



University of Hawai'i at Mānoa

Hawai'i Natural Energy Institute

School of Ocean & Earth Science & Technology

The Concept of Artificial Upwelling: Myth or Promise?

Some of the biologically most productive oceanic regions correspond to upwellings sustained by wind forces near coastal boundaries or by the divergence of ocean currents. As a result of such processes, nutrient-rich upwelled water is exposed to greater photosynthetically-available solar radiation. In sharp contrast, vast areas of the tropical oceans are oligotrophic with strong and persistent density stratification that prevents abundant deep-water nutrients from reaching the surface. 'Artificial upwellings' essentially would 'bridge the gap' and bring nutrient-rich deep water to the surface by anthropogenic means, e.g. with pipes and pumps.

Basic considerations supported by simple calculations will be presented to probe whether engineering could effectively 'turn the water column upside down' and locally alter oligotrophic marine environments. When needed, field data from the Hawaii Ocean Time (HOT) series at Station ALOHA are used. The proposed approach relies on the existence of two distinct time scales for this complex problem: one corresponds to buoyancy (near field) and the other to turbulent diffusion and photosynthesis (far field).

Gerard Nihous

Associate Researcher

Hawaii Natural Energy Institute

Tuesday, March 6, 2007

3:15 – 4:15 PM

POST 723

Sponsored by

Hawai'i Natural Energy Institute