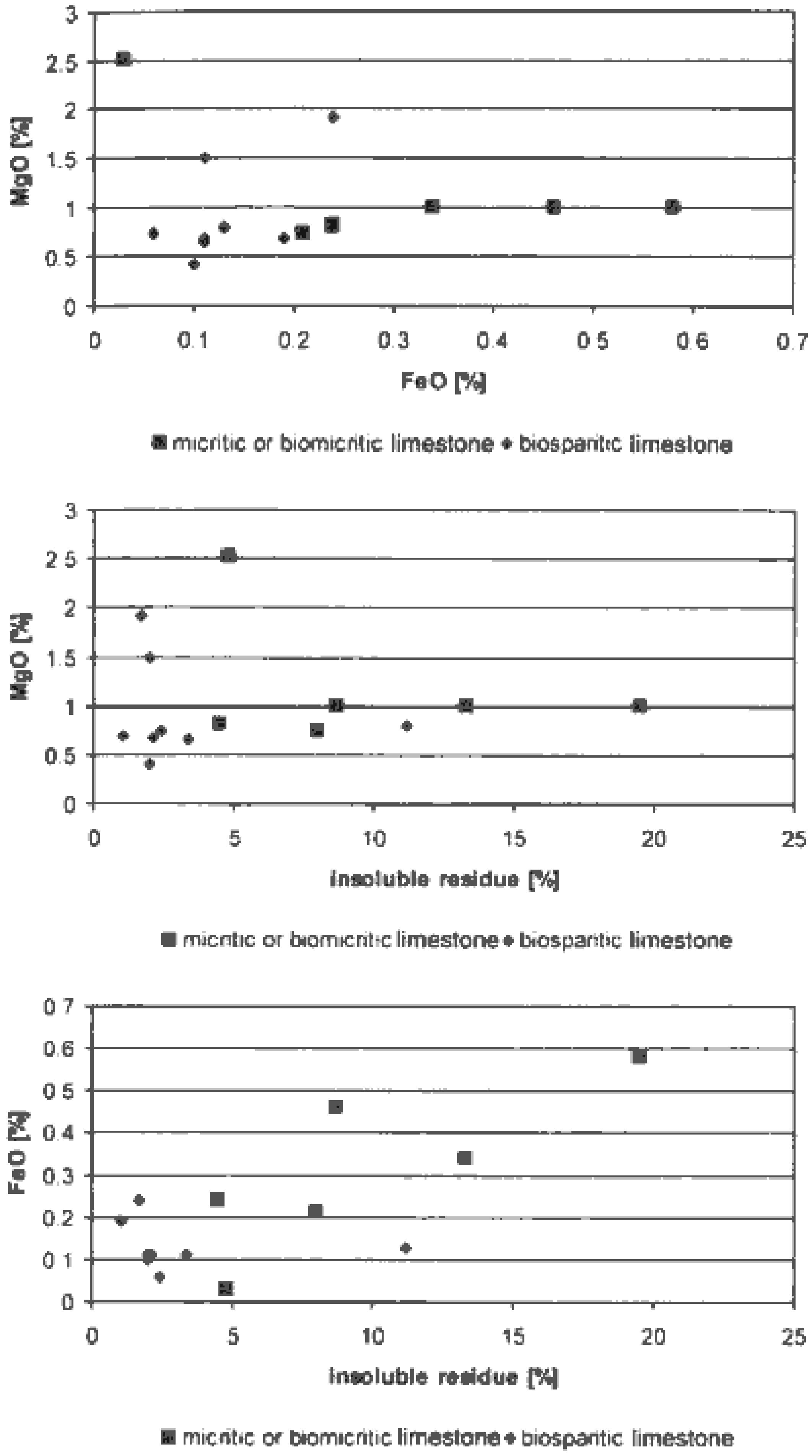

Figure 24. Graphs showing a correlation between FeO, MgO and insoluble residue.

stones both MgO and FeO are bound in the late diagenetic dolomite.

As expected, a positive correlation between MgO and FeO was found. This has been frequently observed in carbonates, and especially in the Barrandian sediments by SVOBODA et al. (1957) and KUKAL (1964). Their conclusions are based on thousands of analyses. Only several samples show a higher percentage of MgO without an elevated FeO content. This may be explained by the crystallization of dolomite with only reduced Fe in its crystal lattice.

9. Discussion

The utility of microfacies analysis

WILSON'S (1975) and FLÜGEL'S (1982) conception of standard microfacies (SMF) and facies belts (FB) is based on the study of Mesozoic and Cenozoic carbonates. However, the paleontological and sedimentological features of Early Paleozoic limestones differ from those of the Mesozoic. Thus, the relevance of using this method in the reconstruction of Paleozoic sedimentary environments is somewhat reduced. In spite of this, the microfacies analysis of Early Paleozoic carbonates can still be informative, if some variations are applied. This was shown by the study of VELEBILOVÁ and ŠARF (1996), who defined eight new microfacies partly comparable with SMF.

