The Colca River area, located in the Central Andes, in southern Peru, is characterized by significant seismic and volcanic activity recorded in modern and historical times. Shallow (< 20 km) earthquakes of small-to-moderate magnitude (usually $M_w < 6.0$) associated with active crustal faults occur annually and pose a threat to the local community and infrastructure. The current activity of the Sabancaya volcano consists mainly of ash and gas emissions. However, the factors influencing the occurrence of seismic and volcanic activity in the region, as well as their potential correlations, remain insufficiently studied and knowledge about them is limited due to the relatively short time span of modern records (maximum 100 years) and historical documents (in Peru - 16th century). It seems that to fully understand the connections between subsequent earthquakes, the activity of adjacent faults and the interactions of seismic and volcanic activity, a much longer period of time, covering hundreds/thousands of years, should be analyzed. Therefore, the aim of this project is to determine the influence of the change and accumulation of Coulomb stress on fault planes over a longer time period (of the order of 10^3 years) caused by earthquakes and volcanic activity, as well as interseismic loading related to the shear zone underlying the brittle deformation zone.

In the first stage of the project, research will include the analysis of satellite images, geological and topographic maps and digital elevation models to identify active faults. Two fieldwork campaigns are planned, during which paleoseismological trenches will be made crossing active faults, where based on the observed deformation of sediments it will be possible to identify displacements indicating past earthquakes. Sediment samples will also be collected for radiocarbon and optically stimulated luminescence (OSL) dating, as well as for analysis of regional strain orientation using the AMS method based on the anisotropy of magnetic susceptibility. Interpretation of the obtained results will allow for identification and characterization of past seismic events. In the final stage of the project, a complex analysis of Coulomb stress transfer and accumulation will be performed, taking into account all known earthquakes, recognized seismic paleo-events, data regarding volcanic activity obtained in cooperation with the INGEMMET institute in Peru, and calculated interseismic loading. By combining several research methods, the obtained results will allow for better understanding the causes of occurrence and distribution of shallow earthquakes and the relationship between seismic and volcanic activity in the Colca River region.