



## **Artificial neural network analysis of factors controlling ecosystem metabolism in coastal marine environments**

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Knowing the metabolic balance of an ecosystem is of utmost importance in determining whether the system is a net source or net sink of carbon dioxide to the atmosphere. However, obtaining these estimates often demands significant amounts of time and manpower. Here we present a simplified way to obtain an estimation of ecosystem metabolism. We used artificial neural networks (ANNs) to develop a mathematical model of the gross primary production to community respiration ratio (GPP:CR) based on input variables derived from three widely contrasting European coastal ecosystems (Scheldt Estuary, Randers Fjord, and Bay of Palma). Although very large gradients of nutrient concentration, light penetration, and organic-matter concentration exist across the sites, the factors that best predict the GPP:CR ratio are sampling depth, dissolved organic carbon (DOC) concentration, and temperature. We propose that, at least in coastal ecosystems, metabolic balance can be predicted relatively easily from these three predictive factors. An important conclusion of this work is that ANNs can provide a robust tool for the determination of ecosystem metabolism in coastal ecosystems.