



Center for Subsurface Sensing and Imaging Systems (CenSSIS)

Coral Imaging Using Ultrasound

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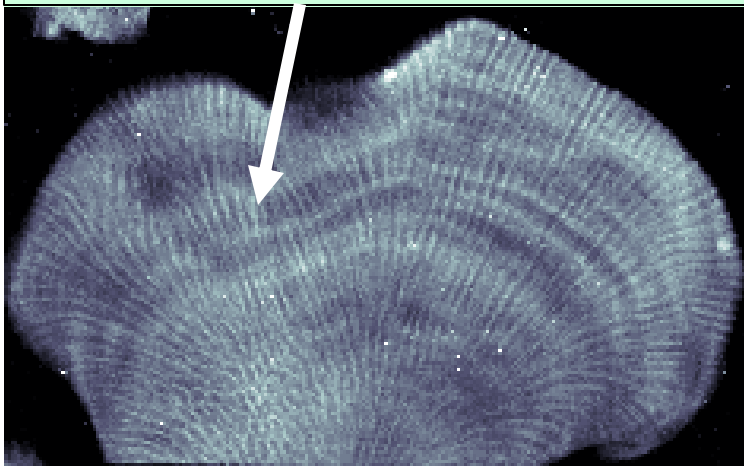


Motivation – Distinguish Year Bands

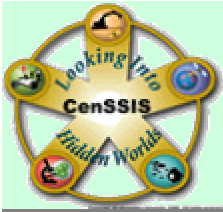
Tree Rings



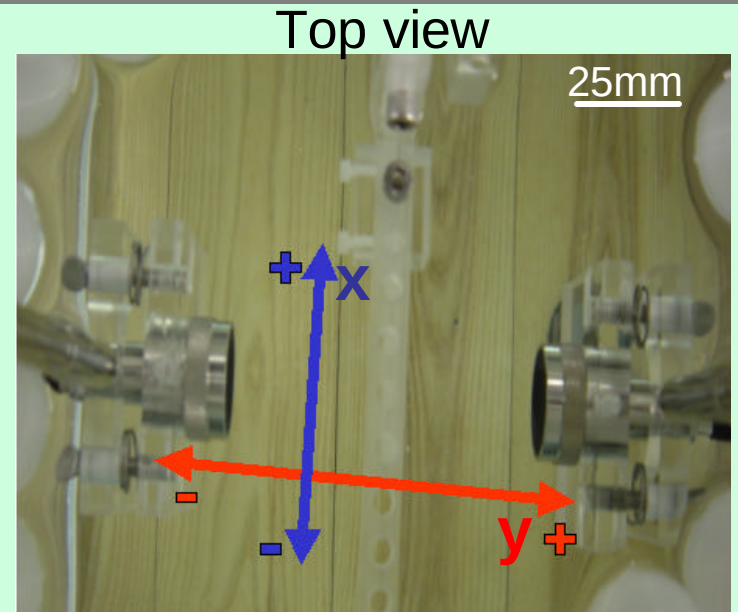
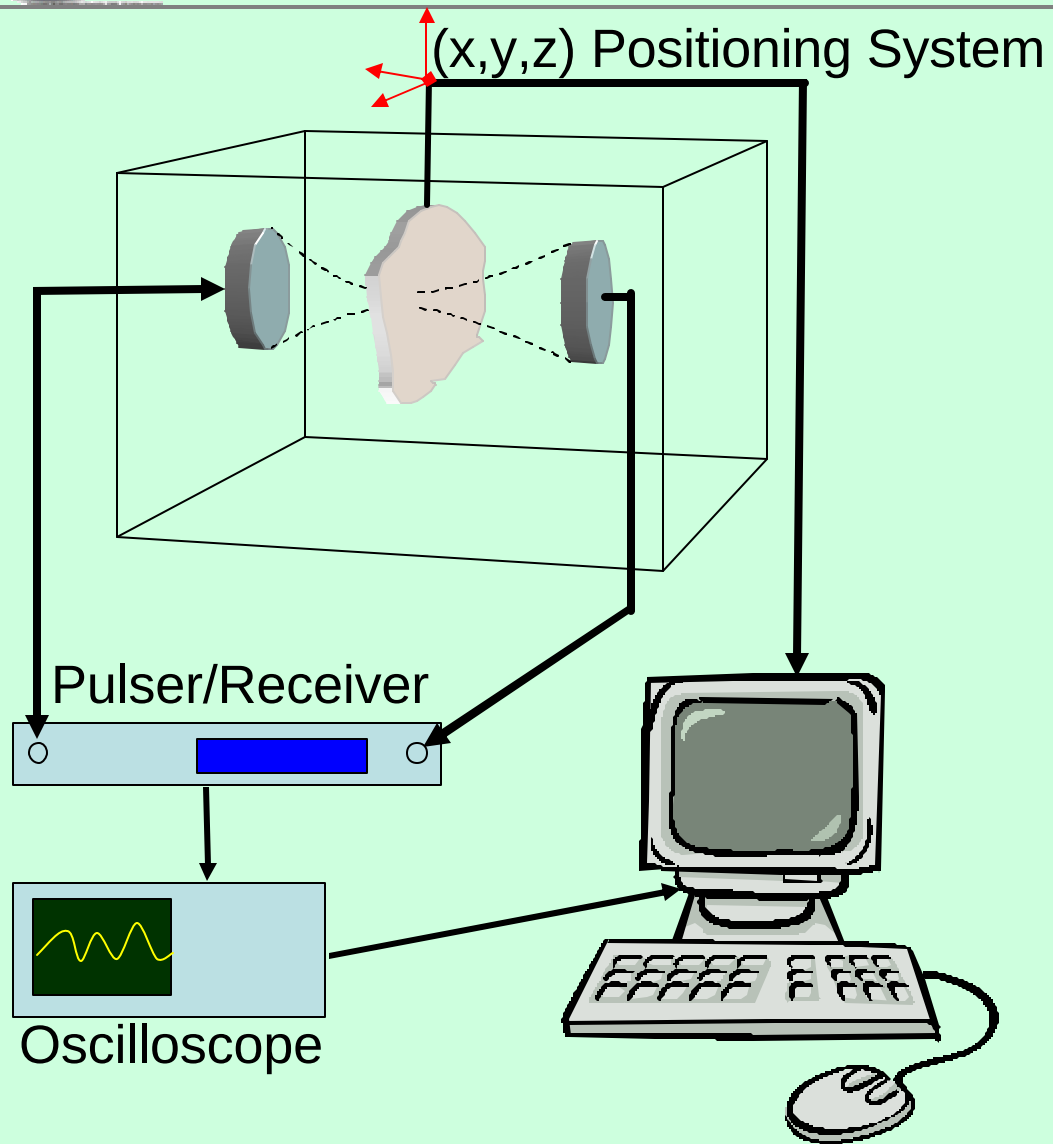
Coral Year Bands



