

ARM Introduction

(Pascal Desbarats)
pascal.desbarats@labri.fr

Questions

- 3D imaging ?
- Modalities ?
- A discrete world ?
- Medical Imaging ?

3D imaging

◎ Surfaces

- Laser scan
- Microscribe
- Photogrammetry
- ...

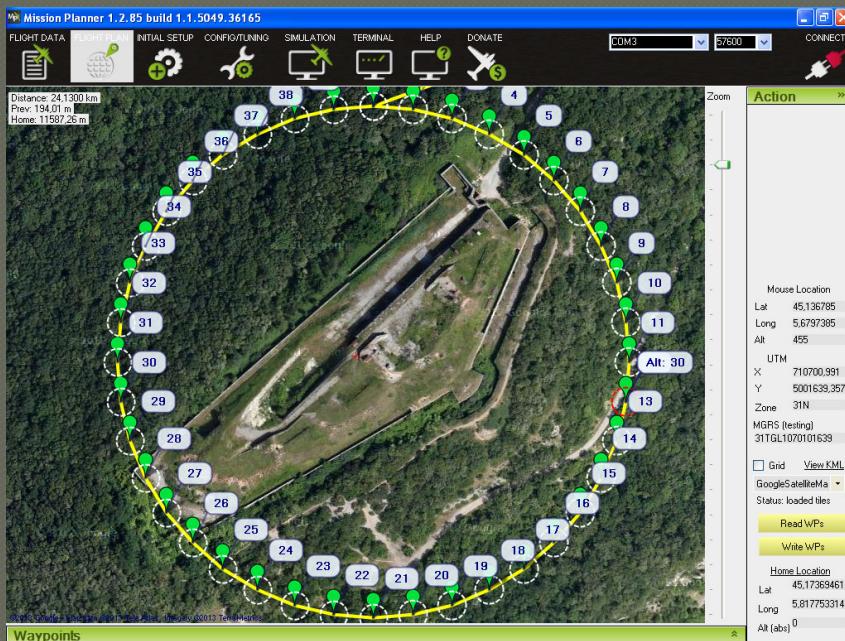
◎ Volumes

- CT scan (and other tomographic devices)
- MRI
- THz (tomography, tomosynthesis)

Laser scan

- Different methods (grid or line deformation, time of flight, ...)
- Can be fixed or operated by hand
- High resolution (~10-60 microns)
- Point cloud(needs surface reconstruction)

Photogrammetry



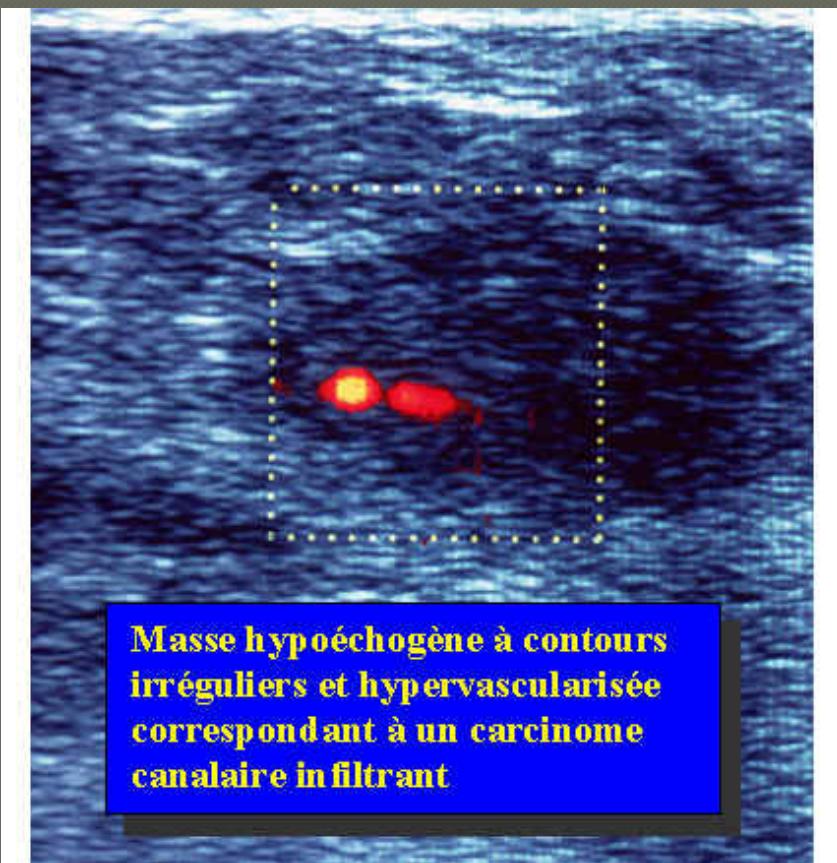
- Aerial photogrammetry

- Fort de Comboire

- Drones

- (escadrone)

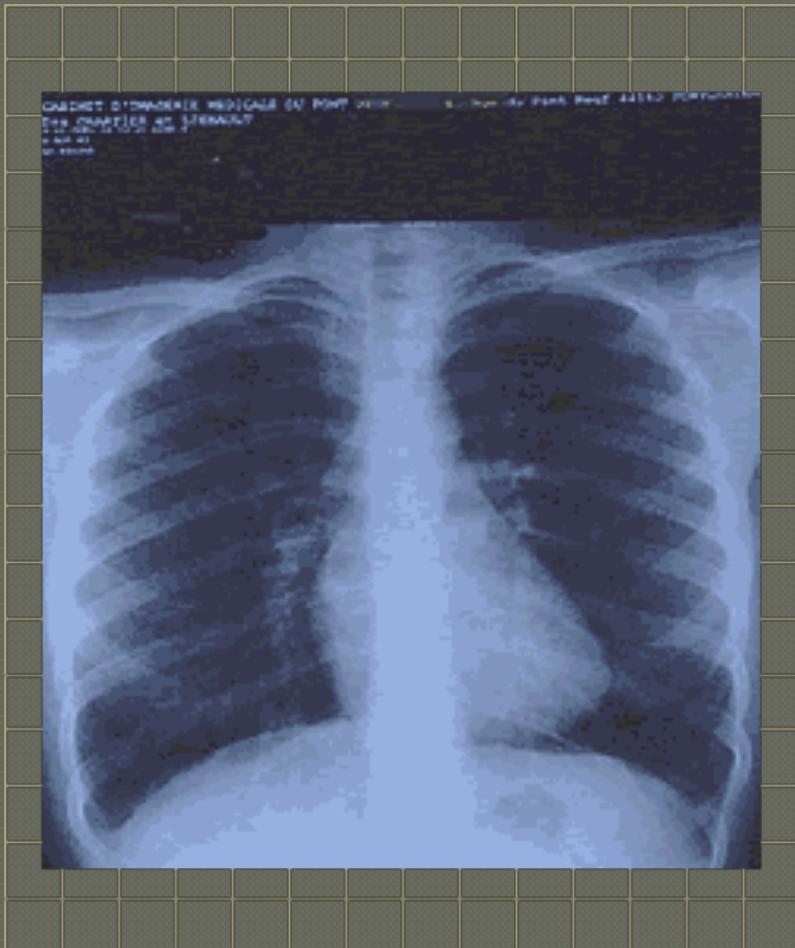
Echography (2D, time)



