Chapter - 13

CHAPTER-XIII

ASSIGNMENT OF AGE TO THE BOUNDARY LAYERS : DISCUSSION

The lithostratigraphic characters of the Anjar section especially the Intertrappean II and III show close similarity to the continental sections in other parts of the world. Mineralogical characters indicating presence of globules, spherules feldspar clasts, high carbonaceous matter and oxidised organic carbon are favouring possibility of an ideal K/T boundary section. Geochemical indicators like chalcophile, lithophiles and siderophiles indicate exceptionally high content of Ir, Os and other related elements which are closely comparable to the other known continental K/T sections of the world. Geochronologically the K/T boundary age in Kutch show excellent correlation and agreement with dates of known KTB impact meteoric Chicxulub crater i.e. 65.2$\pm$ 0.6 Ma; for the flow underlying the dinosaur and iridium bearing layer. The basal flow shows good plateau age of 68.7$\pm$0.8 Ma. The uppermost age of the volcanism in Kutch as indicated by integrated Ar dates is 61.0 $\pm$ 1.6Ma. Age for third and fourth flows are 65.3$\pm$0.6 and 65.1$\pm$1.5 respectively. The K/T boundary dates at 65.0 Ma on geochronological scale world over. The geochronological dates indicated by Flow F3 are very close to age of KTB. Hence, the Intertrappean bed III may house boundary. The palaeomagnetic evidences are suggestive of palaeomagnetic polarity reversals during the deposition of III Intertrappean bed. The palaeomagnetic evidences of the polarity reversals suggest a NR scale for entire volcanic sequence. The basal three flows F1 to F3 show normal magnetic polarity, whereas the upper four flows F4-F7 show reversed polarity. The geochronological age and magnetic polarity for them suggest a sequence belonging to 29R chron. The actual reversal may have taken place some time during the deposition of third Intertrappean bed, i.e., at Palaeomagnetic KTB. The faunal and floral evidences indicate that the Intertrappean bed No. II contains probable uppermost Cretaceous, Maestrichtian faunal elements (Dinosaurian/Titanosauridae and Hypsilophodontidae) and Ostracodes invertebrates. The floral elements of uppermost Cretaceous Maestrichtian elements include charophytes and other mosses which indicate Maestrichtian age for the II Intertrappean.

Intertrappean bed III contains uppermost Maestrichtian elements in the basal unit (lower 1 35 m. section up to the cherty limestone of pit. Amongst conclusive elements include dinosaurian fossils from Dinosaurian biozone Titanosauridae, Magalosauridae, geeckoid and piscean elements The invertebrate fossils of upper most Cretaceous Maestrichtian age include Ostracodes, bivalves and gasteropods and annelid burrows. The Maestrichtian floral elements include cycadean megasporophylls, fern spikes algae and other gymnosperm spores and cones etc. These floral elements are restricted to the horizons below chocolate brown and black shales of "Dinosaurian bone zone" in pit-I