- Skeletal density of coral related to ocean temperature
- Currently X-Rays used for imaging
- Ultrasound velocity and attenuation are related to skeletal density



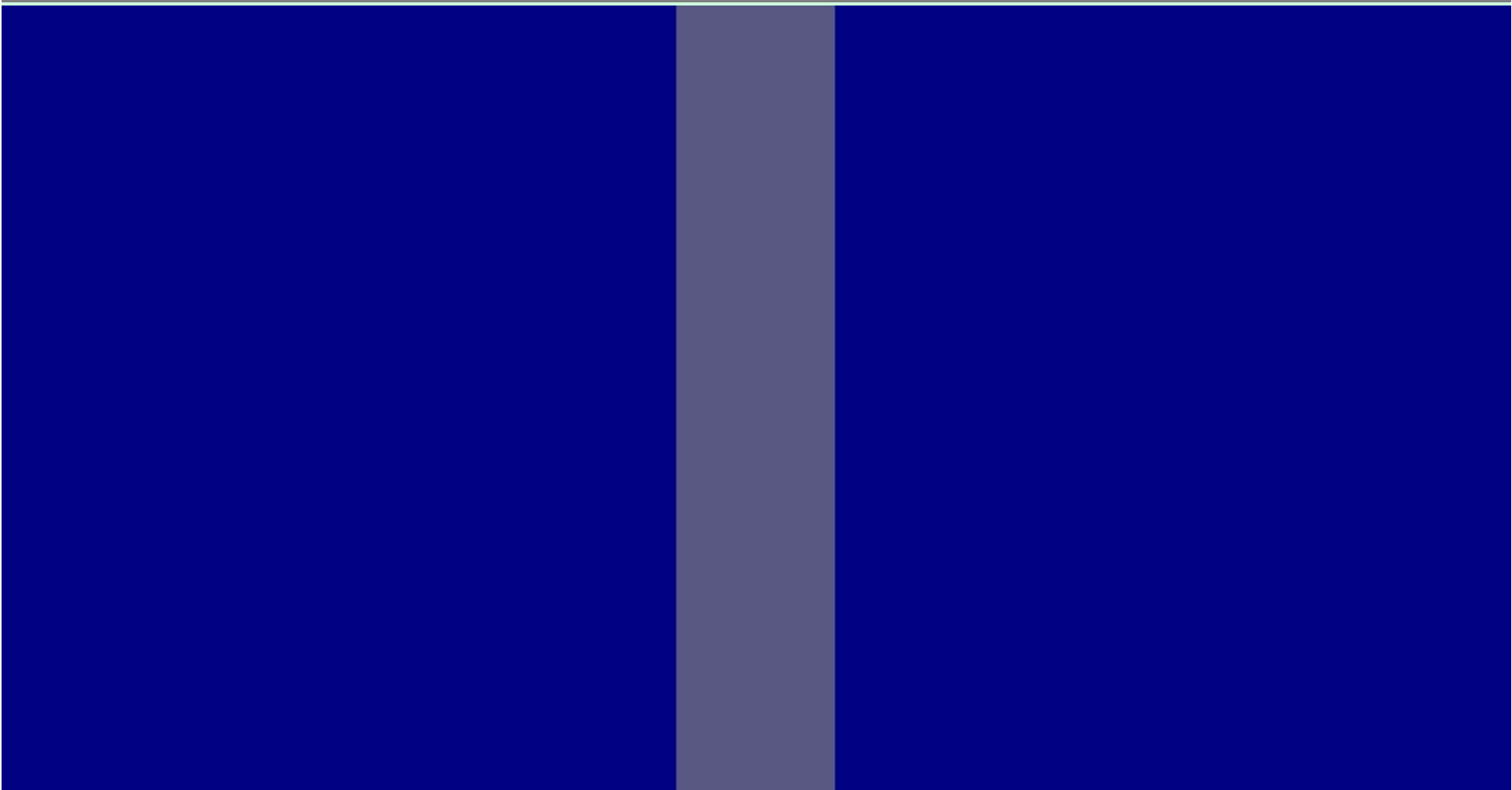