Echography (3D)

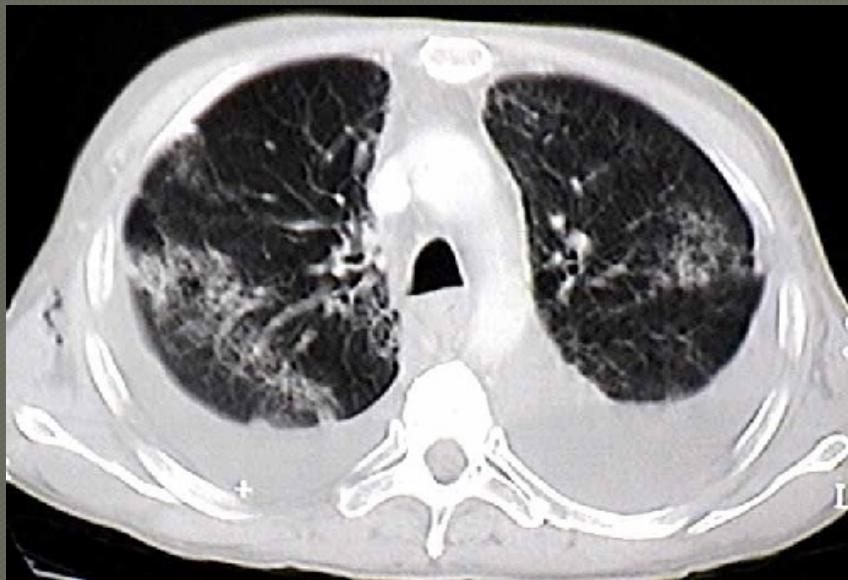


Radiography (2D)



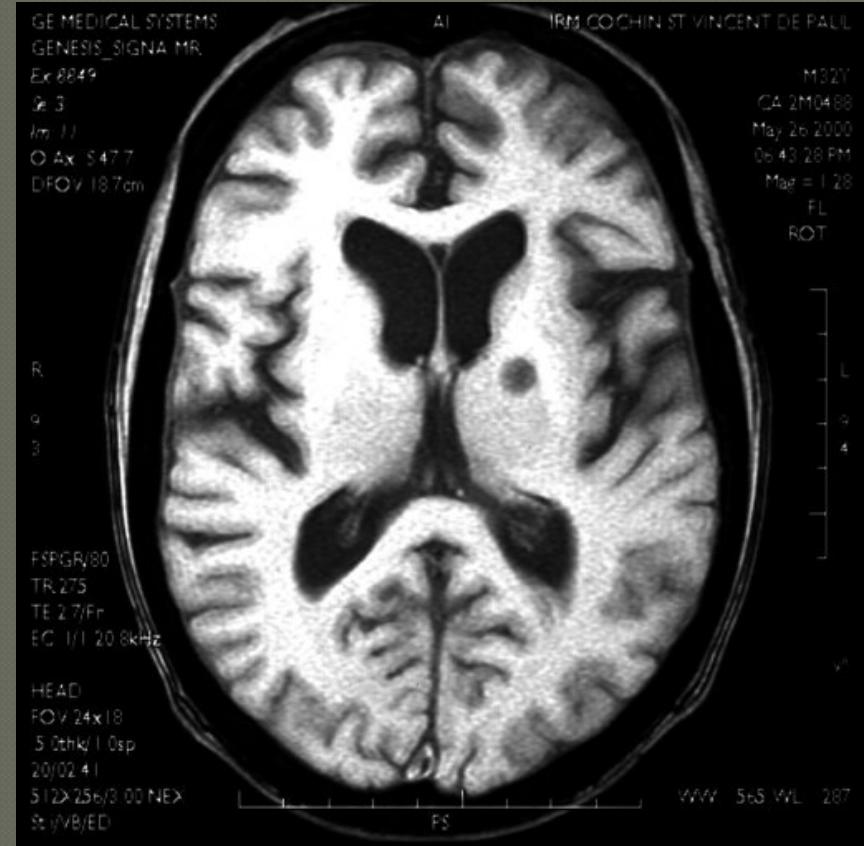
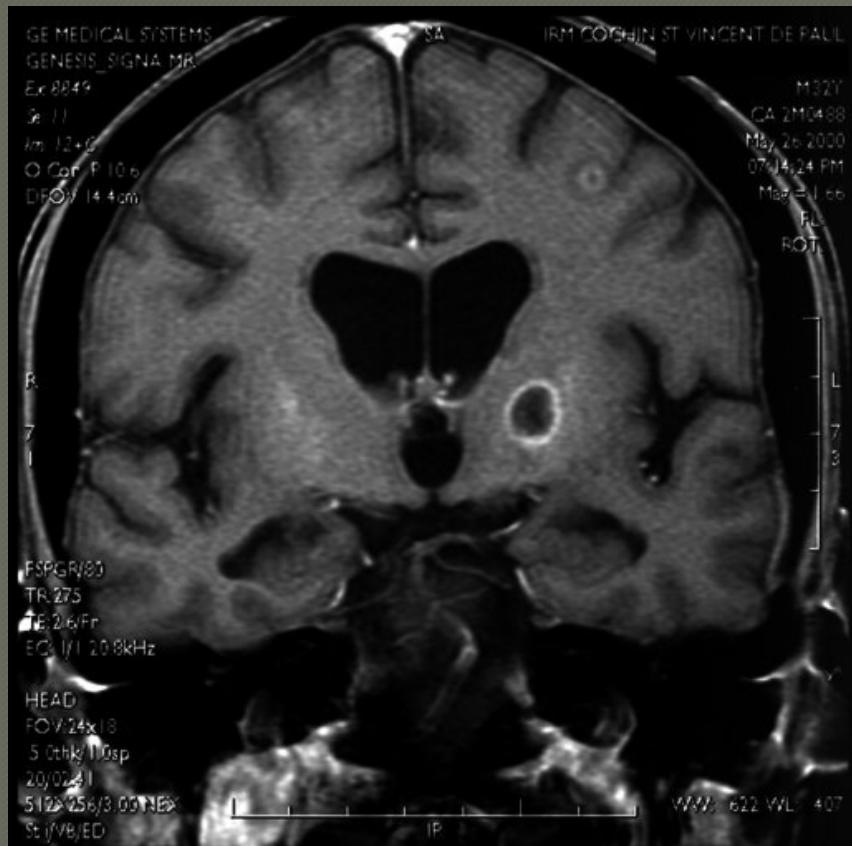
- Pros ?
- Cons ?
- (considering image analysis)

