

United States  
Department of  
Agriculture

Soil  
Conservation  
Service

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Subject: Report of International Assignment;  
Israel: 16 July to 4 August 1987

Date: 31 August 1987

To: Jerry Hammond, Director  
International Activities Division  
Soil Conservation Service  
P.O. Box 2890  
Washington, D.C. 20013

Executive Summary

1. Consultant Name: James A. Doolittle
2. Country Visited: Israel
3. Dates and Duration: 16 July through 4 August 1987; 20 days
4. Host Country Cooperating Institutions:
  - A. Israel Department of Antiquities and Museums
  - B. W. F. Albright Institute of Archaeology, Jerusalem
  - C. Nelson Glueck School of Biblical Archaeology, Jerusalem
  - D. Joe Allon Center for Regional and Folklore Studies, Kibbutz Lahav.
5. U. S. Cooperating Institutions:
  - A. Cobb Institute of Archaeology
  - B. Mississippi State University
  - C. NASA/ERL
  - D. USDA-Soil Conservation Service
6. Objectives of Visit:

Research addressed the growing need for the development and refinement of effective and economical, non-destructive methods for reconnoitering large archaeological sites. The research aims were to establish "proof of concept" for the use of two types of orbital remote sensing systems: multispectral thermal infrared (TIMS) and Shuttle Imaging Radar (SIR) in archaeological site investigations. Ground-penetrating radar (GPR) would be used with scanning radiometers to provide detailed, high resolution, ground control data.

While providing ground control data for orbiting remote sensing systems, the goals of Jim Doolittle's visit with the ground-penetrating radar were (i) to provide a more thorough understanding of the archaeological site, (ii) to develop in-field excavation strategies, and (iii) to assess the the potential of GPR for broad scale reconnaissance applications.

#### 7. Summary of Activities:

The USDA-Soil Conservation Service's ground-penetrating radar was prepared for shipment by Geophysical Surveys Systems, Inc. It was shipped from Logan Airport to Ben Gurion Airport, Tel Aviv, Israel on 10 July 1987 under Carnet ATA/US/1/87-1816. Equipment was picked up on 19 July. Intensive and extensive field work was conducted at Tell Halif, Kibbutz Lahav, during the period of 19 July through 1 August 1987. Kibbutz Lahav is located near the northern fringe of the Negev Desert about 20 km north of Beersheva. Tell Halif is situated near the lower slopes of the Hebron Mountains on the higher Shefela.

Specialists from NASA/ERL were unable to participate in the scheduled field research. This was a major disappointment and place an additional burden on the GPR to meaningful and useful results. Results from the GPR field survey proved to be most beneficial to the archaeological investigations at Tell Halif. With the aid of Frank Miller, Remote Sensing Specialist, Mississippi State University, a reconnaissance technique was developed for future GPR investigations at archaeological sites. Two new study areas were established and several sites were expanded on the basis of results from the GPR field work. The GPR projected the occurrence and depths to artifacts and layers prior to excavation within two study areas. Field groups were able to excavate eight sites where the GPR had identified the locations of buried wall foundations and artifacts. At each site, artifacts were unearthed at depths and locations prescribed by the radar. A major find was a buried cistern. A three foot wide, twelve foot deep access hole led into a 30x16x16 foot buried chamber. The opening had been buried by 30 inches of soil and debris. This find attracted many archaeologists and the press to Tell Halif. All were enthusiastic about the radar performance and many projected future work with the GPR in Israel.

Prior to my departure from Israel, I had the opportunity to summarize my activities and make recommendations. Based on experiences at Lahav, I encouraged the use of GPR techniques by archaeologists within Israel. A general reconnaissance survey to determine the potential of using GPR techniques over a diverse geographic range of archaeological sites should be made in the near future. Additional GPR investigations could be contracted in the future. However, for maximum returns, archaeologists should be trained in GPR interpretations and systems made available to more sites within Israel.

Equipment was packaged and returned to Ben Gurion Airport on 2 August 1987. Although the radar arrived at Kennedy Airport in New

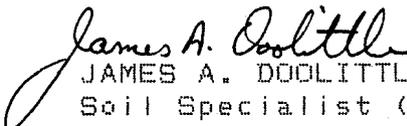
York on 6 August 1987, it did not clear customs in Philadelphia until 14 August 1987.

### 8. Benefits:

This trip provided an excellent opportunity to explore the potential of using GPR on a major archaeological site within Israel. The GPR was highly successful and all participants were impressed with the units performance. Field techniques for archaeological and site investigations were developed and improved. Further recognition of the USDA-Soil Conservation Service's leadership in the development and use of GPR was attained before an international audience. Professional papers are being prepared which will document results and observations of this field study, and further establish the leadership role of SCS in the early development of GPR technology.

Personally, this trip was most gratifying and will always be remembered. I had the opportunity to work with archaeologists from several institutions in Israel and United States. My knowledge of soils and GPR was used to solve archaeological field problems before an international audience. I have gained a lasting friendship with the participants of the Lahav Research Project.

9. Final trip report is being prepared. Report will summarize interpretations and contain a more detailed discussion of the site at Lahav and field procedures developed and used during this field study.

  
JAMES A. DOOLITTLE  
Soil Specialist (GPR)

cc:

Arthur B. Holland, Director, NENTC, SCS, Chester, PA  
Richard Arnold, Head of Soil Survey Staff, NHQ, Washington, DC