



The role of Geophysics for a sustainable environment: potentials, challenges and limitations

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The increasing worldwide demand for energy including the exploration of new resources are provoking prompt activities to guarantee a safe accomplishment together with a conscientious protection of the environment.

Within this framework geophysical technologies play a key role for the profound assessment and characterization of the subsurface, which hosts most of the corresponding targets of human interest. These technologies (active- and passive-source seismology, electromagnetics, etc.) are expected to deliver a reliable and highly-resolved image of the subsurface including its structural inventory and the related rock-physical parameters on a broad scale and depending on the used inversion methodology.

In particular in terms of energy and resources, i.e. the exploration and partly the storage and disposal of end-products, the existing geophysical imaging techniques are well suited for both, the over-the-years well established oil/gas industry as well as for newer emerging industry branches, e.g. geothermal energy. On the other hand the related problems, e.g. induced earthquakes, are currently stimulating various research areas and the development of new technologies for a better understanding and prediction of the inherent processes and a more reliable risk assessment. This applies in equally the same manner to natural phenomena, including but not limited to natural earthquakes, volcanoes, landslides, etc.

This presentation will summarize the key issues as well as the possibilities and potentials of existing geophysical monitoring and prediction approaches within this framework. Furthermore, some of the current challenges will be addressed, e.g. the required steps towards an improvement of image quality and resolution along with an increased computational efficiency of these methodologies. Finally, also the limitations of state-of-the-art technologies will be discussed with an assortment of successful and failed case studies that demonstrate the potential pitfalls and illustrate the future needs and required research/working directions.