

Palaeoecology of the Upper Tournaisian (Carboniferous) crinoidal limestones from South Belgium

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The Tournaisian stage (lower Carboniferous) is considered as the golden age of crinoids. In S Belgium, upper Tournaisian crinoidal limestones, locally called «Petit Granit», are known in the Condroz area (Ourthe Formation) and in the Soignies area (Soignies Member) where tens of quarries expose the crinoidal facies. An isopachs map shows that the Ourthe Formation thins westwards and northwards, possibly because of synsedimentary block faulting. Despite its apparent monotony, five crinoidal and peloidal microfacies are identified throughout the formation, and the size and preservation of the crinoid columnals vary vertically and laterally. The encrinite deposited as amalgamated tempestites that accumulated under the fair-weather wave base. An estimation of the carbonate production rate in both sedimentation areas was calculated and a value of c. 1200 cm³/m².y is proposed for the Ourthe Fm. The individuals density was lower in the HSA possibly due to its deeper situation. The analysis of disarticulated crinoid columnals reveals that the crinoidal meadows were diverse with several taxa following a vertical tiering model to maximise the captation of particles from the water column. Beside the crinoids, the fauna was dominated by suspension feeders (brachiopods, bryozoans, tabulate and rugose corals) adapted to a weakly-agitated environment and a relatively soft ground. Rare nektonic and benthic macrophages (holocephalan, actinoceratoids, palaechinids and trilobites) shows that the ecosystem was relatively complex despite a simple appearance. Moreover, it witnesses the recovery of the marine environment after the collapse of the reefal ecosystem at the end of the Devonian.