Scanner CT



- Low noise
- Good resolution
- Variable parameters
- Uniform scale
(Hounsfield Units)

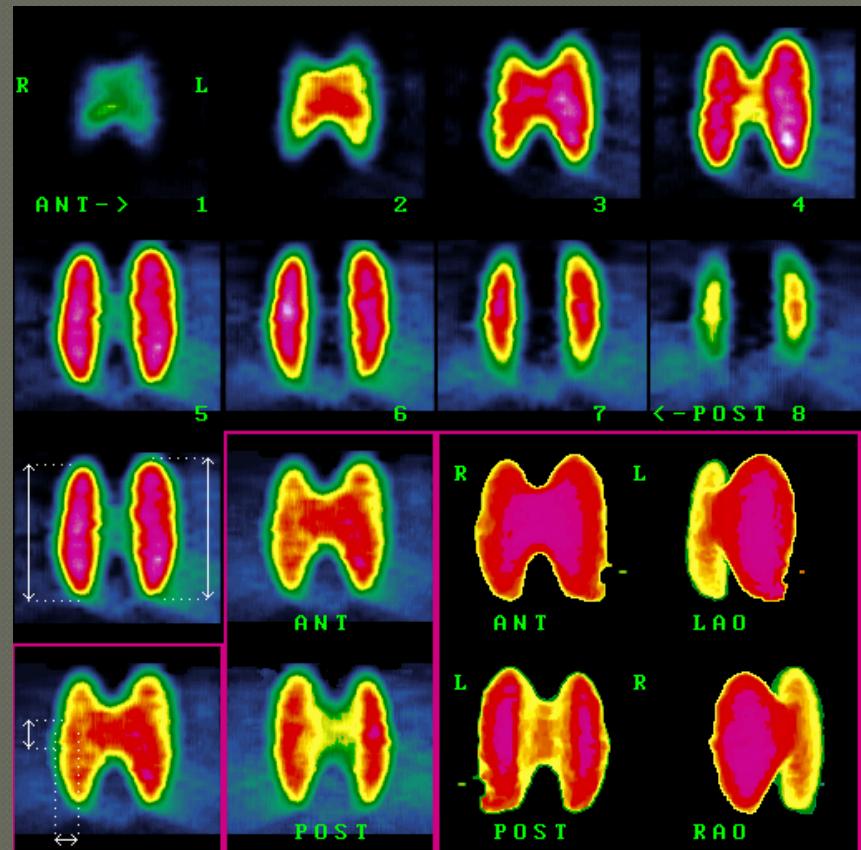
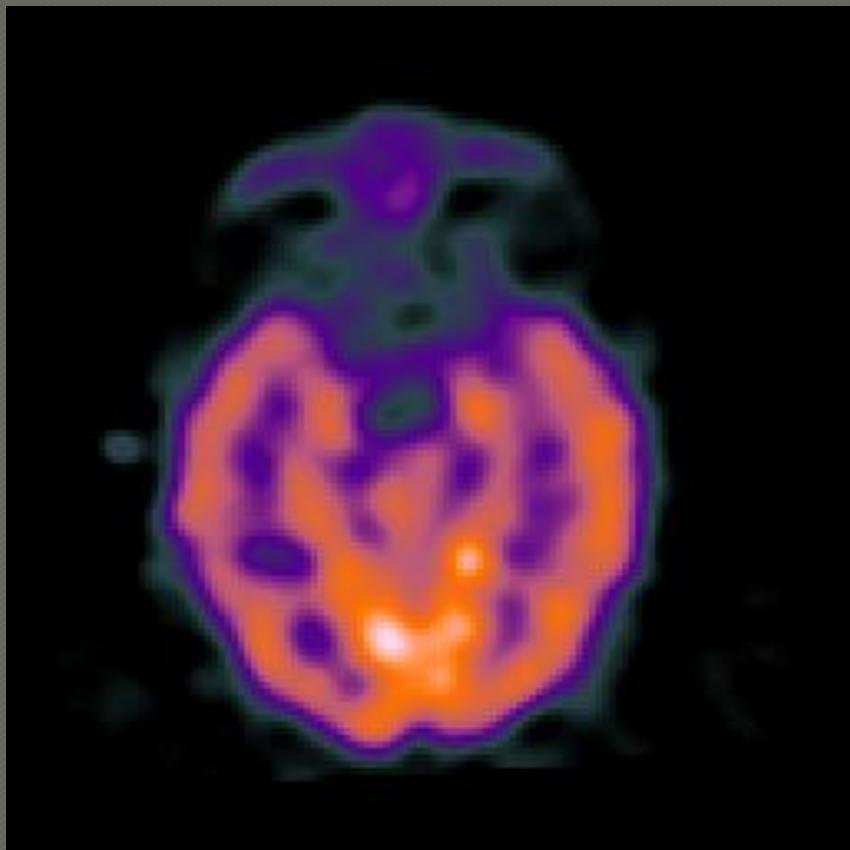
MRI (1)



