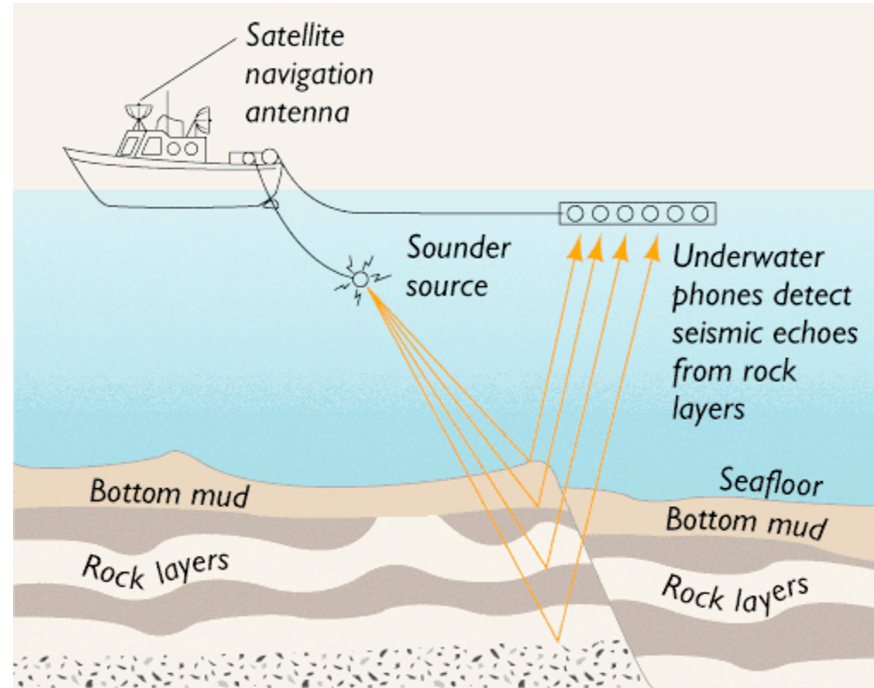
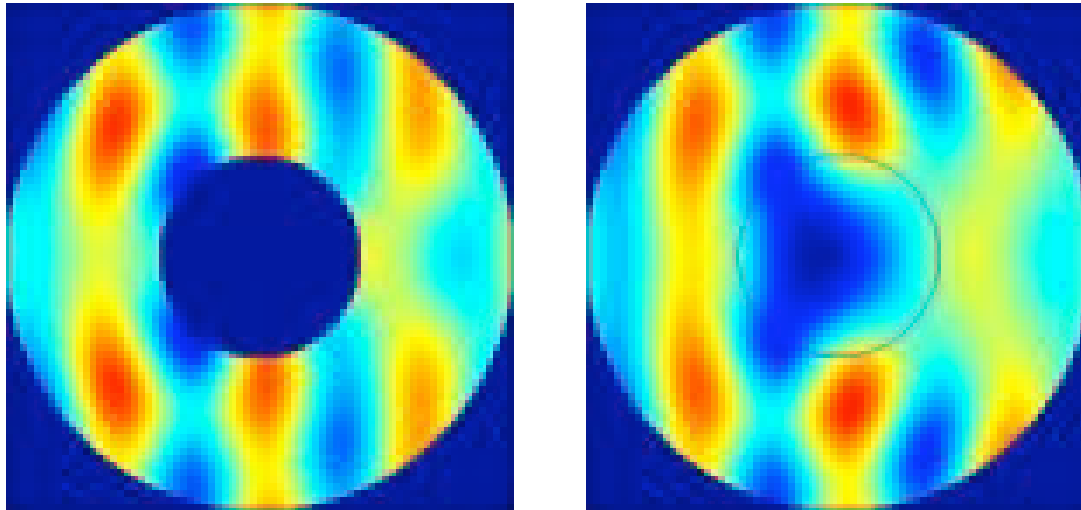


Inversio-ongelmat

Matti Lassas,
Samuli Siltanen,
Lauri Oksanen



Maan kuvantamista:
maaperän pintakerrosten kuvantamista tutkalla ja
öljynetsintää akustisten aaltojen avulla



Inversio-ongelma: Voidaanko sisäinen rakenne määrätä ulkoisista mittauksista?

