SIMPLE DUAL-FREQUENCY GPR DATA BLENDING: EXPERIMENTS AND CONSIDERATIONS TO AID IN DUAL-FREUENCY DATA INTERPRETATION

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Dual frequency ground penetrating radar (GPR) systems have become commonplace in single-channel GPR deployments across applications in engineering and environmental geophysics. The benefit of both high and low frequency data collected along a single profile provides expanded resolution and ability to interpret the shallow subsurface from a single instrument pass. However, dual-frequency systems generally provide two separate frequency datasets upon export and thus typically require separate but coincident interpretation. Quantitative merging of dual frequency GPR has been a subject of research and experiment for the last 5-10 years, with a variety of methods applied to the problem, including machine learning, frequency domain summation, as well as more straightforward signal summation, among others. The benefit of dual (or multi) frequency merging of GPR data is generally expanded bandwidth, and therefore increased resolution, of individual GPR profiles. However, an additional benefit in dual –frequency merging is the reduction in data dimensionality and increased efficiency of site interpretation. This presentation describes a simple time-domain approach to dual –frequency GPR data blending and explores the applicability of dual-frequency blending as an interpretation tool in production geophysics. For example, in areas where signal penetration of the higher frequency component of a dual-frequency system is equitable to the lower frequency components, dual-frequency fusion may be of limited value. Conversely, in areas where penetration depth of individual frequency components is variable along a profile, dual-frequency blending can provide insights not readily interpretable from each frequency component alone. Beyond the utility of merging separate radargrams into a single channel, blended data can provide insights into the multiscale nature of subsurface features.