Post-folding bending of the Silesian nappe, Western Outer Carpathians (Poland)

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The Western Outer Carpathians are a north-verging fold-and-thrust belt composed mostly of Lower Cretaceous through Lower Miocene flysch. The belt comprises several nappes. One of these nappes, the Silesian nappe, extends along the whole belt and a portion of it is the object of this study. The study area is located in the Dunajec River valley. In this area the Silesian nappe forms a bend, convex towards the NNE. West from the bend, the map-scale fold axes are oriented W–E, whereas east from the bend they are oriented NW–SE. The strata in the study area range from Early Cretaceous to Oligocene in age. Folding and thrusting within the discussed part of the Silesian nappe were completed before the Upper Badenian time (15 Ma). The study area has been subdivided into 14 structural domains. These domains are limited by tectonic contacts. Strata orientations were measured separately for particular domains, for each domain at least 40 measurements. The total number of measurements is 1122. The stereoplots of strata orientation for particular domains are generally coherent. Poles to stratification form either single girdles or single ellipsoids. Moreover, the reconstructed fold axes are plunging shallowly, generally less than 10° (max. 17°). These features indicate that the fold axes result from a single folding. However, the orientation of reconstructed fold axes differ considerably between particular domains from N–S to NW–SE, through W–E (predominant), to WSW–ENE. It appears that considerable differences in orientation of the reconstructed fold axes among particular domains may result from individual rotations of these domains. The rotations, in turn, could be related to the bending of the Silesian nappe. The bending involved extension which could result in breaking the bend into blocks (domains) and individual rotations of these blocks. In this interpretation, the very different orientations of fold axes within particular domains result from dispersal of a single pre-bending fold set. It appears, therefore, that the bending of the Silesian nappe took place after completing of folding and thrusting within this nappe, during the latest Badenian or later.