CRETACEOUS COLLISION AND INDENTATION IN SW PART OF WEST CARPATHIANS: VIEW BASED ON STRUCTURAL ANALYSIS AND NUMERICAL MODELLING

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We describe complex structural evolution of southern part of West Carpathians associated with reworking of Palaeozoic basement and its Mesozoic cover during Cretaceous convergence. Onset of Cretaceous continental collision is marked by major change in overall convergence direction from the east-west Meliata obduction to the north-south shortening and beginning of progressive and complex indentation of rigid promontories into weak Paleozoic metasedimentary (Gemer) complexes. This indentation process created early arcuate cleavage fan within low grade meta-sediments in front of the northward moving rigid basement indenter. The interaction of moving indenter with western stationary crystalline basement (Vepor) block is responsible for development of the boundary parallel shear zone along which the main southern indenter is translated to the east. This results in development of a new steep transpressional cleavage overprinting the early fabric. Eastward displacement of the southern indenter causes the development of thrust zone parallel to the margin of eastern stationary crystalline basement block. A proposed numerical model of thin viscous sheet deformation produced by rigid indenter of elliptical shape reliably simulates the development of deformation patterns characteristic for cleavage fan. Modelled discrete partitioning between western promontory and the indenting block fully agrees with the observed secondary cleavage orientation associated with transpressional shear zone. Our numerical model interconnects this complex kinematic frame with finite strain pattern, which was to date possible only for simple boundary conditions. In addition the model explains the polyphase cleavage patterns in terms of complex shapes of promontories and changes in movements of indenting blocks.