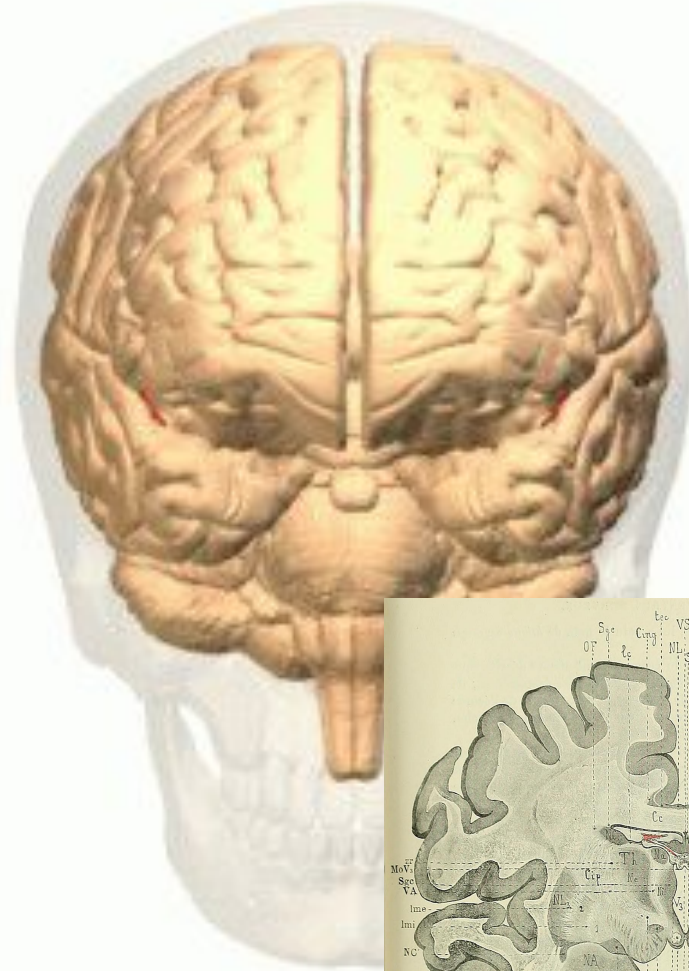
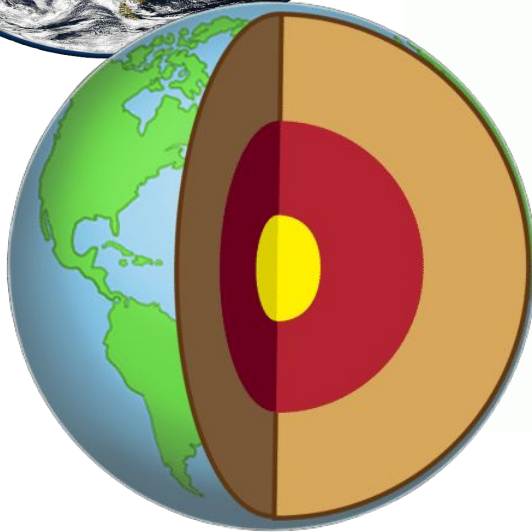
# Des cartes anatomiques



# Des cartes anatomiques

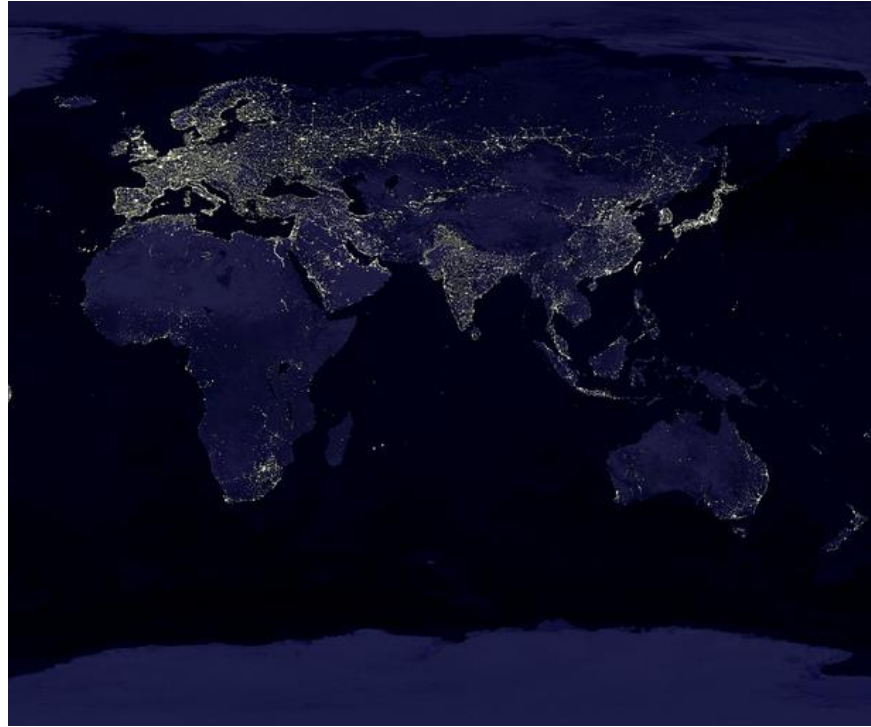


# Des cartes anatomiques

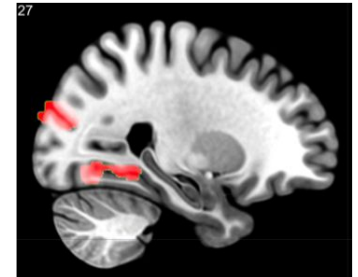
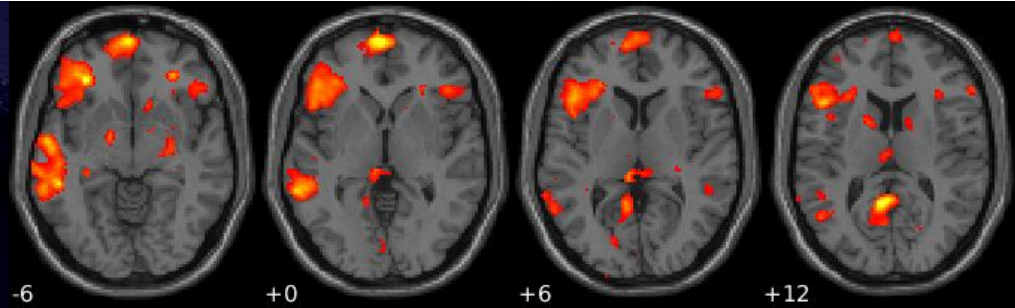
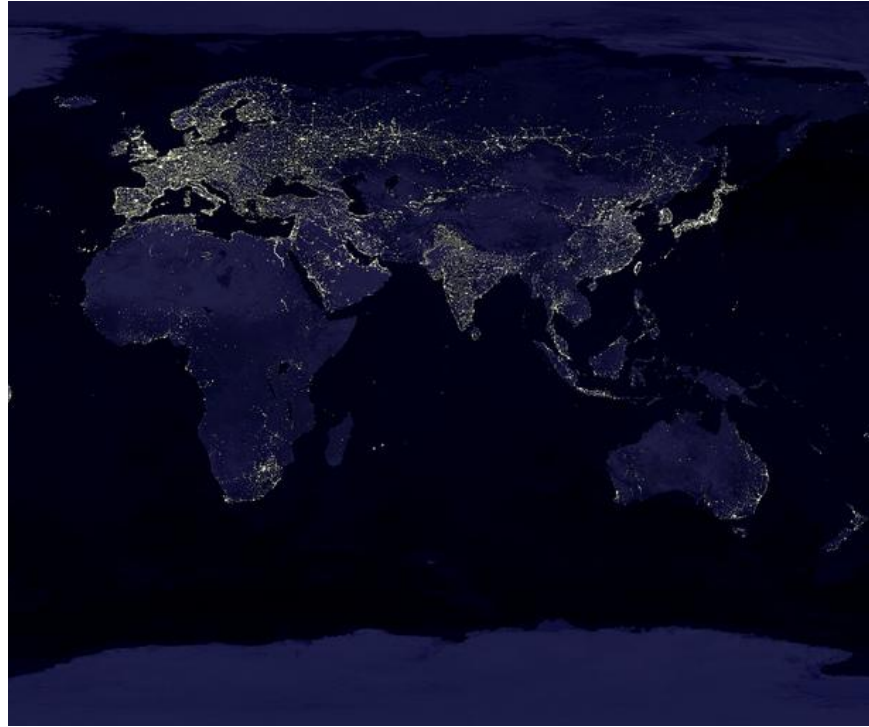




