LIST OF TABLES

3.1 Parameterisations of inherent optical properties of pure sea water and constituents of Case I waters 24

3.2 Data sources and characteristics of the SeaBAM data set, reproduced after *O'Reilly et al.* [1998] 25

3.3 Regional distribution of the COASTLOOC stations located in Case I waters 26

3.4 Performance with regard to pigment retrieval of spectral band combinations used as input to ANNs. The performance is given for the most successful of the 16 ANNs trained for each combination of input parameters, characterised by the number of neurons in the hidden layer and the noise level 28

3.5 Empirical ocean colour algorithms based on remote sensing reflectance 33

3.6 Performance of the ANN-based pigment retrieval scheme as compared to selected empirical algorithms when applied to the SeaBAM and COASTLOOC data sets 33

3.7 Performance against noise of the ANN-based pigment retrieval scheme as compared to empirical algorithms. All algorithms were applied to SeaBAM remote sensing reflectance ratios to which different levels of noise have been added. The following acronyms are used: POL = POLDER, CCO = CalCOFI two-band cubic, MO3 = MOREL-3, MO4 = MOREL-4, OC2, OC2B and OC4 = Ocean Chlorophyll algorithms 2, 2B and 4 35

4.1 Information on the COASTLOOC data set 40

4.2 Parameterisation of inherent optical properties of pure sea water and constituents of Case II waters 42

4.3 Inputs for Mie calculations 49

5.1 Ranges of oceanic constituent concentrations 52

5.2 Characteristics of *in situ* data sets 56

5.3 Performance with regard to pigment retrieval of spectral band combinations used input to ANNs (Case II waters) 59

5.4 Performance with regard to SPM retrieval of spectral band combinations used input to ANNs (Case II waters) 60

5.5 Performance with regard to CDOM retrieval of spectral band combinations used input to ANNs (Case II waters) 61

5.6 Performance of the selected optimal ANNs for the retrievals of three oceanic constituents 64

5.7 (a) Performance of the ANN-based pigment retrieval algorithms as compared to the PMNS algorithm 68

5.7 (b) Performance of the ANN-based SPM retrieval algorithms as compared to the PMNS algorithm 68

5.7 (c) Performance of the ANN-based CDOM retrieval algorithms as compared to the PMNS algorithm 68

6.1 Aerosol models used in this study.....71

6.2 Size distributions of various aerosols used in this study 72

6.3 Ranges of oceanic constituents 74

6.4 Ranges of atmospheric components 75

6.5 Ranges of geometric and other parameters.....75

6.6 Spectral channels and their bandwidth used in this study 75

6.7 The noise level added to training data inputs 76

6.8 Performance of the ANN-based algorithm for the retrieval of the oceanic constituents as well as the optical thickness of aerosols 79

6.9 Aerosol mixtures for testing the performance of the trained ANN 84