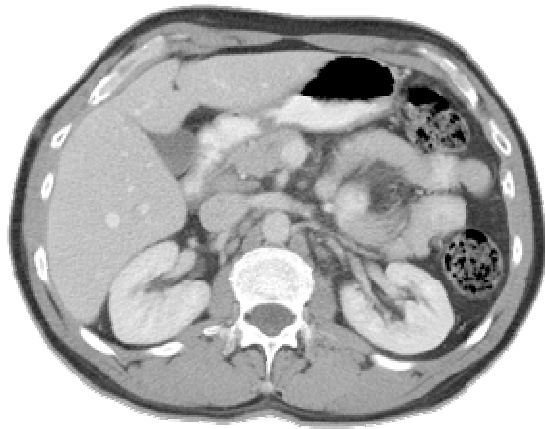
Tarkastellaan aaltoja u ,

$$\frac{\partial^2 u}{\partial t^2}(x, t) - c(x)^{-2} \Delta u(x, t) = 0, \quad x \in \mathbb{R}^3, \quad t \in \mathbb{R},$$

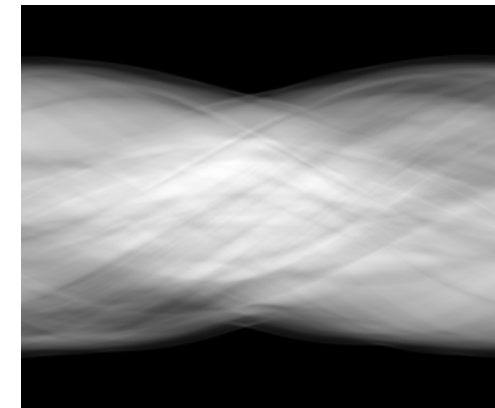
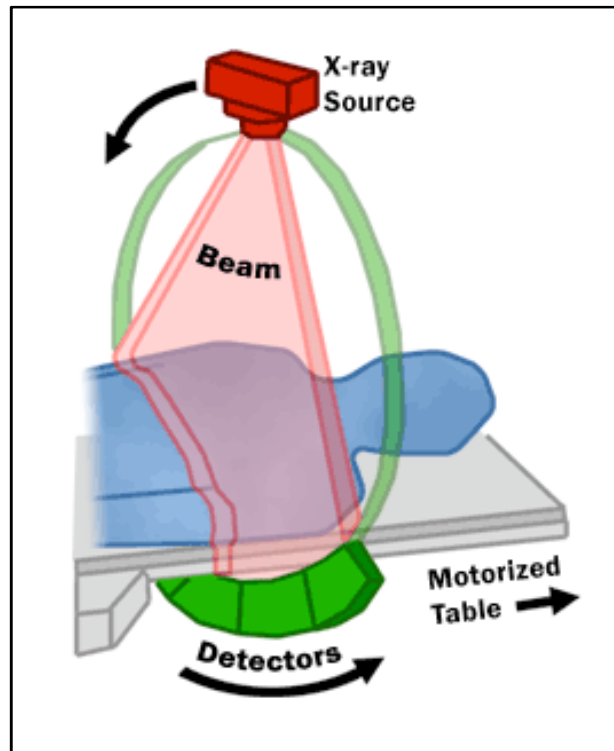
missä $c(x)$ tunnetaan vain alueen $D \subset \mathbb{R}^3$ ulkopuolella. Mitataan aaltoja D ulkopuolella. Voidaanko $c(x)$ määrätä alueessa D ?

