

## Evolution of Planktonic Production During the Toarcian Anoxic Event in Umbria (Italy)

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The TAE is represented by an about 6 m thick black shale interval in the Pozzale section, Umbria. Rock-Eval pyrolysis, measurements of TOC, TIC, sulphur, HCl-soluble Ca, Mg, Fe and Mn contents and determination of  $\delta^{34}\text{S}$  and  $\delta^{13}\text{C}_{\text{carbonate}}$  have been carried out on 21 samples. While the bulk of the carbonate is of basinal, nanoplanktonic origin (Bucefalo Palliani et al., 1998), on the basis of the carbon isotopic ratios the diagenetic carbonate is of minor importance. Calculation of the original amounts of  $\text{C}_{\text{org}}$  ( $\text{TOC}_{\text{or}}$ ) by summarising TOC and sulphur contents (Vető et al., 1994) permitted to estimate an average  $\text{C}_{\text{flux}}$  of  $0.3 \text{ t } \text{C}_{\text{org}} / \text{m}^2 / \text{Ma}$ . The slow sedimentation and the low  $\text{C}_{\text{flux}}$  are in agreement with the very negative  $\delta^{34}\text{S}$  values, mostly below -30 permil. In spite of the predominance of marine components in the OM and the overall lamination (Bucefalo Palliani and Cirilli, 1993) the interval can be subdivided into two parts on the basis of the HI: it shows a clear upward increase (from 100 to 450 mg HC/g TOC) then it varies between 270 and 410 mg HC/g TOC, without a clear trend. This pattern reflects the gradual improvement of the organic preservation followed by its relative constancy on a medium level. This variation of the preservation is explained by the variation of both the productivity and the rate of sedimentation. The  $\text{TOC}_{\text{or}}$  and the Ca content increase upward in the lower part of the interval. This pattern is interpreted as the

result of the acceleration of OM deposition, of deposition of the calcareous plankton and the overall sedimentation during the first phase of the TAE. The second phase of the TAE started with a drop in the deposition of the calcareous plankton then this latter slightly and gradually accelerated while the rates of OM deposition and of the overall sedimentation remained roughly constant. The strong correlation between Ca and Mn suggests some interdependence of the Mn flux and the planktonic production. In spite of the four fold differences in thickness and rate of sedimentation between the Pozzale section and the Sachrang section, a representative of the TAE in the Northern Calcareous Alps (Ebli et al., 1998), the depth trends in  $\text{TOC}_{\text{or}}$ , HI and Ca content of the two sections show striking similarities.

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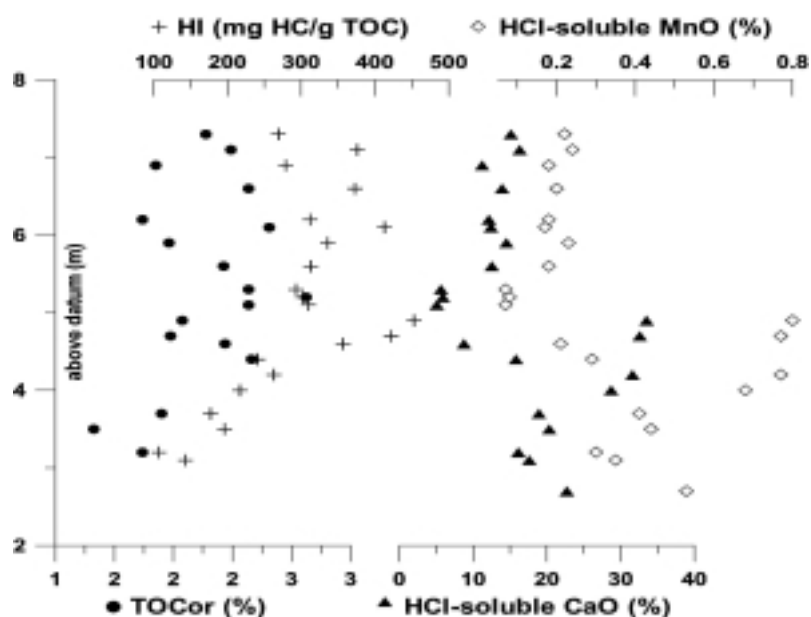


Figure 1: Geochemical log of the early toarcian black shale interval, pozzale section