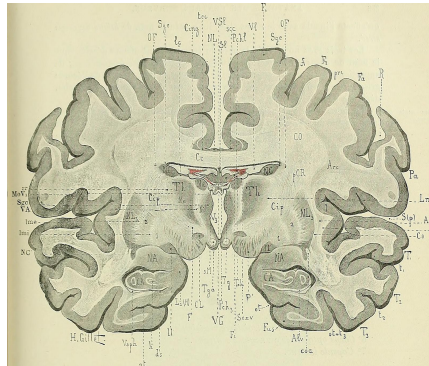
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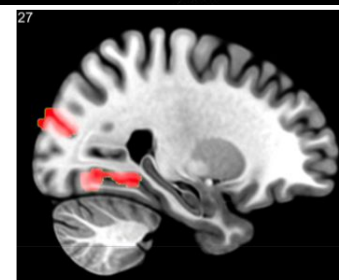
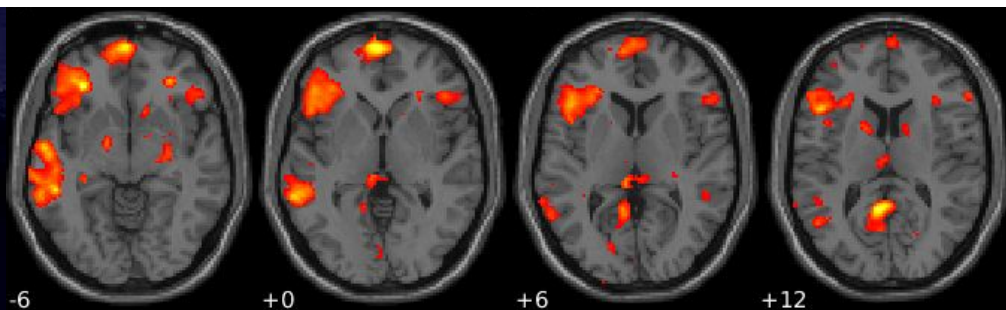
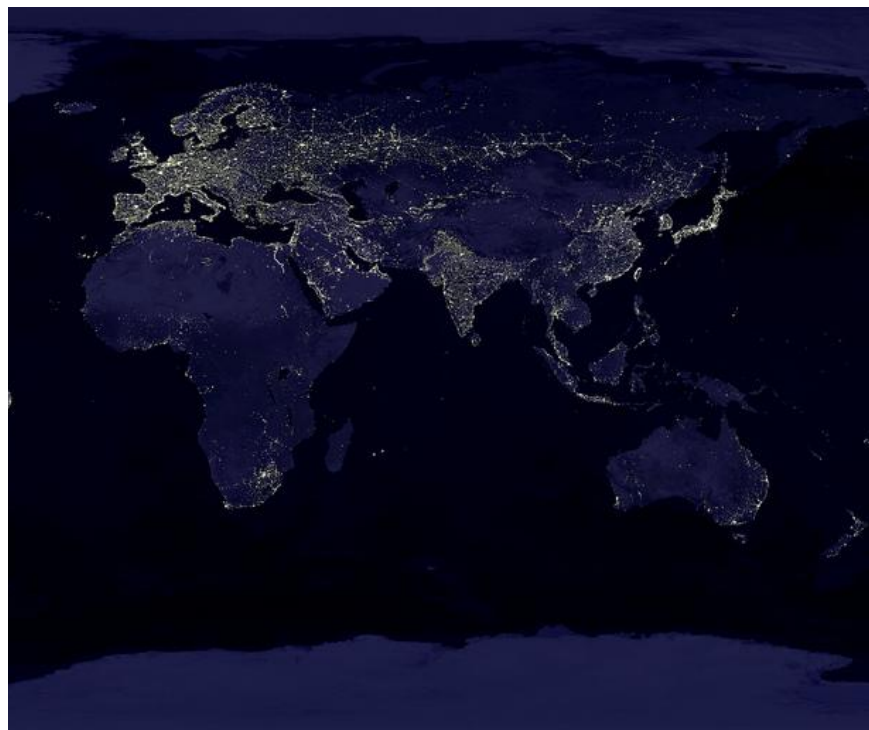
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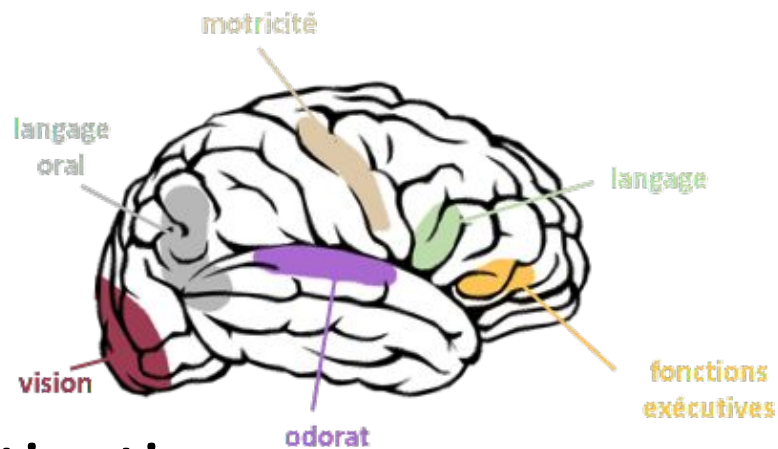
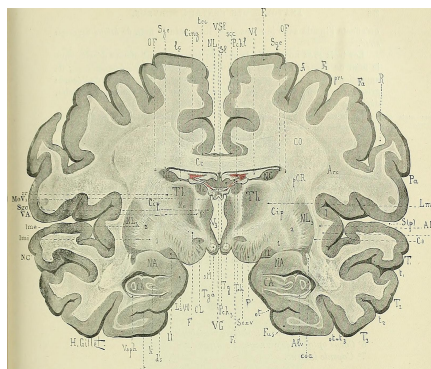
Regarder des visages  
& paysages



# des cartes d'activité ...

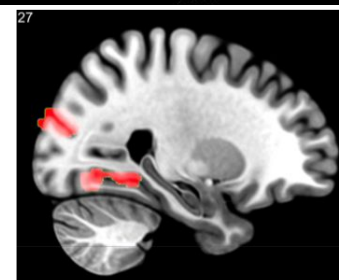
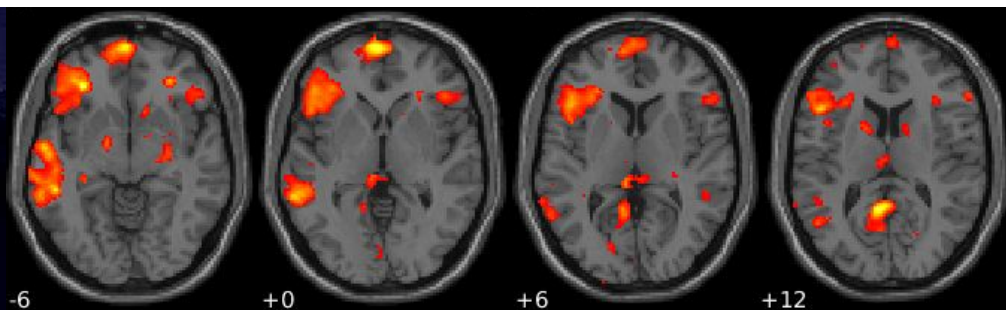
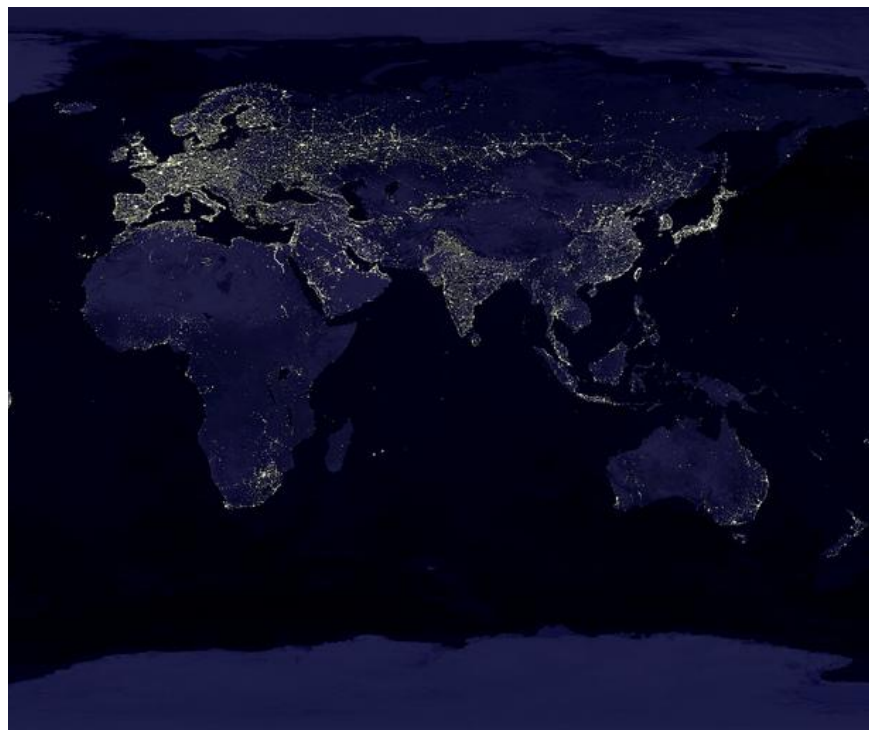


Regarder des visages  
& paysages

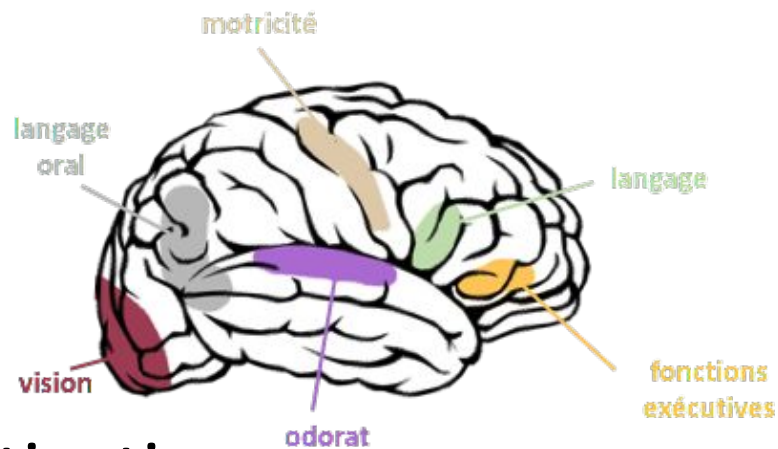
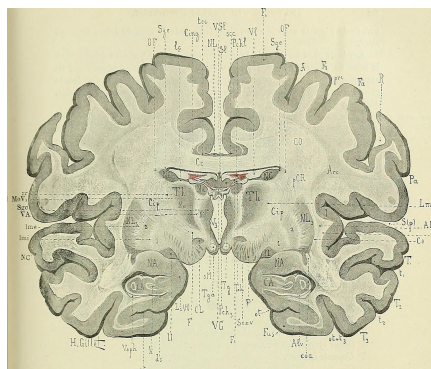


