
PREDICTING THE MOVEMENTS OF NUTRIENTS IN THE GREAT BARRIER REEF

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ABSTRACT

An outline is given of the movement of nutrients in three cases, namely the case of river floods, the circulation around reefs for non-buoyant nutrients, and the fate of buoyant nutrients (coral eggs and sewage). In the first case, the river plume formation leads to a baroclinic coastal boundary layer of width increasing northward (for large river discharges) away from the river mouths. When the river flood ceases, baroclinic effects break up the plume in patches which are leaking along the coast. These patches drift more or less passively with the currents and can sweep over a considerable extent of the Great Barrier Reef. In the second case, non-buoyant nutrients are **advected** by currents around reefs and may be trapped in lagoons and near separation points. The CORSPLEX model can be used to predict these topographically-controlled flows as it has been successfully verified against extensive field data collected at three test areas, namely Rattray Island, the Ribbon Reefs and Bowden Reef. In the third case, buoyancy-induced secondary flows are expected to have a dominant influence as they result in concentrating the coral eggs, oil and buoyant waste along topographically-controlled fronts. This process is not predicted by any available classical two-dimensional models. These models are still extensively used, though they are invalid, in determining the fate of nutrients, coral eggs, oil and sewage near reefs.
