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Determination, by using GPR, of the volumetric water content in structures, sub-structures, foundations and soil – ongoing activities in Working Project 2.5 of COST Action TU1208

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This work will endeavour to review the current status of research activities carried out in Working Project 2.5 “Determination, by using GPR, of the volumetric water content in structures, sub-structures, foundations and soil” within the framework of Working Group 2 “GPR surveying of pavements, bridges, tunnels and buildings; underground utility and void sensing” of the COST (European COoperation in Science and Technology) Action TU1208 “Civil Engineering Applications of Ground Penetrating Radar” (www.GPRadar.eu). Overall, the Project includes 55 Participants from over 21 countries representing 33 Institutions. By considering the type of Institution, a percentage of 64% (35 units) comes from the academic world, while Research Centres and Companies include, respectively, the 27% (15 units) and 9% (5 units) of Institutions. Geographically speaking, Europe is the continent most represented with 18 out of 21 countries, followed by Africa (2 countries) and Asia (1 country). In more details and according to the Europe sub-regions classification provided by the United Nations, Southern Europe includes 39% of countries, Western Europe 27%, while Northern and Eastern Europe are equally present with 17% of countries each.

Relying on the main purpose of Working Project 2.5, namely, the ground-penetrating radar-based evaluation of volumetric water content in structures, substructures, foundations, and soils, four main issues have been overall addressed over the first two years of activities. The first one, has been related to provide a comprehensive state of the art on the topic, due to the wide-ranging applications covered in the main disciplines of civil engineering, differently demanding. In this regard, two main publications reviewing the state of the art have been produced [1,2]. Secondly, discussions among Working Group Chairs and other Working Project Leaders have been undertaken and encouraged to avoid the risk of overlapping amongst similar topics from other Working Projects which directly could have dealt with moisture evaluation. As a result, independent and complementary targets have been singled out. To cite a few, interesting exchange of views took place in both the First and Second Action General Meetings of Rome and Vienna, respectively, in July 2013 and May 2014. In addition, a questionnaire with a relevant list of topics together with the identification of test scenarios for advanced comparison of inspection procedures have gathered invaluable information on the main expertises, fields of application, and equipments managed by the Project participants. The heterogeneous scenario outlined consequently, has indeed represented the third main issue to address. According to the Participants responses, roads were found to be the main target investigated (53%) so far, followed by soil materials (21%). In line with this, asphalt and compacted loose materials gathered the main interest among the main constituent materials with, respectively, 39% and 22%, as well as organic soils (22%). In this framework, the intermediate scale of investigation s , i.e., $0.01 \text{ m}^2 < s < 100 \text{ m}^2$, was found to be the most used for surveying. Finally, the fourth issue has been focused at avoiding the research to get blocked by ensuring a continuous updating of the latest results in moisture assessment using ground-penetrating radar achieved by Project 2.5 Participants [3-9].

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