PALAEO-COASTAL MORPHOLOGY OF THE NEOPROTEROZOIC BADAMI BASIN – SOME FIELD EVIDENCES FROM KHANAPUR, BAGALKOT DISTRICT, KARNATAKA

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The Neoproterozoic Badami Group of the Kaladgi-Badami basin consists of an undisturbed sequence of sandstone, shale and limestone exposed in the northern districts of Karnataka and adjoining parts of Maharashtra (Viswanathiah, 1977; Jayaprakash et al. 1987). The sequence unconformably overlies Archaean granitoids, schists and the Mesoproterozoic Bagalkot Group of sediments. The environment of deposition of the Badami Group has been interpreted as shallow marine (Sathyanarayan, 1994). This note presents some field evidences around Khanapur village, Bagalkot district revealing the nature of palaeo-coastal morphology during the deposition of Cave Temple arenite (CTa), the main sandstone member of the Badami Group.

Field Evidences

Sub-horizontal beds of the CTa Member rest unconformably on equigranular pink and grey Closepet Granite near Khanapur (lat.16°02'05"N; long. 75°47'00"E; Fig.1). Precisely the Member is a medium to coarse grained subarkose showing profuse cross bedding. At one place,

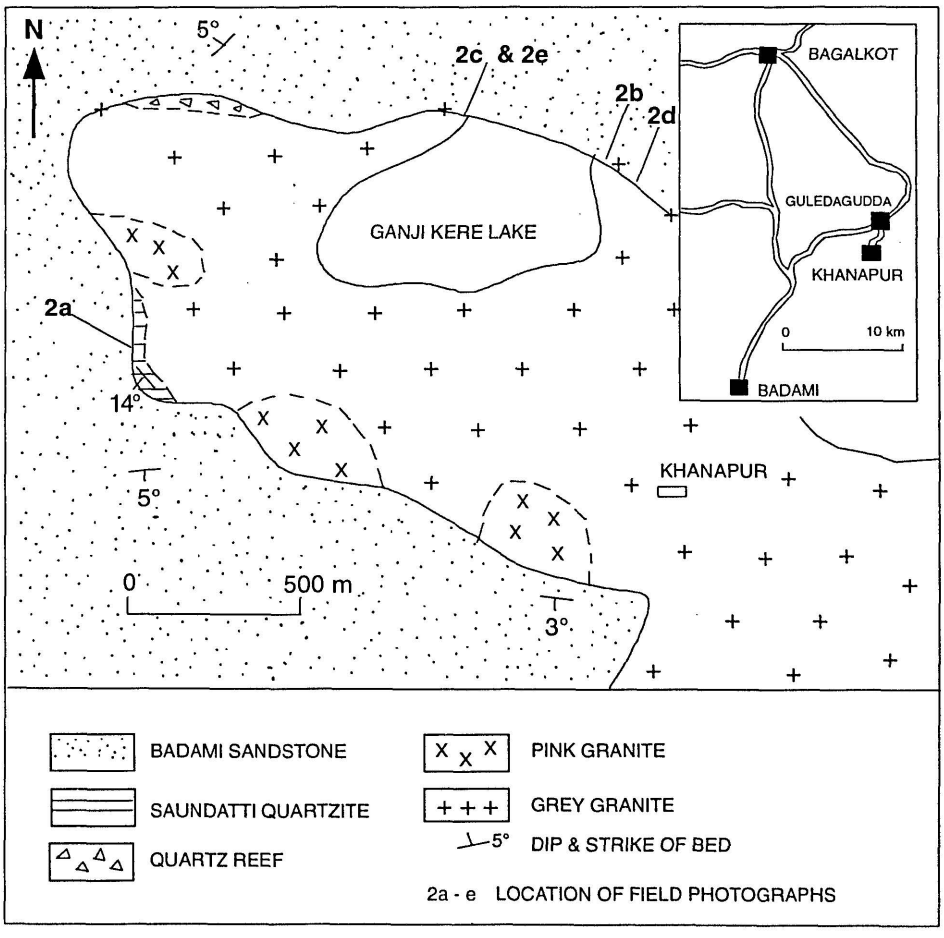

Fig.1. Geological map of the Khanapur area, Bagalkot District, Karnataka with Inset Location map.

