Small scale ripple superimposed on large scale ripple

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Abstract

Small scale ripple superimposed on large scale ripple have been observed in the Talchir rocks of Giridih basin. Both the small scale and large scale ripple observed are combined flow ripple with greater wave influence. The ripples were formed in wave agitated glacial lake.

Introduction

Small scale ripples superimposed on large scale ripple (Fig. 1) have been observed in the Talchir sediments of Giridih (Gondwana) basin. The structure under discussion occurs in silty sandstone. The purpose of the present note is to describe the structure hitherto not reported from glaciofluvial Talchir sediments and also to give a general interpretation of the structure.

Figure 1.

Description of the structure

The structure is a large wavy structure on which small ripples are superimposed. The larger feature has a continuous straight crest for at least 8 metres. The profile is sharp crested but rounded and symmetrical. The average spacing is 3.5 metres, height 0.60 metres, and the chord is 3.70 metres.

The small scale ripples show a variation of ripple parameters in vertically successive layers. The crest continuity could be measured up to a maximum distance of 50 cm. The profile of the ripple in the lower units is rounded and symmetrical whereas in the upper unit it is slightly angular and asymmetric. The small ripple succession is climbing in nature. The ripple height, spacing and chord varies from 8.5 to 34.2 cm, 25.7 to 55.8 cm and 21.4 to 70.00 cm respectively, from bottom upward direction.
The median grain size of samples from trough and crest of large scale structure and from the lower and upper parts of the small scale ripples are represented in Figure 2.

**Interpretation**

The structure observed is a large ripple on which small ripples are superimposed. Superimposition of small ripples on large ripple are known in geological literature. Following Allen (1968), two types of ripples under discussion will be referred to as large scale ripple and small scale ripple. Many workers believe that the two types of ripples vary not only in scale but also in their origin (Sundborg, 1956; Bagnold, 1956; Simons and Richardson, 1961).

The relationship between bed shear stress and ripple morphology deduced from flume experiment (Guy et al., 1966) strongly support existence of two populations of
ripples, one large and the other small in physical scale. The symmetrical profile and crest continuity of large scale ripples suggest that these are wave generated ripples. The sharp crest of large scale ripples, unusual for wave ripples, has been observed both in flume and modern sediments (Harms, 1969).

The rounded symmetric to asymmetric profile, uniform ripple height and spacing in each of the vertically successive layers suggests that the small scale ripples are of combined flow origin. The large ripple spacing (> 12 cm.) and straight crest however indicate that the ripples formed in a wave dominated environment. Grain size distribution plots of samples from trough and crest (Fig. 2) show greater variation of median diameter (trough samples always slightly coarser) in case of large scale ripple and asymmetric small scale ripple (upper part of the sequence) than the symmetric small scale ripples (lower part of the small scale ripple sequence), suggesting thereby that the current influence was least in the case of symmetrical ripples.

The climbing nature of the small ripples indicates a progressive increase in wave strength and also current velocity in the depositional area. The long crest continuity of wave ripples is very common both in wave agitated sea and lakes. The large spacing of wave ripples is also observed in lakes and seas (Reineck and Wunderlich, 1968). The structures discussed are interpreted to have formed mainly by storm generated waves in glacial lake.

References


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