Activation

# des cartes d'activité ...

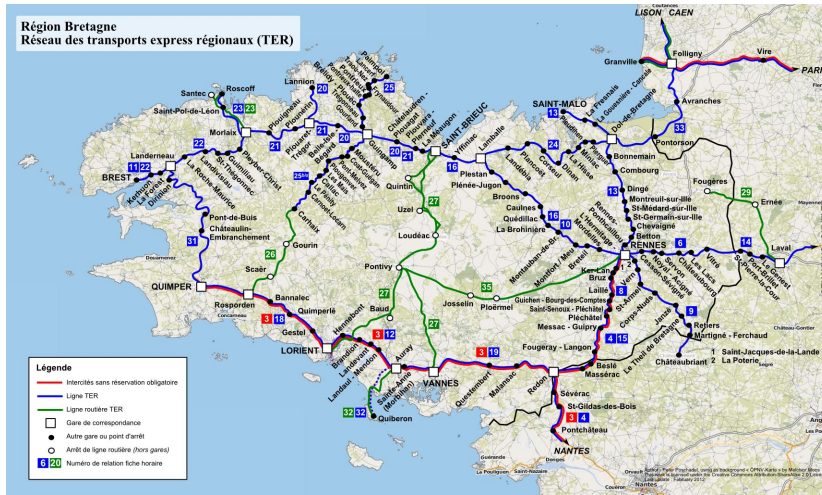


Regarder des visages  
& paysages

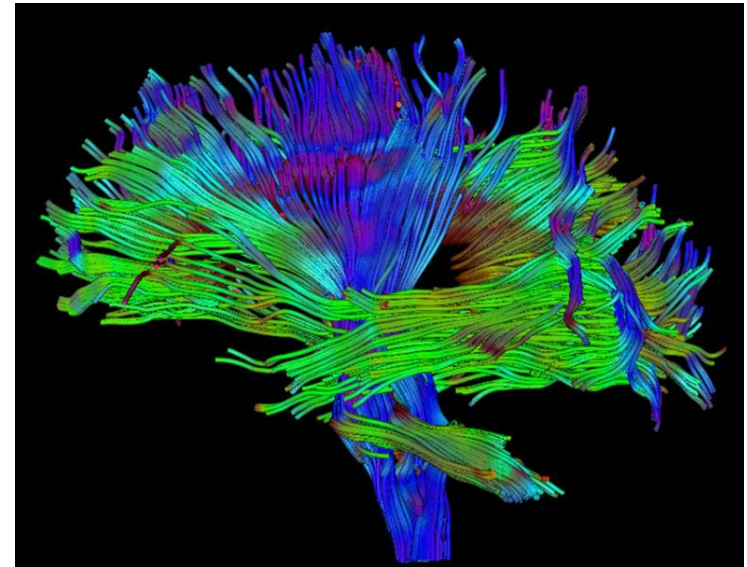
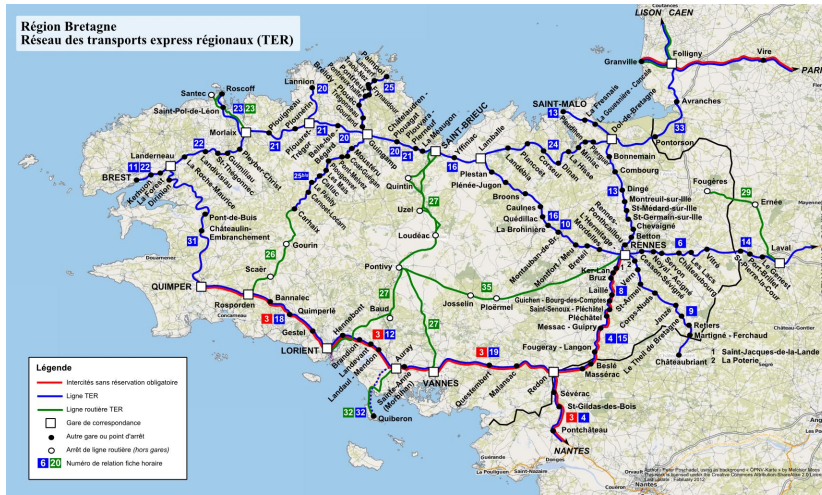


Activation

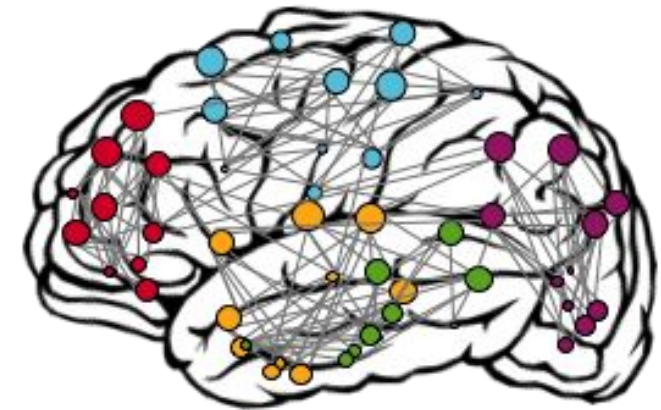
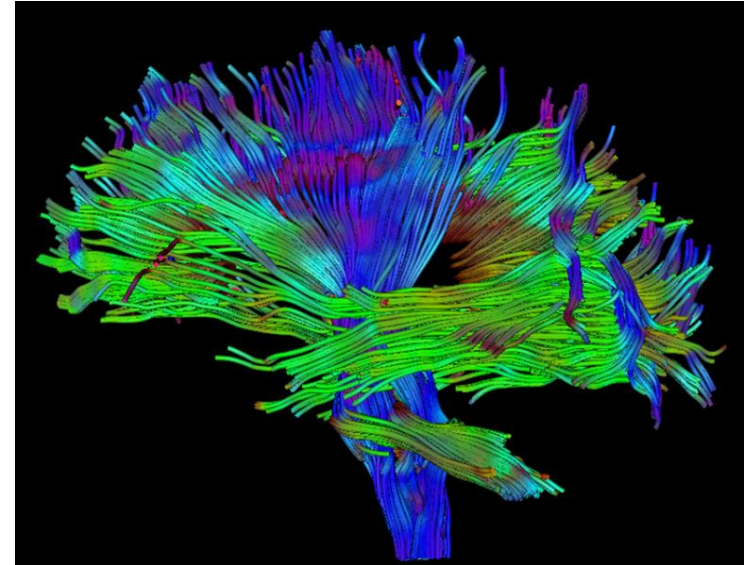
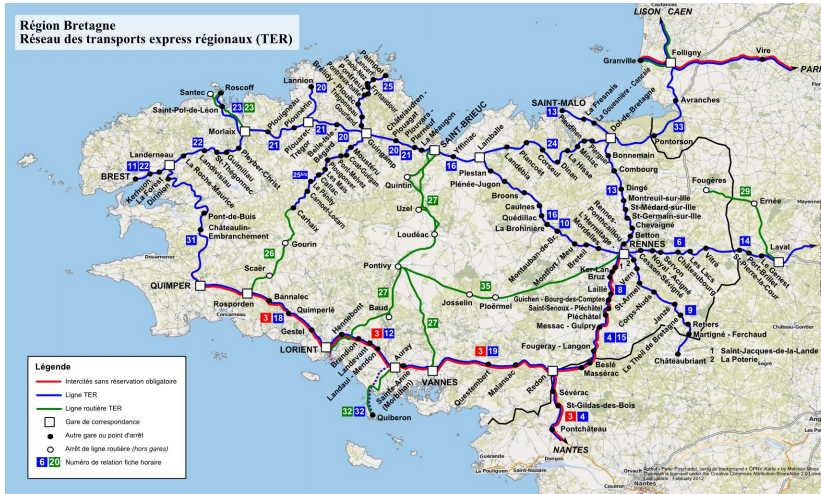
# ... des cartes de connexions ...



# ... des cartes de connexions ...



# ... des cartes de connexions ...



Connectivité

# ... des cartes d'hydratation ...

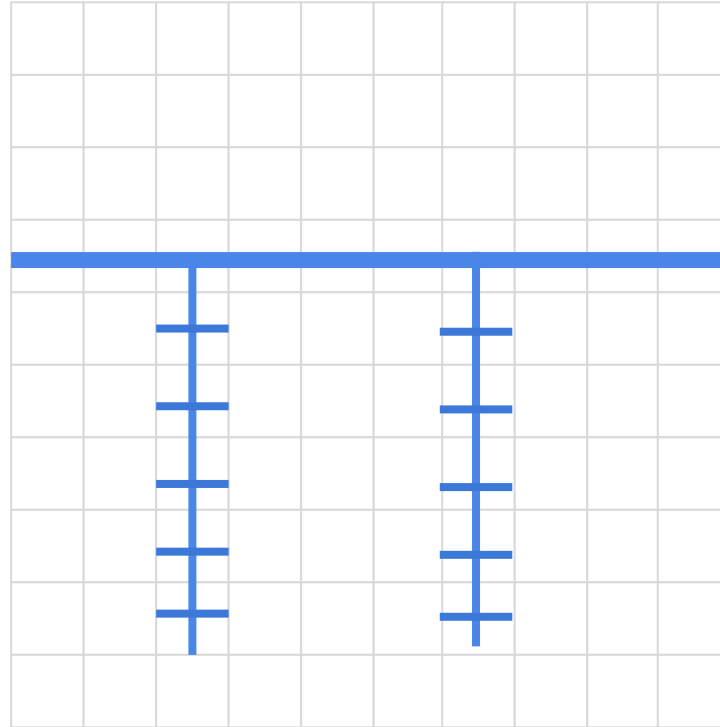




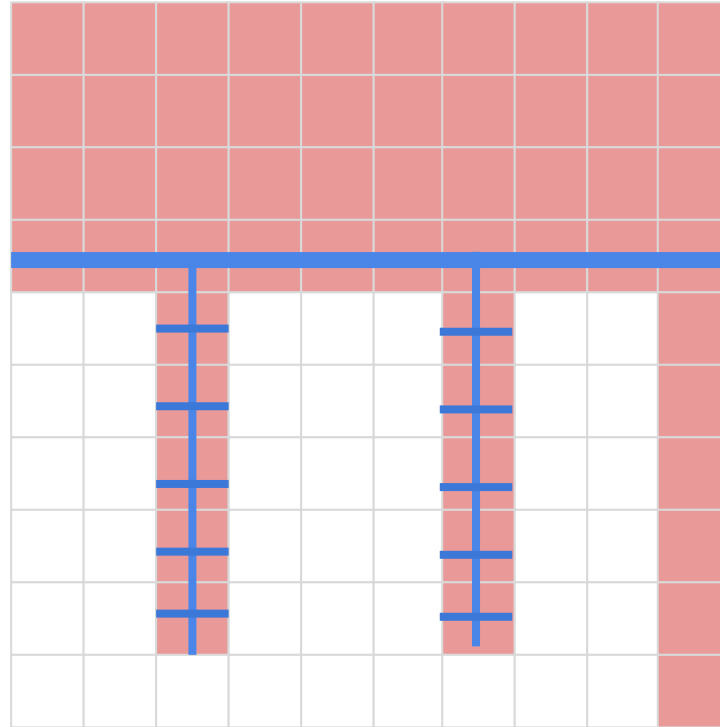
# ... des cartes d'hydratation ...