Setup



1MHz Focused
Transducers



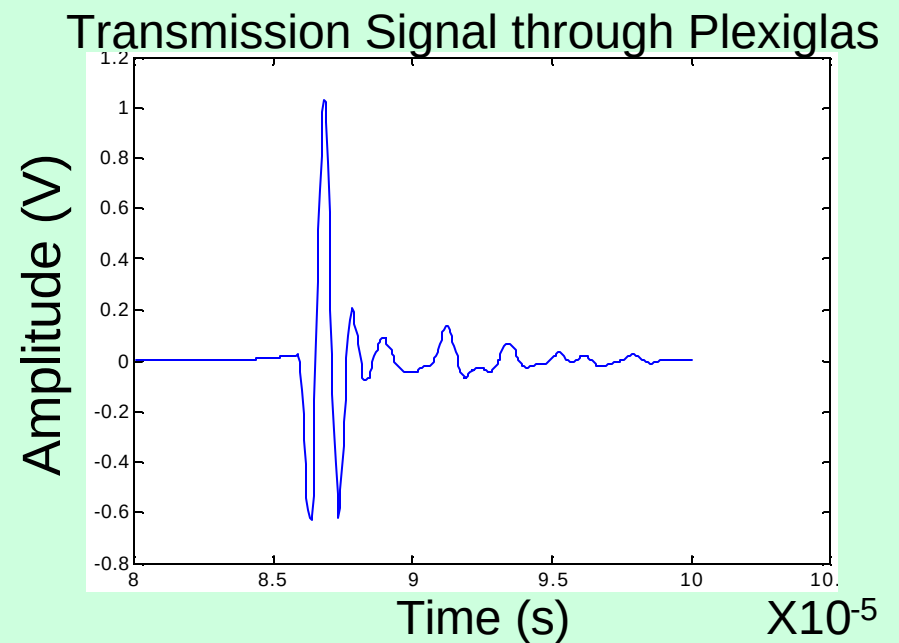
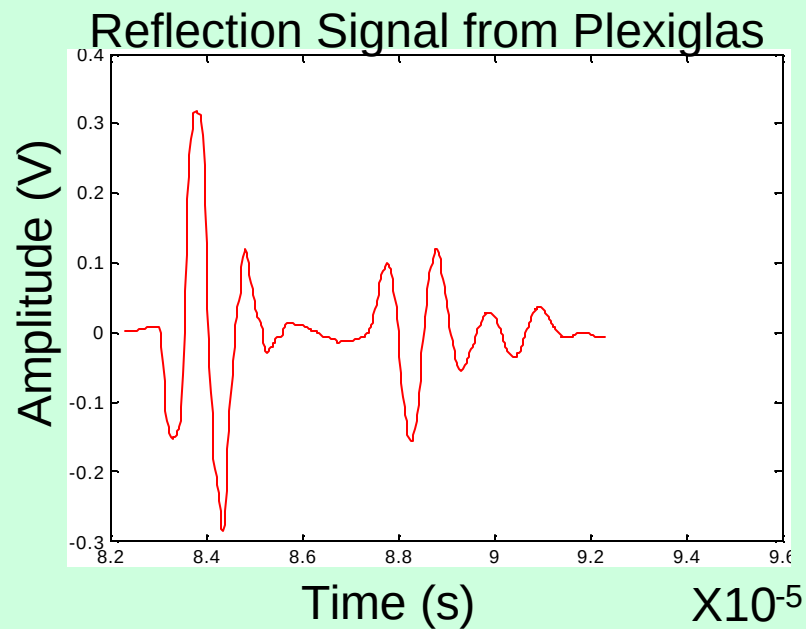
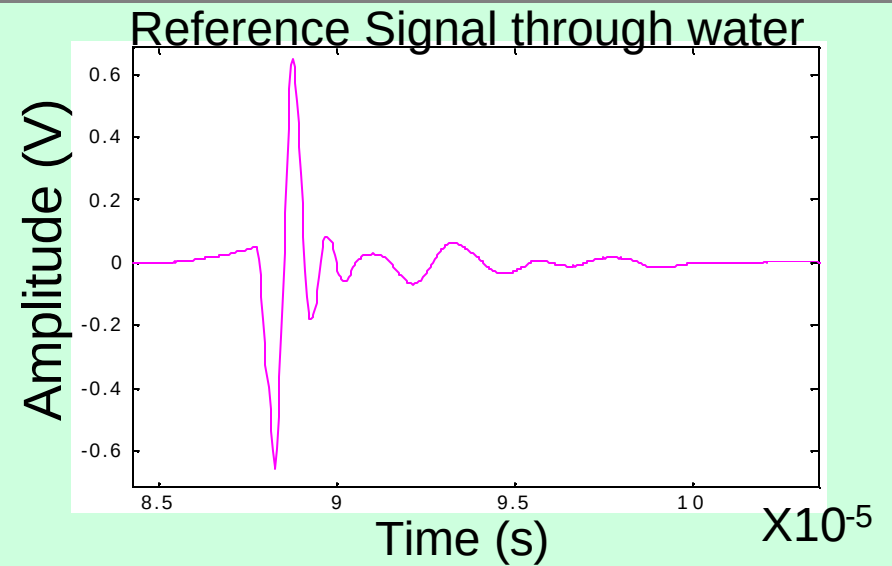
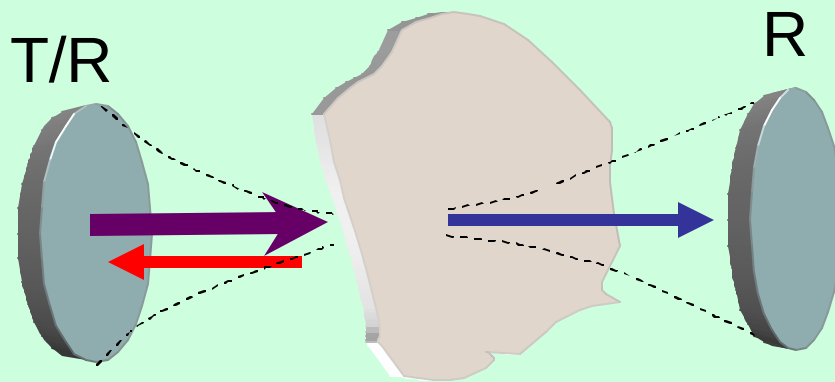
Technique



