

## Keynote

### Reliability Assessment of Existing Geotechnical Structures

#### Biography



Dr. Timo Schweckendiek is a senior researcher/consultant in geotechnical risk and reliability at Deltares (NL) since 2006; he is also part-time affiliated to Delft University of Technology. His interest in geotechnical reliability was sparked working on his MSc thesis on 'Reliability analysis of deep excavations' and has not vanished ever since. Timo's early work focused on reliability and risk analysis of flood defense systems, largely related to a major revision of the assessment and design approaches for dikes and hydraulic structures in the Netherlands. In that period, Timo also produced his PhD thesis on reliability and Bayesian updating for internal erosion (piping) of dikes. In recent years, his focus has shifted to broader application of reliability concepts to a wide range of geotechnical structures and problems such as retaining structures, piles or railway embankments. With

his team at Deltares, he works on geotechnical reliability in projects, method and tool development, education and code development. Timo is affiliated to the Dutch Expertise Network for Flood Protection (ENW), the Dutch Association for Risk Analysis and Operational Safety (NVRB), ISSMGE-TC304, the subcommittee updating Eurocode 7 (CEN/TC250/SC7), and he is currently serving on the GEOSNet board.

#### Abstract

Reliability analysis for geotechnical structures has been subject to extensive research since the 1980s; the state-of-the-art is evolving with an increasing pace. The amount of academic production in this field suggests that scholars see significant potential in the application of reliability-based methods in geotechnical engineering practice. What about the state-of-practice? Do we also see an increasing amount of applications of uncertainty- and reliability-based approaches in geotechnical and civil engineering? In this keynote lecture, Dr. Schweckendiek will critically examine the state-of-practice of reliability approaches in geotechnical practice, largely drawing from his own experience in the Netherlands with flood defenses, hydraulic structures and railway embankments. He will discuss the benefits and limitations based on practical examples, specifically focusing on the assessment of existing structures. In many countries, a considerable share of the infrastructure assets approaches the end of their design life time. Hence, there is an increasing demand for underpinning that continued operation of these structures is safe or responsible, often under conditions deviating from the original design (e.g. loads or environmental factors). Schweckendiek will discuss the reasons why assessment of existing structures is particularly amenable to reliability analysis, such as the availability of performance information, cost-benefit considerations and the problems of assessing existing structures based on codes developed for design. For substantiating his propositions, he will draw from recent project experiences in the Netherlands with quay walls, flood defenses or wooden foundations piles. The goal of this lecture is to stimulate discussion on the future of our profession between academics, applied researchers and practitioners, aiming at realizing the full potential of reliability in geotechnical practice. Examining the lessons learnt and success factors, Schweckendiek will argue which developments and activities are needed for our research to be truly impactful for reliability assessment of geotechnical structures, such as the incorporation of data-driven approaches, data fusion or eventually the development of digital twins.