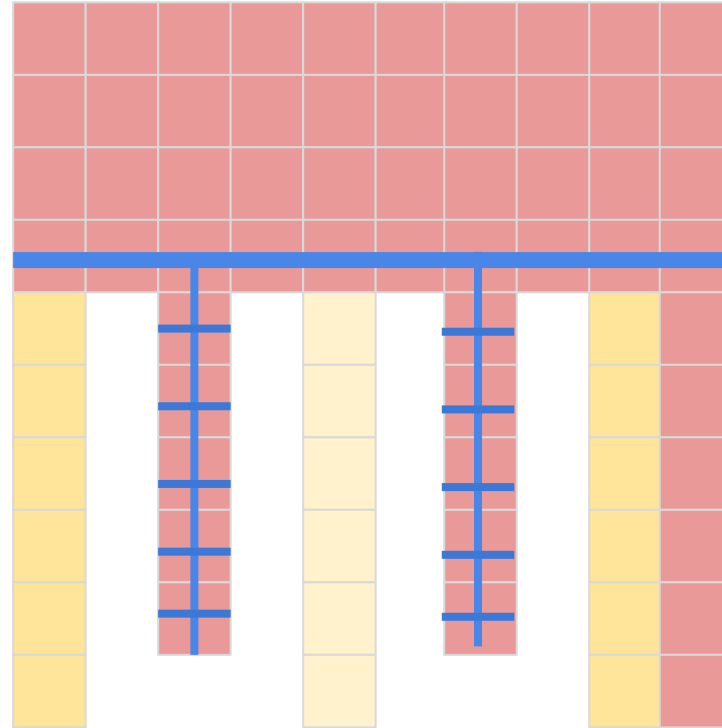
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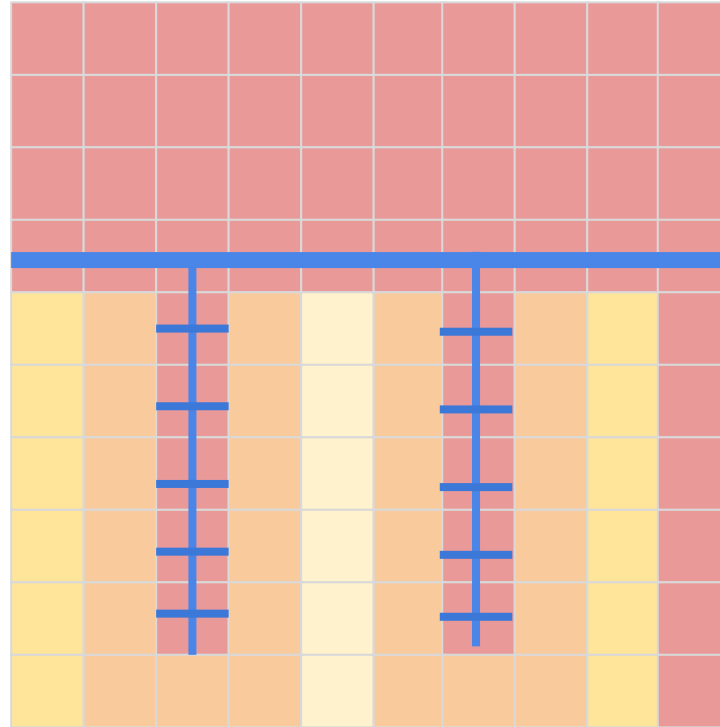
# ... des cartes d'hydratation ...



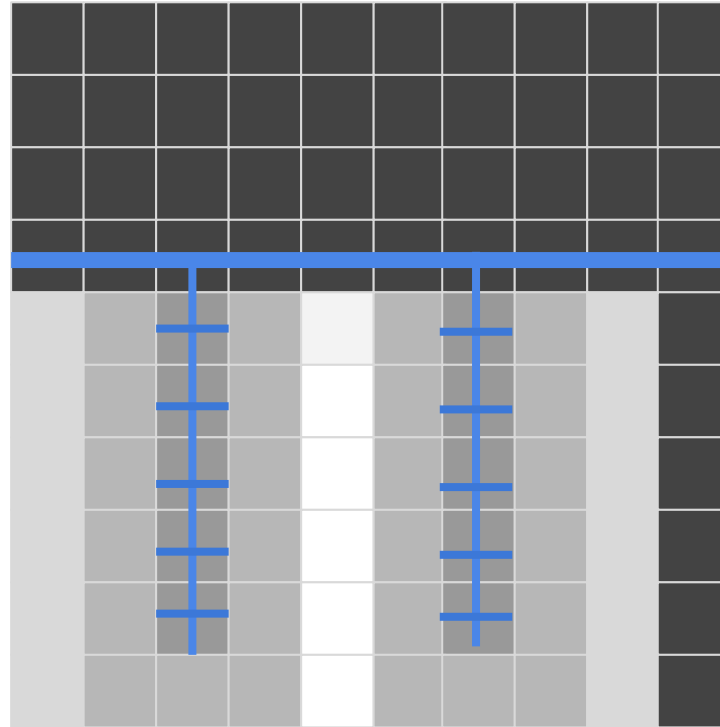
# ... des cartes d'hydratation ...



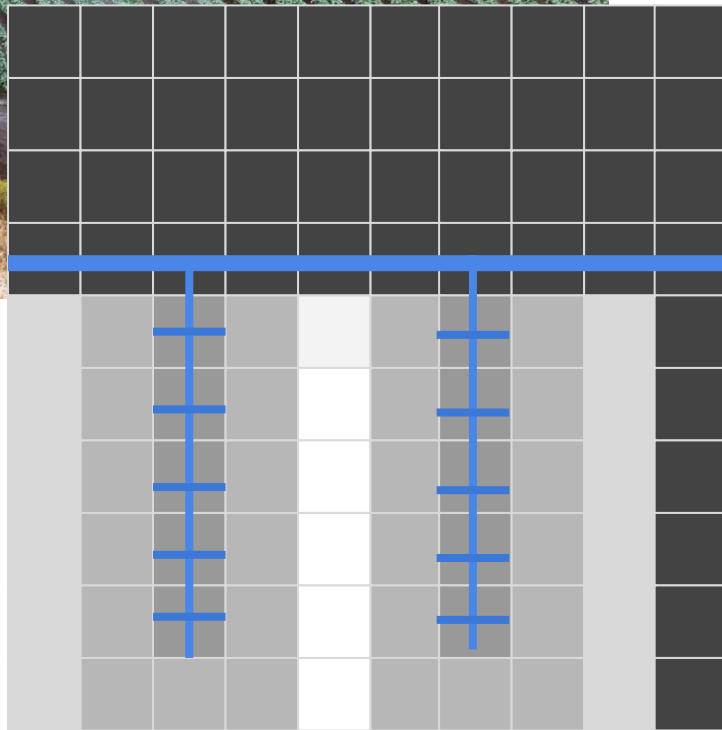
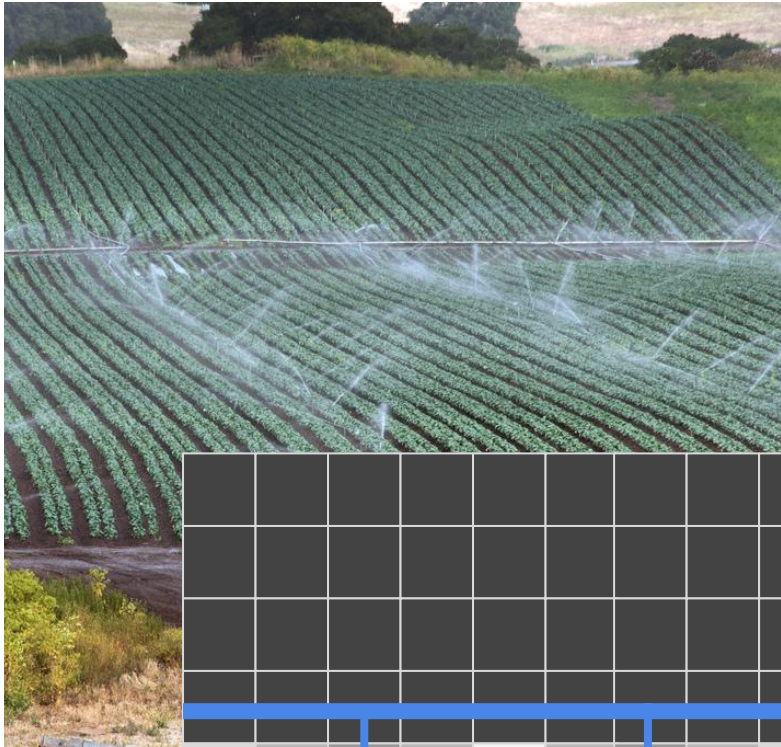
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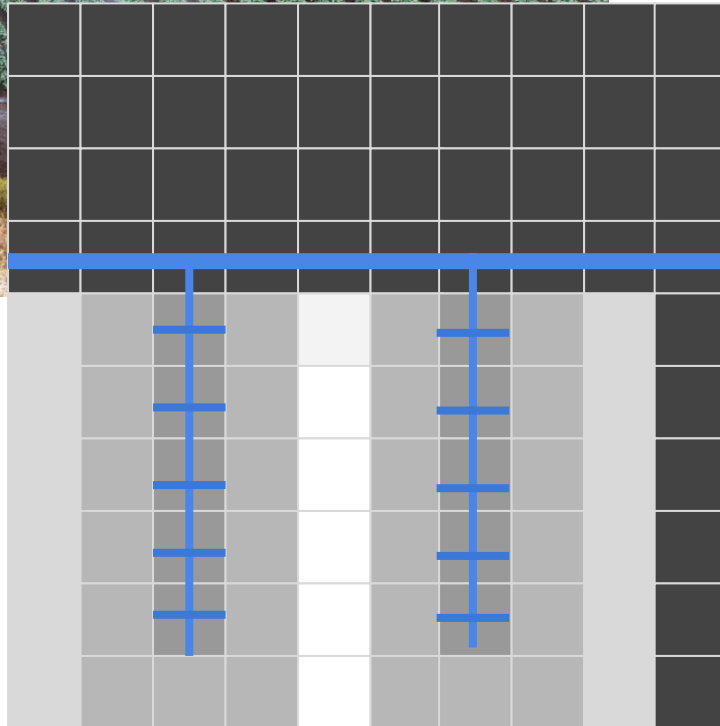
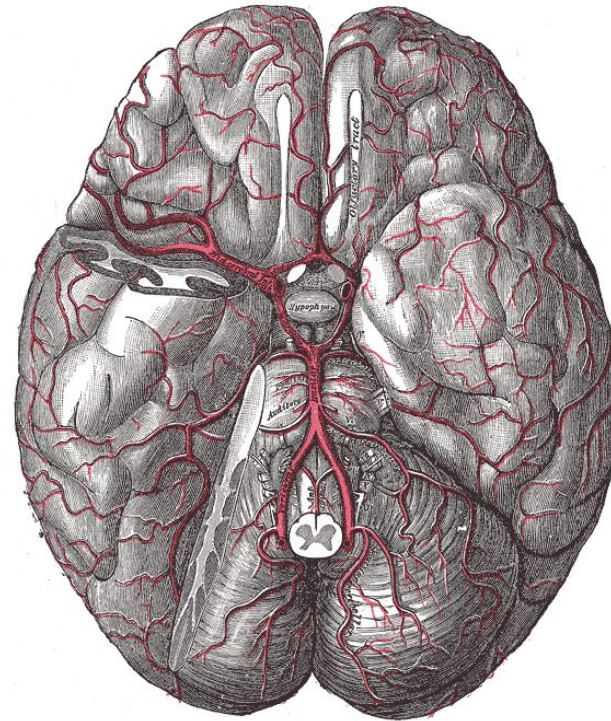
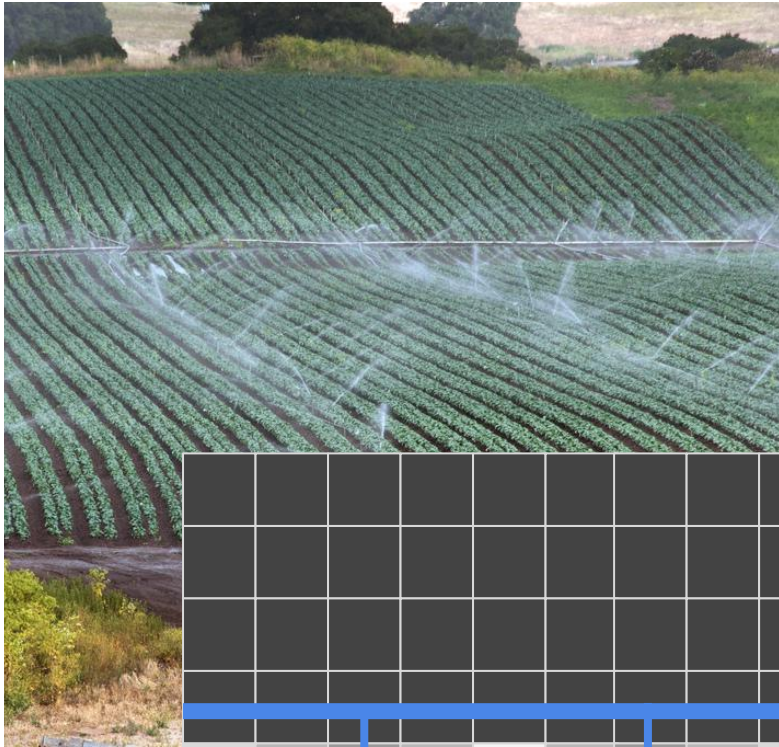
# ... des cartes d'hydratation ...



