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薄覆盖层地区隐伏断层及其上断点探测的地震方法技术——以废黄河断层为例

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Seismic exploration methods for buried faults and its up-breakpoint in thin sediment areas—An example of the Feihuanghe fault

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摘要

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摘要

通过在同一条测线上应用三种不同地震勘探手段(共偏移距地震反射法、横波反射法与高分辨率折射法)联合反演的方法,获得了测线控制地段内废黄河断层的确切位置、上断点埋深以及速度分布图像.探测结果表明:在薄覆盖层地区的断裂调查中,上述三种技术手段的联合反演要比单独使用其中任何一种手段更加可靠,并能从不同角度查明断层的位置、性质及其特征,为钻孔联合剖面位置的布设和钻孔深度的设计提供地震学依据.经高精度钻孔联合地质剖面证实,三种地震勘探方法反演得到的主要地层界面和构造特征都与钻孔联合地质剖面吻合较好.试验表明了上述三种地震勘探方法在基岩面埋深较浅地区联合反演的可行性以及地震勘探与钻孔联合地质剖面相结合的工作方法的有效性.

关键词 薄覆盖层地区, 隐伏断层, 共偏移距地震反射勘探, 横波反射勘探, 高分辨率折射勘探, 联合反演, 钻孔联合地质剖面

Abstract:

We have obtained the exact location and depth of up-breakpoint and velocity distribution image of the Feihuanghe fault in the line control by joint inversion of seismic exploration methods(common offset seismic reflection, shear wave reflection and high-resolution refraction)on the same line. The results indicate that in fault investigations for thin Quaternary sediments, the joint inversion of the above three technical methods is not only more reliable than using any one of them alone to identify the location, nature and characteristics of faults by different means, but also provides seismological evidence for the position layout of composite drilling sections and the depth designing of drilling. According to the confirmation of high-precision composite drilling geological sections, the main stratigraphic interfaces and tectonic features obtained from the three kinds of seismic exploration methods are quite consistent with the results from the composite drilling geological section. The experimental results show the feasibility of the joint inversion of the above three kinds of seismic exploration methods in thin Quaternary sediments and the efficiency of the combination of seismic exploration and composite drilling geological profiles.

Keywords Thin sediment area, Buried fault, Common offset seismic reflection exploration, Shear wave reflection exploration, High-resolution refraction exploration, Composite drilling geological section, Joint inversion

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