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Sedimentary development of a continuous Middle Givetian to Lower Carboniferous section from the fore-reef fringe of the Brilon reef-complex (Rheinisches Schiefergebirge, Germany)

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The Brilon-reef complex is one of the biggest Devonian carbonate buildups (~80 km²) of the Rheinisches Schiefergebirge. The Burgberg section is located in the south-eastern fore-reef area of the Brilon reef-complex and exposes a succession of strata (117 m thick) which extend from the Middle Givetian (middle *varcus* conodont zone) to the Lower Carboniferous. This outstanding outcrop offers the opportunity to investigate the main phases of development, demise and drowning of the Brilon reef-complex from a fore-reef setting. Field and microfacies observations led to the definition of five lithological units (1-5) and nine microfacies which are integrated into a sedimentary model divided into off-reef, intermediate fore-reef and proximal fore-reef sedimentary domains (SD). SD1 is the most distal setting observed and is characterized by fine-grained sediment, dominated by pelagic biota and the local occurrence of storm and gravity flow deposits. SD2 is characterized by a mixture of biota and sediments coming from both deeper-water and shallow-water sources and is influenced by storm and gravity flow currents. In this domain *Renalcis*-mound like structures could develop locally. Finally, SD3 corresponds to the most proximal setting which is strongly influenced by gravity flow currents derived from the reef and the back reef of the Brilon reef-complex, bringing significant proportion of reef-builders remains. The microfacies stacking pattern through the Middle Givetian to Carboniferous of the Burgberg section indicates five main palaeoenvironmental trends corresponding to the lithological units (U1-5). From the base to the top of the section, these units are: (U1) - initial development of reef building upon submarine volcanoclastic deposits during the Middle Givetian (middle *varcus* zone); (U2) - the significant seaward growth of the reef from the Middle Givetian to the Early Frasnian, marked by the high increase of reef derived material to the fore-reef area; the maximum development of the Brilon reef-complex to the south extending from the *disparilis* to the *falsiovalis* conodont biozones; (U3) - the stepwise withdrawal of the reef influence from the Middle to the Late Frasnian (*jamiae* conodont biozone) characterized by a progressive decrease in shallow-water derived materials and increase in fine-grained sediments and deep-water biota; (U4) - demise and drowning of the Brilon reef-complex as a result of the Late Frasnian Kellwasser events (upper *rhenana* and *triangularis* conodont biozones) and development of a submarine rise characterized by nodular and cephalopod limestone deposits extending from the Late Frasnian to the Late Famennian; (U5) - significant deepening of the Burgberg area starting in the Late Famennian, marked by pelagic shales overlying the nodular limestone deposits.

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