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Fiber optic distributed acoustic sensing for levee monitoring

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Since the early development of fiber optic sensing technologies, several applications for infrastructure health monitoring have been developed. Most of these applications exploit the sensitivity of fiber optics towards temperature or strain changes which later can be related to the structure deterioration processes main drivers. For soil characterization, geophysical applications have been also widely developed in the fields of seismics and groundwater. The present study aimed to study the feasibility of levee monitoring based on geophysical acoustic methods while using the spatially distributed signals captured by a fiber optic acoustic monitoring system. To test its applicability, a four-day flooding transient experiment conducted on a dike in the real scale lab “Flood proof Holland” in the Netherlands, was monitored every halve hour. The results show is good correlation between the average moisture content in time with respect to the estimated speed of sound of the measured wave by the cable. The estimated velocities are also in good agreement with the ones reported in literature for superficial non consolited soils. Yet, the contact between cable and soil is a great source of uncertainty which must be studied in depth.