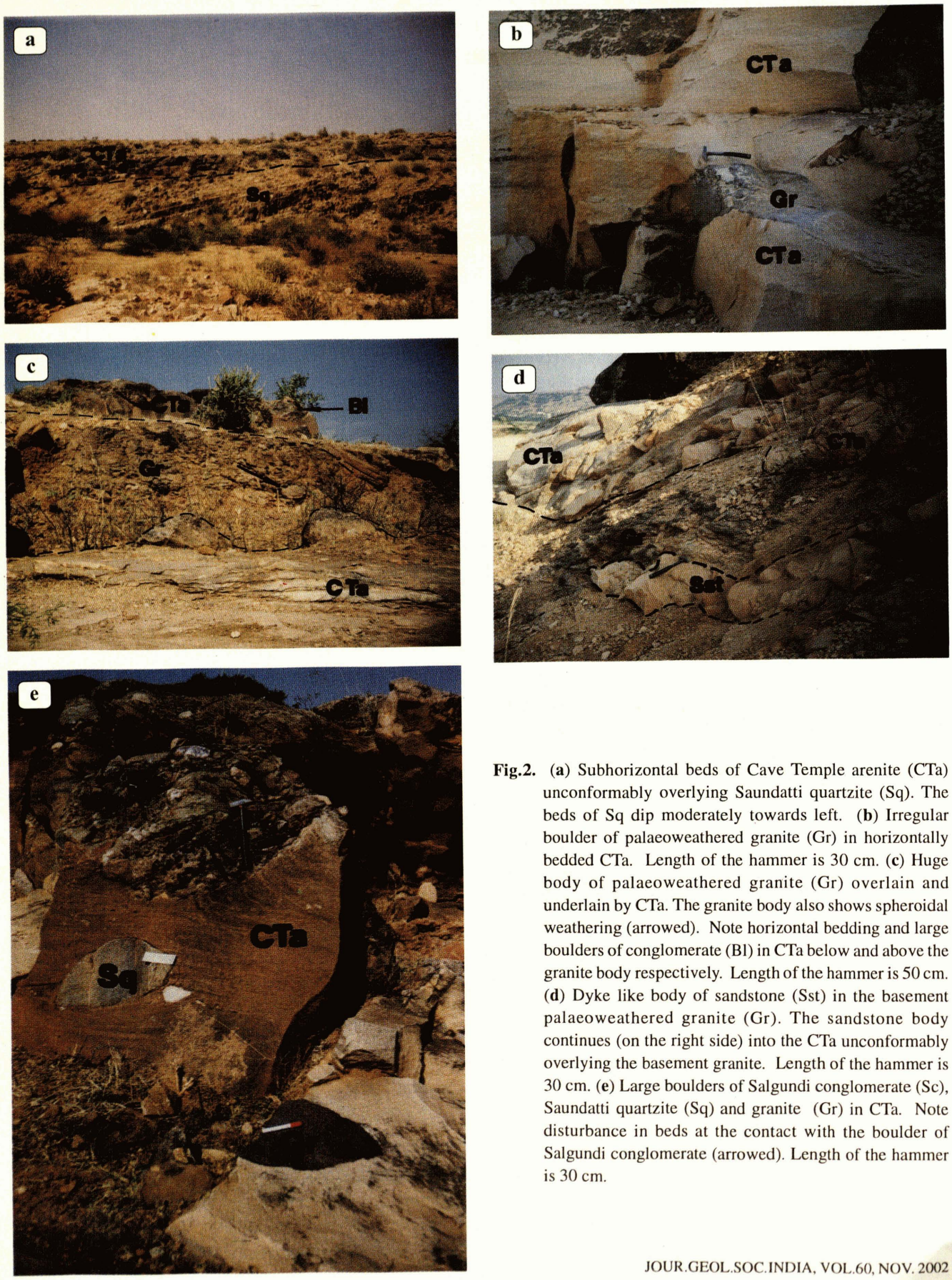

Fig.2. (**a**) Subhorizontal beds of Cave Temple arenite (CTa) unconformably overlying Saundatti quartzite (Sq). The beds of Sq dip moderately towards left. (**b**) Irregular boulder of palaeoweathered granite (Gr) in horizontally bedded CTa. Length of the hammer is 30 cm. (**c**) Huge body of palaeoweathered granite (Gr) overlain and underlain by CTa. The granite body also shows spheroidal weathering (arrowed). Note horizontal bedding and large boulders of conglomerate (Bl) in CTa below and above the granite body respectively. Length of the hammer is 50 cm. (**d**) Dyke like body of sandstone (Sst) in the basement palaeoweathered granite (Gr). The sandstone body continues (on the right side) into the CTa unconformably overlying the basement granite. Length of the hammer is 30 cm. (**e**) Large boulders of Salgundi conglomerate (Sc), Saundatti quartzite (Sq) and granite (Gr) in CTa. Note disturbance in beds at the contact with the boulder of Salgundi conglomerate (arrowed). Length of the hammer is 30 cm.

moderately dipping (~25°) Saundatti quartzite, a member of the lower Bagalkot Group, is exposed in-between basement granite and CTa (Fig.2a). Near the unconformity contact with the CTa, a three to four metre thick pinkish red ferruginised alteration zone has commonly developed within the basement granite. The alteration zone consists of quartz and altered feldspar, and is characterised by high K_2O content of 6 to 9% by weight. This alteration appears to be the result of palaeoweathering as evidenced by the presence of boulders of such altered granite within the CTa (Fig.2b).