Multiple reflections and transmissions

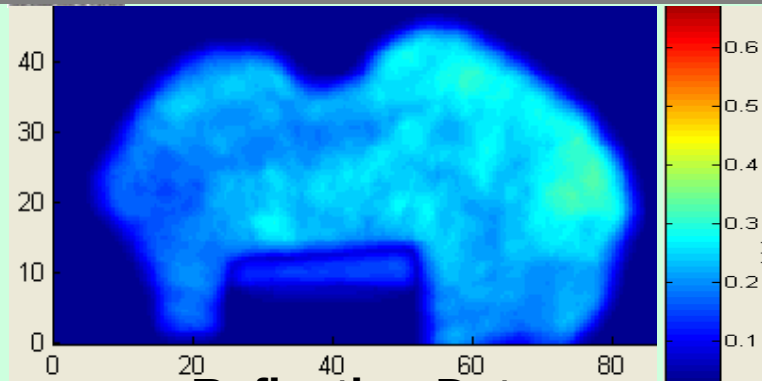


Technique

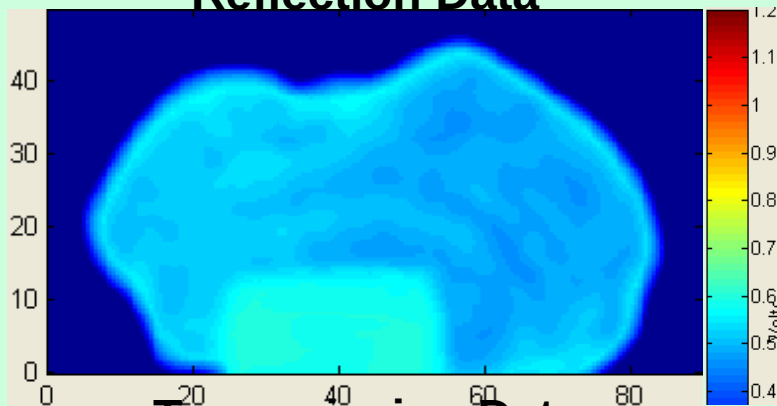




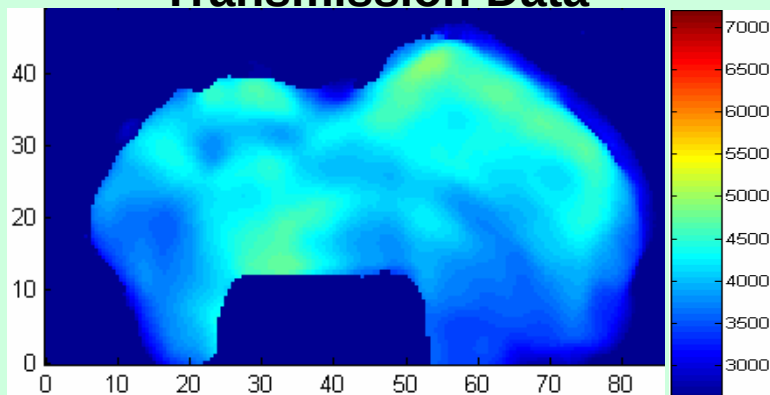
