to study transient's formation or elimination of the electric field in the medium. We discuss some experimental results on the relaxation polarization (of the electric field) in a sample porous body due to an external electrical field, as well as its adequate mathematical modeling. As a sample porous medium we consider purified sand in a viniduril (polyvinyl chloride) box which was filled with the aqueous solution of a salt or a mixture of water and oil. Experiments were conducted for solutions of different concentrations and different proportions of water and oil. A constant potential difference was applied to a sample which caused a constant electric current in the sample. The carbon and the high-quality stainless steel were used for the electrodes. The values of the potential difference and current were carefully controlled. We have measured the dynamics of the potential difference between some internal sample points using the multimeter with the RS-232 interface. These measurements have been automatically transferred to the computer for processing. The experiments were conducted for different initial values of the external voltage from 20 V to 400 V, with the voltage increased by 10 V steps. The voltage was stabilized. The time of application of the low constant voltage causing no noticeable heating is 15 min. For larger voltages the heating can become significant, and the time of application of the voltage was reduced to 2-3 min.

Experimental studies have shown that the filler significantly influences the nature and the speed of the relaxation of the electric field. The smallest relaxation times and initial polarizations and the largest speeds were observed for the distilled water, while the largest initial values of the polarization were observed for samples filled with the electrolyte solution. Our results also show that the largest times for the voltage drop are obtained for a mixture of water and oil used as filler with the relaxation curves highly depending on the concentration of oil.

We emphasize that such complex structures are characterized by very different polarization mechamisms, from electronic to electroosmotic with very different characteristic relaxation times (from $10^{-13}$ s to minutes). By using macroscopic experimental technique we actually measure the average value of the electric potential. Therefore, in order to properly describe the polarization relaxation one needs to know the relationship between the macroscopic electrical characteristics of the medium and its components (phases). In view of this, we consider the relaxation time spectrum characteristic for the materials in question. We calculated the effective electrophysical characteristics of a porous medium and emmulsion by using well known equations. Our calculations show that for the solution of salt one can achieve a good agrement between the experiment and theoretical predictions even only two relaxation times are taken into account. The influence of the interrelationships between the electrical and mechanical fields on the polarization relaxation processes is also discussed.

## Sustainable aggregates resource management: approach within South East Europe

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Earth scientists, geologists, are involved not only in fundamental research projects, but also in applied projects. Most applied projects are multidisciplinary and have as their goal the solution of different open and ongoing challenges that society faces. An important set of these projects deals with the provision of an adequate and secure supply of raw materials. Within such projects many questions are addressed by geologists, who are able to utilize their geological knowledge to collect relevant data, analyze those data and to compile it into comprehensive information that provides a solid base for sound decision making. Geologists can best perform these tasks when they are aware of the need for information, the potential contribution of geology and other disciplines, and prevailing societal paradigm of sustainable development.

Consider, for example, the case of aggregates (crushed stone, sand and gravel), which are crucial for infrastructure and construction. Their importance and role in the societies has evolved over time, and last few decades have seen dynamic changes. In parallel to these changes, the role of aggregates resource geologists has also changed, due to the requirements for data and information related to resources. In the increasingly complex world that we face more and more diverse geological information is required, not only information on deposit quantity and quality, but also other geo-oriented information that supports the economic, environmental and social aspects of deposit, quarry development, and the whole mine life cycle.

Many countries are rich in aggregates, but supply is not coordinated, which is the case within South East Europe. Among many challenges are illegal and damaging quarries, unreclaimed sites, limited recycling, and community opposition. Primary aggregates can only be extracted where they occur, but quarrying has had environmental and social impacts, including inefficient usage of water and energy, air pollution, and community disruption. These have given the industry a negative image, intensified by illegal quarrying, limited recycling of construction and demolition (C&D) wastes, and minimal use of quarry and industrial by-products.

Geologists form a major part of the project team of the South East Europe project entitled “Sustainable Aggregates Resource Management”. Main objectives of the project are to develop a common approach to sustainable aggregate resource management (SARM) and sustainable supply mix (SSM) planning, at three scales, to ensure efficient and secure supply in South East Europe. Efficient, low socio-environmental impact, quarrying and waste management is SARM. SSM promotes the use of multiple sources of aggregates, including recycled wastes and industrial by-products (slag) that together maximize net benefits of aggregate supply across generations. At the site level, the issues are high environmental impacts, limited recycling, the need for stakeholder consultation and capacity building, and lack of social license to operate. At the regional/national level, the issues are policies and regulations affecting aggregates that: do not address resource and energy efficiency or EU guidelines, preclude the use of recycled materials and industrial by-products, and fail to address aggregate consumption in long-term sustainable development and spatial planning. The transnational issues are lack of capacity and lack of coordination on aggregates production and transport among nations.

The project partnership has the requisite expertise for implementing the project, achieving the objectives and producing the planned outputs. These include: Recommendations on environmentally and socially acceptable quarrying, prevention of illegal quarrying, quarry waste management and opportunities for increasing the rate of recycling of quarry waste and construction and demolition waste, implementation of relevant EU legislation, and aggregates policy and management; manuals on SARM and SSM at the regional, national and transnational spatial scales, and methodology of life cycle assessments in the primary and secondary aggregates sectors.

## The impact of fault zone and fractures on the discharge rate of Sasan Spring, Kazerun, Southern Iran

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Carbonate aquifers typically exhibit complex groundwater flow patterns, mainly due to depositional heterogeneities, faulting, fracturing and karstification. Sasan spring is a significant karst groundwater discharge point in the Kazerun area, one the most important karstic region of the southern Zagros in southern Iran. The annual precipitation, recharge coefficient and apparent catchment area of the Sasan spring are 524 mm, 37%, and 36.2 km², respectively. On this basis, the annual discharge of the spring is expected to be 7 MCM. However, the actual measured annual discharge of the spring is 91.4 MCM, some thirteen times larger than 7 MCM. It therefore seems that a major part of the recharge source to the spring is supplied form the adjoining watershed through a fault zone and the associated