We discuss indirect measurements of continuum quantities

Example: Radon transform in X-ray tomography

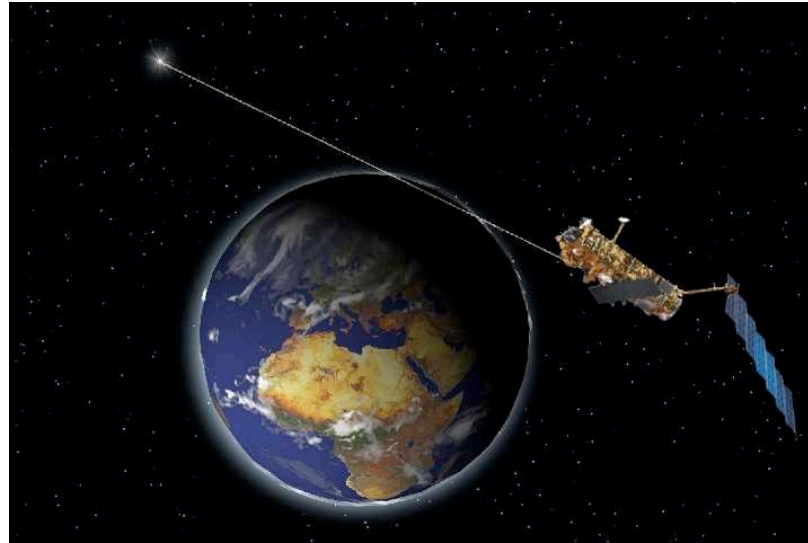
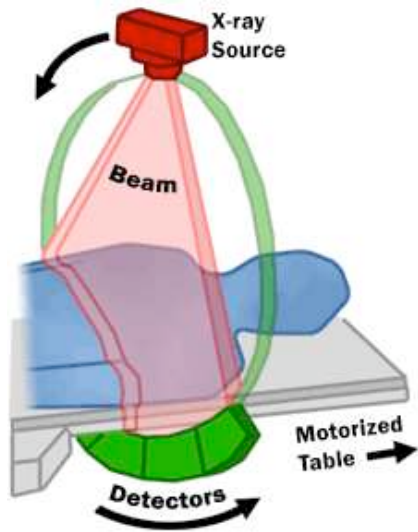


U
(attenuation coefficient)



M
(noisy sinogram)

$$M = AU + \epsilon$$



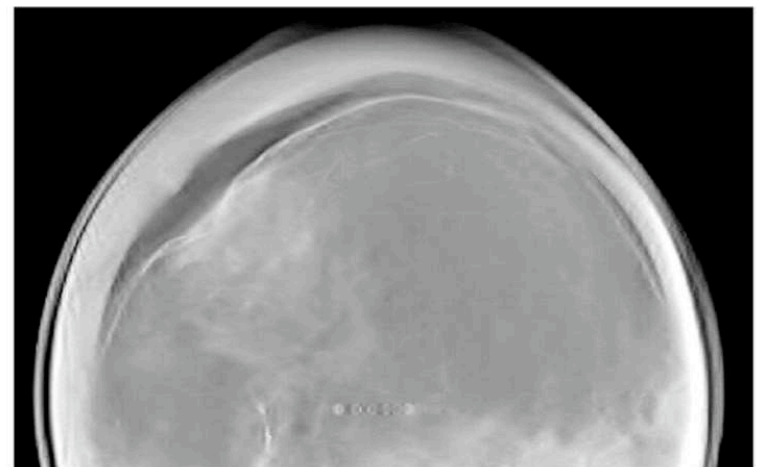
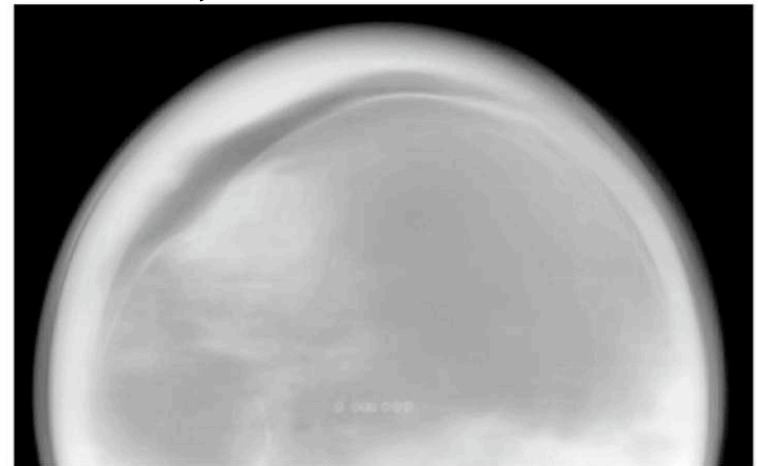
Röntgentomografiaa ja otsoninmittausta valonsäteillä
(Kuvat: FDA ja GOMOS)