Results



Reflection Data

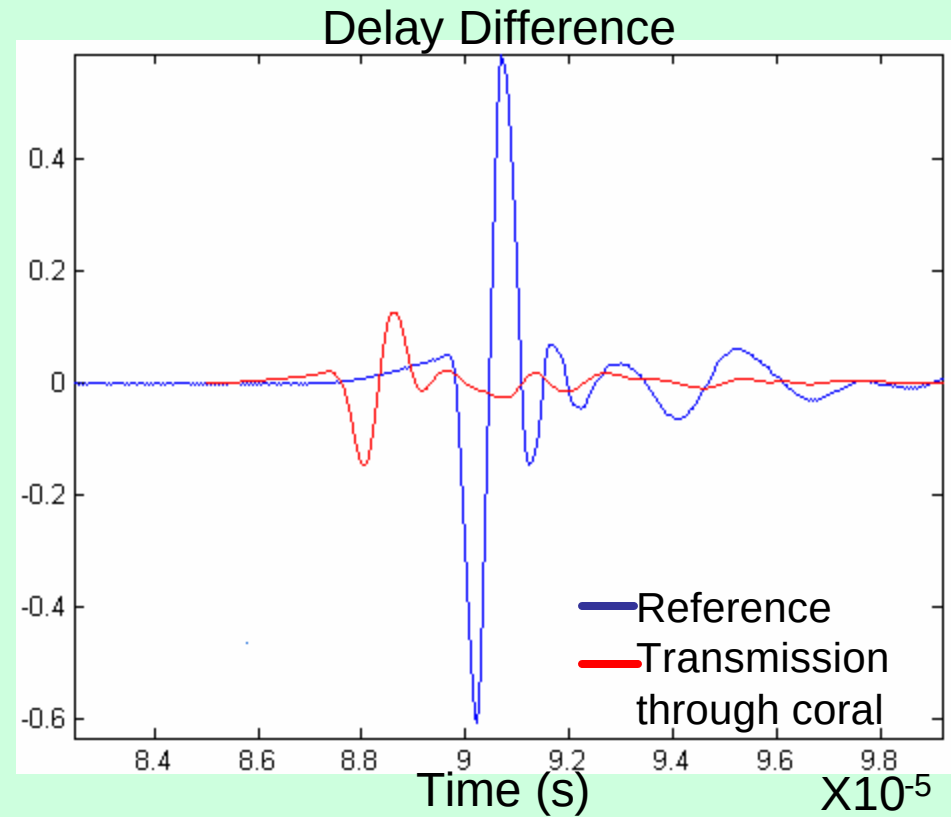


Transmission Data



Velocity Data

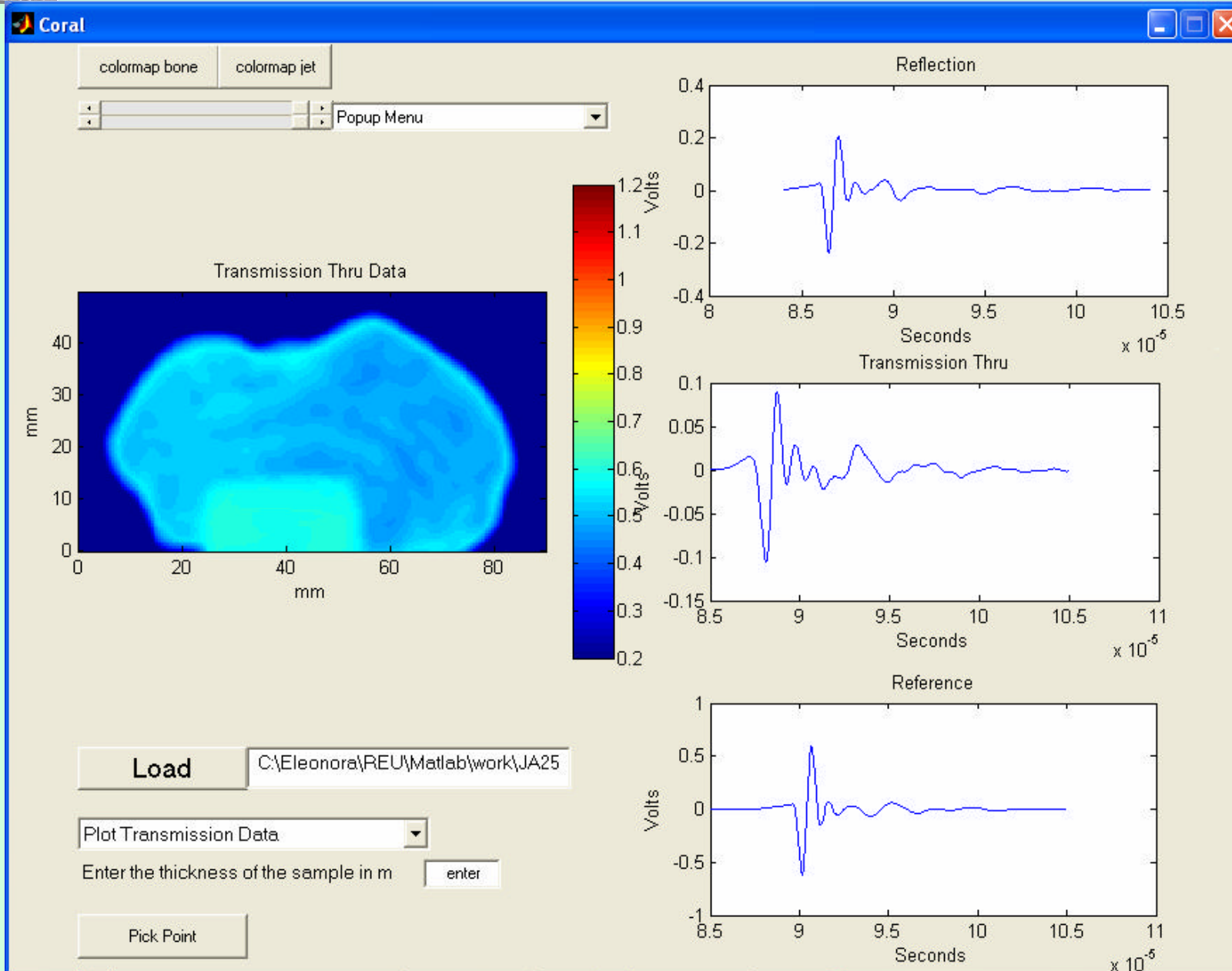
Amplitude (V)



