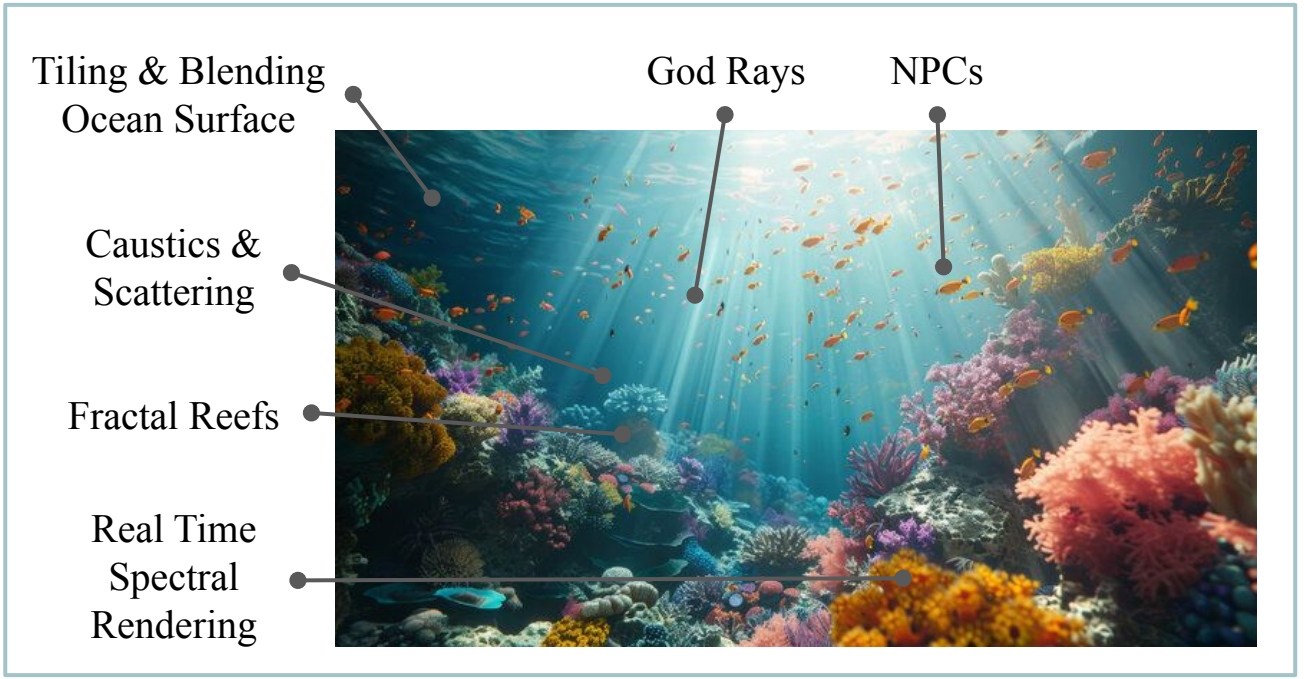
Under the Sea (Final Product AI Concept Art)

Joanna Fisch, Nick Liu, Yuhan Liu

Under the Sea

Real-time, infinitely explorable ocean, generated by combining some of the latest publications in parallelizable graphics algorithms.

Implemented in WebGPU



Literature

For procedural coral reefs: Into the Portal: Directable Fractal Self-Similarity (SIGGRAPH ‘24)

- novel, directable method for introducing fractal self-similarity into arbitrary shapes

For water surface: Fast orientable aperiodic ocean synthesis using tiling & blending (HPG ‘24)

- tiling and blending, a procedural generation algorithm popular for real-time texture synthesis, in order to quickly generate variations of the mesh displacement of an ocean surface

For rendering and underwater effects: Real-Time Underwater Spectral Rendering (HPG ‘24)

- analytical approximation to the Radiative Transfer Equation, allowing for real-time spectral rendering with results comparable to Monte Carlo ground-truth references,in a fraction of the time

Milestones

Milestone 1: Understand & Implement Target Papers

- ocean surface, spectral underwater rendering, fractal coral

Milestone 2: Build GPU-Based User Experience Enhancements on top of Foundation

- infinite world generation, more complex procedural structures, NPC sea creatures

Milestone 3: Optimize for More Efficient Real-Time Rendering

Final: Refine for Artistic Aesthetics & Quality