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A puzzle about the Scandinavian topography

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In this contribution we analyze the topography of Scandinavia with a method recently used to assess the age and the stage of topographical evolution of the Alps (Hergarten, Wagner & Stüwe, EPSL 297:453, 2010). The method considers the mean (channel) slope at fixed catchment size as a function of the elevation. For continental Europe (without Scandinavia) we found a linear relationship without any offset up to elevations of several hundred meters, which means that slope is directly proportional to elevation. This relationship also holds for smaller parts of Europe such as the region directly draining to the Atlantic Ocean or the Mediterranean region, although the reason for this phenomenon remains unclear. In contrast, the region of Norway draining to the Atlantic Ocean west of Norway's southernmost point shows a different behavior. The slope-elevation relation follows is a straight line, too, but with a significant offset of about 500 m. Extrapolating this relation towards negative elevations suggests that zero slope would be achieved about 500 m below sea level. A possible interpretation of this vertical shift in topography might be that 500 m of glacial subsidence are still left at Norway's coast of the Atlantic Ocean. But on the other hand, analyzing the part of Scandinavia draining to Skagerrak, Kattegat and Baltic Sea yields a linear slope-elevation relationship without any vertical shift, although this region should include the center of Scandinavia's glacial subsidence.