$$v_c = \frac{d}{T_t - T_0 + \frac{d}{v_w}} = \frac{d}{DT + \frac{d}{v_w}}$$

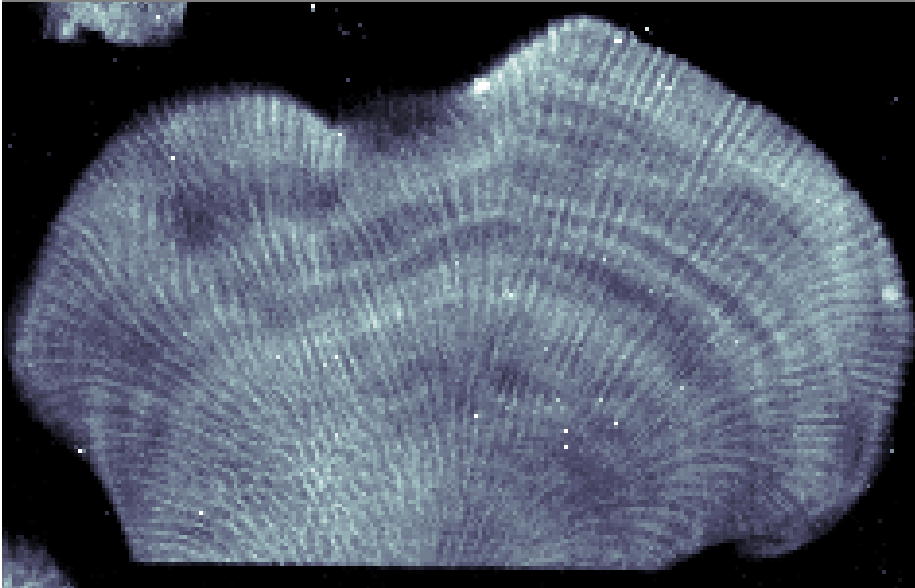


GUI

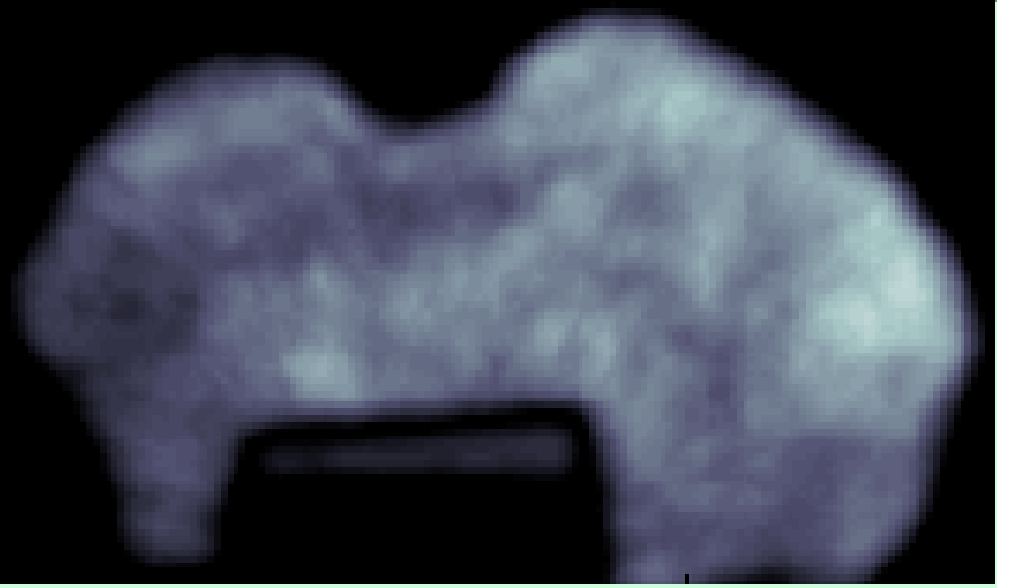




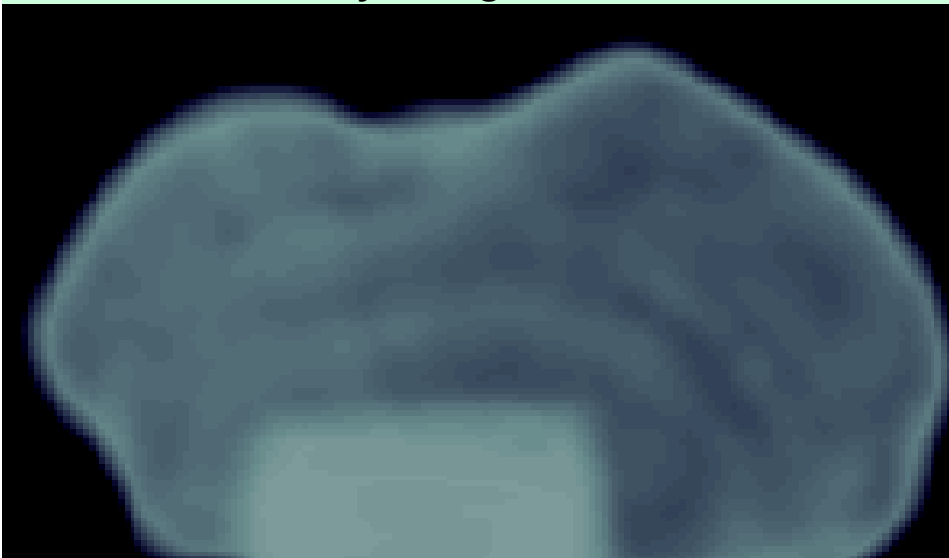
Results – JA25



