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Archaeological Geophysics in Israel: Past, Present and Future

L.V. Eppelbaum

Dept. of Geophysics and Planetary Sciences, Raymond and Beverly Sackler Faculty of Exact Sciences, Tel Aviv University, Tel Aviv, Israel (levap@post.tau.ac.il, Fax: +972 3 6409282)

Israel is a country with diverse and rapidly changeable environments where is localized a giant number of archaeological objects of various age, origin and size. The archaeological remains occur in a complex (multi-layered and variable) geological-archaeological media. It is obvious that direct archaeological excavations cannot be employed at all localized and supposed sites taking into account the financial, organizational, ecological and other reasons. Therefore, for delineation of buried archaeological objects, determination their physical-geometrical characteristics and classification, different geophysical methods are widely applied. The number of employed geophysical methodologies is constantly increasing and now Israeli territory may be considered as a peculiar polygon for various geophysical methods testing. The geophysical investigations at archaeological sites in Israel could be tentatively divided on three stages: (1) past [– 1990] (e.g., Batey, 1987; Ben-Menahem, 1979; Dolphin, 1981; Ginzburg and Levanon, 1977; Karcz et al., 1977; Karcz and Kafri, 1978; Tanzi et al., 1983; Shalem, 1949; Willis, 1928), (2) present [1991 – 2008] (e.g., Bauman et al., 2005; Ben-Dor et al., 1999; Ben-Yosef et al., 2008; Berkovitch et al., 2000; Borradaile, 2003; Boyce et al., 2004; Bruins et al., 2003; Daniels et al., 2003; Ellenblum et al., 1998; Eppelbaum, 1999, 2000a, 2000b, 2005, 2007a, 2007b, 2008b; Eppelbaum and Ben-Avraham, 2002; Eppelbaum and Itkis, 2000, 2001; 2003, 2009; Eppelbaum et al., 2000a, 2000b, 2001a, 2001b, 2003a, 2003b, 2004a, 2004b; 2005, 2006a, 2006b, 2006c, 2006d, 2007, 2009a, 2009b; Ezersky et al., 2000; Frumkin et al., 2003; Itkis and Eppelbaum, 1998; Itkis, 2003; Itkis et al., 2002, 2003, 2008; Jol et al., 2003, 2008; Kamai and Hatzor, 2007; Khesin et al., 1996; Korjenkov and Mazor, 1999; Laukin et al., 2001; McDermott et al., 1993; Marco, 2008; Marco et al., 2003; Nahas et al., 2006; Neishtadt et al., 2006; Nur and Ron, 1997; Paparo, 1991; Porat et al., 1999; Reeder et al., 2004; Reinhardt et al., 2006; Reich et al., 2003; Ron et al., 2003; Segal et al., 2003; Sternberg and Lass, 2007; Sternberg et al., 1999; Verri et al., 2004; Weiner et al., 1993; Weinstein-Evron et al., 1991, 2003; Weiss et al., 2007; Witten et al., 1994), and (3) future [2010 –]. The past stage with several archaeoseismic reviews and very limited application of geophysical methods was replaced by the present stage with the violent employment of numerous geophysical techniques (first of all, high-precise magnetic survey and GPR). It is supposed that the future stage will be characterized by extensive development of multidiscipline physical-archaeological databases (Eppelbaum et al., 2009b), utilization of supercomputers for 4D monitoring and ancient sites reconstruction (Foster et al., 2001; Pelfer et al., 2004) as well as wide application of geophysical surveys using remote operated vehicles at low altitudes (Eppelbaum, 2008a).

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