

APPLICATION OF FACTOR ANALYSIS TO STUDY PROPERTIES AND COMPOSITION OF ESTONIAN LOWER PALAEOZOIC ROCKS

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Petrophysical properties of Estonian carbonate rocks depends on both primary sedimentation and secondary alteration processes. R-mode factor analysis was applied to reveal the differences and similarities in composition and properties of different age and genesis rocks and to interpret processes influenced them. 18 petrophysical and geochemical variables were studied and analysed for five data sets including some 500 rock samples. All data sets include both dolomites and neighbouring them limestones clayey to varying degrees. The results of factor analyses showed that the most percent of parameter variation were made by two first factors interpreted as clay content and dolomitization factor. Primary sedimentation processes determined the clay content factor and dolomitization was the post-sedimentation factor. In different data sets they could be either first or second factor. The dolomitization factor was the first in the Middle and Lower Ordovician data sets, the clay content factor was more important in the Upper Ordovician and Silurian data sets. Dolomitization caused significant remagnetization and increase in bulk density, FeO, Fe₂O₃, MnO and Cl in the Middle Ordovician dolomite layer of Vao formation, remagnetization in Lower Ordovician dolomite layers with increase in density, FeO and Cl and remagnetization by migrating fluids and significant increase in FeO, Fe₂O₃, MnO and Cl in the fracture zone in Middle Ordovician rocks. In Silurian and Upper Ordovician rocks we could determine significant increase in magnetic susceptibility with increasing clay content and very weakly magnetic dolomites with significant increase in grain density, MnO and Cl content in Silurian and increasing in grain density and Cl in the Upper Ordovician rocks.