CHAPTER - IV

DISTRIBUTION OF BIF IN KARNATAKA NUCLEUS

4.1 Distribution of BIF in Indian Context

The maximum development of iron-formation in India is restricted to the Archaean (Pichamuthu, 1974; Radhakrishna and Naqvi, 1986; Naqvi and Rogers, 1987). The older of these (3500-3000 Ma) are represented by minor bands of complexly folded and metamorphosed iron rich beds confined to high grade regions like those of Tamil Nadu, Kerala and south Karnataka. They occur as remnants of an older group of sediments and volcanics (Sargur supracrustals) engulfed in a sea of tonalitic gneisses dated at 3305 ± 54 Ma by Beckinsale et al. (1980). These have been designated as Tamil Nadu type (Prasad et al., 1982) and are also found in Bihar, Madhya Pradesh and Rajasthan. Bulk of the iron formations of India, however, is confined to the Archaean cratonic nuclei (2900-2600 Ma) forming part of the greenstone sequence (Sarkar et al., 1969; Sarkar and Saha, 1977) and are found in Bihar and Orissa (Gurumahisani, Badampahar, Tomka-Daitery, Janda-Koira), Karnataka (Bababudan, Kudremukh, Bellary-Hospet, Sandur, Chitradurga, Shimoga, Kushtagi), Maharashtra (Ratnagiri), Madhya Pradesh (Bailadila, Rowghat, Dalli, Rajhara) and Goa. Mishra (1990) has given a beautiful account of the distribution of Archaean BIFs of Karnataka in space and time.

4.2 Distribution of BIF in KN

Iron formations are found in all the schist belts of KN (Fig. 4.1). In older greenstone belts, they are found within the
Figure 4.1. Geological map of Karnataka state showing the location and map pattern of BIF of different schist belts. (Modified from Manikyamba, 1992).
BANDED IRON FORMATION IN DHARWAR CRATON

INDEX

- BF of Bababudan Group
- BF of Vangilas Formation
- BF of Dungkal Formation

ARABIAN SEA

DHARWAR

KODACHAD

BABABUDAN (Mulangi)

KUNDURUKHA

MAVINHALI

SARGUN

CHIKBANVAR GANACHAPPUR

SANDUR

KUSHTAGI

KADNEMMUR

NARTHAR

KUHAR

KUSHTAGI

WINGALDHAL

ERVEYAGANAHALLI

VANVILAS

DODUNI

CHITRADURGA
mafic/ultramafic komatiites and amphibolites. Only a few bands of magnetite-garnet-grunerite-quartz are found in these rocks (Naqvi, 1981). Thickest and widest development of BIF is found in Kudremukh, Bababudan, Kushtagi and Sandur schist belts. In most of the schist belts of KN quartz-pebble-conglomerate (QPC) and quartzites are followed by a dolomitic horizon which at several places has preserved excellent exposures of stromatolites (Gnaneshwar Rao, 1992; Manikyamba et al., 1993). A transition from stromatolitic cherty carbonate to oxide facies BIF and shales through manganese carbonate shales and carbonate facies BIF has been observed at Shimoga (Kumsi) and Chitradurga belts (Gnaneshwar Rao, 1992).

4.3 Cyclicity of BIF deposition in KN

Naqvi et al. (1988) have identified five successive units or cycles of BIF precipitation in the schist belts of KN (Fig. 4.2) which have been designated as BIF$_1$, BIF$_2$, BIF$_3$, BIF$_4$ and BIF$_5$. Out of these five cycles, three have been studied in detail by Gnaneshwar Rao (1992). The BIF of Bababudan Group in Kudremukh schist belt has been studied by Khan et al. (1992) and in Sandur schist belt by Manikyamba et al. (1993). First cycle of BIF deposition (BIF$_1$), as a very thin horizon of only 1-2 meters thickness is found in older greenstone belts. The second cycle of BIF precipitation (BIF$_2$) took place in Javanahalli Group in between the amphibolites. The BIF$_3$ cycle of around 3000 Ma in the Bababudan Group is most extensively developed and well preserved in Bababudan, Kudremukh and Sandur schist belts. In Bababudan Group of Kudremukh schist belt mostly cherty and shaly mixed oxide
Figure 4.2. Model stratigraphic sequence of schist belts of Karnataka nucleus, showing five successive cycles of BIF deposition in the older and younger schist belts (after Naqvi et al., 1988).
sulphide carbonate facies BIF are found. BIF$_4$ is found in the Chitradurga schist belt where occurrence of oxide, carbonate, as well as sulphide facies BIF is found (Gnaneshwar Rao, 1992). The fifth and last cycle is a thin uneconomic zone of cherty and shaly BIF associated with greywackes. All the five cycles of BIF precipitation are well preserved in Chitradurga schist belt. In the Archaean greenstone belts, BIFs are found in three associations namely with (1) arenites-stromatolitic-carbonate-Mn formations-argillite suite (2) volcanogenetic-volcaniclastic suite and (3) greywacke-argillite suite. In Kushtagi schist belt of Bababudan Group BIF$_3$ is mostly of cherty and shaly oxide facies and is associated with volcanics.

4.4 Restriction of BIF in Archaean Schist Belts

BIFs are very well developed in India and are present in all the schist belts of Archaean age. However, while in Australia, Canada, Greenland and South Africa the BIFs are very well developed in early Proterozoic basins, in India they are mainly confined to Archaean schist belts and are not found in early Proterozoic basins. The middle Proterozoic basins like Cuddapah are devoid of BIF and its sedimentation is confined to Archaean schist belts (Radhakrishna et al., 1986). In KN they are mostly developed in 3.0 to 2.8 Ga old Bababudan Group (Manikyamba et al., 1993). Therefore, these BIFs have a special significance in the history of crustal evolution and probably represent a much more advanced stage of evolution of the DC and related biosphere, as such a thick BIF development has not taken place in the Archaean Greenstone belts of other shield areas (Goodwin, 1973, 1991).