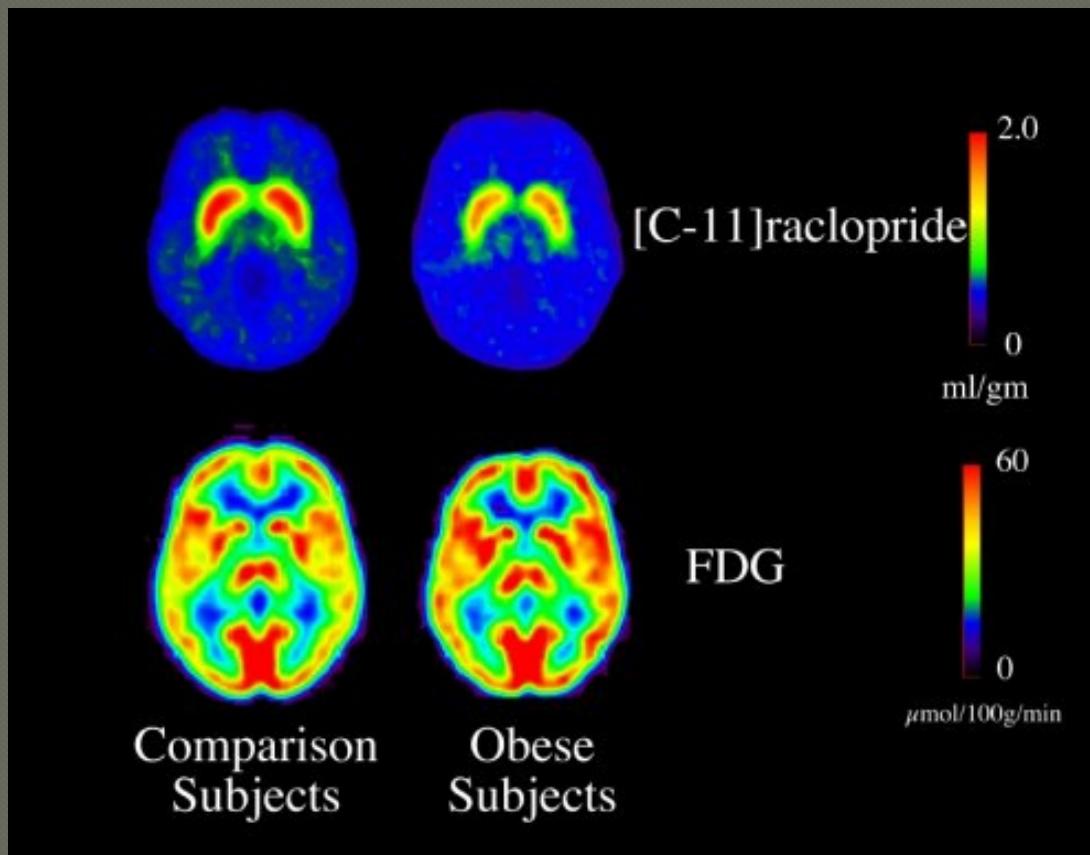
MRI (2)



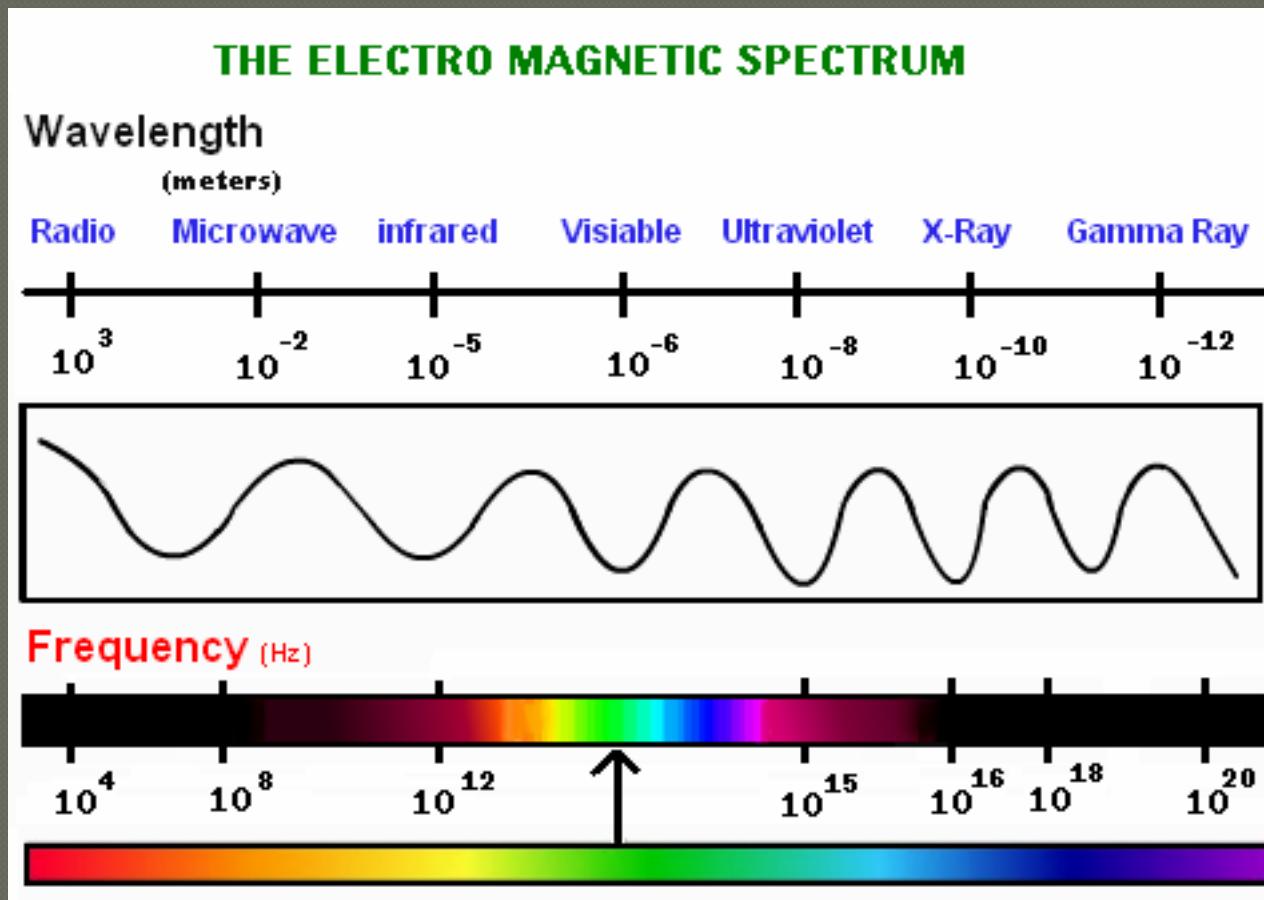
SPECT (Single Photon Emission Computer Tomography)



