



**Figure 7:** Scaled differential absorption at 443 and 490 nm which is related to absorption by dissolved coloured organic matter (CDOM). The units are strictly arbitrary because of the unknown variations in phytoplankton and sediment-specific absorption with region and season, but approximate to absorption at 440 nm in units of  $\text{m}^{-1}$ .

## Conclusions

The data presented here represent the state-of-the-art in remote sensing products of New Zealand coastal waters: i.e. they are the best quality data currently available. The absolute concentrations of SPM and absorption due to CDOM are unlikely to be precise because of the regional nature of the relationship between inherent optical properties and biogeochemical properties in natural coastal waters, and uncertainties associated with the algorithm and remote measurement process. This means that the onshore-offshore patterns shown in the Case 2 products in a given area may be expected to reflect patterns in suspended sediment and CDOM in that area, but comparisons of the absolute values of the products between different coastal regions of New Zealand are unlikely to be meaningful. The data may be broadly representative of the degree of influence of freshwater run-off on coastal waters, and consequently the data may be found to be useful within the Marine Environment Classification to investigate factors affecting biological and/or ecological properties of the New Zealand marine environment.

The long-term average results are intuitively sensible, indicating higher concentrations of suspended particulate material (SPM) and coloured dissolved organic matter (CDOM) close to the coast than in the offshore regions. Higher long-term values of suspended sediment are shown to occur in the Hauraki Gulf, Hawke Bay, Cook Strait and along the west coast of South Island, which seems reasonable. It is not possible to validate these products in a more formal sense at present.

Rigorous validation of remotely-sensed ocean colour data in the coastal zone is a considerable undertaking. At the time of writing, NIWA has carried out three dedicated bio-optical research cruises in coastal waters: (1) Golden Bay, Tasman Bay, the Marlborough Sounds (December 2001); (2) Bay of Plenty (June 2004); (3) Hauraki Gulf (December 2004). Bio-optical work has also been carried out off Gisborne in January 2005 as part of the Kilo Moana geological research voyage. Results from the latter two voyages have yet to be analysed and incorporated into the bio-optical retrieval algorithms.

The authors recommend that the following work be carried out in the future to assess and improve the quality of biogeochemical products of New Zealand's coastal zone derived from ocean colour satellite measurements:

- Analysis and synthesis of existing in situ bio-optical data, with increased use of underwater radiative transfer modelling methods for testing optical closure (e.g. Hydrolight software).

- Further development of the Inherent Optical Property Case2 algorithm, and intercomparison of this algorithm with alternative Case 2 methods.
- Validation of atmospheric correction procedure over New Zealand turbid waters.
- Specialised bio-optical fieldwork in key coastal regions of New Zealand: Hawke's Bay, Cook Strait, west coast South Island.

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