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Deep borehole based subsurface geophysical monitoring network: TELLUS Project

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We introduce a comprehensive strategy to monitor subsurface fault behavior and associated geophysical environment (e.g., micro-seismicity, stress, groundwater), using a deep borehole based monitoring system. This study provides an in-depth overview of the TELLUS (The Earth Login Leverage for Underground Signal) project, with its individual monitoring system tracking subsurface fault movements with high precision by deploying borehole seismometers, and gathering important data on various geophysical properties.

This paper details site selection process and characterizations, the operational framework on monitoring system installations, and the potential of deep borehole monitoring approach in advancing subsurface-related geophysical studies. We conducted extensive review of the distributions of major fault systems in the south-eastern part of South Korea. Subsequently, we strategically selected and arranged candidates for monitoring system installations. Total of six TELLUS deep borehole monitoring systems were installed in the vicinity of the major faults (Yangsang and Ulsan fault).

In the TELLUS observatories, preliminary monitoring data is being collected in real time, and this is establishing a foundation for a more precise understanding of the behavior of subsurface faults and the related geophysical environment. It would be expected that the comprehensive analysis of these datasets will further elucidate the intricate subsurface geophysics. This enhanced understanding promises to contribute substantially to our seismic risk assessment capabilities and to the broader field of geoscience research, offering new insights into earthquake prediction and geophysical phenomena.