

ANSTO User Meeting 2021



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Type : Oral

Jaws caught on the IMBL

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Maturational changes in feeding behaviour among sharks are associated with increased mineralisation of the teeth and jaws, but this relationship has only been demonstrated in a few species. Large, highly mobile shark species are rarely available for detailed anatomical study, despite their importance for ecological health and widespread interest among the general population. We examined the crania, jaws, and teeth of two great white sharks (*Carcharodon carcharias*), a 2.3 m juvenile and a 3.2 m young adult.

The CT scans used a 230 keV (mean energy) polychromatic beam from the 4 Tesla wiggler, with a filtration of 6mmAl, 6mmCu, 3mmMo and 3mmPb. The detector was a Teledyne-Dalsa Xineos 3030HR with 100µm pixels, a width of 300mm, and a 1mm CsI converter for high efficiency at high energy. Image noise was reduced by collecting 18,000 projections per rotation to deliver an image quality good enough to segment out different tissue types. With a beam size of 300mm x 35mm, the shark head was covered by 'tiling', and stitching the tiles, with the full-head image made up of two columns and 21 tiles, to image a 600mm x 520mm area. Total scan time was 9 hours.

The heads were also imaged using conventional CT and 7 Tesla MRI for finite element modelling of bite forces produced by the jaw musculature. These results will be compared with measurements of the difference in mineralisation of tooth and jaw cartilage between the two specimens to assess developmental changes in tooth and jaw hardness as the animals shift their diets from largely fish-based (juvenile) to larger prey, such as seals, scavenged whales and surfers (adults).

Level of Expertise

Expert

Presenter Gender

Woman

Pronouns

She/Her

Which facility did you use for your research

Australian Synchrotron

Students Only - Are you interested in AINSE student funding

No

Do you wish to take part in the Student Poster Slam

No

Condition of submission

Yes

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