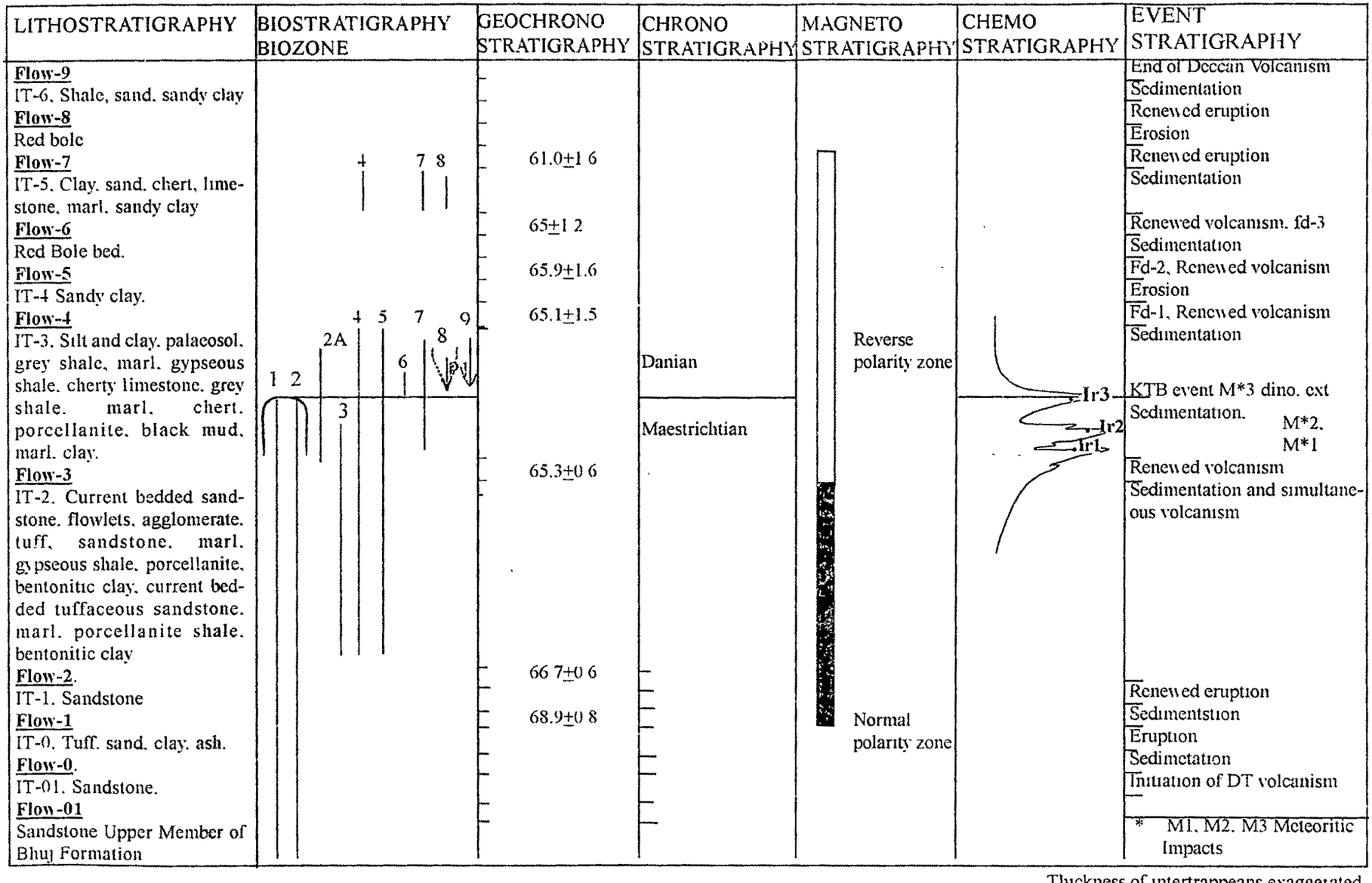
The cherty limestone and chert layer and greyish and black shales above the topmost unit of ash layer and iridium layer I (of Angiosperm zone III) is considered part of Tertiary sequence representing basal Palaeocene. The faunal elements indicating Tertiary age are avian elements, the foraminifera (including Globigerina bulloids, G. guebina, Palaeotaxtularia, Nodosoria sp etc., ostracode ferns, oncolites, algae-Girvenella-Azolla, Caytonids (P) and many mega fossil plants of angiosperm affinity (dicot and monocot woods), suggesting end of Maestrichtian and begining of P1 zone. The dinoflagellates, palmae and Nostocle algae-Azolla have infact indicated beginning of Tertiary flora from basal most plant bed. The fern spike and cycade layer may be considered as the end of Maestrichtian and on set of palaeocene sequence. Hence the dinosaurs have continued in the basal palaeocene for a couple of thousand years. Appearance of micro-mammals were recorded in the basal plant bed. Further higher in the section, these elements may increase in their relative dominance in Angiosperm zone III, charophyte zone, physa zone above Ir_1 layer. Their maximum dominance is in Angiosperm zone III. In the other zonations, the chara, physa, algae oncolites and coccoliths, mammals dominate where as the pollen spores of angiosperm dominate in the angiosperm zone I.

The fifth Intertrappean contains dominantly forums and angiosperm plants zone algae Hallimaeda and some bryozoan remains. The forums cannot be identified from section in detail but comparison of section suggest miliolida and some larger forams. The fossil assemblage suggest a possible upper Palaeocene to lower Eocene age for the fifth Intertrappean bed.

XIII.1. CONCLUSION FOR THE ANJAR SECTION:

From the above discussions, it is clear that the K/T boundary layer is post basal trappean, the Deccan Volcanism and this layer is confined to the basal part of third Intertrappean bed. The Deccan volcanism started at the basal Maestrichtian around 70 m.a. The II Intertrappean bed represents palaeontological uppermost/ Cretaceous age. The brown chocolate shale and the black shale sequence below Ir1 represents the transition zone where some basal palaeocene forms of pollens Triplanosporites, sp. Monosulcate pollen (palmae) Laerigatosporite sp. are present. Dinoflagllates include surcula sphaoridium sp. cheistosphuidium sp. (Enistordium sp. Kilokansium polypus, Hystrichophaeridium sp. Tectatodinicin sp. of early Tertiary affinity are also present. On the basis of these, it is concluded that the brown and black shales below Ir1 represent the transitional zone with appearance of well established palaeocene elements. The limestone and chert above iridium layer Ir1 are therefore definite palaeocene in age. Their abundance increases in the upper section with appearance of varied groups like physa, mammalian elements, avian elements and angiosperm pollens, is rather suggestive.

Table - XIII: EVENT STRATIGRAPHY OF ANJAR SECTION



Thickness of intertrappeans exaggerated

XIII.2. DAYAPAR SECTION:

In Dayapar section the burrowed sandy clays and cream coloured marly layer with invertebrate and charophytes "Physa" and "Borrowed Annelid zone" indicates Maestrichtian age The Ostracode charophyte zone contains dominantly basal palaeocene elements (oncolites, caytonia, Magasporophylls). This is overlain by a "Bone Bed zone" which contains dinosaurian bone fossils along with other reptiles, boidian, chilonia and avian bones. This assemblage on the basis of associated vertebrates beside dinosaurs are considered to be of Palaeocene. Thus the Ostracode charophyte zone (table VA) represents a transitional zone containing uppermost Maestrichtian and basal Palaeocene. The pink to chocolate coloured brown layer is considered as the boundary layer.

****