Evaluating the use of soil moisture probes in the historic built environment

Nicole Fielding
School of Life Sciences, University of Lincoln

Professor Belinda Colston FRSC
School of Life Sciences, University of Lincoln

Dr Adrian Goodman
School of Life Sciences, University of Lincoln

Ronald Blakeley
Trinity House

Much of the deterioration affecting historic buildings is a direct result of moisture penetration in porous building materials. This damage can be wide-ranging and severe – from "puddle staining" and mould, to decay fungi and deterioration due to the crystallisation of soluble salts. The relationship between masonry moisture content and the extent of the decay is complex, and monitoring moisture movement, particularly within mass masonry structures is problematic. If, however, effective conservation strategies are to be developed and adopted, it is imperative that a full understanding of the causes and mechanisms behind moisture-driven deterioration is achieved, and the development of an effective method for monitoring masonry moisture movement key.

Current research has been evaluating the potential of utilising technology, normally used in agriculture, for the historic built environment. Methodologies for establishing calibration protocols for the Delta-T PR2 capacitance-type soil moisture probe (Delta-T Devices Ltd) is discussed for a range of historic masonry materials, and an assessment given of its suitability for use in historic masonry structures (Figure 1). A three-year case-study at North Foreland Lighthouse (a grade II listed building in Kent, England), carried out in parallel with the probe evaluation and calibration, provided invaluable 'real' data for validating the use of the probe in historic contexts. The impact of moisture ingress into the thick masonry walls of North Foreland's tower, and its subsequent impact on the internal environment and observed salt-induced material decay, was evaluated, and has been used to inform an effective conservation strategy for the lighthouse.

Figure 1: Delta-T PR2 moisture probe being used for soil moisture measurements (top left), and during laboratory calibration for building materials (right). Delta-T PR2 monitoring locations were installed at six locations over the height of the 18 m tower at North Foreland Lighthouse. Precision core-drilling was needed through the depth of the 1 m walls (bottom left).

Publications from research

FIELDING, N., COLSTON, B. AND GOODMAND, A. (2013). Evaluating the use of agricultural moisture probes in the historic built environment. *2013 Eastern Analytical Symposium and Exposition*, Somerset, New Jersey, USA, 18-20 November 2013 (accepted).

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