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Wave-induced growth and modulation of sub-surface turbulence.

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This study investigates the effect of monochromatic surface wave motion on the subsurface turbulence using experimental and numerical approaches. The evolution of turbulent kinetic energy, length scales and structure is evaluated using passive and active infrared imaging (i.e. Thermal Marking Velocimetry) of the water surface. This approach allows for effective decoupling of orbital and turbulent velocity components. Numerically, a fully nonlinear model for the wave motion is coupled with Large Eddy Simulation for the turbulent motion. The results confirm turbulence production due to wave motion. The turbulent kinetic energy was found to be a function of time, wave steepness, wave phase, and initial turbulent conditions. Additionally, turbulent motion near the surface was found to be horizontally anisotropic due to the formation of near-surface eddies, elongated in the direction of wave propagation.