COASTAL DYNAMICS

A case study with the United States Geological Survey (USGS)

Underwater seagrass protects our coastlines by reducing the impact of storms. Increasing external stressors such as rising sea levels and ocean temperatures threaten their habitat.

To better understand the impact of coastal hydrodynamics on vegetation, scientists from the United States Geological Survey wanted a cost-effective data-driven approach to sensitivity analysis. In other words, they wanted to understand which hydrodynamic characteristics have the greatest impact on vegetation.

They used equadrature's sensitivity analysis framework with their Coupled Ocean-Atmoshphere-Wave-Sedimental Transport (COAWST) modelling system. With a very small simulation budget, equadratures was able to provide sensitivity metrics that provide very useful. The project lead, Dr Taran Kalra, a computing technical scientist with the Marine Science Centre Coastal, and Estuarine Dynamics Coastal Group at Woods Hole had the following to say:

> While we had studied other techniques for sensitivity analysis, it was clear that equadratures was purpose-built to provide us valuable information on a tight budget. Additionally, the equadratures team offered us great technical support throughout the project and provided us with a valuable understanding of Sobol' indices and other sensitivity metrics.
>
> Taran Kalra.

Detailed outputs of this case study may be found in the reference below.

Kalra, Aretxabaleta, Seshadri,Ganju, Beudin, [2017] "Sensitivity analysis of a coupled hydrodynamic-vegetation model using the effectively subsampled quadratures method", Geosci. Model Dev, 10 (12).

equadratures