# ... des cartes d'hydratation ...

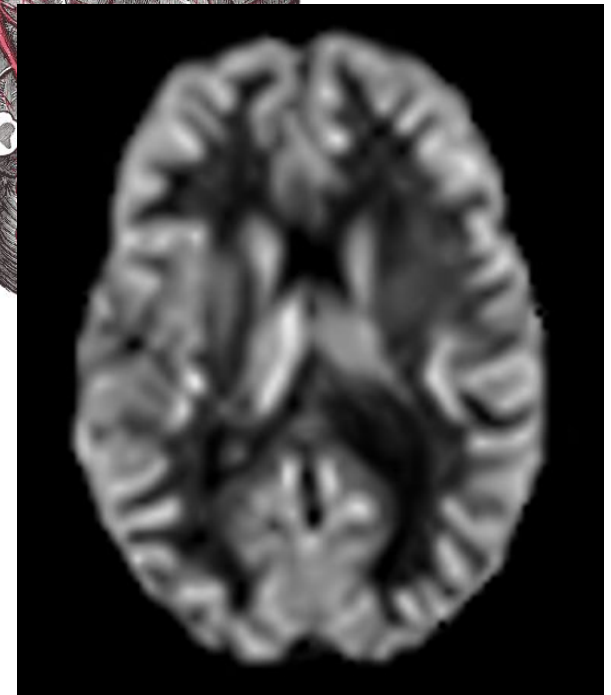
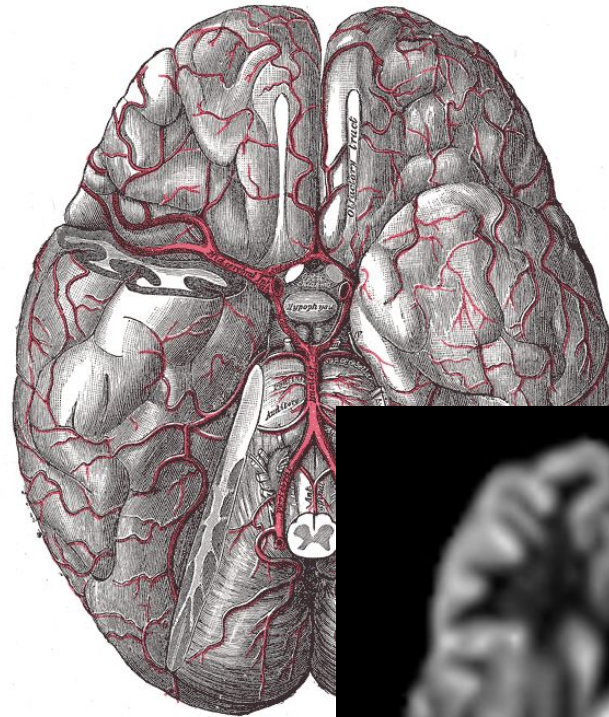
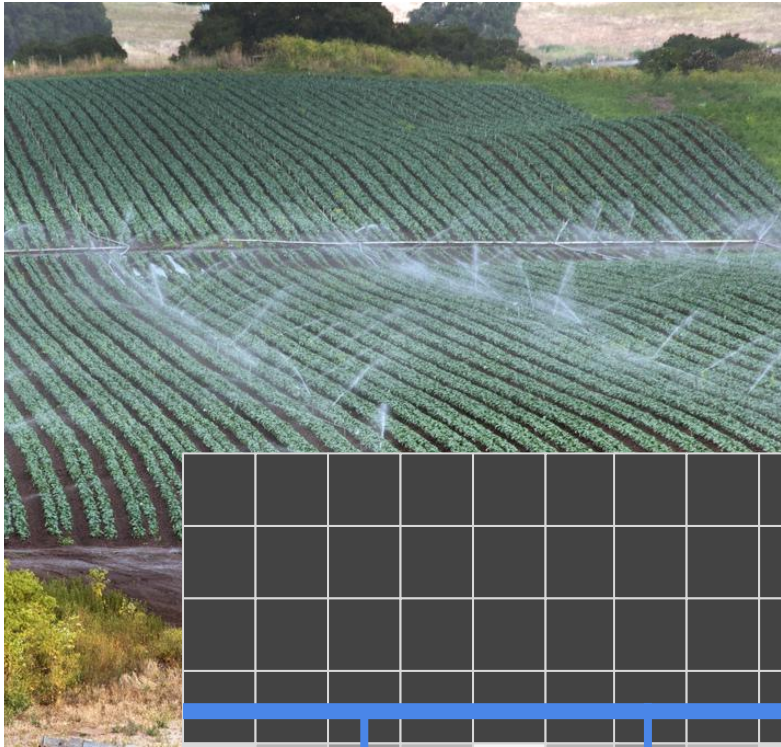


# ... des cartes d'hydratation ...

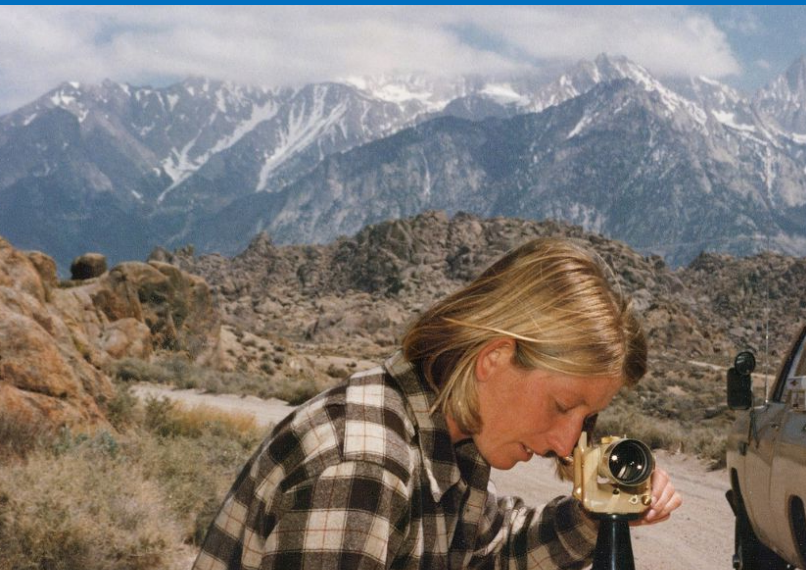




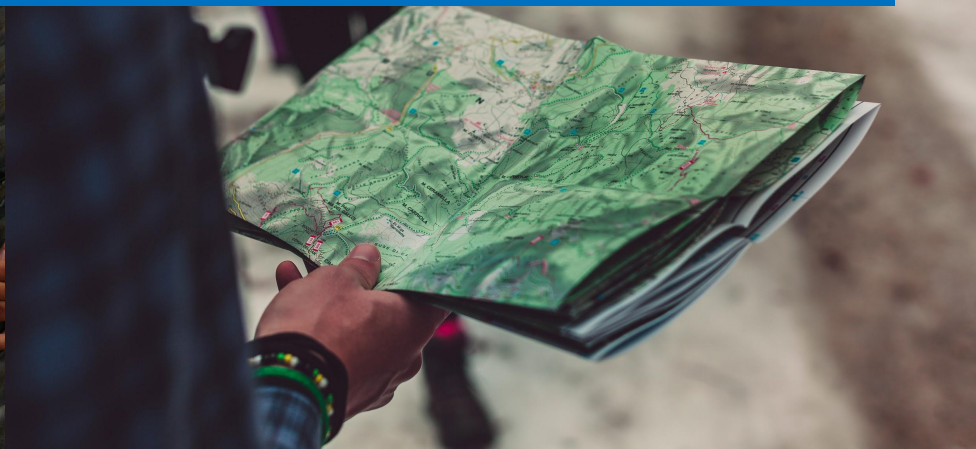
# ... des cartes d'hydratation ...



