

# A quality control system for biological oceanographic data in the Northern Indian Ocean

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A quality control system (qcs) has been developed for checking the quality of primary production (pp) and chlorophyll-a (chl) data collected during the International Indian Ocean Expedition (1960-66), and cruises of R.V. Gaveshani (1976-94) and O.R.V. Sagar Kanya (1985-1997) from the Northern Indian Ocean. Besides the standard quality control (qc) measures, the qcs has specific norms for checking the quality of 'pp' and 'chl' profiles based on photosynthesis theory. The first norm was that when the rates of 'pp' i.e. carbon fixation due to photosynthesis are normalized to 'chl' (pp/chl), the ratio (Assimilation Number) will be maximum at light saturation and that this would not exceed  $25 \mu\text{g C } (\mu\text{gChl})^{-1} \text{ h}^{-1}$  (Falkowski, 1981; Balch and Byrne, 1994). When a maximum ratio of 250 was used for a day length basis, the results of the qcs showed that about 5% of the 'pp' and 'chl' data exceeded this. The second norm was that the decrease of 'pp' with optical depths is exponential and that the 'pp' rates at the bottom of the euphotic zone (depth at which ambient light intensity is 1% of that at the surface) cannot be higher than those above. A tail end increase, therefore, would render the values suspect. Analyses based on this norm showed that in about 11% of the cases, the 'pp' values were unreliable.

The qcs, in general, were used to check the metadata information, duplicate records, range and statistical limits of the 'pp' and 'chl'. These checks were based on visual inspection, comparison with supporting information and statistical computation. Visual inspection of the qcs was performed by comparing the individual profiles at selected stations with 'standard' vertical profile of 'pp' and 'chl' in the region. The qcs also compare the 'pp' and 'chl' profiles with temperature profile of the same station, if available. Statistical qc check was performed by grouping the 'pp' and 'chl' profiles in  $1^{\circ}\text{X}1^{\circ}$  or  $2^{\circ}\text{X}2^{\circ}$  latitude-longitude square depending on the number of profiles available. Mean and Standard Deviation (SD) at each observed depth for the square were computed from the available 'pp' and 'chl' profiles irrespective of the season. Range for 'pp' and 'chl' at observed depths in each square was fixed as mean  $\pm 5\text{SD}$ , when the site was in coastal water and the depth was above 50m. With the rest of the cases, it was fixed as mean  $\pm 3\text{SD}$ . All the above 'pp' and 'chl' profiles passed this test.

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