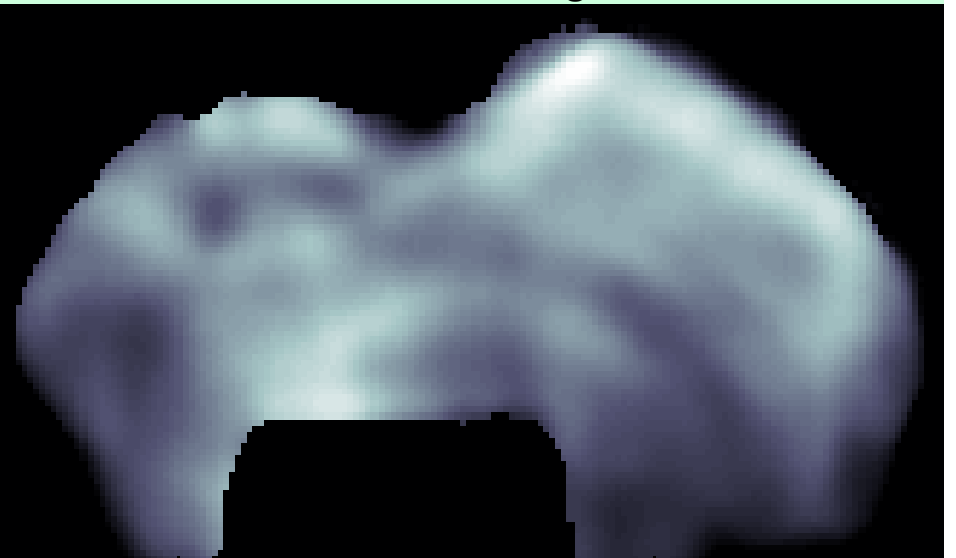
X-Ray Image



Reflection Image



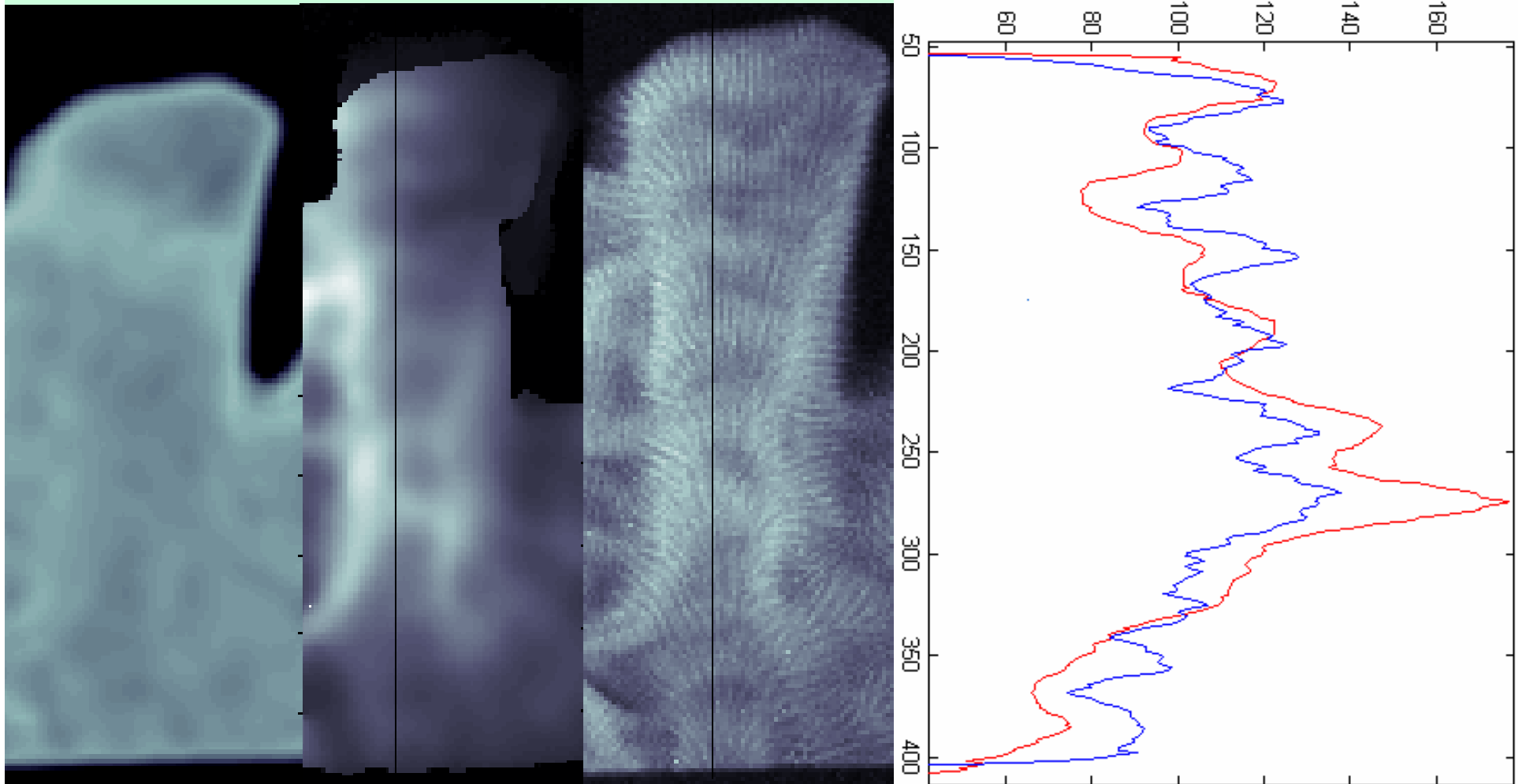
Transmission Thru Image



Velocity Image



Results – JA27



Transmission

Velocity

X-Ray

— From Velocity Image

