

Chapter-III

Methodology

3.1 Collection of samples

Samples for the present study were collected from the sandy-beaches of the east coast of India in 1985 for a foraminiferal project from all the stations shown Map 1.1. In the second phase the samples were again in 1999 from the selected 'exposed sandy-beaches'.

A total of 144 samples of beach-sands were collected from 16 beaches, from Puri to Kanniyakumari as shown in Map 1.1. At each sampling station 9 samples, each of around 500gm were collected on a grid pattern (3 across and 3 along the beach) at a distance of 2 m from each other across the beach and 5 m along the beach, as shown in the Fig. 3.1.

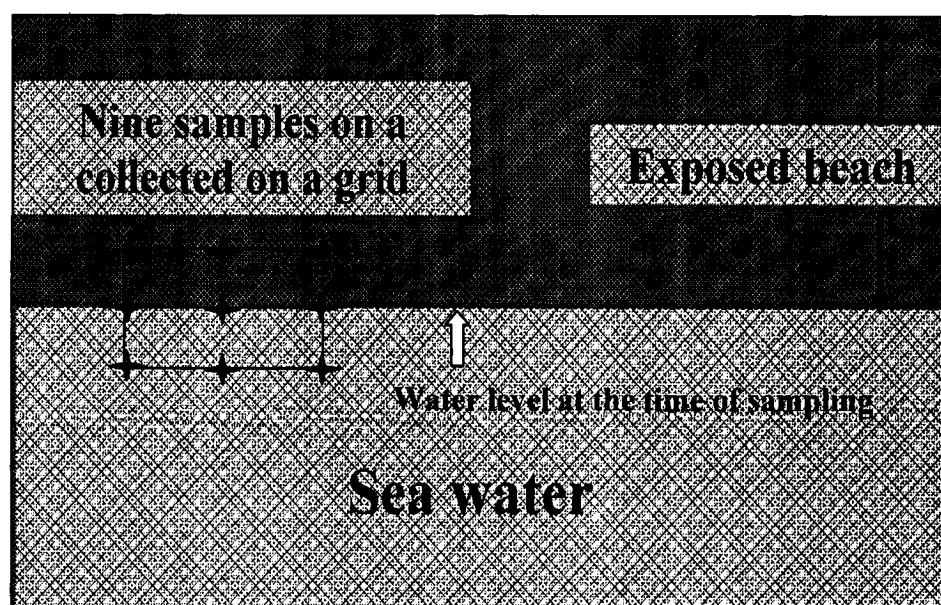
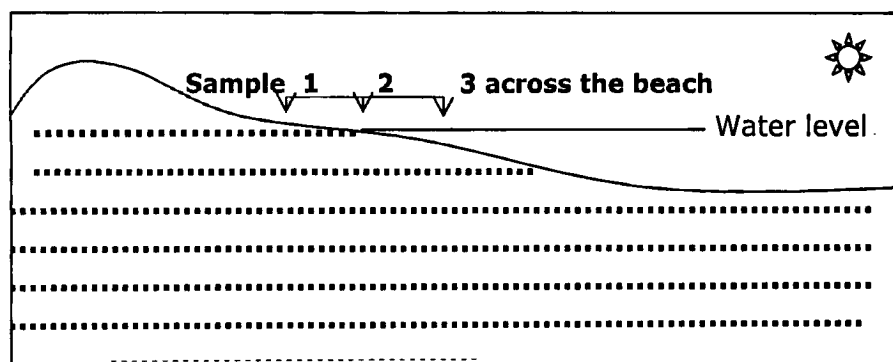


Fig. 3.1 (A) Pattern of samples & beach profile



(B) Position of samples with relation of water level

All the 'nine samples' from each station were dried and mixed thoroughly to obtain a 20 gm representative fraction from each station after coning-and-quartering.

3.2 Sieve analysis

The fraction was then wet-sieved to wash the dissoluble substances in a 230 ASTM sieve (phosphor-bronze metal) with 0.063 mesh opening until clear waters started coming. It was endeavoured that the total out flow remains within 1000ml volume. The filtrate was dried to obtain the weight percentage of clay and silt.

The filtered fraction was wet sieved through a set of sieves (30, 60, 100, 150, 200 and Pan) to get separate (+) mesh fractions of sediments for quantitative and qualitative analyses. The fractions were then dried again in hot aerated oven on 50°C and weighed separately to obtain their weight percentage.

Heavy mineral analysis of the samples collected from the beaches under study was carried out in the Sedimentological Laboratory, Centre of Advanced Study in Geology, Dr. Harisingh Gour University, Sagar.

The cleaned fractions of +30, +60, +100, + 150, +200 mesh were separated for heavy minerals using Bromoform (2.85 specific gravity) as a separating medium and centrifuged for 10 minutes. After separating the lighter fractions carefully the heavy minerals were transferred to small glass bottles.

3.3 Whole grain study and optical mineralogical studies

The heavy mineral grains of each mesh fraction were studied by Zoom Stereoscopic Microscope (Carls Zeiss, STEMI 2000) for whole grain study (roundness and sphericity, surface, fractures, crystal elements etc.) and photomicrography. Carls Zeiss programme on WINDOWS MICROSOFT^{XP} was used to prepare photoplates of the selected varieties of different species of heavy minerals from each station separately (Plates 1 to 17).

All the grains from the different sieve fractions were mounted on glass slides with Canada Balsam for optical studies by petrological microscope (Nikkon *Eclips LV 100 POL*). Nikkon software was used to prepare the plates of the photomicrographs of the selected varieties of different species of heavy minerals.

All the counted grains of each heavy mineral were listed in Table 4.1 to show the distribution of different heavy minerals in their order of predominance.

3.4 Granulometric studies

Granulometric studies of the beach sands have been carried out to obtain the weight percentage of different mesh fractions using an electronic balance. Table 5.1 to 5.13 were prepared to show the particle size (ϕ), weight retained in each sieve, percentage of sieved fractions and cumulative frequency to prepare histograms, frequency curves, and cumulative frequency curves. They have been shown in Fig 5.1 to 5.13 (Chapter V).

Statistical treatment of the granulometric parameters of the present study was done on a computer program was newly developed on C++ and

MICROSOFT VISUAL BASIC 6.0 using two very important parameters: (i) Simple Skewness Measures (α_s) versus Simple Sorting Measure (So_s), and (ii) Inclusive Graphic Skewness (SK_I) versus Inclusive Graphic Standard (σ_1). The results have been shown in **Chapter V**.

3.5 X-Ray diffraction analysis

X-Ray diffraction analysis of samples from six selected stations has been carried out at Tata Refractory, Belpahar, Orissa.

The samples were crushed in Planetary Ball Mill to obtain (-) 320 mesh size of the samples. The Peak Intensity curves (Fig. 6.1 a to f) were prepared to identify the different mineral phases to confirm the mineralogical identification of the heavies.

3.6 Induced couples plasma mass spectroscopy (ICP-MS)

Induced couples plasma mass spectroscopy (ICPMS) was also performed to analyses the Rare Earths and radioactive elements. The analysis was carried out in by Prof. Ishiyama, of the Institute of Earth and Environmental Sciences, at ICP-MS Laboratory of the Akita University, Akita, Japan. The methodology of the analysis has been mentioned in Chapter VI.

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