Wilson's microfacies analysis is fully applicable in relatively deep-water and transitional environments, where microfacies types correspond well to the SMF. However, the application is more ambiguous in shallow-water deposits where depositional mechanics were influenced by the presence of large crinoid biostromes. Such ecosystems are distinctly different from the Mesozoic reefs described by WILSON (1975) and FLÜGEL (1982). Crinoid forests excluded the development of most other organisms except some brachiopods and small trilobites. The morphology of such environments is not comparable to those of reefs or carbonate platforms. According to HLADIL (1994), the crinoid biostromes can be considered as elevations on flat continental shelves, often in an otherwise open marine environment.

Sections of micritic to biomicritic limestones with dark calcareous shales that correspond to SMF 9 or 3 often contain laminae or thicker layers of bioclastic limestones (SMF 5). This alternation cannot be explained by abrupt shallowing of the sedimentary basin and the onset of conditions favourable to the deposition of SMF 5, but by the redeposition of bioclastic material from shallow parts of the basin. A possible mechanism for this redeposition has been discussed above (see chapters 4–6).

10. General conclusions

The development of the Ludlow-Přídolí boundary beds differs among the localities considered in this paper. The Kosov section represents the shallowest develompent of the Upper Ludlow. The deposition of crinoidal limestones took place at a depth of a few metres, in an area of large crinoid biostromes. These crinoid forests produced great amount of organic detritus which formed taluses at their margins. Such development is observed in the Marble quarry, where the depth has been estimated at a few tens of metres, yet still above the wave base. A specific situation is documented in the Požáry quarry where the influence of local current conditions between the Svatý Jan and Nová Ves volcanic elevations is presumed.

The development of the Lower Přídolí is rather uniform – micritic to biomicritic limestones interbedded with calcareous shales. This deposition took place at a depth of several tens of metres, below the wave base. The episodic input of coarser, detrital material from the shallower parts of sedimentary basin seems to have occurred.

A shallowing trend during the youngest Přídolí and the oldest Lochkovian time interval is evident from the NE part of the Prague Basin towards the NW. The drop in sea level caused the increased input of coarse, detrital, mostly crinoidal, material to the deeper part of the sedimentary basin, and the deposition of coarse-grained, bioclastic, crinoidal limestones. Debris flows could provide a mechanism by which the deeper basin was supplied with coarser detritus.

The Požáry quarry section, which corresponds to the shallow-water development of the Lochkov Formation (Kotýs Limestone), was close to a source of bioclastic material. This deposition took place in an environment above the wave base, at a depth of a few metres. The Podolí section belongs to the transitional development of the Silurian-Devonian boundary beds. The Radotín section corresponds to the deeper-water Radotín Limestone facies up to the transitional Kosoř Limestone facies. These sections were situated further basinwards, where the input of detrital material was more limited and periodically affected by stronger traction currents.

Microfacies analyses suggest that the deepest-water development of the Lochkovian-Pragian boundary beds occurred at Černá rokle near Kosoř. The depth is estimated to have been a few hundreds of metres, which corresponds to the deeper part of a continental shelf. After the regressive event of the Lochkovian-Pragian boundary, a gradual deepening of the sedimentary basin is evident, connected with a facies shift within the boundary strata of the Lochkov and Praha formations. The presence of a typical shallow-water SMF in the deeper part of the basin may be explained as the redeposition of coarse-grained bioclastic material from shallower regions by turbidite currents.

A transitional facies development is located in the stratotype section at Homolka near Velká Chuchle. The deposition of these beds took place at a maximum depth of a hundred metres, which corresponds to a shelf environment close to sources of organic detritus. A shift in facies belts in the wider boundary interval is also demonstrable.

Cikánka, near Praha-Slivenec, corresponds to an elevated, shallow-water depositional environment of the Lochkovian-Pragian boundary beds, with a depth of deposition of a few tens of metres. Coarse-grained bioclastic limestones represent taluses of sand-sized biogenic detritus at the margins of the elevated areas. Crinoid biostromes served as a source of the organic detritus that was transported further basinwards.

All types of dolomitization and silicification mentioned in previous papers on these beds were found and described in the present study. Early diagenetic changes occurred mainly in the micritic matrix, while late diagenetic alterations are present in fractures, stylolites, and bioclast voids.

FeO, MgO, and insoluble residues show a positive correlation in the micritic and biomicritic limestones of deep marine development.

This paper also shows that Wilson's microfacies analysis is applicable to the Early Palaeozoic carbonates of the Barrandian area.

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