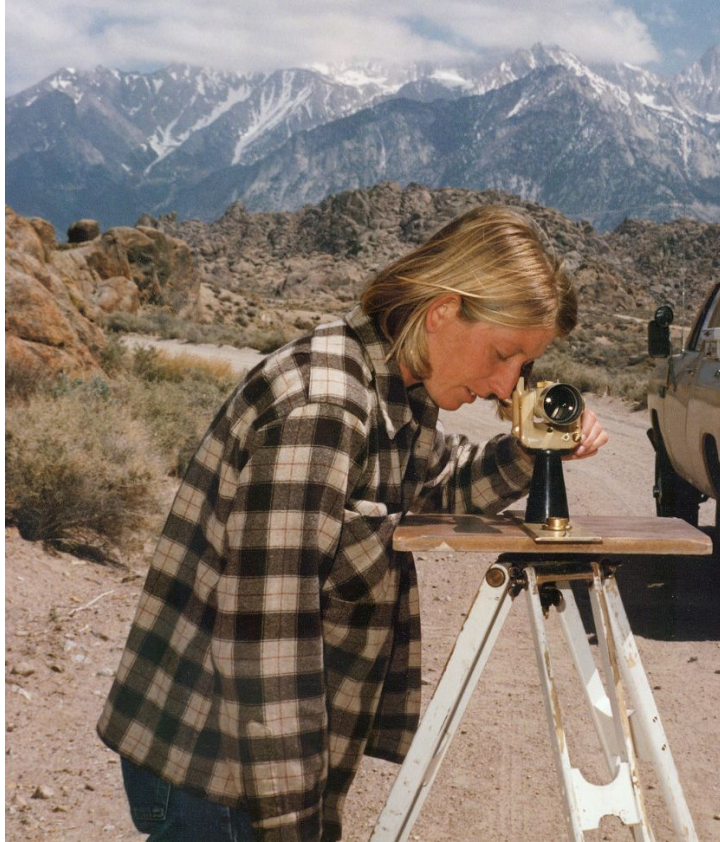
Perfusion



# Notre métier : la cartographie du cerveau

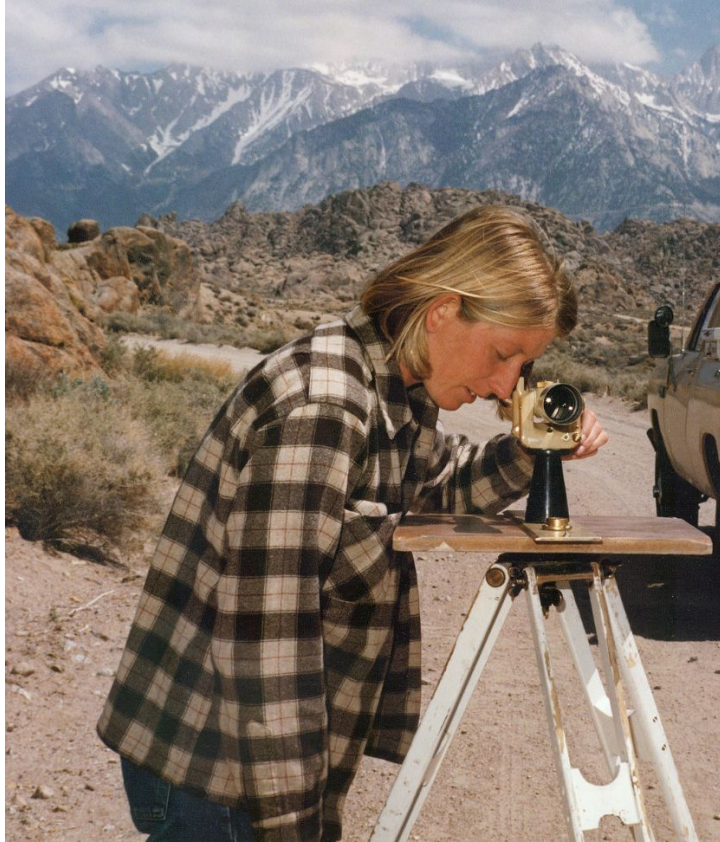


# Travailler la mesure



## Topographe

# Travailler la mesure

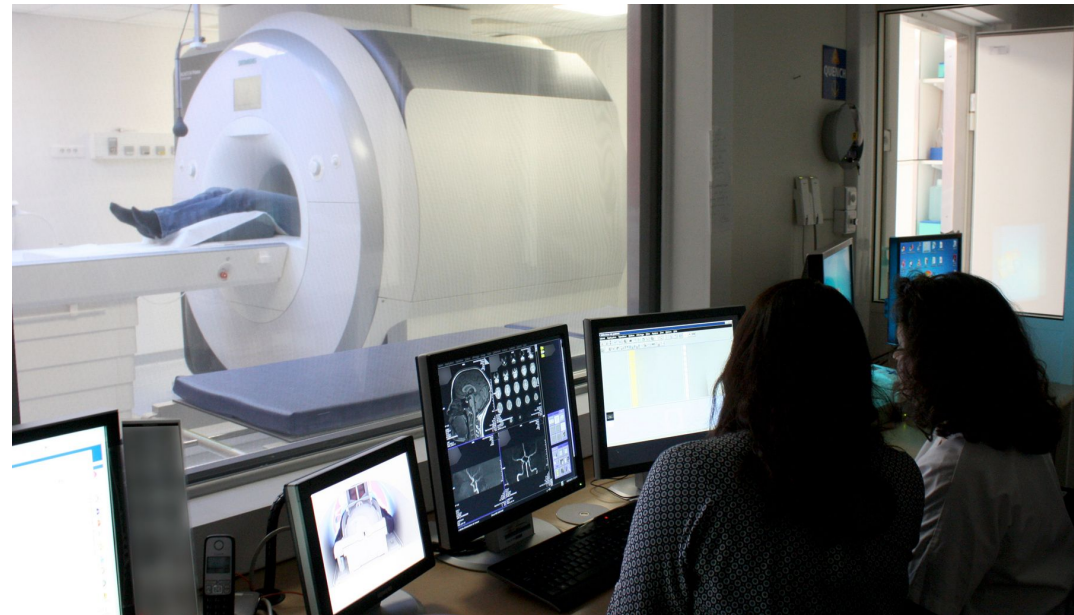


**Topographe**



**Elise  
Bannier**

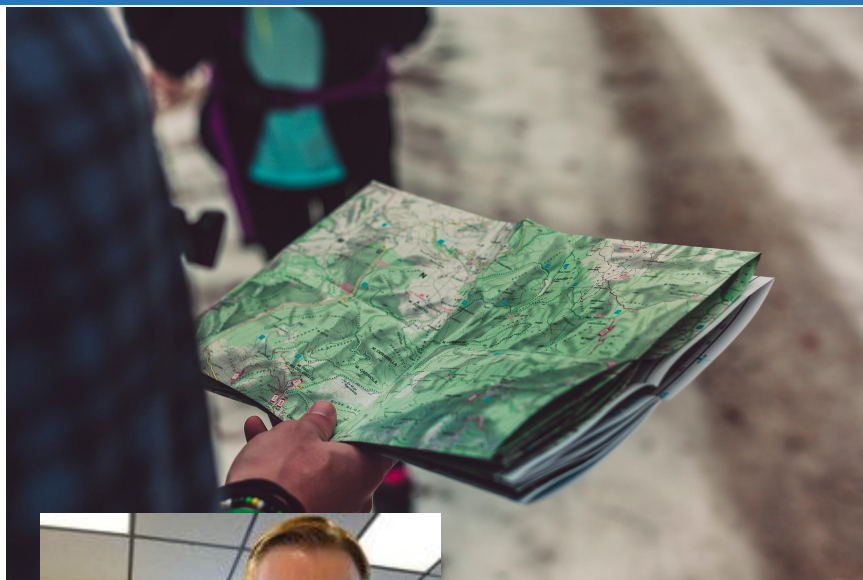
**Physicienne  
de l'IRM**



# Créer de nouvelles cartes



# Créer de nouvelles cartes



**Mathématicien**

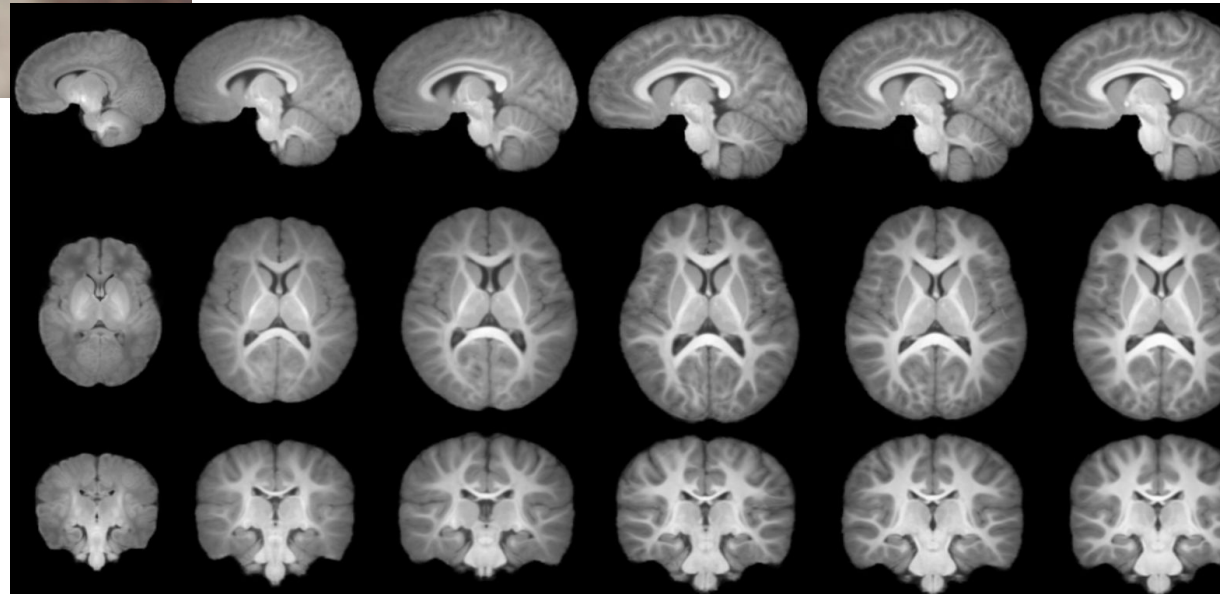
**Antoine  
Legouhy**

# Créer de nouvelles cartes



**Mathématicien**

**Antoine  
Legouhy**



0 0.5 1 1.5 2 2.5  
âge en année

**Cartographe**

# Découvrir de nouveaux horizons





# Découvrir de nouveaux horizons



**Marine  
Dubois**

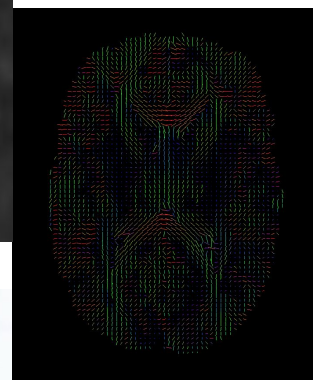
**Radiologue**

# Découvrir de nouveaux horizons



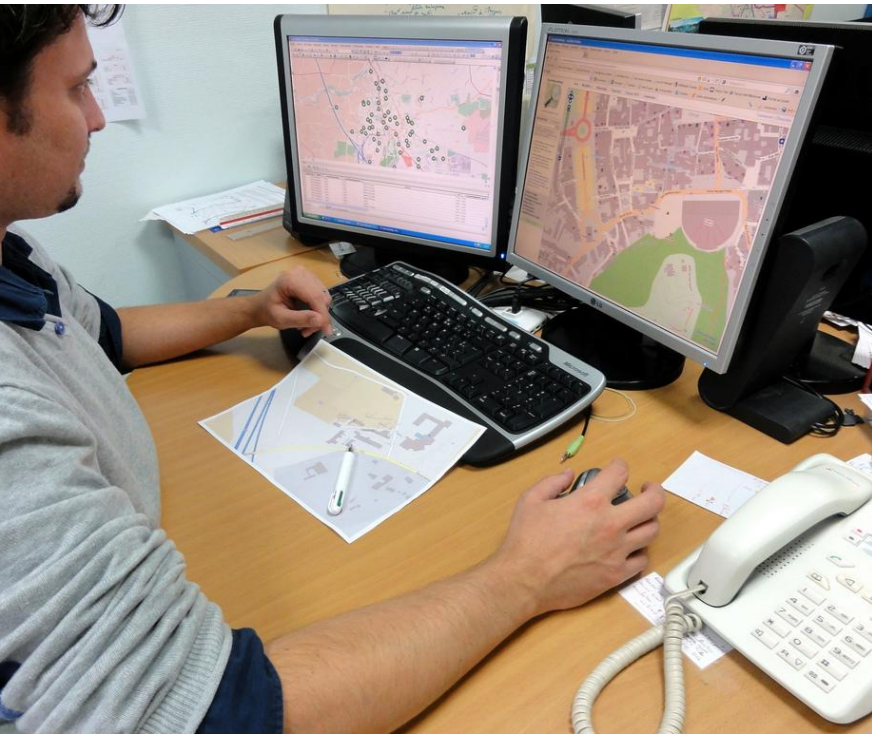
**Marine  
Dubois**

## Radiologue



**Explorateur·trice**

# Gérer & Combiner les données



**Géomaticien·ne**



**Camille  
Maumet**

**Neuro-  
informaticienne**