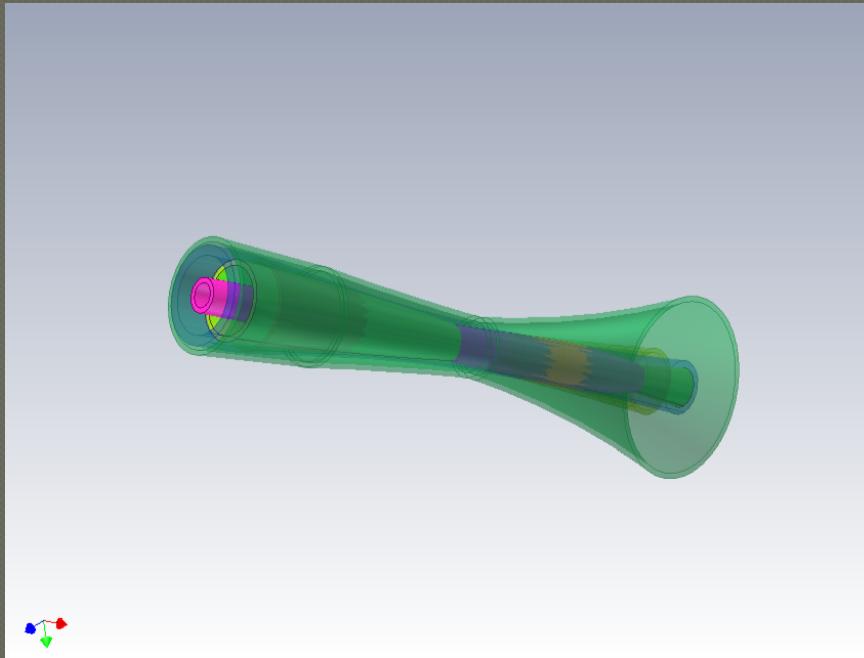
PET (Positon Emission Tomography)



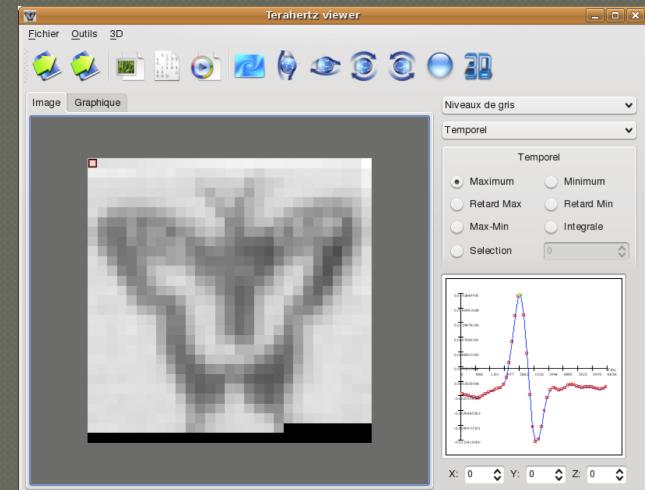
Let us explore the electromagnetic spectrum ...



New : Terahertz imaging



THz beam (image : P. Mounaix)



(Photo NYTimes)

Can we build a chain of process ?

- From acquisition to visualization
- Surfaces and volumes ...
- Visualization vs Analysis