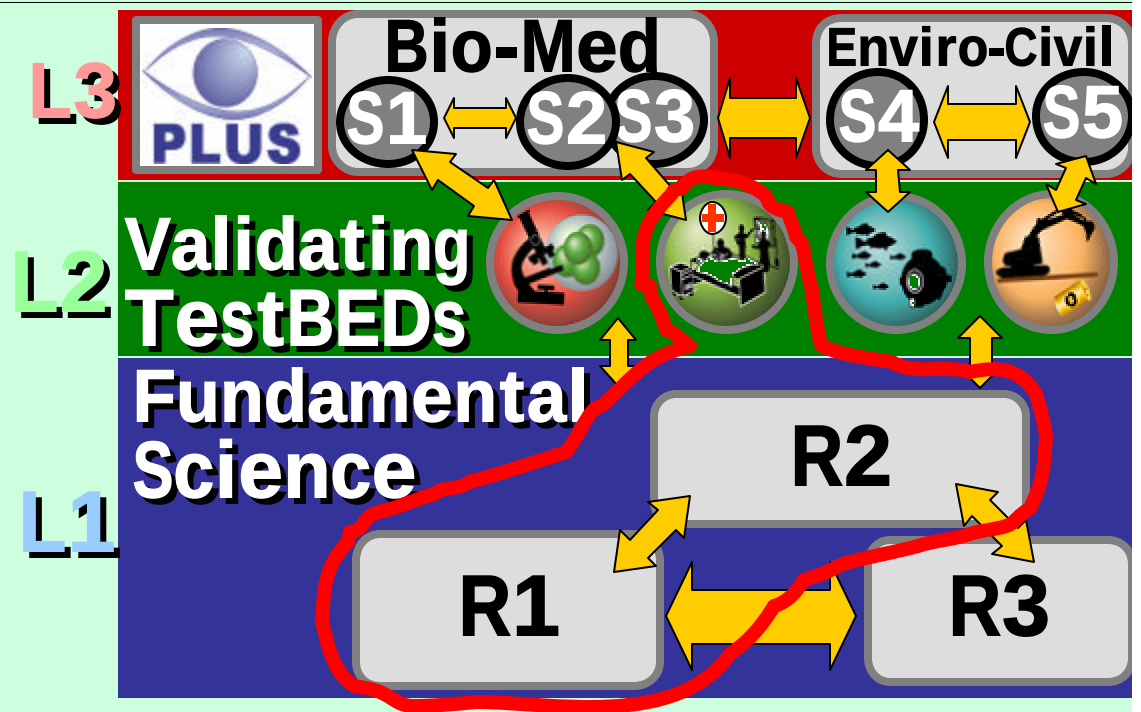
— From X-Ray Image



Conclusion

Ultrasound can be used to determine coral skeletal density

Contribution to CenSSIS





Acknowledgements

Robin Cleveland

Emmanuel Bossy

Anne Cohen

CenSSIS



Questions?