**L'imagerie cérébrale du futur !**

## Une étude démontre les biais de la reconnaissance faciale, plus efficace sur les hommes blancs

Lorsqu'il s'agit de reconnaître le genre d'un homme blanc, des logiciels affichent un taux de réussite de 99 %. La tâche se complique lorsque la peau d'une personne est plus foncée, ou s'il s'agit d'une femme.

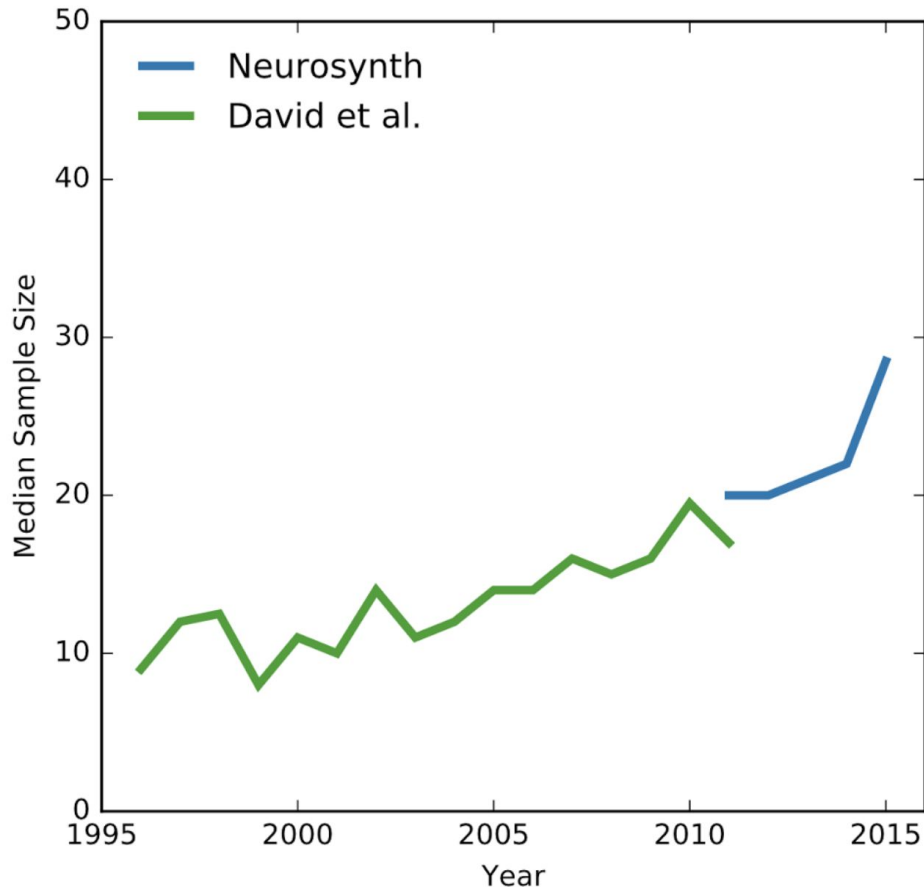
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LE MONDE | 12.02.2018 à 14h52 • Mis à jour le 13.02.2018 à 18h18 |

Par Perrine Signoret

Source : P. Signoret, [Le Monde](#).

# En imagerie cérébrale



2015 : ~30 sujets / étude

Source : Poldrack et al, [Nature Neuroscience 2017](#)

# Les données “ouvertes”

Étude unique

30 sujets

Consortium

1000 sujets

Cohorte

1 000 - 100 000 sujets



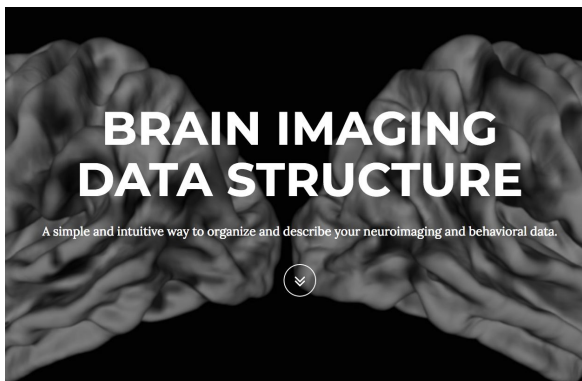
Photo de Neil Conway

Comment tirer parti de ces données ?

# Trouver un langage commun

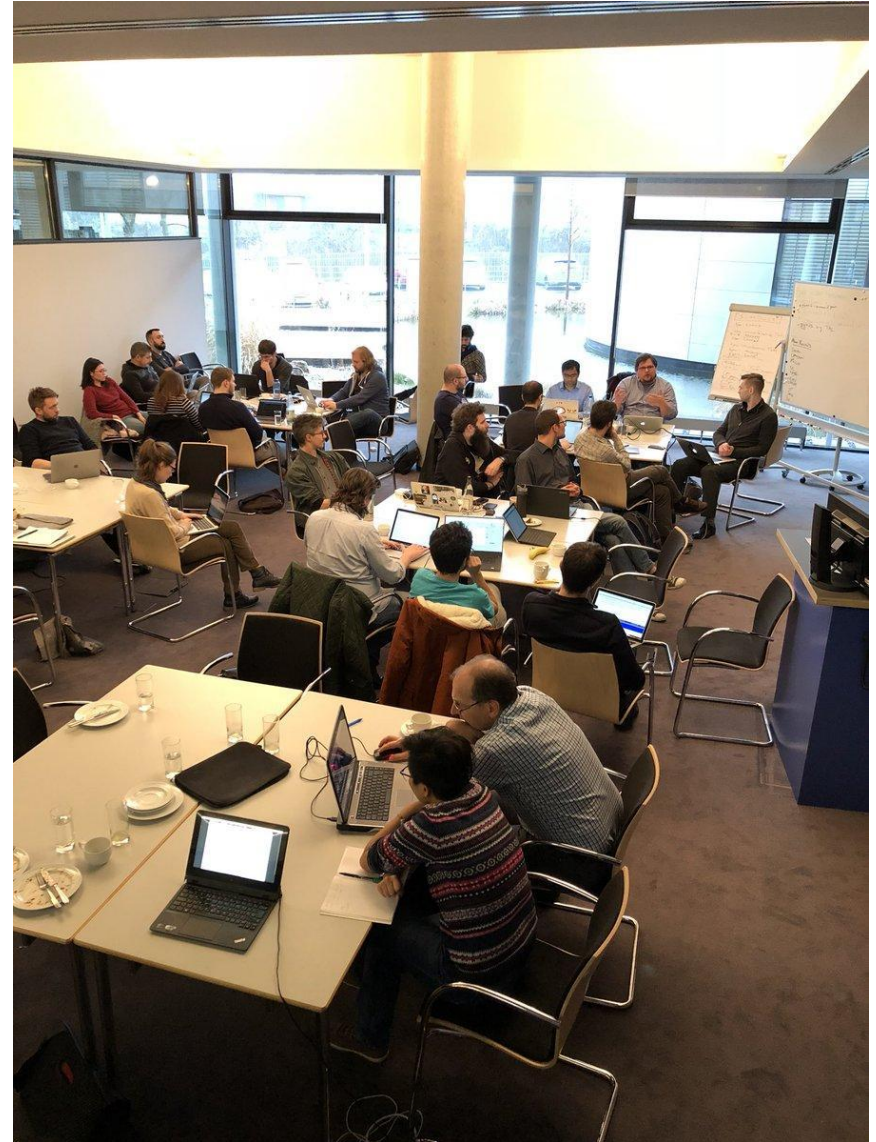
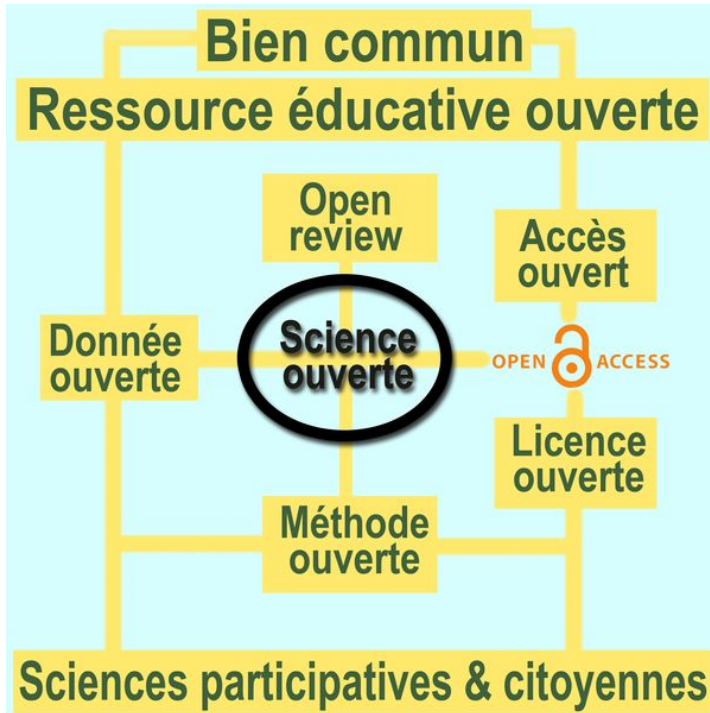


