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Development of TDR distributed sensors for land subsidence measurement

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The influences subjected by land subsidence and notably inundation are raising in Taiwan recently. To efficiently access the problems, historical trends and the instant field measurement data (at least by days), including multi-depth subsidence leveling and water leveling, are essential and urgent. However, current multi-depth subsidence leveling with magnetic rings conducted by manual operating, for example, lacks high temporal and spatial resolution data, which cannot evaluate the consistency between the subsidence leveling and the limited underground water levels in the same aquifer layer appropriately. To improve the field measurements, this study is carried out based on the core technology of Time Domain Reflectometry (TDR). In the preliminary idea, TDR distributed sensors, as magnetic rings for land subsidence measurements in a borehole, are developed with the underground water level sensors embedded. The prototypes of TDR distributed sensors indicates the feasibility of measuring, but the influence of signal dissipating due to the long transmission line (>100 m) need to be brought attention to, as well as the corresponding measurement accuracy. Therefore, a laboratorial physical modeling is suggested for further evaluation, and this modeling is constructed now. All the measurement data are expected to be employed and fed back as the calibrators and indicators to propose the defense strategy for land subsidence and inundation.