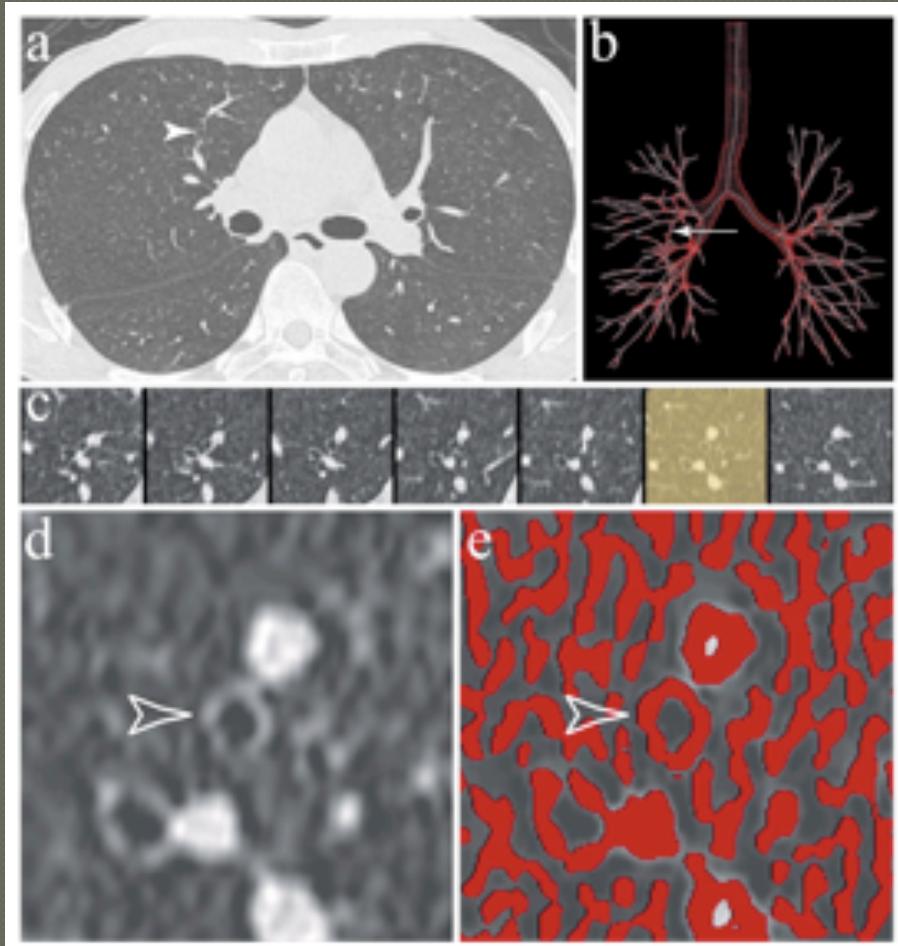
Focus : the visualization problem

- How to properly visualize a discrete 3D image ?
- Difference between a 3D image and a 3D object ...
- Warning : voxels are not always isometric

