

Figure 3: Profile (344) after application (Time- Zero) filter

Then we apply (Background Removal) filter, where the use of this filter is a necessary measure to get rid of noise clips and access to the wanted signal, when you apply this filter with degree (strong), anomaly appears in this profile as shown in Figure (1-6), which can be interpreted due to the presence of metal awnings that we experienced in the course of the survey, as shown in Figure (4).



Figure 4: Shows umbrellas that cause the emergence anomalies in the profile (344)

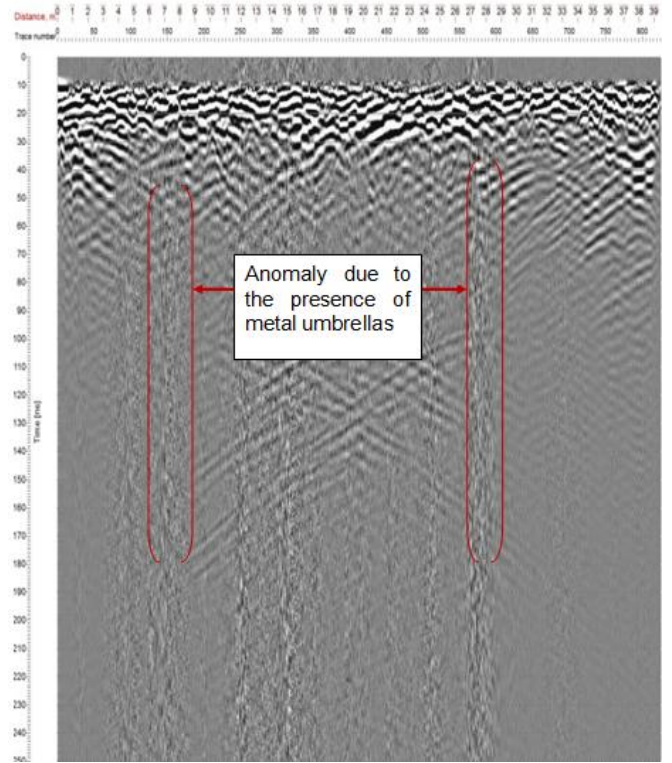


Figure 5: Shows the anomaly in profile (344) after the application (Background Removal) filter by applying (Band -pass) filter, low cut =50 MHz, low pass=100 MHz, high cut =296 MHz, high pass =588MHz the profile will be more clear for illustrations, the curve (hyperbola) data will appear in this curved (speed = 30.6 cm / ns) and dielectric constant (1), this information is especially dry sand, the Figure (6).

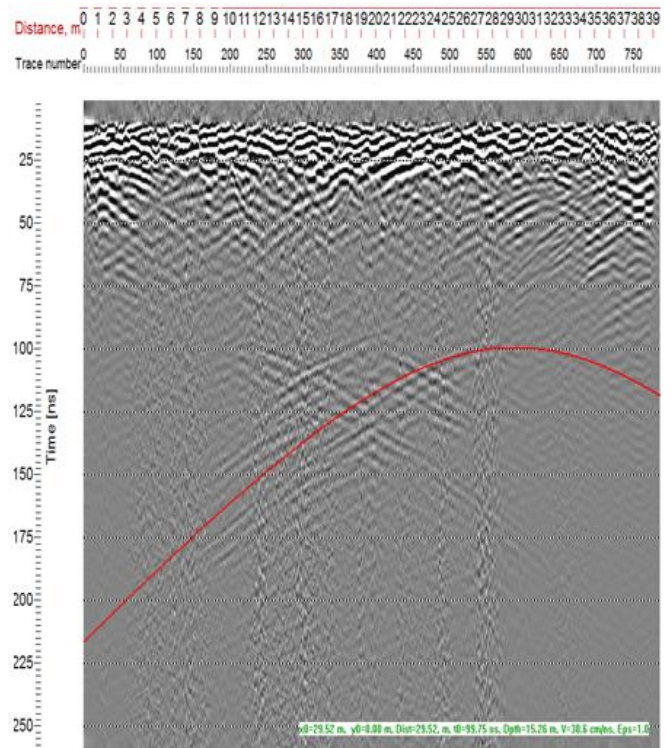


Figure 6: Profile (344) after applying Band -pass filter

References

- [1] Daniels. J. J. Surface Penetrating Radar. Radar sonar navigation and avionics series, The Institution of Electrical Engineers, London, UK, 1996.
- [2] Buan S. T. TEM horn antennas for landmine detection applications. Thesis report, Queensland University, May 2002
- [3] Benson R. C., Glaccum, R. A., and Noel M. R. Geophysical techniques for sensing buried wastes and waste migration. National water Well Association., 1983.<http://www.hanford.gov/dqo/project/level5/burwm/burwm.pdf>.
- [4] Imse, J.P. and. Levine, E.N. Conventional and state-of-the-art geophysical techniques for fracture detection. Proceedings Second Annual Eastern Groundwater Conference, pages 261–278, 1985..
- [5] Wright D.L., Olhoeft G.R., and Watts R.D. Ground-penetrating radar studies on Cape Cod, in conference on surface and borehole geophysical methods in ground water investigations. Proceedings: U.S. Environmental Protection Agency and National Water Well Association, San Antonio, TX, , pages 666–680, 1984.
- [6] Pradip, K. M., Three-dimensional Borehole Radar Imaging. PhD thesis, University of Cape Town, Department of Electrical Engineering, 2005.
- [7] Annan A. P., and Cosway S. W, 1992, “Simplified GPR beam model for survey design”, Society of Exploration Geophysicists, New Orleans, USA..
- [8] Chen, J., 2001, “Bayesian Approaches for subsurface characterization using Hydro geological and Geophysical Data”. Ph.D. Thesis Engineering. Civil and Environmental Engineering. University of California, Berkeley.
- [9] Daniels, J.J., 2000, “Ground Penetrating Radar Fundamentals”, published report, Department of Geological sciences, Ohio State University, Region V, pp:1-21.
- [10] Environmental Protection Agency. Ground Penetrating Radar. (http://www.epa.gov/region5superfound/sfd_fss/htm/gpr.htm0)
- [11] Davis, J.L, Annan, A.P., 1989, “Ground penetrating radar for high- resolution mapping of soil and rock stratigraphy”. Geophysical prospecting. Vol. 37, pp. 531-551