**Introduction**

Computed tomography (CT) is a versatile, non-destructive technique for 3-D object analysis, theoretically allowing for the discrimination and quantification of individual mineral phases within a given sample.

**A novel approach**

Here, we introduce a novel approach to constrain individual mineral phases of a given sample using the distribution of aragonite and calcite in two diagenetically altered tropical corals as an example in combination with reference material.

**Work flow**

1. **Sample imaging and manual reference material segmentation**

   - 3-D sample reconstruction
   - Isolated reference material
   - Manually segmented
   - Coral
   - Aragonite
   - Abiotic aragonite
   - Air
   - C1*: Coral variable aragonite-calcite mix
   - C2*: Coral mainly calcite

   *Used corals originate from Zanzibar, last interglacial

2. **Calculation of mean radiodensity variability throughout each segmented reference material and surrounding air**

   - Aragonite
   - Calcite
   - Air

   *Script for automated multiple mean values calculation developed by S. Krause, K. Engelkes, S. Büsse

3. **Definition of min-max intensity values for each material**

   - Plot of mean values vs 3D of radiodensity for each reference material and air to identify reliable min-max radiodensity boundaries

   Due to material heterogeneity and scan settings approx. 10% of overlapping mean radiodensity of aragonite and calcite in this sample

**Real-life problems using CT**

A reproducible, straight-forward mineral identification and quantification is hampered by the natural mineral heterogeneity and individual X-ray source aging of signal-to-noise ratio of CT-scanners.

**4. Seed point setting and watershed algorithm**

Small volumes (e.g. 25x25x25 voxel) of the entire sample are probed for their mean radiodensity value. In case it falls within the definition for a pre-defined mineral, a seed point for it is set. Subsequently, seed points are propagated with the watershed algorithm.

**Achievements**

- Robust non-destructive reconstruction of multi mineral phases, suitable for sample pre-investigation

**Current limitations**

- Approx. 10% of aragonite is not correctly assigned