Limited angle tomography results for X-ray mammography

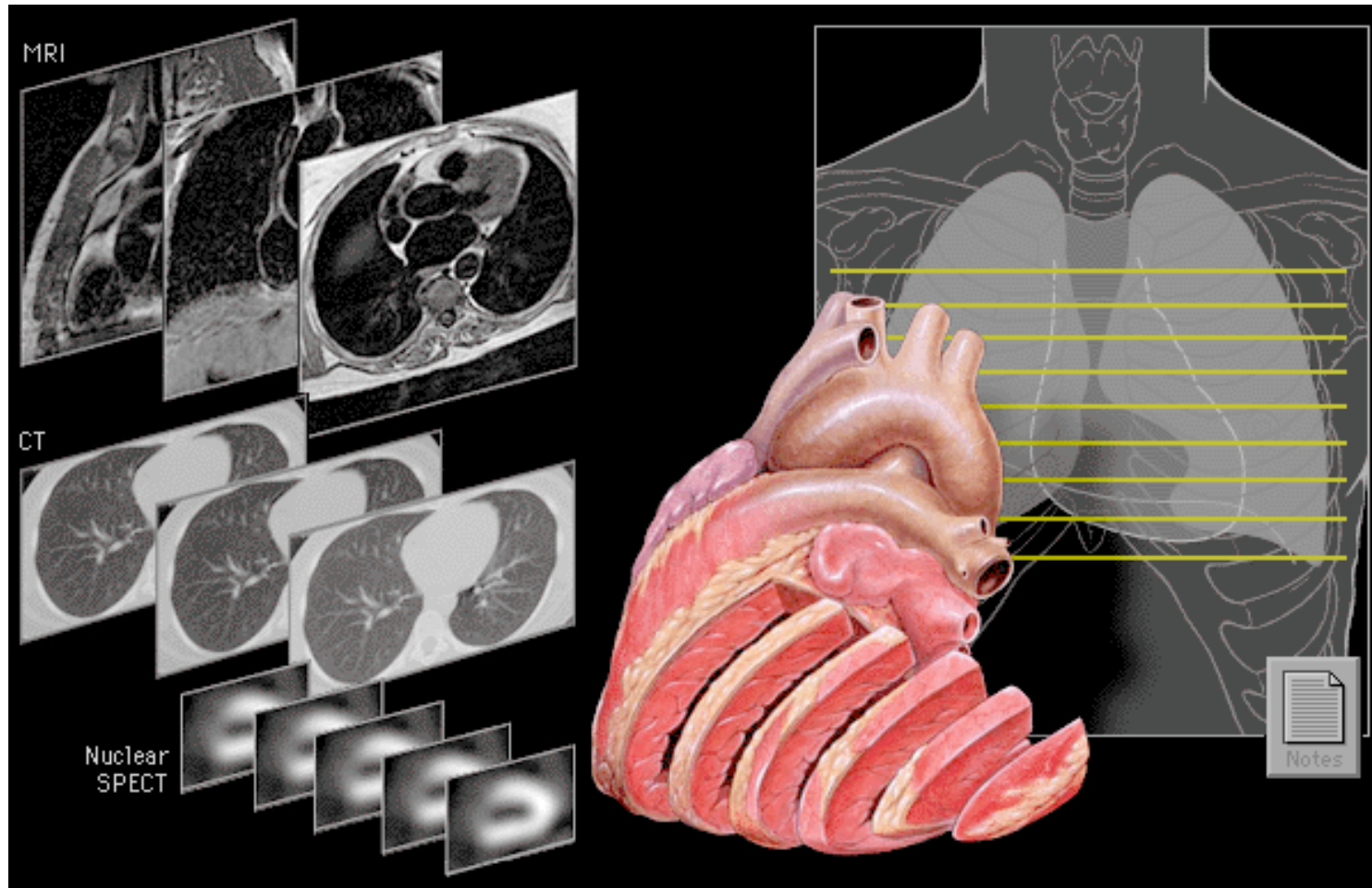


[Rantala *et al.* 2006]
Thanks to GE Healthcare

Tomosynthesis



Besov prior



Kolmiulotteista kuvantamista lääketieteessä eri menetelmillä