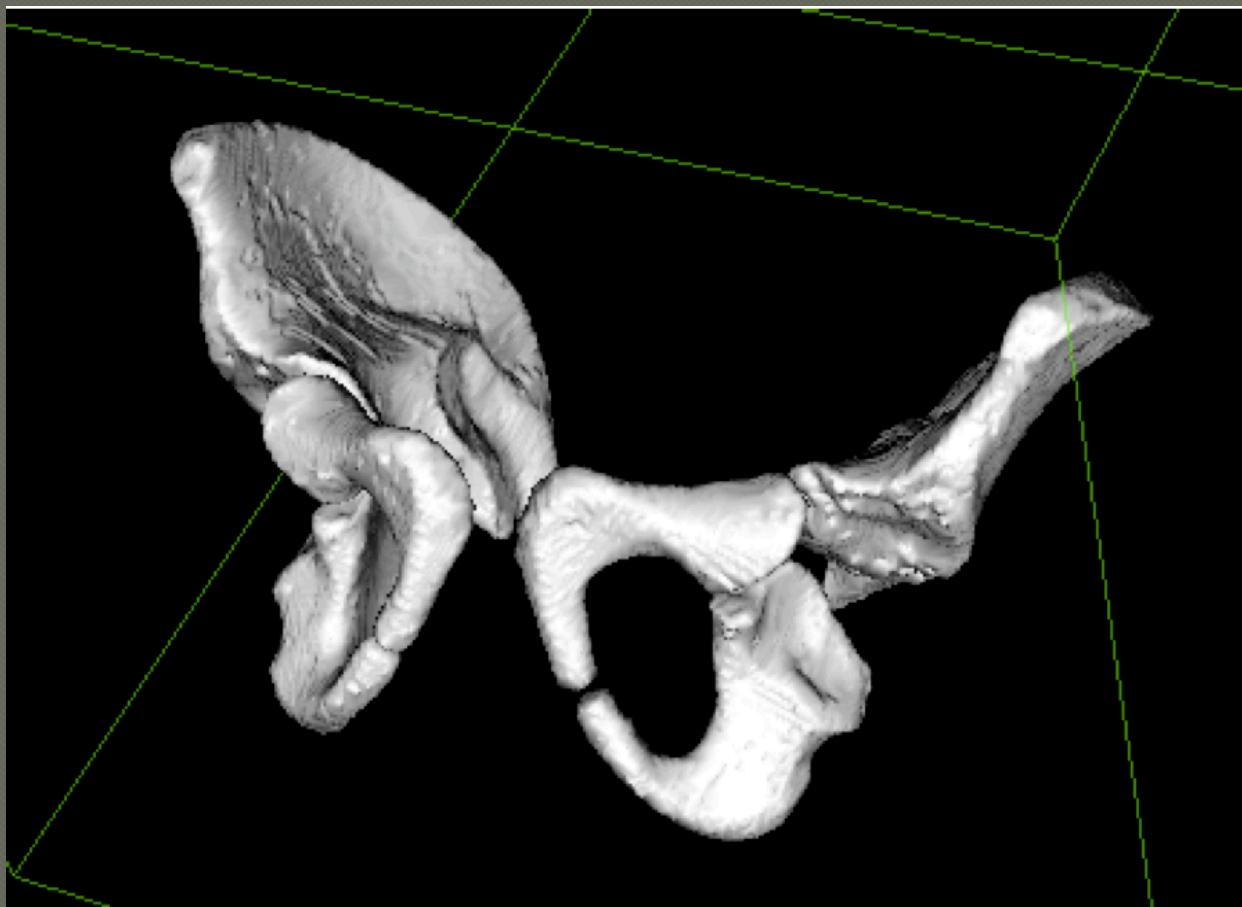
Points and Surfaces ... easy



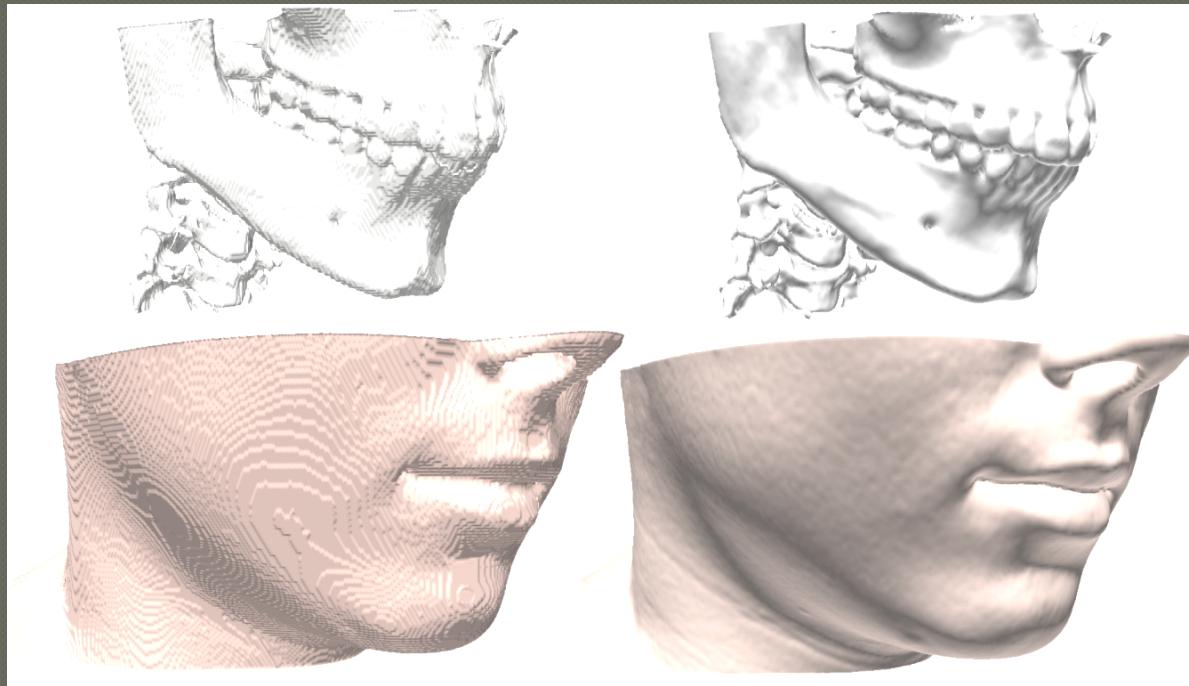
3D volumes ... not so easy



Segmentation ...