A vertical section exposes a large (about 30 m long and 2 m thick) body of altered granite sandwiched between overlying and underlying beds of CTa (Fig. 2c). The granite body resembles a huge boulder within the CTa and shows palaeoweathering features described above. It also displays spheroidal weathering. In another vertical section, a linear sandstone body extends from the CTa within the underlying granite (Fig.2d). The sandstone body is similar to a dyke apparently cutting into the basement granite. Several big boulders (upto 1.5m in diameter) of Saundatti quartzite and Salgundi conglomerate (the basal member of the older Bagalkot Group) occur within the basal part of the CTa (Fig.2e). The beds in CTa are considerably disturbed at the contact with these big boulders. However, such boulders are not present in the upper beds of the CTa away from the basal unconformity. Pebbles of palaeoweathered granite, as described earlier, are scattered in the basal beds of the CTa and some are concentrated along the bedding planes.

Implications for Palaeo-coastal Morphology

The above mentioned features provide information about the morphology of the coast during the deposition of the CTa. The coast was rocky, made up of granite and Saundatti quartzite. Close examination of the huge granite body in Fig.2c revealed that it is not an isolated transported body, but only a projected portion of the basement granite (Fig.3). It existed as a promontory that was gradually covered by sediment (CTa) with the rise of sea level. Presently, only one face of the promontory is exposed which, in the vertical section, looks like a huge boulder within the CTa. Erosional features like cracks and caves were present on the weathered profile of the basement granite, filled up by sand either by initial stage of deposition or due to squeezing at the time of lithification. The dyke like body of sandstone in Fig.2d is such a crack filling. The resistant Saundatti quartzite occurred as cliffs with high relief overlying the granite, overlooking the rising sea. The distortion of bedding plane within the CTa by the boulders of Saundatti quartzite and Salgundi conglomerate indicates that these boulders rolled down and fell on the coastal sediment. Probably the energy level was high and pounding waves were responsible for removal of such big boulders. The preservation of coastal features of sharp relief reflects that the basement granite

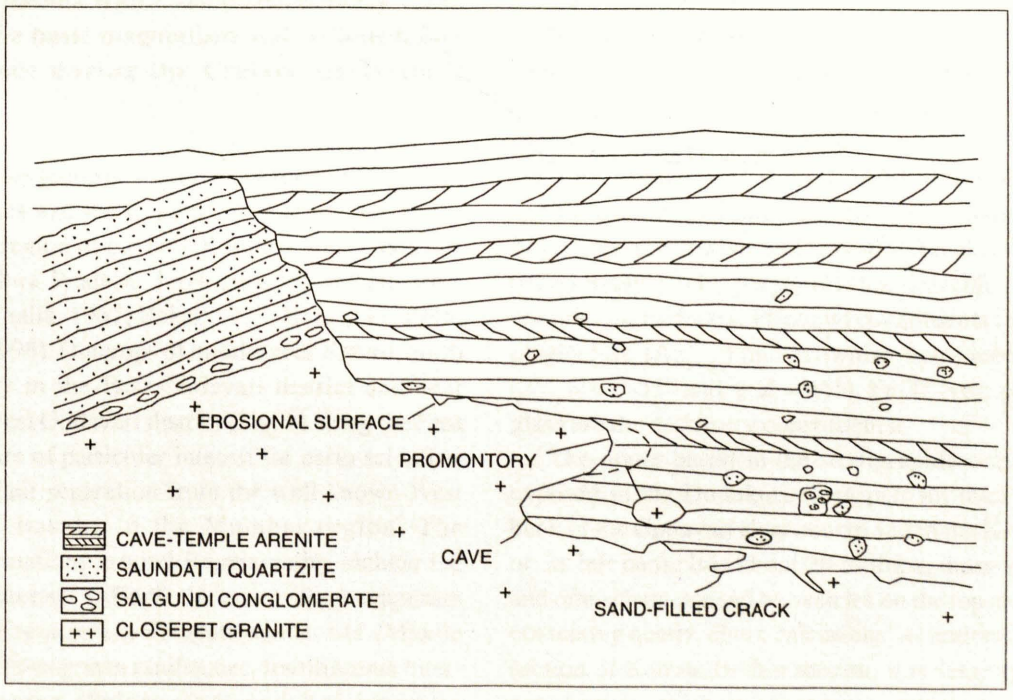

Fig.3. Hypothetical section showing palaeocoastal morphology of the Badami basin at Khanapur (not to scale).

and Saundatti quartzite were quickly covered by deposition of CTa with rapid rise of sea level. The absence of boulders of basement granite and Saundatti quartzite in the upper beds of CTa also supports this fact. Present day examples of such sharp relief coastal features like promontories, caves and cliffs exist at many places along the Indian coast (Ahmed, 1972).

Acknowledgements: Our thanks are due to Shri D.C. Banerjee, Director (retd.), AMD, for according his permission to publish this note. Encouragement from Shri R. K. Gupta, Director, AMD is gratefully acknowledged. Discussions in the field with Dr. Mir Azam Ali were fruitful. Suggestions from Dr. R. Dhana Raju have helped in improving the quality of the manuscript.

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(Received: 21 September 2001; Revised form accepted: 30 May 2002)