On the observational method in tunnelling

ABSTRACT:
Continuous observations made during the driving of a tunnel have always been taken for granted, just like keeping one’s eyes on the road when driving a car. Therefore, the term “observational method” often produces a reaction of surprise among tunnelling engineers in practice. Even if it is explained that “observation” in the narrow sense of the word really means “monitoring”, doubt and misunderstanding still remain. In the first part of the paper the term “observational method” as introduced by Peck and redefined by Eurocode is examined critically. The problems encountered in tunnelling are usually so diverse and complex that monitoring can be usefully applied in many different ways. In the second part of the paper a case study is described in which Peck’s ideas are followed.

1.0 INTRODUCTION
The term “observational method” was introduced into geotechnical engineering by Peck (1969) in his Rankine lecture. He was following here Terzaghi, who already in the 1940s tentatively proposed a method, which he alternatively called “experimental method” and “learn-as-you-go method”. Terzaghi’s considerations revolved around the question: how and according to what criteria a project during its development can be economically executed based on an increasing knowledge of the properties and behaviour of the ground. Terzaghi thought that such a method was most likely to be successful in overcoming the set-backs encountered. In this connection Peck (1969) spoke of a “best-way-out-application”. Terzaghi and Peck realised that taking into account experience and observation during the execution of a project was in no way new and corresponded in fact to common sense. The oldest report on the so-called “learn-as-you-go” method in geotechnical engineering comes from Herodot. The difficulty pointed out by Peck of trying to formalise the use of field measurements in geotechnical engineering, applies already to the first sentence of his work today.
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PetroWiki was initially created from the seven volume Petroleum Engineering Handbook (PEH) published by the Society of Petroleum Engineers (SPE).
The SEG Wiki is a useful collection of information for working geophysicists, educators, and students in the field of geophysics. The initial content has been derived from: Robert E. Sheriff's Encyclopedic Dictionary of Applied Geophysics, fourth edition.

In geotechnical engineering, during the construction of earth structures (dams and tunnels, for example) the observational method is a continuous, managed and integrated process of design, construction control, monitoring and review enabling appropriate, previously-defined modifications to be incorporated during (or after) construction. All these aspects must be demonstrably robust. The objective is to achieve greater overall economy, without compromising safety.