Large tracts of flat-topped isolated plateaus and table mountains (Spanish **MESA**) are by far one of the most spectacular sandstone landscapes of the world. The iconic representative of such a topography is Monument Valley in the United States of America, yet similar landforms may be traced in Europe as well – Saxon Switzerland in Germany and Stołowe Mountains in Poland may serve as examples. What all these tablelands have in common is a nearly horizontal layering of rock series of varied resistance to exogenic factors, with a sandstone cap in the uppermost part. For more than a 100 years researchers from many parts of the globe have been wondering what the evolutionary pathways of this kind of topography are. As early as in the end of the 19th century it was postulated that the parallel retreat of escarpments bounding the mesas must be the dominant mode, leading to the systematic reduction in the extent of the isolated hills. The view is valid till the present day, yet the exact attribution of particular mechanisms contributing to the phenomenon remains one of the challenges of contemporary science. The concept dominant for decades claimed that the major role in escarpment retreat was played by episodic processes of catastrophic character – such as rock falls occurring within the precipitous sandstone cliffs. This point of view, however, is no longer tenable since our team proved that in various circumstances the processes of gradual, non-catastrophic decay are much more common. The driving force is water percolating inside the rock massif, leading to the removal of sandy particles from its interior. Hence, a question arises as for the processes behind the mysterious nature of the sandstone: why is a strong rock, which can be built of resistant quartz as in the areas studied by our team, so susceptible to disintegration into single mineral grains?

The major goal of the Q-MESA project is to define what factors control the evolutionary pathways of sandstone tablelands in Central and Western Europe. Is it internal rock structure or environmental conditions? What is the interplay between these factors? On the basis of observations and research conducted so far, the following working hypothesis is put forward: **Chemical alteration of quartz grains (arenization) is responsible for the evolution of escarpments in tablelands underlain by well-jointed, quartzitic sandstone.** To verify the legitimacy of this statement, our team will conduct a serious of studies, including field measurements in the sandstone tablelands of Poland, Czechia, Germany and England, dating attempts in different time scales and using a variety of methods, microscopic analyses as well as laboratory experiments. The search for the evidence of chemical etching of quartz grains and silica cement, which will serve as a proof for the contribution of solutional processes will be of key importance. This is going to be accomplished by the microscopic analyses of rock samples, with the use of scanning electron microscope (SEM), and by the study of the chemistry of waters seeping from the interiors of the plateaus. Fieldwork will enable us to check what kind of "architectural" features of sandstone (e.g. the density of jointing) support the gradual or catastrophic evolution of the marginal parts of the mesas. In the field, we will also make an attempt to check what are the strength properties and the moisture content of rock surfaces, searching for the evidence of weakening of rock walls due to chemical weathering process. In the next step we will be supported by laboratory experiments: they will alow to determine what the behaviour of sandstones when they are exposed to water is. The dating techniques will give us an clue when the processes of sandstone deterioration have been the most efficient. The comparison of this data with the knowledge of the past environmental conditions will let us understand what kind of circumstances (climate, vegetation) support the development of tablelands underlain by quartz sandstone. We assume that the Q-MESA project will make us discover whether sandstone landforms we know from, for example, the Stołowe Mountains, may be regarded as the karstic ones – that is, formed mainly due to solutional processes. If it turnes out to be true, we will open a New Chapter in the history of studies on the sandstone landscapes of Central and Western Europe.