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Comparative processing approach for a 3D Ground Penetrating Radar survey at Musmeci bridge (Potenza, Italy).

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Abstract. In the framework of an extensive experimental and numerical study, a 3D Ground Penetrating Radar (GPR) survey has been carried out in order to assess the structure of the "Ponte sul Basento" (1967-1976) in Potenza town (Basilicata Region, Southern Italy. The bridge, better known as Musmeci bridge, is a very considerable reinforced architectural concrete structure of the XX century which was designed and built by the Italian architect Sergio Musmeci (1926-1981). Moreover, the bridge represents an important flyover linking the city centre to the highway Potenza-Sicignano. Then, it crosses the Basento river and a railway very close to the main train station of the city. Recently, the bridge shows several problems related to the aging and the intensive use due to the traffic load lately grown up and water infiltration phenomena. The GPR survey has been designed in order to investigate the geometrical characteristics of the bridge deck (Gerber saddles, internal stiffening walls, pillar supports) and detect the presence of defects or damage due to water infiltrations and the traffic fatigue. Concerning this, a 900 MHz 3D GPR survey interesting a treat of a lane has been carried out on the road surface. Moreover, a second 1500 MHz 3D survey has been carried out from the bottom of bridge deck in order to focus a Gerber saddle. Subsequent processing stage has been carried out by following two strategies (Bavusi et al., 2010a; Bavusi et al., 2010). Firstly, radargrams have been treated by using a classical processing 2D and 3D procedure including: zero-time correction, remove header gains, AGC-gain, time cut, migration. Then, so processed data have been resampled and interpolated in order to built a 3D dataset whose some time/depth-slices have been extracted at proper time/depth. Then, the processing procedure has been repeated by using a Microwave (MT) inversion tomography approach as follows: pre-processing of the data, tomographic reconstruction of the 2D datasets; superimposition and interpolation of the 2D reconstructions to obtain a 3D representation (Solimene et al., 2007). Finally, a comparative interpretation of both kind of processed results and following considerations about investigated structures highlighted the structural particulars and their pathologies suggesting two processing procedures should not be considered alternative but complementary.

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