



Questions & Answers XRT seminar

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What kind of information from XRT would you like to use in your research?

Plant/Soil

- 3D root architecture dynamics (preferably more than 1 plant).
- 3D architecture of fungi growing solid substrate.
- First stage of mushroom formation.
- Soil texture.
- Effect of soil fauna and roots on soil pore size, distribution and connectivity.

Food

- Volume, surface, shape, density, counting.
- Presence of capillaries (size distribution).

Physiology and animals

- Volumetric (+relation between volumes).
- Sizes + thickness + locations of sponge structures (marine animal, or coral).
- Internal bone structures.
- Structure of fouling (tiered process).

For all objects:

- *Geometric data like size, shape, location and thickness are standard features of our analysis software.*
- *3D root structures in a wet environment are still hard to separate from that environment since the density of root are more or less equal to that of water.*
- *Solid-air are relative easy to perform.*

What will be your first object you want to scan and what do you want to know about the object?

Plant/Soil

- Is it possible to detect stresses (due to water shortage, insect infection, etc.) by this method?
- Pot with 2 or 4 plants; root architecture of each plant individually.
- Is it possible to detect organic matter in the soil sample?

Food

- Fried mango; air bubble, oil, water.
- Hazelnut, walnut, fruit yoghurt.
- Peanut, peanut butter; oil, water, protein.

Physiology and animals

- Insect head + brain (?) 0.01mm².
- Uptake of microplastics in mussels (before, after, after depuration) visualise where in body and how many.

For all objects:

- *Three main criteria for X-Ray Tomography are:*
 - o *difference in density of the components you want to see, and*
 - o *the details that need to be analysed should be larger than the resolution (1/1000 of the object size).*
 - o *the object must not change in size, shape and position during scanning.*

What else do you want to know about XRT

- Benefits of XRT above other imaging equipment.
It fills the gap between light microscopy and MRI in terms of resolution.
Moreover it is, like MRI, a 3D analysis.
- Limitations of XRT regarding material properties that it can detect.
Very dense (and thick) and very soft matter is hard to scan, but not always impossible.
- Dynamic range vs. density/specs in general.
The detector has a dynamic range of 14bit and 2024x2024 pixels.
- Is there any forbidden element that must not be analysed?
Not in general.

I have another question/remark

- Location of oil in pores oil absorbing foam (μm spheres +pores).
Yes, that is possible.
- Is it possible to send the results to a 3D printer? Create large version.
Yes, that is possible; however some 3D printers have geometric limitations.
- Would it be possible to distinguish (2D) animal components (bone, muscle, hair, feather) in animal feed samples (which is prohibited by law)?
Depends on the specific situation. Dense material (like bone) might be easily detectable. Hair and feather might be more difficult.