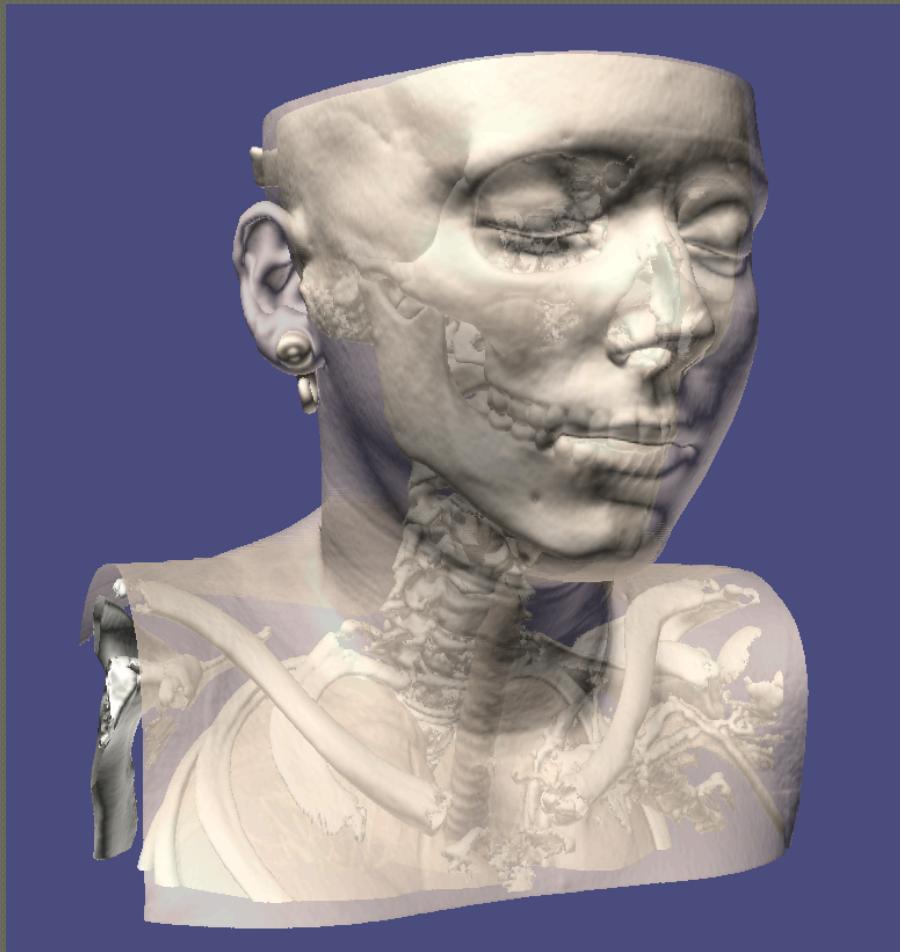


Surface extraction

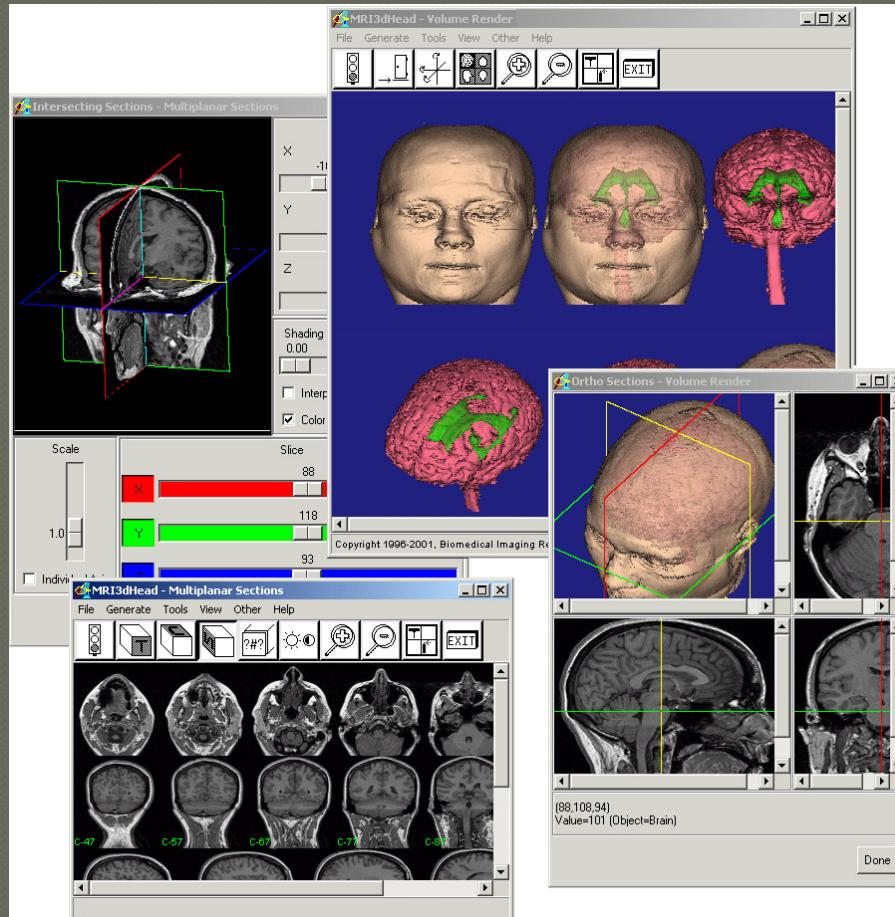


Marching Cube (Lorensen, 1987) vs HMH (Dutailly et al., 2009)

Using transparencies



Slices and segmentation

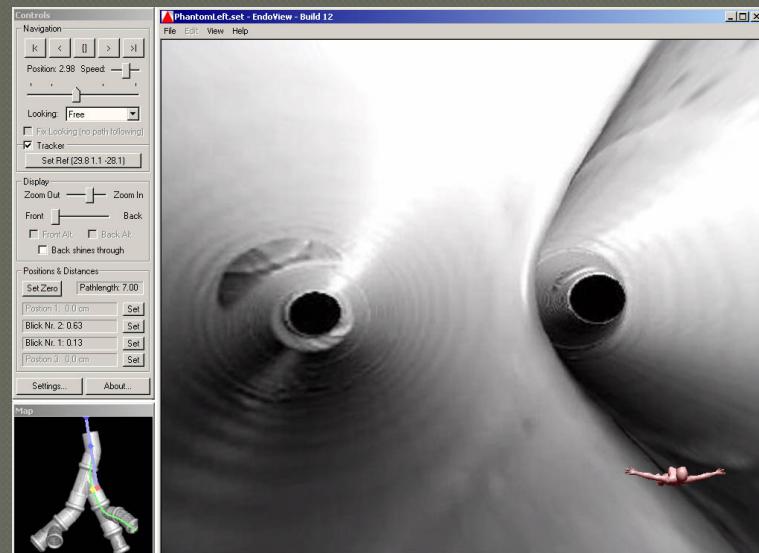
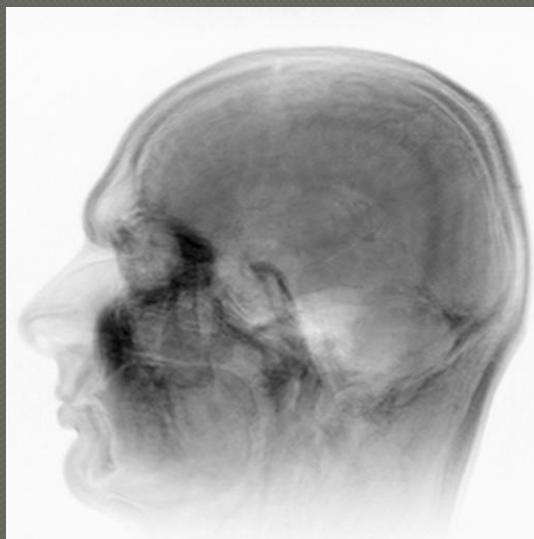
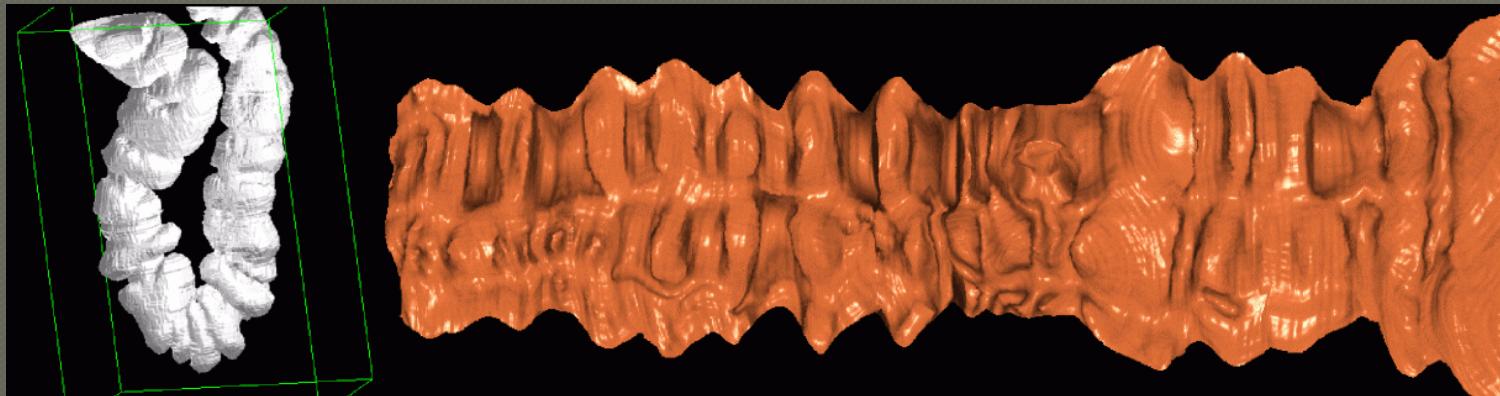


In situ ...



(c)2000 www.amiravis.com

Tricks



Your first work...

- 3D volumetric vizualisation
- Using transparencies ...
- C++/OpenGL/ Qt
- Shepp-Logan 3D

