# Where does the sediment go?

## Visualising sediments in sponges using micro-computed tomography (micro-CT) scanning

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## Aims

> To determine where suspended sediments in the water go when they enter a sponge

> To visualize and describe structures and mechanisms associated with sediment clearance in sponges

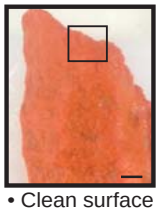
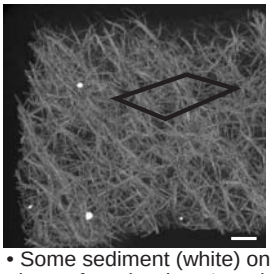
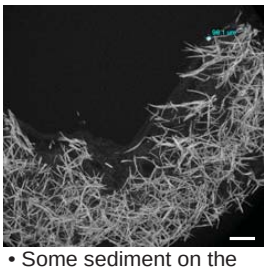
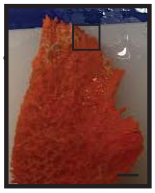
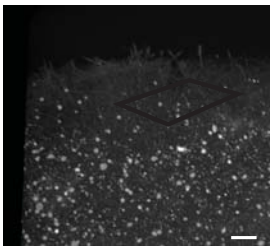
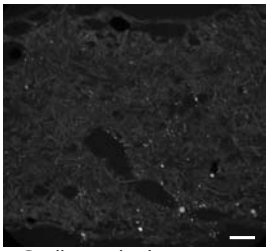
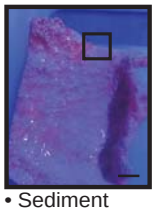
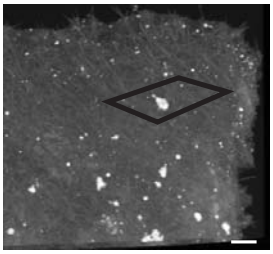
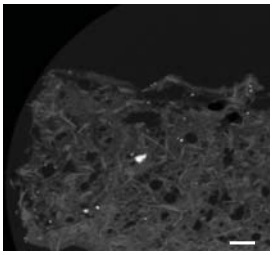
## Background

> Marine sponges filter up to $10^5$ times their volume of water daily
> They depend on extensive, convoluted channel systems for gas exchange, feeding and waste elimination
> How do they maintain these channels when exposed to high turbidity?

## Methods

> *Sylissa* sp was exposed to sediment concentrations of 200 mg $L^{-1}$
> Scanned using a Xradia VersaXRM micro-computed tomography (Micro-CT) scanner
> Created 3D images of sponges using multiple X-rays images

## Results

| | Photo | 3D micro-CT | 2D micro-CT |
|---|---|---|---|
| **Control** |  • Clean surface (scale = 1 cm) |  • Some sediment (white) on the surface (scale = 1 mm) |  • Some sediment on the surface (scale = 1 mm) |
| **Three hours** |  • Sediment accumulation |  • Sediment evenly distributed inside sponges |  • Sediment in tissue (choanosome) and canals |
| **Three days** |  • Sediment cover |  • Sediment aggregated in discrete areas |  • Sediment surrounded by tissue (choanosome) |

## Discussion

> Sediment collects in the channels and in the tissue
> Two methods of sediment management in *Stylissa* sp. were identified:

1) Adherence of sediment to mucus in the canals
2) Active aggregation of sediment in discrete areas

## Future work

> Use Micro-CT scans to explore the pressure-response relationships of sponges to dredging-related stressors:

1) High total suspended solid levels
2) High sedimentation rates

Special thanks to: Christine Schönberg, Evy Buettner, Flora Siebler, Mari Carmen Pineda, Gerard Ricardo, and SeaSim

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