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├── sub-01/  
│   ├── anat/  
│   │   └── sub-01_T1w.nii.gz  
│   ├── func/  
│   │   ├── sub-01_task-rest_bold.nii.gz  
│   │   └── sub-01_task-rest_bold.json  
│   └── dwi/  
│       ├── sub-01_dwi.nii.gz  
│       ├── sub-01_dwi.json  
│       ├── sub-01_dwi.bval  
│       └── sub-01_dwi.bvec  
├── sub-02/  
├── sub-03/  
└── sub-04/
```





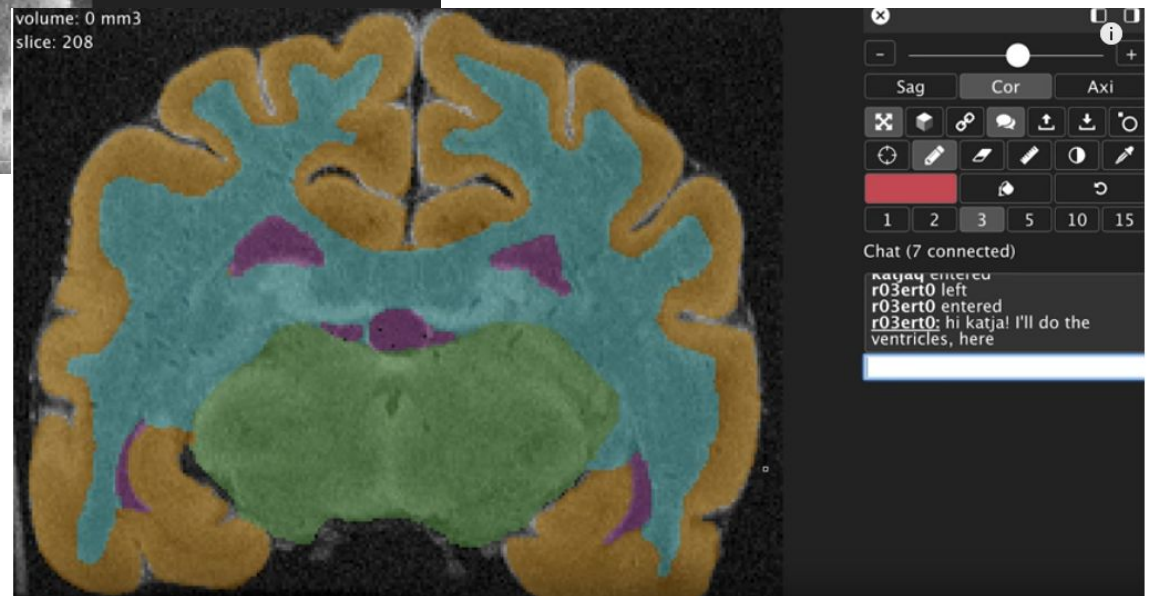
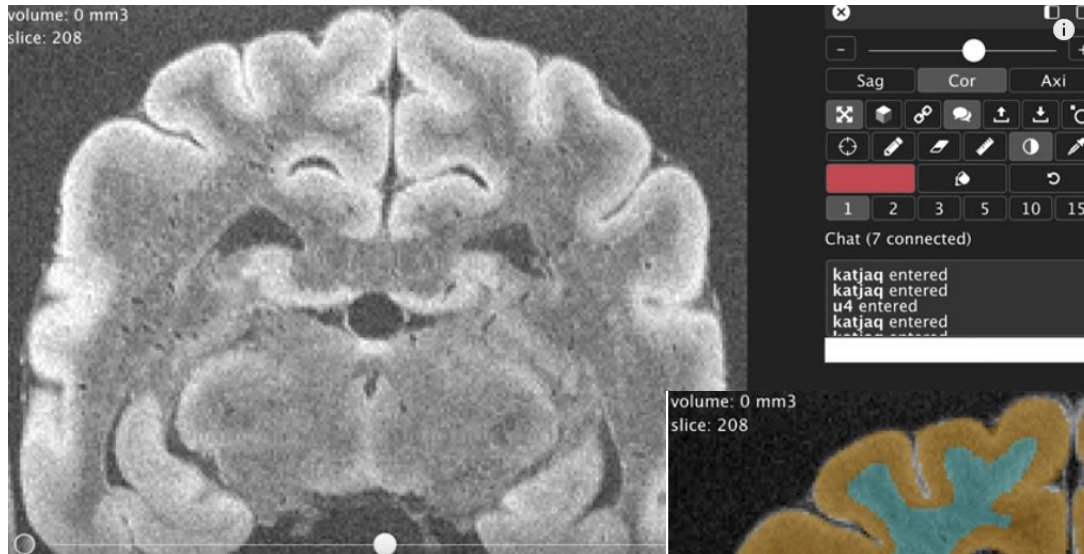
# Une recherche plus collaborative



# Production participative “Crowdsourcing”

## BrainBox

<http://brainbox.pasteur.fr>

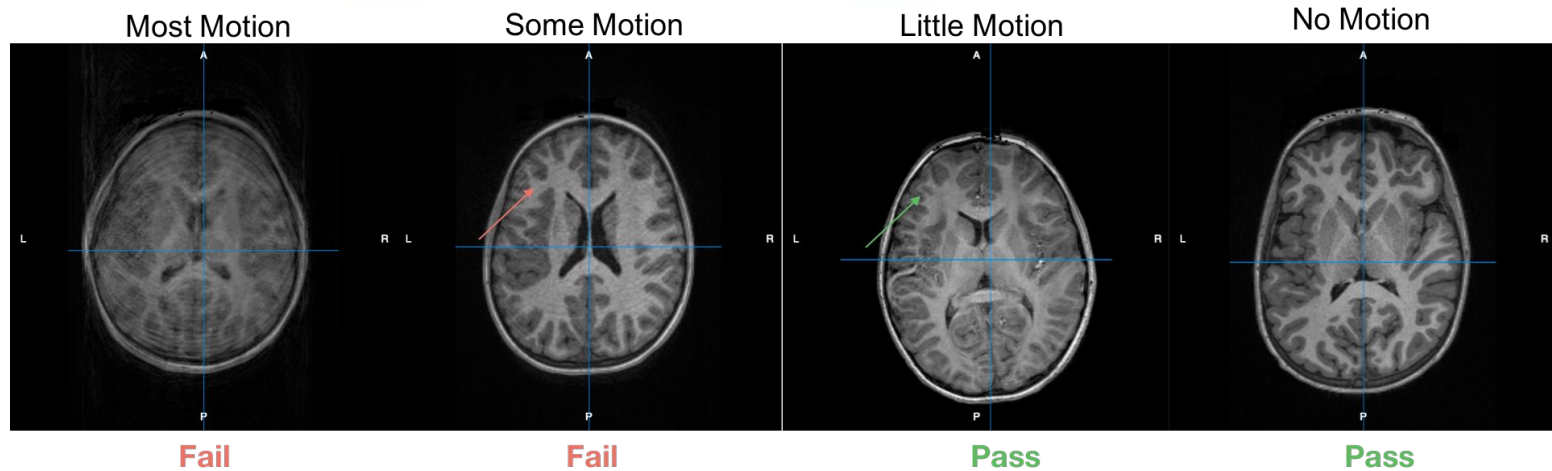
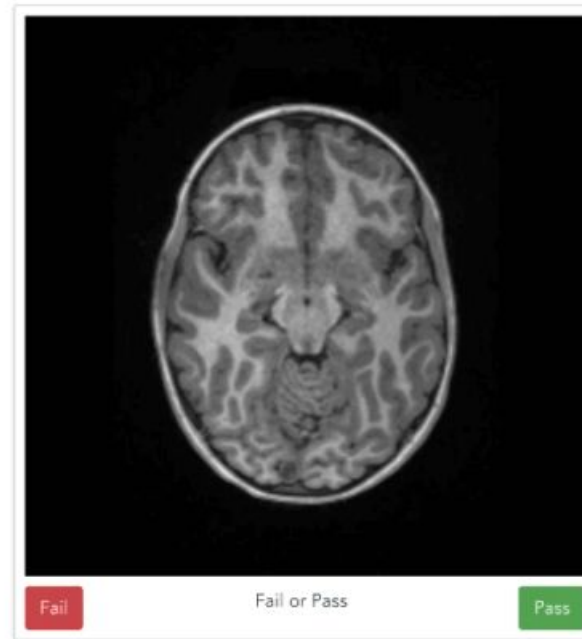


<https://www.youtube.com/watch?v=kwsLoVKnw24>

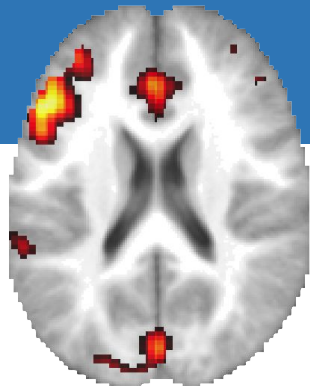
# Participez à la science du cerveau !

Braindr

<https://braindr.us/>



# Cartographes du cerveau



**Camille Maumet**

Univ Rennes, Inria, Inserm, CNRS, IRISA

**Merci !**

Elise Bannier, Giulia Lioi & Claire Cury

À toute l'équipe Empenn !

Luc Maumet

Et vous toutes et tous pour votre participation !

<http://camillemaumet.com>



[cmaumet](https://twitter.com/cmaumet)

<https://team.inria.fr/empenn/>



[empenn\\_lab](https://twitter.com/empenn_lab)

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BrainBox : [Website](#), [Roberto Toro](#) & [Katja Heuer](#)

Braindr : [Website](#), [Anisha Keshavan](#)

